

LOGLAN 1: A LOGICAL LANGUAGE

Revised Fourth Edition

by
James Cooke Brown

THE LOGLAN INSTITUTE, INC.
c/o Jennifer Brown
1701 N.E. 75 St.
Gainesville, FL 32641

HTML Edition
prepared by
James Jennings

1999

PDF Edition
compiled by
Cecil T. Sims

2008

Downloading the PDF Edition of this book, and making one paper copy of it for your personal use, may be done without payment to The Institute, and while such individual copies may be loaned without charge to other readers, no such copies, nor portions thereof made on any medium shall be used for any commercial purpose whatever without the express written permission of the copyright owner, The Loglan Institute, Inc.

As of this writing, the 1989 Fourth Edition is still in print for those who prefer a bound book.

Copyright Page From the 4th Paper Edition

To the memory of
BENJAMIN LEE WHORF
1897-1941

Copyright © 1966, 1969, 1975, 1989
by The Loglan Institute, Inc.
All Rights Reserved

The word 'Loglan'® is a registered trademark of The Loglan Institute, Inc., and may not be used on packaging or descriptions of products offered for sale unless a license for such use has been granted the vendor by The Loglan Institute. Such licenses will not normally be denied vendors who agree to use authentic Loglan in their products.

Library of Congress Cataloging-in-Publication Data

Brown, James Cooke, 1921-
Loglan 1: A logical language
Fourth edition.

Bibliography: p.

1. Loglan (Artificial language) I. Loglan Institute. II Title.

PM8590.B7 1989 499'.99 89-7968

ISBN 1-877665-00-Z

Printed in the U.S.A.
BookCrafters - Fredericksburg
Virginia

PREFACE TO THE FOURTH EDITION

This edition is double the size of the Third Edition and reflects the re-engineering of Loglan that took place between 1975 and 1989, a research program participated in by the hundreds of active loglanists who assembled around the language after the 1975 publications. Part of the increase in size of this new edition is due to the fact that it has some 60 pages of word-lists, while the Third Edition had but a single glossary of 16 pages. The reason for the inclusion of these new and bulkier word-lists is that this edition, unlike its predecessor, must stand alone. The 1975 edition was accompanied by the then-freshly revised Second Edition of our dictionaries, *Loglan 4 & 5*, also published in 1975. But in the last half dozen years the Loglan word-makers have been very active. Since 1975 the lexicon of Loglan has more than doubled in size. In particular, it has grown from around 4,000 terms then to more than 9,000 terms, and at present rates of growth there could well be 12,000 terms in our dictionary files by the time the Third Edition of our dictionary is ready to be printed. While all these new lexical materials are safely stored on The Institute's computers, where they may be--and often are--augmented, The Institute does not yet have the editorial staff to build a bilingual dictionary which is three or even two times the size of our present one. Dictionary-work is by far the most labor-intensive, and therefore the most costly, work we do. It is hoped that with the publication of this Fourth Edition we will grow sufficiently both in numbers and in revenues in the next few years to make the expansion and publication of a new bilingual dictionary of 10,000 or 15,000 Loglan terms the next large project of The Loglan Institute.

In the meantime, *Loglan 1* must, as I say, stand alone. It must not only serve the user as a resource book on the grammar, morphology, and usages of the new language, but also as a tool with which to update and freely add to the old dictionary. By including complete lists of primitives and affixes in this volume, I have tried to make it possible for the buyer of this book who also owns a copy of the 1975 dictionary to update the latter on demand. For example, suppose such a user were to look up the 1975 word for 'understand'. He or she would find the so-called "complex" word **sadja** with **sanpa djano** ("sign-know") listed as its "deriving metaphor". The user could safely assume that the metaphor was still valid. So using Appendix B of this volume, the user would find that **saa-** and **-dja** were among the new affixes of **sanpa** and **djano**, and they could then be confidently combined to produce the new Loglan word for 'understand', namely **saadid** (pronounced "sah-AHD-ja"). Moreover, by following the rules given in this book, all users will arrive at this result.

The language has grown in all its other departments as well. Usages in particular have multiplied. Loglan morphology, too, is now better understood; and so its exposition has grown. Above all, Loglan grammar is now a much more flexible Instrument than it was in 1975 as well as a completely conflict-free one; so there are now many more ways of using it. As a consequence of these additions to the language, nearly all the chapters of the Third Edition have had to be considerably expanded. The only exceptions are the Foreword, which though supplemented with a new historical addendum has been otherwise left intact, and Chapter 7, which is entirely new. In the latter I discuss for the first time publically a detailed program for testing the Sapir-Whorf hypothesis with Loglan. This project may still be some years away. But

it may well be time for the present generation of loglanists to prepare themselves for their crucial roles in it.

J.C.B
Gainesville
April, 1989

PREFACE TO THE THIRD EDITION

This work is a revision and abridgement of the Second Edition published on microfilm in 1969 (University Microfilms Catalogue No. S-398, Ann Arbor, Michigan). Virtually no grammatical changes have taken place in the language since that date but a system of "implicit quantification" has been introduced with the object of making certain logically complex expressions speakable, and these have occasioned certain minor changes in the usage-patterns of the language. The new usages will be found in Section 3.16 in Chapter 3 (4.16 in the earlier edition), Sections 4.21 and 4.24 (formerly 5.21 and 5.24), Sections 5.9, 5.11, 5.16-18 and 5.22 (6.9, 6.11, 6.16-18 and 6.21), and Section 5.21 is new. As the preparation of this edition was undertaken after the 1972-74 revision of the dictionary had been completed, Chapter 6 on Words and Growth has been almost entirely rewritten to accommodate the new lexical materials; in particular, Sections 6.2-4 are new. Chapter 7 of the Second Edition on Uses and Prospects has been eliminated in this edition both for reasons of space and because some of those prospects have been realized. For example, it is now clear that Loglan is a speakable language. It is therefore reasonable to hope that the publication of this Third Edition together with a newly augmented edition of the dictionary (*Loglan 4 & 5*) will make possible the experimental work for which the language was originally designed. Those wishing to participate in this work may communicate with the Institute through either of the addresses given on the title page.

J. C. B.
Ibiza
April, 1975

PREFACE TO THE SECOND EDITION

Substantial portions of this work have been published in a First Edition issued by the Loglan Institute in 1966. The present work is a revision and augmentation of that earlier one. In particular, the Foreword, Chapters 1 and 2, and Sections 4.7, 5.12, 5.23-24, 6.18 and the Notes are new; Chapter 3 has been omitted; and Sections 5.10, 5.18, 5.21-22 (5.17, 5.20-21 in the earlier edition), 6.8, 6.16-17, 6.19 and 6.21 (6.18 and 6.20) have been substantially revised. Except for the systematic distinction now drawn between the "afterthought" and "forethought" modes of connection, the structure of the language is essentially unchanged.

J. C. B.
Gainesville
March, 1969

PREFACE TO THE FIRST (PREPRINT) EDITION

This edition of some several hundred copies is meant to be distributed to several kinds of readers: (1) those who have corresponded with me about Loglan over the years since the publication of the *Scientific American* article in 1960; (2) those among the readers of several journals who have responded with interest to a recent announcement of the project; and (3) a handful of scholars whom I have expressly invited to examine one feature or another of Loglan in advance of publication. Our motives in preparing such a prepublication edition are threefold:

First, Loglan purports to be a logical language. We should like to give logicians an opportunity to inform us where, and in what respects, Loglan as it stands is not. Then, in consequence of the revision that will be enabled by their criticism, the published version of the language will have a better chance of fulfilling this broad claim.

Second, this book in particular purports to be a popular introduction to Loglan, meant to engage a substantial proportion of its readers in such further study as may lead, in some of them at least, to active mastery of the language. Languages, however, are more than commonly complex affairs. One does not succeed in writing simply about a complex thing solely by deciding to do so. Again, I should like to be told where I have failed.

Third, interest in Loglan among academics--once very lively--has all but died. Six years of silence after the publication of a set of prolegomena does not fit the temper of the times. I frankly hope in this semi-private publication to stir that interest up again. For without academic support the publication of the other Loglan manuscripts--and there are several--is likely to be delayed for some time.

Over the years since the publication of those prolegomena several thousand pages of manuscript have been prepared. There are two dictionaries (English-Loglan and Loglan-English, the first with 12,000, the second with 3000 entries); there is a programmed textbook equivalent to about a semester of college work; and there is a major portion of a technical treatise on the linguistic aspects of the subject in addition to the computer programs and working papers not primarily meant for publication. To a serious student of the language none of these books will be worth much without the others.

Moreover all of them have waited for a suitable introduction, which it has been my purpose in the present volume to provide.

Of all the academic interests that bear on Loglan it is the linguistic interest that is least well-served by the present book. Linguistical matters--being in the main descriptions of the unconscious features of the language act--are far more difficult to deal with popularly than logical ones. Everyone knows at least a little about how he thinks; hardly anyone knows anything about how he talks. Because this book will, in published form, be addressed primarily to the general reader, I have therefore sidestepped linguistic issues wherever I could, planning to treat

the most important of them in appendices in subsequent editions of the work.¹ This has meant ignoring the concerns of the linguist almost entirely in this book, especially as in this preprint edition it is virtually stripped of appendices. But the linguist will take some comfort I hope in knowing that another volume in this series is addressed exclusively to him.²

In short, there are two kinds of questions one can ask about Loglan. The first is, Is it a language? The second is, Is it a logical language? This book deals only with the second question; for it takes an affirmative answer to the first for granted. Yet the first contains the germ of a very interesting scientific question: Can a language of any kind be built? I hope this brief foreword will apprise the scientific reader that I am not unalert to the importance of this question. But it turns out that one cannot describe a language attractively to its eventual speakers by dwelling on the question of whether they exist.

J. C. B.
Paris
March, 1966

1 The appendices growing out of my correspondence over the First Edition became a second book, *Loglan 2: Methods of Consttuction* originally published on microfilm (Brown (1969a) but later published serially in the first and second volumes of *The Loglanist*, 1976-78.

2 *Loglan 2*, but now not quite "exclusively", as aspects of Loglan of interest to computer scientists are also discussed in this book.

PRONUNCIATION GUIDES

Vowels

a	1. as in E. 'father' (Anglo-German dialects)	[ah]
	2. as S. 'casa', F. 'la', and E. 'palm'	[aa]
e	1. before vowels, 'eigh' as in 'eight'	[eigh]
	2. elsewhere, as in 'met'	[e] or [eh]
i	1. before vowels, 'y' as in 'yet'	[y]
	2. elsewhere, as 'ee' in 'feet'	[ee]
o	1. before /r/ or /i/, 'aw' as in 'law'	[aw]
	2. elsewhere, as in 'note'	[oh]
u	1. before vowels, 'w' as in 'wee'	[w]
	2. elsewhere, as 'oo' in 'boot'	[oo]
w	as 'u' in F. 'plus' and as 'ü' in G. 'Mühle'	[eu]
y	as 'u' in 'up' and 'a' in 'about'	[uh]

Diphthongs

ai	as 'igh' in 'sigh'	[igh]
ao	as 'ow' in 'cow' and 'ough' in 'bough'	[ow] or [ough]
ei	as 'ay' in 'day'	[ay] or [eight-ee]
oi	as 'oy' in 'boy'	[oy]

Consonants

b	as in 'boy'	[b]
c	as 'sh' in 'shy'	[sh]
d	as in 'dog'	[d]
f	as in 'fog'	[f]
g	as in 'get'	[g]
h	as in 'hut'	[h]
j	as 's' in 'measure' 'z' in 'azure', and 'J' in F. 'Jean'	[zh]
k	as in 'kin'	[k]
l	1. as in 'let'	[l]
	2. as in 'bottle' when vocalic	[ll]
m	1. as in 'met'	[m]
	2. as in 'rhythm' when vocalic	[mm]
n	1. before /k/ or /g/, as 'ng' in 'sing'	[ng]
	2. elsewhere as in 'net'	[n]
	3. as 'en' in 'listen' when vocalic	[nn]
p	as in 'pet'	[p]
q	as 'th' in 'thin'	[th]
r	1. as in 'rat'	[r]
	2. as 'er' in 'father' when vocalic	[rr]
s	as in 'sat'	[s] or [ss]
t	as in 'tin'	[t]
v	as in 'vet'	[v]
x	as 'ch' in G. 'Bach'	[kh]
z	as in 'zinc'	[z]

FOREWORD

At the beginning of Christmas Holidays, 1955, I sat down before a bright fire to commence what I hoped would be a short paper on the possibility of testing the social psychological implications of the Sapir-Whorf hypothesis. I meant to proceed by showing that the construction of a tiny model language, with a grammar borrowed from the rules of modern logic, taught to subjects of different nationalities in a laboratory setting under conditions of control, would permit a decisive test. I have been writing appendices for that paper ever since. I believed, once or twice, that I had glimpsed the end of it; but I cannot yet be certain.

This book is one of those appendices. It is a first installment on what I think I have seen in the intriguing prospect which has opened up for me by working with the Whorf hypothesis. It is also an effort to put the structural matter of a not-so-tiny--and still incomplete--artificial language into the hands of those who will, if it really is a language, find that out for me by speaking it.

The book is also faintly impolite. If it were polite, it would have to bow itself out of existence. For its humblest thesis is a challenge to the scientific authority of those who believe that human languages cannot be constructed. But I tender this challenge with the expectation of the imminent arrival of a strong ally. In science, at least, the final judgement of what is and what is not impossible belongs to Nature not to man.

The book is also impolite in what I hope will be found a more agreeable sense in that it makes free use for experimental purposes of results which were in the first place purely formal. I allude, of course, to the use I have made of the formal inventions of logicians, not all of whom will appreciate the lowly forms I have bent them toward in the interests of speakability. Still, I take it to be one of the prices of publication that one occasionally finds one's work borrowed for unexpected applications. I hope Loglan will not be found so counterindicated by the logical fraternity that they will make no similar trespass on my own.

Among the scholars whose work I have freely borrowed, and on whose insights nearly all that is good in Loglan probably depends, I must mention my indebtedness to the late Hans Reichenbach. His analysis of token-reflexive words in particular, and of conversational forms in general, has become part of the structure of Loglan. I must acknowledge also my profound debt to Rudolf Carnap, on whom I, like everyone, depend for his conceptions of object language and metalanguage, and for his formulation of the concept of the semantical field. Besides, it was Carnap's view of the possibility of logical languages in the first place which almost certainly shaped my own. From the pragmatist tradition in philosophy I have derived the chief grounding of my theory of Loglan semantics, especially from the early, seminal work of Charles Morris on the general theory of signs. In particular, I feel that my view of predication and designation, as complementary halves of the language act, is as implicit in his work as it is certainly central to mine.

Finally, among philosophers and logicians I must mention Willard van Ormand Quine. Quine's work, more than any other, presented both confirmation and challenge to me. The publication of *Word and Object* in 1960 was an epochal event in the development of Loglan. Page after page

seemed to have been designed to provoke, counsel and console anyone who would build a logical language which was at the same time to be ontologically sound. Most of his insights, happily, were confirmatory; others were easily incorporated into what had been the structure of Loglan. A few remained linguistically indigestible, but these evoked, by opposition, some of the more novel ontological features of the language. Let me mention only one: my treatment of indirect discourse as the designation of an event abstraction. This insight, if it is one, was forced on me by my inability to render speakable the more intricate ontological solution of Quine.

Among the older generation of linguists I owe a very special debt to the late Otto Jespersen. It was his *Analytic Syntax* which provided the first testing ground of my thesis that a human grammar could be written in the predicate calculus. In a similar way the work of Zellig Harris provided me, as everyone, with the descriptive machinery which was to serve as a test of the structural completeness of the language. Finally, the design of Loglan phonology owes much to the distinctive features analysis of Roman Jakobson.

Among [later] linguists I owe a quite particular debt to Victor Yngve, whose formulation of the depth hypothesis, and whose consequent view of the constraints placed on grammar by the speech generating process, have informed nearly all my own efforts to make Loglan speakable. I owe a similar debt to Noam Chomsky, whose views of the relationship between rules of grammar and the grammatical domain provided the theoretical focus of my work on ambiguity. Finally, I should mention the practical relevance to Loglan of the work of Anthony G. Oettinger and Susumu Kuno on the machine analysis of ambiguity. Unfortunately, the publication of their work in 1963 was just too late for Loglan. In September of that year I had completed my own search for ambiguity in the language by cruder means and was turning to other things. To have done it over again by their more powerful methods would have delayed the publication of the language by at least two more years. I decided not to do it. At the time it was my hope that an ambiguity analysis of Loglan by their methods would one day be performed. [Loglan grammar was in fact finally disambiguated in 1982 by the even more powerful methods of Aho, Johnson and Ullman (1975).]

Everyone who writes on matters semantical in English is beholden to the early work of C. K. Ogden and I. A. Richards. Moreover, in the patient inquiries of Ogden and his colleagues into the idiom structure of English, I found one of the cornerstones on which to rest the structure of primitives in Loglan. In a similar way, Helen Eaton's 1940 list of the most frequently used concepts in the four major European languages (excluding Russian) was of inestimable value in testing the adequacy of the Loglan list of primitives for the semantics of those languages.

No one who works with elements as varied, or lists as long, as those that make up a language can afford to work alone. The assistance I required in the first five years of my work with Loglan was paid for by my paternal connection with a certain board game called *Careers*; and to my publishers, Parkers Brothers of Salem, Mass., and the youngsters who played that game during this, and a later, period I and Loglan owe a not inconsiderable debt. But by 1960 not even *Careers* could support our increasingly Augean labors; and I turned to more usual sources of academic finance. Much in this connection is owed to the then-editors of the *Scientific American*. Their willingness to publish the prolegomena of Loglan in that year secured that critical degree

of publicity without which nothing fiscal is possible in our civilization, and with which, perhaps, very nearly anything is.

But it is to the then-reigning board of social science advisers to the U.S. Department of Health, Education and Welfare that Loglan owes its most direct financial debt. Without the generous assistance provided by the Department through its Institutes of Health (specifically, Mental; Grant Number M-4980) neither the dictionary-building nor the computer studies of Loglan could have been contemplated. Even after the expiration of that early grant, however, computing time was generously made available to me by the computing centers at both the University of Florida at Gainesville and Florida State University at Tallahassee through their on-going support by the National Science Foundation. To the lenient wisdom of these two national organizations, and to the directors and steering committees of these two regional centers, I would like to express my sincere appreciation for the opportunity they gave me for dialogue with the machine. For many years it was my only informant on matters loglandic, and it is the most articulate speaker of the language yet.

Many human individuals have also worked for and with me on Loglan. The list of those who have worked in either formal or informal capacities on the project includes Monte R. Blair, Mrs. Patricia Carmony, Mrs. Jean Chalmers, P. H. Coates, Peter Drummond, H. Greisdorf, Ted R. Keiser, Mrs. Mary E. Kimmel, Ida Larsen, Catherine A. Loveland, Morgan MacLachlan, P. H. Monet, Mrs. Carol S. Morrison, Harrison Murphy, Ardesch Narain, Arthur E. Nudleman, P. Sanchez, Mrs. Caroline Smith, Mrs. Margaret Sung, J. Stefnastoti, Mrs. Wilda Szeremi, Mrs. Christine S. Tennant, Robert L. Tennant and John W. Warne. I wish also to thank the handful of scholars who have read this or earlier drafts of the MS, or who have in other ways lent me their professional criticism and advice. Among them are Mr. Julian Granberry, Prof. Thomas A. E. Hart, Prof. Charles Morris, Dr. F. Rand Morton, Dr. James Oliver, Mr. Mortimer Shagrin and Dr. Benjamin Wyckoff.

Among those who read the preprint edition of this book were many who found the time to help me locate its errors or realize its many opportunities for improvement. I feel especially indebted to H. D. Baecker, T. M. Bloomfield, G. Peter Esainko, Eric Martz, Howard Reep, Perry Smith, W. A. Verloren van Themaat, Viryl V. Vary, and James F. Wirth for their very extensive comment; the book is a good deal better than it would have been without their comments.

I also wish to take this opportunity to thank the many students who have helped me to understand the language by attempting to learn it at various stages of its development, particularly as this often involved the peculiar pain of submitting to imperfect teaching programs. It is from these cheerful subjects that we have gathered whatever we now know of the phonology of the language, as well as whatever insights we now have into how to teach it.

Finally, I wish above all to acknowledge the ten years' collaboration of my [then] wife, Lujoye Fuller Brown, often amounting to coauthorship, and the unstinting labors of Mr. and Mrs. Ted Keiser, our colleagues in the Institute, who among many other services to Loglan shouldered in our absence the job of publishing and distributing the 1966 edition of this book.

A word about footnotes. I have banished most technical discussion and all polemics to the notes and have collected these at the end of each chapter. My purpose is to permit the non-technical reader an untrammelled swing through the book. I trust that the technical reader will not mind piecing out the scientific argument behind the various moves I have made by consulting these notes. He will find that some of them constitute short essays on a moot point. Some moot points, however, require longer essays; and these, while occasionally referred to in this book, have been reserved for the second volume in this series, *Loglan 2*.

J. C. B.
Gainesville
March 1969

Except for its bracketed portions, the foregoing essay was written twenty years ago when the Loglan Project was fourteen years old. Now, in 1989, in its thirty-fourth year, Loglan is ready to "go public" again for the third and, I trust, final time.

The first time Loglan left my laboratory was in 1960 with the publication of the *Scientific American* (SA) article "Loglan" in June of that year. That article, as many older readers will remember, drew an unprecedentedly voluminous response from the international scientific public, and no doubt led to the funding of my early work by The National Institutes of Health (NIH) in 1961-62. Being funded permitted me to make the first formal studies of Loglan grammar on computers. These were still new to university campuses but marvelously apt for grammatical work. The NIH grant also underwrote the first teaching programs and made possible the extension of the Loglan vocabulary beyond the first few thousand words. Grammatical work was my chief occupation during this period, however, and making the language as accommodating of natural forms as it could be made and remain unambiguous was my chief goal. These studies lasted through 1964. Their completion led to the first book on the language, *Loglan: A Logical Language*, published in 1966. This book--actually a "preprint edition" through which I sought criticism for my methods--later became *Loglan 1*. A few years later the first dictionaries of the language, *Loglan 4 and Loglan 5*, were ready for release. These, together with the second edition of *Loglan 1* and a book on methods of construction, *Loglan 2*, as well as a programmed textbook, *Loglan 3*, were all published on microfilm in 1969. This body of early work was intended mainly for the friends of the project that had been made by the SA article in 1960.

Loglan left my workshop for a second time in 1975. Private funding had made possible a further expansion of the dictionaries in 1973-74, and a second edition of *Loglan 4 & 5*, together with a third of *Loglan 1*, were published. In both hardback and paperback editions in December of that year. The response of the scientific and computing communities to the 1975 publications was again very gratifying; the first printing of 3,000 copies of *Loglan 1* was soon sold out. We could have sold many more, and would have done so had we known that we were to continue to support ourselves. But The Loglan Institute had just been incorporated as a non-profit research institute so as to permit it to receive public grants; and we decided not to reprint. We expected to be funded; and by 1977 we were learning, through the active use of the language by the new community of loglanists¹ which the 1975 books had brought to life, that the language still

required some final truing in the engineering laboratory if it were to be as good as it could be as a releaser of Whorfian effects.

Alas, we were not funded. To everyone's surprise the National Science Foundation (NSF) turned down the multidisciplinary research proposal which we submitted to it in 1977, one that proposed that we prepare the language for, and then conduct, an experimental test of the Sapir-Whorf hypothesis among second-language learners, a plan that had been subscribed to by a group of ten supporting scholars. These had come to us from the full spectrum of related fields: logic, linguistics, anthropology, psychology, and computer science; and among them were some of the most respected workers in their fields. Yet NSF declined to support this effort...primarily, we discovered, because Loglan had not pleased the one linguist on its review panel. The other reviewers were delighted with our plans to attempt an experimental test of the Whorf hypothesis and gave our proposal the highest possible marks. But because the Loglan Project was so ineluctably interdisciplinary, a work which crossed the boundaries of many fields, we were obliged to please all its judges; and in this we failed.

Clearly it was back to the test-bench whether funded or not. Once discovered, the structural defects we were finding in the 1975 language, however minor, obviously had to be repaired before I could turn the language over to its ultimate users. So in 1978 The Institute embarked on my several engineering projects anyway, knowing that with only individually donated money and part-time volunteers to help me, the work would proceed at a much slower pace than I had planned. Ten years later I can say with some confidence that we have accomplished everything we set out to do and possibly just a bit more. Loglan is now ready to be used: both experimentally, in a test of the Whorf hypothesis, and as a machine-man interface by the computing world. It may also find its uses as a translation medium for the international dissemination of scientific text; but that may still be some years away.

Old friends of the project will wish to know how the language has changed since 1975. Even more urgently, friends from earlier years will want to know whether Loglan turned out to be speakable or not, that is, whether it is a human language or just another writable code. The answer to the second question is yes. Through an apprenticeship program launched by The Loglan Institute in 1977, in which live-in apprentices learned the language directly from me (and I from them!), I am happy to report that sustained daily Loglan-only conversations lasting three-quarters of an hour or more were achieved with three out of four apprentices within thirty days, usually within twenty. For some years I hadn't known whether the object I had created was a language or not. But in 1977, I learned that it was; it flew.

As for whether and how much the 1975 language has changed, buyers of the 1975 books will be happy to learn that while several peripheral features of Loglan have grown remarkably in the past fourteen years, the core of the language has not changed. Having just revised it, I am happy to report that nearly all the differences between the 3rd and 4th editions of this book have been additive. So nearly everything old readers learned about the 1975 language will still apply. There will, however, be much in the fine grain of the current language that the watchful reader will find interestingly different, and some that is altogether new.

The additions made since 1975 have been of three distinct kinds:

First, many new usages have been invented. By a usage I mean an habitual way of using a language which people employ in recurrent situations. Thus, 'Good morning!' is a usage; so is 'Fire!' In 1975 there were only a few usages, mostly greetings and farewells. The reason was simple. Except for one small group of learner/users--the group that assembled at my Gainesville lake house in 1972 (the first "Loglan Sogrun")--the language had not been socially used. Buyers of the 1975 books, however, began to use the language in a wide variety of exploratory ways including social ones. In 1976 a journal called *The Loglanist* was established. Here, dozens of new words and usages were proposed by these explorers every year, nearly all of them becoming part of the language. Unfortunately this process dribbled to a near-halt in 1982. This happened primarily because my engineering interventions were temporarily dismantling the language. Still, much had been accomplished. As a consequence of the inventive ferment of 1976-82, the usage patterns of the 1989 language are incomparably richer than those of 1975.

Second, many additional word-forms have been added to Loglan morphology. (The morphology of any language specifies its word-forms and gives the rules by which new words may be added. [Chapter 2](#), Words and Word-Forms, describes the current morphology of Loglan.) The morphology of 1975 Loglan was starkly simple; there were only a few sorts of Loglan words, and adding a new word meant fitting it into a simple, uniform formula. Charming as this simplicity was, however, it had three defects. The first was that the shortest complex words looked like simple words; the 1975 morphology could not distinguish them. The second was that while longer complex words were always recognizable as such, they could not always be deciphered. Finally, the 1975 method of incorporating loan- words was unacceptably Procrustean. Perhaps the reader remembers Procrustes? He was the innkeeper of antiquity whose beds were all of the same size. When a guest came along who was too long to fit a bed, Procrustes chopped him off; when a guest was too short, Procrustes stretched him out. The 1975 borrowing forms were like that. They did semantic violence to the source words. Indeed, they were so Procrustean that a good imitation of a source word was difficult to find.

After several years of studying the "undecipherable affixes" problem, and testing various trial solutions against one another, I settled on a set of regular word-parts (affixes) out of which all complex words could be built. This also solved the "false simples" problem since, when made up of these standard parts, even the shortest complex word could not imitate a simple one. The parts supplied are, of course, routinely decipherable. So loglanists now have a way of introducing new complex words into the language that ensures that they will always be identifiable as such and also be immediately decipherable.

As for making borrowing more flexible, Loglan loan-words are now a residual category: a loan is whatever is not something else. Loans no longer have to fit any particular formula. They may be of any length or shape that does not accidentally imitate some other kind of word, or string of words, that may occur legitimately in the language. For example, **protoni** cannot be any other kind of word or string of words. Therefore it is a loan-word, and its source is obvious. Neither can **iglu** nor **bakteriorodopsini**, and these are also transparent imitations of their sources. Thus Loglan loan-words may now be infinitely varied. So good imitations of the international vocabularies of science and travel are easier to achieve.

Among the minor morphological problems that were also solved was the "packing" problem. Some clusters of 1975 words were so closely packed together into the word-space that under noisy conditions they could easily be mistaken for one another. (Technically speaking, the language was not redundant enough.) "Unpacking" them meant increasing their phonological distance from one another. For example, in the old lexicon, **kanti** meant 'bill' or 'account' while **kante** meant the 'number' or 'numerical count' of something; and the two words differed only in their unstressed vowels. To "unpack" them, **kante** has been remade as **konte**, and **kanti** has been retained; but the two concepts now differ in two phonological particulars. They have thus been moved farther apart in the word-space. Only slightly more than 100 primitive words have been unpacked in this way, but this has substantially increased the redundancy of the language...something that more than one linguist had warned us we must do.

A third kind of addition made since 1975 was to the grammar. Loglan grammar is now demonstrably unambiguous. The grammar of the 1975 language was not ambiguous in any known way, of course; but there were undoubtedly several unknown ways in which it was ambiguous since, at the time it was built, no algorithm existed by which syntactic ambiguity in a human language could be exhaustively detected. In 1975, however--which was the same year in which our own two books were published--a trio of mathematicians at Bell Laboratories, Alfred V. Aho, Stephen C. Johnson, and Jeffrey D. Ullman, announced their discovery (Aho, Johnson and Ullman 1975) of a constructive-proof algorithm that was capable of demonstrating that a given grammar of a certain formal type--one of interest to computer science for designing programming languages--was unambiguous if it happened to be; and if the given grammar was ambiguous, then the same algorithm was capable of locating all the sources of ambiguity in it. This powerful tool--augmented by some formal constructions of our own for dealing with the grammar of a speakable language--enabled us to write an unambiguous grammar for Loglan by 1982.

The "machine grammar" project, as we called it--or sometimes simply "MacGram"--was perhaps the most scientifically interesting engineering project of the 1978-88 period. Many of our new loglanists were programmers or computer scientists. One of their interests in Loglan, it turned out, was that it seemed to them to be a promising candidate for the "interface language" between humans and their machines that such workers were then and are apparently still looking for. (There is more on this topic in [Chapter 1, Sec. 1.5](#).) But it was quickly pointed out by these new partisans of the project that unless Loglan grammar was *demonstrably* unambiguous, the language would be useless as an interface. Besides, syntactical non-ambiguity had an important Whorfian function as well, one that had long been recognized: it would make implausible ideas speakable and hence examinable. Since many important ideas are at first sight implausible, a grammar that would permit them to be uniquely spoken would be just one more step toward liberating the language-bound human mind...if, indeed, the human mind *is* language-bound as Whorf and Sapir suggest. Accordingly, it was in the service of both releasing Whorfian effects and preparing Loglan for its potential interface function that the Aho-Johnson- Ullman theorem was used to stabilize this important property of the language.

Loglan was first shown to be syntactically unambiguous in February 1982. There is still, of course, some ambiguity left in the language, namely the kind by which an old meaning of a word may be extended metaphorically to convey a new one. Indeed, there must be exactly this kind of

metaphorical ambiguity in any language if its lexicon is to grow. But since 1982, every well-formed Loglan utterance has had one and only one *grammatical* interpretation. Moreover, in the seven years since 1982, Loglan grammar has been kept demonstrably unambiguous more or less continuously, despite a series of significant expansions in its grammatical domain. In short, the language has grown. More things are sayable in it than have ever been sayable before. But its grammar has stayed unambiguous. The techniques for maintaining unambiguous languages in unambiguous states are now well-understood. Therefore there is every reason to believe that Loglan will remain unambiguous for as long as we wish it to be.

Curiously enough, the disambiguation of Loglan grammar has not altered it in any essential way. Instead, and true to the general pattern of change through augmentation that has characterized the development of the language throughout the last fourteen years, all that has visibly happened to the grammar of the language is that a number of new punctuation words and linkage patterns have been added. These allow the speaker who wishes to speak intricately and yet clearly to use the spoken punctuation marks and linking words of Loglan to maintain the structural clarity of even very complex speech. Essentially, this is all that has been added. So the principal learning task of the returning loglanist will be to add these new punctuating and linking schemata to the kit of old grammatical forms which he or she already knows.

Beyond these three kinds of structural additions to the language, there has been a considerable expansion of the lexicon. Once the principles of making borrowings flexible and complex words both recognizable and decipherable had been established, the way was clear to expand the lexicon in two quite different directions: one, toward increasing the richness of ordinary speech and writing by the spontaneous addition of new complexes, and two, by demonstrating that Loglan can incorporate the lexical precision of modern science and technology simply by borrowing the already existing international vocabulary of science.

Summing up, there have been six kinds of growth in Loglan since 1975: (1) The body of tested usages has grown from near-zero to a substantial and still-growing list of standard communication forms. Some of these amount to the solutions of interesting philosophical problems. How does one say 'X is two-legged' in a logical language? Once solved, the solutions to such problems are available to other speakers at no analytic cost. (I have acknowledged the authors of such solutions in the end-of-chapter notes.) (2) All complex predicates are now decipherable. So new ones may be added *ad libitum* in full confidence that one's auditors or readers will be able to perceive one's poetic intent. (3) Borrowing has also become flexible, with the result that words like **iglu** and **bakteriorodopsini** may be added to the language virtually at will. Indeed, the international vocabularies of science, travel, and gastronomy seem in principle to have been already incorporated into Loglan. (5) Loglan utterances are now demonstrably unambiguous. This means that the man-machine interface potentialities of Loglan, which have always existed in principle, are now ready to be exploited in practice. Finally (6) by using the new word-making facilities, the Loglan lexicon is now ready to be expanded into any size we wish it to be.

The scholarly debt I have accumulated since 1969 is smaller than the one I owed in 1969, if only because, in the last ten years, the project has moved out of the design phase into the engineering phase of human linguistics; and little if anything was known about deliberately building selected properties into human languages before we began this work. Our profoundest debt for this period of our work is, of course, to Alfred V. Aho, Stephen C. Johnson, and Jeffrey D. Ullman (1975) for their discovery of a constructive-proof algorithm for testing ambiguity in LALR(1)-type grammars. We are also indebted to Stephen C. Johnson (1975) for his implementation of this algorithm in an automatic parser generator called YACC (Yet Another Compiler-Compiler), a property of Bell Laboratories. YACC was the centerpiece of our own grammar-building tool, which we called LYCES (Loglan Yaccing & Corpus-Eating System; Brown 1982).

My debt to my fellow unpaid workers for The Loglan Institute, and to the members of The Institute who, through gifts and dues, have funded my occasional research assistants, is both collectively incalculable and immense. Given the failure of The Institute to win academic funding for our work, I would be at it still were it not for these open purses and helping hands. In particular, my warmest thanks go to William E. Dorion, Robert J. Hampton, Michael E. Pique, and Nora Tansky, whose uncommon acts of financial generosity have amounted over the years to small grants in aid of research.

In that same connection, thanks go again to my publisher, Parker Brothers, and to the several generations of children who played my game Careers over the past thirty-odd years. The Careers-income provided a steady subsidy of Loglan research for as long as Careers stayed on the market, as it did from 1956 through 1982. Uncomplainingly, one might say, this most simple-minded of my intellectual children has supported its higher-browed but slower-maturing (and commercially less sprightly) siblings.

My thanks also go to the handful of scholars who co-signed with me, or in some other way publically supported our 1977 research proposal to the U.S. National Science Foundation (NSF). These include Profs. John R. Atkins, Charles J. Barton, John B. Carroll, John H. Chalmers Jr., Carol M. Eastman, William R. Edwards Jr., John M. Jacobsen, John Parks-Clifford, and Willard Van Orman Quine, as well as Ms. Elizabeth A. Edwards, Dr. Rudolf W. Meijer, and Mr. Charles Nieukerke.

My thanks as well go to all the helping hands, paid and unpaid, who have worked for me and Loglan over the years. I list them here in the rough chronological order of the events in which they participated or of the projects on which they worked. (My apologies to those whose names I've missed. If told of omissions, I will be pleased to correct them in future printings of this book.)

Earliest, then, were the members of the Loglan Sogrun which formed in the Spring of 1972: Vivian Adkins, James A. Bush, Rush Elkins, J. Michael Gilmer, Tad Hanna, Carolyn Marshall, Michael Pique, Stephen Simmons, Frances Stein and G. Thomas Wells. Together we had the first experience of using the language as an instrument of everyday life.

To the team of four then-young linguists--Donald Albury, Fillmore Clark, James Flege and Barbara Smith--who helped me expand the 1969 dictionary into the 1975 one in 1973-74, my

grateful thanks for a massive job well-done. Also, thanks go to Gustavo Arcia, Hsuan Fuang, Drs. V. Gusew and K. Naribaev, and to Luke Yu who, as native speakers of languages other than English, consulted with me on the 1975 dictionary project. Also, I want to express my indebtedness to Marie Fugate for key-punching the 50,000 cards from which the 1975 dictionary was printed, and to Philip Schwartz who helped me program it and put it all on tape. Thanks also go to Eugene Garelick, Tad Hanna, and Carolyn Marshall for their work in correcting the 1969 dictionary and readying it for the 1973-74 editorial team.

My special thanks go to my four apprentices of the period 1977-78. These four not only helped me make the to me epochal discovery that Loglan was speakable, but helped me understand its problems. They were Robert K. Jenner, Patrick Mears, Scott W. Layson, and John Parks-Clifford. It was with these speakers that the first sustained Loglan-only dialogue was experienced.

Thanks as well as admiration for the job he did go yet again to John Parks-Clifford, who served as Editor of *The Loglanist* from 1976 through 1983; pc, as he was known, served also as the guide and counselor of the throng of explorers whose reports filled its pages. Somehow he found the time in a busy teaching schedule to marshal, order, and periodically adjudicate the results of their often boisterous efforts.

I am of course also grateful to the explorers themselves, the contributors to *The Loglanist* during the Years of Invention (1976-81): John R. Atkins, Charles J. Barton, Samuel Bassett, C. R. Berman Jr., David M. Bowen, Douglas Brown, Jeffrey R. Brown, James F. Carter, John H. Chalmers Jr., David Chapman, Stephen Chapman, Robert J. Chassell, Martin Clay, Thomas A. Crispen, Richard C. Darwin, Daniel Dassew, Robert D. Davidson, Paul Dickson, Christopher Dollin, Colin Fine, Jerome Frazee, William Freiday, Asha Goldberg, Henry A. Grady Jr., Donald Graham, Douglas Hainline, Dean Hickerson, Charles Hixson, G. Huyck, Robert K. Jenner, James Jennings, Ronald W. Johnson, Mel E. Kanner, Richard Kennaway, Thomas Kent, George Kirk, Andrew Koenig, David Kreig, Mathew A. Kupstas, Douglas Landauer, Neil Langley, Ida M. Larsen, Scott W. Layson, Robert Levin, Eric Leventhal, Sheldon Linker, Douglas Loss, Anthony S. Lovatt, Bruce J. MacLennan, Klim Maling, Rex F. May, Robert A. McIvor, William Mengarini, Rudolf W. Meijer, Mark Mickelson, David Milton, Richard Morin, Malcolm Mumme, Michael Oliver, Ross R. W. Parlette, David Platt, Jeffrey S. Prothero, Arthur Protin Jr., Keith Ramsay, Richard Rosenberger, John Schilke, James R. Spriggs, Guy L. Steele Jr., Nora Tansky, Rick Thomas, David Tomlin, R. W. Toy, Marianne Turlington, A. R. Walker, Birrell Walsh, Robert L. Williamson, Steve Witham and Keith Wright. In one way or another nearly all their contributions have become part of the language.

I wish also to thank my co-workers on the MacGram Project (1977-82): Scott W. Layson, who helped me finish it, Douglas Landauer, who helped test the early grammars, Sheldon Linker, who got us started, Robert A. McIvor, who served as tool-maker, and Jeffrey S. Prothero, who labored through the middle watches. An allied project was the task of writing up, and coming to understand, our results. In this we were ably helped by David S. Cortesi, Christopher C. Handley and Richard Kennaway.

I wish to acknowledge here the expert assistance I received throughout the morphological engineering project of 1978-83--once called the Great Morphological Revolution, or GMR--from Robert A. McIvor again. In the course of his long association with The Institute RAM has worked on nearly all its projects. None of them would be so far advanced without him.

A large contribution was also made to the GMR project by the many loglanists who served as subjects in its numerous "taste tests". There are too many of these volunteer subjects to list here. But what we know about the morphophonemics of Loglan we largely learned from them.

In 1983 a test of the new morphology was undertaken that involved making several thousand new Loglan metaphors, and that project is still going on. We called it the Eaton Interface after the name of the scholar (Helen S. Eaton) whose (1940) work we used to guide it. I wish to acknowledge the contribution of these Eaton workers to the new lexicon, and especially that of their indefatigable chairperson, Faith Rich. At various times her fellow workers on the interface have been: Charles J. Barton, Thomas Birchmire, David M. Bowen, Jennifer F. Brown, Kieran Carroll, James F. Carter, Kenneth Dickey, Colin Fine, Jerome Frazee, William Gustafson, Ronald W. Johnson, Richard Kennaway, Robert A. McIvor, Michael E. Parish, John Parks-Clifford, Michael E. Pique, Edward Prentice, Nora Tansky, Jeffrey L. Taylor and Birrell Walsh.

I wish also to acknowledge the creative efforts of those who, at various times, have written computer software for The Institute: Glen B. Haydon, Mel E. Kanner, Richard Kennaway, Scott W. Layson, and Robert A. McIvor.

In recent years a number of experts have served as judges on our Science Words Project (1985-88): Dr. Soni Anderson Barker, Kieran Carroll, William Greenwood, Dr. Glen B. Haydon, Dr. Robert A. McIvor and Lawrence Proksch. Not experts in science but in Loglan morphology, Jennifer F. Brown, Paloma Ibanez and Faith Rich have joined them in this work. I thank them all for sharing their insights into the borrowing process with me.

From its inauguration in 1980 until the present, The Institute's newsletter, *Lognet*, has had a quartet of editors or editor-pairs: Edward and Julia Prentice, Robert J. Chassell, John Lees, and Michael E. Parish. The Loglan community is in their debt for yet another unpaid service.

At another level of service, I wish to acknowledge the gifts of time, concern, wisdom and, above all, patience that those who have served as officers, directors and/or trustees of The Loglan Institute have, in various mixes, bestowed on me and it through the years: Jennifer F. Brown, Jean M. Chalmers, Robert J. Chassell, Herschel Elliott, William Greenwood, Glen B. Haydon, Ted and Joy Keiser, Ida M. Larsen, John Lees, Robert A. McIvor, John Parks-Clifford, Nora Tansky, and Larry G. Turner.

To The Institute's procession of secretary/typists over the past fourteen years, who include Barbara Ghosn, Elissa Goforth, Cindi Hardesty, Mary Landauer, Donna Kiefel, Barbara Scanlan, and Adele Sheets, I wish to express my appreciation for the intelligence and skill that each has brought to this typographically demanding project.

I wish also to express my deep gratitude to the many scholarly readers who took time out of busy lives to read one or more chapters of this Fourth Edition in manuscript. The expert advice I've received from this multidisciplinary panel of readers--coming as they do from linguistics, medicine, psycholinguistics, anthropology, philosophy, chemistry, computer science and the international language movement--has not only helped me find the errors in this multidisciplinary work, but also to see the work as a whole in an interdisciplinary perspective. These readers were Prof. John R. Atkins (anthropology), Prof. John B. Carroll (Whorf's editor and a psycholinguist), Prof. Carol M. Eastman (linguistics), Dr. William R. Edwards Jr. (computer science), Prof. Herschel Elliott (logic and philosophy), Dr. Glen B Haydon (medicine), Mr. Mel E. Kanner (computer science), Dr. Robert A. McIvor (chemistry), Mrs. Faith Rich (international languages), Prof. P. David Seaman (linguistics), and Dr. Guy L. Steele Jr. (computer science). I wish also to thank At. Elizabeth Alexander James, a professional writer, for her very useful comments on problems of style in a work of this sort. Ms. James has come to represent for me that most courageous of all readers, the general one.

Finally, I wish to acknowledge the special contribution made by my two research assistants of the last few years, Paloma Ibanez and my daughter, Jennifer Fuller Brown. Both have brought uncommon deftness to everything they touched. I wish also to acknowledge the wide-ranging contributions of my wife, Dr. Evelyn R. Anderson. She has not only served as the on-board critic of my writing and helped push the production of the book through its many stages, she has also been the principal preparer of the input for our new teaching programs. Once again I am obliged to Dr. Robert A. McIvor, this time in his role as Loglan's Chief Grammarian, for standing by to help me solve the many grammatical problems that have arisen during this last year of our work together.

Loglan has indeed become a work of many hands.

J. C. B. Gainesville
March 1989

1 In my English idiolect, as in Loglan and French, words like 'loglanist', 'loglandic' and 'loglandical' are general terms like 'cat' and 'dog' (i.e., common nouns or adjectives) and therefore uncapitalized, whereas words like 'Loglan' and 'Loglandia' are singular terms (words with single designata, like 'John' or 'Greenland') and therefore capitalized. Both Loglan and French are more fastidious about such logical matters than Standard English is.

Chapter I

INTRODUCTION

1.1 The Scientific Strategy

Loglan is a language which was originally devised to test the Sapir-Whorf hypothesis that the structure of language determines the boundaries of human thought. An important implication of this hypothesis is that the widely differing structures of individual human languages must therefore set very different formal limits on the historical potentials of the various human cultures that are, in a sense, contained in them. Glimpses of these limits were seen in the data of comparative linguistics by Edward Sapir in the 1920's, and a hypothesis which explained their structural origin was proposed by Benjamin Lee Whorf in the 1930's.¹ By the early 1950's, the many detailed implications of their theory of linguistic relativity had begun to occupy the attention not only of other linguists,² but of psychologists and sociologists as well.

During the 1950's a good deal of cross-cultural experimental work was done on the psychological fringes of the hypothesis, and while many of the results were corroborative, not all of them were, and of course none were decisive.³ The Whorfian phenomenon, if indeed it existed, was apparently so deeply imbedded in the reality-shaping mechanisms of both language and culture that there seemed to be no way of disengaging it for a decisive test. What was wanted, if this important idea was not gradually to be surrendered as essentially untestable, was a device capable of separating the presumed linguistic cause from the predicted cultural effect. But in nature such uncontaminated devices do not exist.

Work on Loglan began in 1955. As a sociologist with a background in both social psychology and philosophy, my own interest in the Sapir-Whorf hypothesis centered around the symbolic mechanisms--the logics, metaphysics and epistemics--by which human individuals contrive both their self-images and their world-views. An important theory of the symbolic process as it eventuates in selves and world-views had been proposed by the American philosopher George Herbert Mead (1934); but Mead's work was uninformed by comparative linguistics. Clearly if these symbolic mechanisms differed among languages as much as Sapir and Whorf thought they did, then the worlds and selves of persons living in different cultures ought also to differ systematically.

But these matters differ systematically anyway, and which difference is due to what cause is nearly impossible to say. For it is nearly impossible to distinguish observationally between the structural effects of the primary language spoken by a people and the content of the culture about which and within which they speak it. Bilingualism offers some opportunity for disentangling these effects. But true bilinguals are rare; their cultural biographies are usually wonderfully idiosyncratic and hence incomparable; and there is a disconcerting sense in which the bilingual has escaped the Whorfian predicament anyway. To unravel the purely linguistic effects of given

languages on human thinking from the effects of the general cultural milieu in which thinking takes place seemed, therefore, to require an experimental approach. In particular, it seemed to require the deliberate introduction of a reasonably culture-free second language with known formal properties into a laboratory-like setting in which its effects on the behavior we call thinking could be precisely gauged.

But how does one import anything as massive as a human language into the laboratory? Well, how does one experiment with lightning? The first thing you do is reduce its scale. You try to reduce this magnificent natural phenomenon to a manageable spark.

But could the size of a human language be significantly reduced without destroying its essential character? Most of the linguists I read and talked to thought not; but one could not know the answer to this important question beforehand. All one could do was try. Then, if the contrived phenomenon, the manageable linguistic spark, behaved in every relevant way like a human language--that is, if people could actually speak it, think in it, generate and transform ideas in it--it was just possible that its manipulation under conditions of control would permit us to make certain limited inferences about the natural phenomenon itself. In particular, not only the Sapir-Whorf hypothesis, but many other questions about the three-way interaction between languages, cultures, and human mental processes seemed amenable to this kind of small-scale, linguistic experimentation.⁴

In 1955 there was no experimental linguistics. But the then very rapid development of theoretical and mathematical linguistics seemed to be transcending the earlier descriptive stage of that science, and hence to offer clear if tentative guidelines for the construction of just such a culture-free language as my strategy required. A number of essential features of linguistic structure had recently come to light, or were strongly suspected; the major components of the language mechanism had been identified; and except for the semantic levels of linguistic structure--then defying exact analysis as they still are⁵--the interactions between the lower levels of the rule structure were rapidly being reduced to exact, mathematical descriptions. Guided by these descriptions it should be possible, it seemed to me, to construct a system which, while distinctly smaller than a human language, bore all those other features of the natural objects which were then thought to be essential.

But if the constructed language were to serve as a laboratory instrument--something to "release", as it were, or at least increase the probability of observing, Whorfian effects--it would obviously not do to imitate any natural language or group of languages too closely. What was wanted, apart from smallness, was not a typical human language, but a severely atypical one. For if the Whorfian effects of second-language⁶ learning turned out to be elusive--and compared to those of primary language learning, which we had decided were impossible to isolate, we could certainly expect them to be minor--they would probably not be revealed in a single culture in a single try. In fact, we could probably expect the complete pattern of any given second language's Whorfian effects to emerge only against the background of many primary cultures, and perhaps only then after many tries. Thus a language constructed to release measurable Whorfian effects when learned as a second language should offer fairly large structural contrasts with all the first languages that might be involved. Since any natural language might eventually be involved, what was required was a diminutive but nevertheless genuine human language which was easily

learned by adults and which differed from all natural languages in some scientifically interesting way. In short, some decisive and probably functional difference between the constructed language and at least a wide range of natural languages would have to be found.

The most promising way to create such a difference, it seemed to me, was to exaggerate some natural function of human language, that is, to increase the functional adequacy of some complex of linguistic structures in a way that would have a strong independent likelihood of enhancing the measurable performance of its learners on some specified set of tasks. Besides, in its original formulation the Whorf hypothesis is a negative one: language *limits* thought.⁷ One way of disclosing such phenomena is to take the suspected limits off, more precisely, to push them outward in some direction in which removing limits would have predictable effects. So it was settled. The diminutive language should also be a functionally extreme one in some known or presumable way: an extremely poetic one, say, or an extremely efficient one, or extremely logical.

Now there is very little scientific knowledge about the literary functions of language, and while a lot is known about efficient codes, it is hard to relate this property to Whorfian effects. Enhancing and clarifying the logical structures of the diminutive language, however, seemed to answer all the requirements of the project. There is a very considerable body of knowledge about the formal properties of logical systems; and a hyperlogical linguistic structure should have a clear and interesting Whorfian effect if it had any: namely the facilitation of certain identifiable kinds of thought. Not only that, but a language which only faintly promised such a mind-enhancing effect would almost certainly prove attractive to a large body of potential learners, namely students. Thus the idea of Loglan as a hyperlogical or thought-facilitating language had a very natural birth.

Or rather, rebirth. For the dream of a logical language is, of course, a very old one...at least as old as Leibniz and probably much older. Some efforts had indeed been made in the pre-scientific era of language study to construct such a language.⁸ But like nearly all such early essays in language-building--coming, as they did, before the huge, unconscious mass of the language structure was known, or even suspected--these efforts too had failed. Then too in 1955 the philosophical as well as the linguistic stage seemed to be set for taking up this age-old human project once again. Logicians had made great strides in the analysis of a wide variety of scientific and mathematical forms of thought,⁹ and at least one school of analytic philosophers, the so-called "ordinary language" school, had made the analysis of conversational forms the focus of a very considerable philosophic effort.¹⁰ Thus the art as well as the science of language analysis had, in the preceding decades, developed in a way that seemed to lead quite naturally to the resumption of the logical language project.

1.2 Loglan as a Logical Language

The name 'Loglan' was derived before the language itself was built, from the two English words 'logical' and 'language'. But the claim invested in this metaphor is in fact narrower than the wide word 'logical' suggests. Loglan is logical only in the sense of purporting to facilitate certain limited kinds of thought: namely those kinds which proceed by the transformation of sentences into other sentences in such a way that if the first are true so also are the second. We might also

expect it to minimize, or help prevent, the errors that are usually made in performing such deductive operations. But these are fairly modest senses of the word 'logical'. We might have meant to convey by it the much stronger claim that Loglan is a deductive system, in the sense that geometry and formal logic are. To support such a claim we would have had to show that Loglan had a set of elementary notions and elementary operations from which all its complex notions and complex operations had been rigorously derived. But we do not make this claim. Derivation in Loglan, as in the natural tongues, is by metaphor, not by formal definition. In fact we take the familiar mechanism by which new meanings are spontaneously created by a speaker or writer combining old words in new ways to be one of the essential properties of human language, and hence one which we must not remove if Loglan is to be a veridical member of its genus. For surely one of the most striking behavioral distinctions between using a language and using a deductive system is that the speaker of a language is at liberty to extend its semantic field by instant metaphor in any direction that he chooses. This is a move that is denied the geometer and the logician, as they well know. The users of deductive systems must introduce new terms by formal definition or not at all. Clearly, Loglan could not be logical in this or any other sense which deprived its speakers of the essential moves of speech.

There are other senses of the English word 'logical' in which Loglan isn't. It is not, for example, wholly consistent; nor could it be and remain optimally logical in the transformational sense implied. Loglan is more consistent than most languages. But though it is a small language, it is a large system; and large systems, like large minds, tend to be intolerant of consistency. Neither is it "reasonable" nor "self-evident." Like the meanings of the simplest words in all spoken tongues, the basic meanings of Loglan are essentially arbitrary. Learning them must be undertaken in the spirit of boundless innocence with which one approaches any foreign tongue. Yet the reader will find, I think, that the narrow transformational mode in which Loglan *is* logical is, in the end, a very rich one, and one that richly distinguishes it from all the natural tongues with which he may be familiar. For the selection pressure on the evolution of all surviving languages has almost undoubtedly been greatest in the nursery and the marketplace, not the study, and certainly not in that all-too-recent habitat of some of them, the scientific laboratory. So in selecting these relatively new functions of language for optimization--new, that is, in the long time-scale of language evolution--we have perhaps overstepped the bounds of nature. Yet it is precisely this that we intend. For by making Loglan an extreme instance of the genus Language--by extending it along a single dimension of language structure as far as it would go and still be speakable--we have given ourselves a far better chance of observing the Whorfian phenomenon than if we had contented ourselves with a culture-free imitation of some average human tongue.

So let us be clear about our scientific strategy. By making Loglan hyperlogical we have intended to maximize, or at least greatly increase, the probability of observing the Whorfian effect. We are in pursuit of a simple existential: Does the phenomenon exist? Then, if it does exist, there are many more subtle things we might wish to do with it, or about it.

Building these logical structures into Loglan has been less demanding linguistically than most linguists I have talked to have supposed. The list of transformation structures I have taken to be necessary, if perhaps not quite sufficient, for these purposes is a short one. It includes speakable provisions for (i) the propositional calculus, including the unique determination of connective scope; (ii) the apparatus of quantification theory, including a clear distinction between bound and

unbound variables; (iii) clear distinctions between all known modes of designation and description; and last, and most tellingly, perhaps, (iv) a word-classification scheme that (a) allows all claims to be expressed in the predicate calculus and (b) treats all predicates indiscriminately except as they are distinguished by the number of their places. This means that Loglan has no nouns, verbs, adverbs or adjectives in any ordinary sense, but only predicates and multi-place ones as required. Now this, among all the ploys adopted by logicians, is perhaps the most far-reaching in its implications for language structure. I suspect it will turn out also to be the most troubling, and yet ultimately the most freeing, feature of Loglan grammar for the English-thinking mind. It is also what makes Loglan processable by machines.

The logically-trained reader will have observed that this list of essential transformation structures is not only a short one, but far less ambitious than it might have been. There is no notational provision in Loglan, for example, for a theory of types...or for any other scheme for removing the paradoxes to which the absence of a hierarchical notation quickly leads. Moreover, the notational provisions for a class calculus are rudimentary. So Loglan in its present form is less than an ideal vehicle for "speaking symbolic logic." Perhaps it could have been made to approach that ideal more closely; I do not know. Perhaps it will in time be brought closer to that ideal by the inventions of its users. But the maximization of Loglan's logicity, in my view, has not been nearly as important in the early days of the language as the retention of the essential ways of speech. By providing this elementary logical machinery in a form which, because it is speakable, may be directly accessible to the human mind, I have hoped to show that *some* behavioral consequences of a thought-facilitating kind ensue. Certainly the effect produced will not be the greatest that could in principle be achieved, if Whorf is right, by a language that was even more hyperlogical than Loglan. But these simple transformation structures may be enough to cast the Whorfian links between linguistic structure and the mental life into clear relief. And that is certainly enough for a first step.

1.3 Loglan as a Laboratory Instrument

Apart from the thought-facilitating functions of Loglan, the language is also meant to be a manageable laboratory instrument: teachable, measurable, controllable; its structure transparently observable both at the moment of introduction into any experiment and in continuous change. Loglan has a number of properties which bear on this complex instrumental function, but chief among them is the matter of scale.

Did we succeed in making Loglan small enough to be "a manageable linguistic spark?" I confess I do not yet know the answer...even after thirty years. But Loglan does seem to be easily learned,¹¹ and on every formal parameter it is agreeably small. The number of its grammar rules is an order of magnitude less than has come to be expected of natural grammars from recent work. Fewer than 200 two- to five-term rules are required to define its domain of permissible utterances; and this contrasts very favorably with the three- to six-thousand rule partial grammars that have been written in machine-translation work with languages like English and German.¹² Moreover, the number of its elementary predicates is small: 800-odd as compared to an uncountably larger number for English, although perhaps not so small as Chinese, which is said to Construct its complex predicates from an even smaller list of radicals. The number of structure words in Loglan is also reasonably small: about 120 monosyllabic morphs and their

compounds suffice for all the grammatical and logical work of the language. The number of "lexemes" or word classes is about half of what is expected in a natural language: less than 70 as compared with 133 in an early grammar of English.¹³ Its phonology is also at the small end of the human range: 27 phonemes as compared to the 45 found by a conservative count in English. So on comparative grounds Loglan Would seem to be manageably small. While the size of a language is not the only factor that determines the speed with which it is learned, it is undoubtedly an important one; and all my early teaching trials have suggested that Loglan is indeed very rapidly learned.

Another feature of the language that reflects its intended use as a laboratory instrument is its cultural neutrality. Partly this has been achieved by what we have come to call its "metaphysical parsimony," or the fact that its grammar presupposes a reasonably small set of assumptions about the world perhaps the smallest possible set, on our present understanding of language structure. This feature also supports the thought-facilitating functions of the language in some obvious, and in some not so obvious, ways. But its original purpose was to guarantee the metaphysical¹⁴ neutrality of the language for speakers of widely different native tongues. Thus any speaker, from any culture, should find it possible to regularly express in Loglan what *he* takes for granted about the world; and he will be able to do this without imposing--or what is perhaps more to the point, without being able to impose--these assumptions on his auditor. Thus, Loglan has many optional grammatical arrangements, but very few obligatory ones. There is no obligatory tense system, for example, as there is in English, nor is there an obligatory gender system as there is in most European tongues, nor is there an obligatory epistemic inflection of the verb as in Hopi. But both tense and epistemic operations exist as optional "inflections" of the Loglan "verb."

Still another element of Loglan's cultural neutrality reflects its intended use in cross-cultural experiments and possibly also as a medium of international translation. To this end I have tried to make the sounds of the basic words of the language equitably familiar to persons of very different language backgrounds. Its sounds and word-roots, for example, have been drawn with strict impartiality from the eight most widely spoken tongues. Of these eight, three are Oriental: Hindi, Japanese and the Mandarin dialect of Chinese. The other five are more likely to be familiar to readers of this book: English, Spanish, Russian, French and German. In this phonological sense Loglan is ready to be used as a "world language;" speakers of these eight languages comprise well over three-quarters of the present population of the earth. What is more germane, native speakers of any of these eight source languages will be able to hear many clues to meaning in Loglan speech. So cross-cultural comparisons of the results of learning Loglan as a second language will be possible across a broad range of native languages.

To maximize the total amount of phonological familiarity to be found in Loglan required that we use a composite system of vocabulary derivation for its "primitive" words. (By 'primitive' I mean words which are used within a language to derive its complex terms and are not themselves internally derived.¹⁵) For example, the Loglan word for 'blue' is **blanu**. And **blanu** is derived partly from Chinese 'lan', partly from English 'blue', French 'bleu' and German 'blau', and more remotely from Hindi 'nila', Spanish 'azul' and Russian 'galuboi'. Only Japanese, among the eight source languages, has no phonetic affinities with this particular Loglan word. Not all words incorporate so much familiarity, of course. But our word-building procedures have roughly maximized the total amount of it to be found in the language.¹⁶

A fourth instrumental property of Loglan bears on a functional relationship between languages that I hesitatingly call accommodation. We want the language to be small; yet we also want it to be very large. We want it to be large in the specific semantic sense of accommodating all that we might wish to say in it, either in response to urgencies developed within the language or because of those prior semantic urgencies that originate in the fact that we already speak other languages. We want, in short, to be able to speak Loglan not only like a Loglander, but also like a Trobriander or an Englishman, a Frenchman or a Chinese. This is a large order, and I am perfectly certain that I have not satisfied it. Yet the very effort to satisfy such a grand criterion has proved rewarding. More than any other functional property of the language, the installation of this one, even incompletely, has involved years of work. And the work *is* incomplete. It is on this point more than any other that I expect to be informed by the publication of even a fourth edition of this volume of the extent to which the grammar of Loglan does *not* permit the expression of meanings to which its speakers find themselves driven...whether, as I say, because of impulses generated within the language or from semantical needs coming from outside.

Yet the remarkable fact is that a very large amount of accommodation has already been built into the language without expanding its grammatical structure to those massive proportions to which linguists have accustomed us with their studies of natural grammars. One way of putting this is that the domain of permissible Loglan sentences is very large...so large, in fact, that English, say--or rather that subset of Loglan sentences which can be put into one-one, or more likely, many-one semantic correspondence with English sentences (for English is ambiguous)--fits into a very small corner of it. Yet the rules that define that vast domain are not numerous; not nearly as numerous as the rules of English are. If I am right in this observation--and of course I may not be, for Loglan may not turn out to accommodate the semantical field of English nearly as well as I think it does--then the possibility exists that for some important reason the grammars of the natural languages are far larger than they need to be. Far larger, for example, than is grammatically required to express the semantical field which they in fact engage.¹⁷

The last formal property of Loglan I wish to mention is its freedom from syntactic ambiguity. I originally conceived this property as an obvious essential for a maximally transformable tongue...obvious, because transformations proceed in one direction from one interpretation of an ambiguous sentence, and often in a quite different direction from another. Moreover, we manage to steer around the very considerable ambiguity of the natural tongues by entertaining only the most plausible interpretations of the sentences we hear. Consequently most natural thinking follows plausibility routes. But this is unfortunate. One wants to be able to think implausibly and yet clearly; for many important arguments have absurd conclusions. Unfortunately it is quite difficult to think nonsensically in an ambiguous language. Whence comes not only the logician's enforcement of all rules of clarity but also his strange love of nonsense, a love which more "natural" minds feel verges on the bizarre...as, for example, in the jabberwocky world of Lewis Carroll.¹⁸

Loglan's freedom from ambiguity has one surprising and possibly dysfunctional correlate. It was once feared that the helpless clarity of its sentences might prove a chilling feature of the language to its poets. One literary scholar (William Empson 1930) had shown that English poets, anyway, appear to use the rich fund of syntactic ambiguity in that language for poetic purposes. Thus if an English poet can contrive a line that says forty things, and each of these forty things

suits her poetic purpose in some way, then she has accomplished at one stroke what a more humdrum writer might take yards to say. And then not say it. So grammatical clarity may therefore unfit Loglan for poetry just as it fits it for thoughtful discourse. Yet nonsense, too, furnishes literary delight; and an unambiguous language makes absurdities clearly sayable. In addition, for a basic structural reason we have not discussed yet, metaphor-making in Loglan is remarkably facile. The net result of these pluses and minuses on the Loglandic poetic act is not known yet. We have had some poets, but not enough yet. Again, as scientists, we have an interesting set of possible outcomes to observe.¹⁹

In sum, and as far as its intentional properties are concerned, Loglan is (1) formally small, almost certainly smaller than any natural language; (2) transformation-facilitating, and in that sense logical; (3) maximally recognizable over a very broad population base, and in that sense impartial; (4) metaphysically parsimonious and hence culturally neutral; (5) largely but probably still imperfectly accommodating of at least some natural tongues; and (6) syntactically unambiguous. What all this may mean in the laboratory is, as yet, anybody's guess. But my own sense is that we have, for the first time, a small-scale model of a human language that may be worth experimenting with.

1.4 Loglan in the Artificial Intelligence Laboratory

The kind of laboratory for which Loglan was originally designed is the social psychological laboratory. What social psychologists normally investigate experimentally are the effects on individual psychology, including thinking, of social experiences, often contrived ones. How Loglan might be used in such a setting to study the Whorfian effects, if any, of second-language learning, is a complex matter that deserves and gets a separate chapter in this book, namely [Chapter 7](#). But there are now other kinds of scientific laboratories in which Loglan might prove useful. One of them is the artificial intelligence laboratory. Let us consider briefly how Loglan might be used there.

Artificial intelligence (AI) workers have applied computer-modeling techniques to a broad range of intelligent performances, i.e., those that apparently involve a considerable amount of internal processing before some relatively simple but highly flexible output is produced...for example, a chess move. These phenomena now include the diagnosis of diseases, the generation and proving of logic theorems, the playing of games like chess and backgammon, and some apparently automatic behaviors which, like human pattern-recognition, also appear to involve intelligent processes. We may expect in time that the AI technique will be applied to itself, i.e., to that intelligent process of which the output is a computer program; see [Section 1.5](#) on the machine-man interface below.

In all AI studies the principal tool is a computer program. The investigator's goal is to write a program that will cause a computer to produce outputs--medical diagnoses, moves in chess, proofs of theorems, discovered patterns--that imitate with reasonable fidelity the performances of some intelligent organism given the same inputs, usually man. The most commonly accepted rules of AI research are (1) that the inputs given the computer be strict analogs of the inputs received by the performing organism, insofar as this is known, and (2) that the outputs produced by the computer be strictly comparable with, or even as good as or better than, the organismic

performances. What goes on between input and output is up to the investigator. To produce its imitative outputs the program may or may not be provided with a model that imitates some suspected natural process or tests some theory. In any case, it is by altering the program, and by observing the consequences of each alteration on the computer's output, that the AI investigator slowly improves the match between its output and whatever is known about the living organism's range of responses. Just as similar computer models are now being used to study weather systems, galactic evolution, plate tectonics, and other complex natural processes that are also difficult or impossible to observe directly, so AI models are being used to study intelligent processes. The aim, of course, is ultimately to understand ourselves.

Loglan could contribute to that understanding. Being a fully described and demonstrably speakable human language, Loglan can provide AI investigators with at least the beginning of a model of how human speech generation and understanding works. Loglan grammar is not only known but already written in a machine-parsable code. So it is itself the beginning of an AI program. Also, like all formal grammars, the current machine grammar of Loglan is infinitely malleable: its rules can be rewritten in an unlimited number of ways that will still parse the same sentences. So a wide variety of hypotheses about how human speech is internally generated can be tested by a grammatical model simply by altering its rule structures in systematic ways. Such alterations could continue until clues about what improved the model's fit with human speech began to emerge.

We do not yet have recorded output from fluent Loglan speakers to supply AI laboratories.²⁰ Besides, it is likely that AI workers interested in testing detailed models of the speech generation process will prefer experimentally induced bodies of verbal output to the records of spontaneous speech that we have collected for linguists. But in the next few years a generation of truly fluent speakers of Loglan is very likely to emerge. Enlisting some of them as subjects, evoking speech from them under controlled circumstances and measuring the physical parameters of that speech--the pace and pattern of its hesitations, the locations of its blurts and pauses, its variations in tone and rate, and, as controls, the measured response strengths of the various individual words in their vocabularies--could easily provide a human standard against which the infinitely manipulable AI output could then be modeled.

Why could not such an investigation be conducted now with natural speech? Because the first complete grammar of a natural language has yet to be written. If we are interested in matching human speech in any language with the output of a computer model, that model must contain not only some analog of the human speech generator itself, but also an analog of the particular language in which the speech is occurring, i.e., a grammar of that language. If the grammar we install in the speech-generating program is incomplete, then the model will be incomplete; it cannot be expected to account for the full range of speech productions in that language. Human speech is essentially spontaneous. To constrain it, say to some subset of a language like English for which one thought one had a partial grammar, would be to turn it into something else, something that was not speech. Besides, if the partial grammars now in hand are any indication, when a complete grammar of a natural human language is finally written, it will be far too large for programmatic manipulation in the AI lab. Natural languages are very large affairs. Like whales and elephants, they make poor experimental animals.

Thus, more than anything else it is the small size, formal completeness and machine parsability of Loglan grammar that seem to suit it for manipulation in the artificial intelligence laboratory.

1.5 Loglan at the Machine-Man interface

Another possible computer-related role for Loglan is at what is called the "interface" between humans and their computing machines. At the moment this interface is occupied by a wide variety of computer software, very little of it succeeding in making the use of computers comfortable for the uninitiated. Despite a considerable commercial effort to make this software "user-friendly", the art of using computers remains an arcane one, full of magician's mumblings and sorcerer's symbols. Much of the arcanery appears to have arisen from the incorrigible literality of the machine coupled with the passion of professionals for compact code. The result is a frequently absurd situation in which a forgotten semicolon or an unmatched parenthesis can mean the loss of a night's work.

Ideally, as all the science fiction has it, one should be able to talk to one's computer: to put questions to it, to clarify one's purposes, to ask what's wrong when uncertainties over semicolons arise, to discuss with it the various ways in which a problem might be approached, to make choices among the sets of strategical alternatives it might present to you, or to answer questions about its understanding of your problem or about the units or degree of precision in which you wish the solution expressed. In other words, to make the machine-man interface truly comfortable for humans and yet continue to be instructive for machines, we need a language in which the requirements of both humans and machines are met.

Loglan may be such a language. We have seen that it is utterly unequivocal grammatically. One consequence is that we humans become aware of what we are actually saying when we talk Loglan. So a Loglan-speaking human is much less likely to say one thing while meaning another, thus misinforming his or her machine. Also, as we shall see in the next chapter, Loglan words resolve uniquely from the speech-stream; no 'I scream'/'Ice cream' phenomena exist in it. So even spoken instructions are unequivocal in Loglan. This is true of no other language. Being able to speak freely composed instructions spontaneously would add immeasurably to the speed and comfort of the interaction for humans, and yet, because it's Loglan, its being spoken would not diminish its precision for machines.

What would guide such a spontaneous--one might even say unstructured--interaction? From the computer's point of view, its sole requirement is eventually to understand exactly what you want it to compute. So it would first parse your sentences, look up the meanings of your words in a shared dictionary, make inferences from its understanding of your message, check them out against a shared knowledge-base, and finally check them out with you. When satisfied from your answers that it had understood your problem, it would translate the set of Loglan instructions it had received from you, and thus verified in this way, into some programming language or languages that it judged suitable to your task. In other words, it would program your problem. Perhaps it would have a set of computer languages, and libraries of stock programs in these

languages, from which to choose. The computer would in effect program itself to execute whatever instructions it had elicited from you in the interface language.

What do we human partners in this high-powered interaction require? That we be permitted to express our thoughts fully, freely and spontaneously without the risk of seriously misinforming our machines. That we be able to understand most of the machine's word-choices and all its utterance-forms immediately, and be able to clarify by interrogation whatever part of the computer's responses to us we do not immediately understand. That we be comforted by the knowledge that the machine is also attempting to understand us, and is using similar inquiries into our meanings and usages in order to do so. That all relevant knowledge be accessible to us as well as to the computer during the problem-defining session. And finally that we be able to make new bodies of relevant knowledge accessible to the computer when we discover that there is something it does not know that we think relevant to our joint task.

Loglan is peculiarly well-suited to the dual role that would have to be played by the interface language in so rich an interaction. There appears to be no practical limit to the human thoughts or kinds of human knowledge that can be expressed in it despite its very small formal size. Yet it is that small size coupled with formal completeness that, as we have seen, makes it understandable to machines. Although its grammar is small and simple, the semantic domain of Loglan is immense. Unlike ordinary programming languages, which have severely limited vocabularies, Loglan will soon have, and in principle has already, a full-sized human lexicon. So from the human's point of view, anything that comes to mind can be said. Moreover, and unlike the subset natural languages now in use at many interfaces--for example, Subset English--the Loglan-speaking computer user will be able to use the full resources of his or her second language. Whatever the human says grammatically the machine with access to that lexicon will understand.²¹ At the same time, the predicate calculus on which the basic grammar of Loglan has been built will provide a way of both storing human knowledge and making it useful to both machines and humans after being stored.

Despite its formal suitedness, there are at least two commercial barriers to Loglan's being used at the machine-man interface for some time. One is the financial risk of building an interface around a language of which there were at the outset very few--even a few thousand--speakers. The other is the cost to the non-Loglan-speaker of preparing him- or herself to use such an interface, namely learning a whole second language. Machines can learn Loglan instantly; humans require time. So until the number of humans who have already invested time and money in learning Loglan has grown substantially--and presumably they will have done so for some other reason--it seems unlikely that any but a public agency would risk an undertaking that required such large investments on the part of potential users.

It is true that the dream of using Loglan to talk with computers may itself be a powerful motive for learning it. But it is a dream that is not likely to be realized until a great many others have also been motivated to learn it. So it is good to consider that there may be other motives for learning Loglan. Once a population of Loglan-speakers exists, however, and whatever their reasons were for learning it, there seems to be little doubt that the formal suitedness of Loglan to enabling machine-man interaction--a property which it may well possess uniquely among the

spoken languages of the world--will eventually commend it to those concerned with the integration of computers into human life.

1.6 Loglan as a Translation Medium

Let me mention briefly yet another possible use of Loglan, one for which it also seems peculiarly well-suited, and for some of the same reasons: that is as a medium of translation among natural tongues. Such a medium would be useful to an international agency charged, for example, with disseminating scientific or technological information which had originated in one language into many others, the United Nations, for example.

Consider the problem. An original document, say a French article on galactic evolution, is to be translated into a dozen other languages, from Chinese to Swahili. As this project would be implemented now, it would turn into a dozen separate translation tasks, each performed by its own bilingual expert, or team of experts, if as many as a dozen could be found. But with Loglan as the translation medium, the project would be transformed into essentially one task: translation of the French document into Loglan. Admittedly this would require human effort aided by whatever computer algorithms the agency had developed for this purpose. But the resulting Loglan document could then be more or less instantly retranslated into almost any number of other natural tongues, and this second step could in principle be performed, and so eventually in practice, by machines.

The reason for the asymmetry is plain. Loglan is syntactically unambiguous; the other languages are not. Therefore, once the sense of any document has been satisfactorily rendered into Loglan--once its metaphors and idioms ("idiotismos" as the Spanish wryly call them) have been transformed into literal Loglan by human workers who know both languages well, and once the most plausible interpretations of its syntax have been settled for--then the resulting document will be unambiguous in every sense of that word. Not only will the Loglan word-meanings be literally translatable into other languages--as is unlikely to have been true in the source language--the document will now be expressed in a language that is syntactically unambiguous as well. So it will now be ready for machine-translation into other tongues.²² No further human work will be necessary. Any computer with access to a Loglan grammar and lexicon will know what the Loglan document is saying; so given bilingual dictionaries and even partial, translation grammars of other languages, saying it again in one of those other languages will be a task that computers probably can perform. If they can, then translations of the Loglan document could go out on as many different natural language wavelengths as we had bilingual dictionaries and translation grammars for.²³

Note that none of the ultimate consumers of this international translation service need know a word of Loglan. What Loglan has made possible, and what the human translator into Loglan has supplied, is a clear statement to the Loglan translating machines of what a certain source message probably means. In a certain sense Loglan has enabled the human translator of the original document to disambiguate that message, or it has forced him or her to do so by its requirement that, in Loglan at least, he or she be syntactically clear. Once this has been done, it is easy for the second order machines to re-express the now-unequivocal Loglan message in some relatively unequivocal words and phrases chosen from the target languages. Such unequivocal

expressions are not always pretty. The English, for example, that results from this sort of automatic translation out of Loglan is peculiar English, bristling with curiously logical phrases like 'the mass of all ...' or 'the event, state or condition of ...', but it gets the job done. What is most striking about this kind of English prose is that it is crystal-clear. It is in fact "Loglanized" English. Reading it not only teaches one a lot about the Loglan way of seeing the world, just as Trobriandized English would teach one about Trobriand metaphysics, but Loglanized English also teaches one about English metaphysics. For it makes explicit what we English-speakers normally take for granted about the world. Now to make any metaphysics explicit is in some curious way to make it non-metaphysical; it is to deprive it of the protective inattention that metaphysics normally enjoys. Assumptions that have been made explicit are no longer quite assumptions. They are propositions to be rolled over in the mind.

Thus the covert process of translation into and then out of Loglan may have a small but interesting side-effect on those who read the "loglanized texts" that issue from it. They may become aware, perhaps quite incidentally, of what was formerly metaphysical in both their own language and the language of the source document.

1.7 Loglan in Information Storage and Retrieval

Another not quite so incidental by-product of using Loglan as a translation medium would be that the Loglan texts so created would be well-adapted for the machine storage and retrieval of the information they contained. For one of the same reasons that Loglan is suitable at the interface, namely that knowledge stored in the predicate notation is apparently usable by both machines and humans, texts translated into Loglan and stored on some electronic medium could later be searched and even studied by machines. The studying Machines would be computers "trained", i.e., programmed in the AI style, in the human art of scholarly reading. Although key words and Phrases can be searched for now, and in texts written in any language, natural language texts cannot yet be understood by computers in this way.

Once again Loglan yields a special benefit because its grammar is transparent and its meanings clear.

1.8 Loglan as a Planetary Second Language

There is yet a seventh way of viewing Loglan. In fact, a substantial minority of those who are already interested in Loglan²⁴ see it as a lively candidate for the universal second language. Everybody who has thought about the matter seems to be convinced we're eventually going to need one on this planet, and a constructed language with the promise of political and cultural neutrality, as well as Loglan's apparent aptness for computer talk, seems a particularly attractive prospect for such a role. People in the "auxiliary language" movement, as it is often called, insist that the new second language would not replace any existing tongue. Indeed, its very existence might help now-threatened minor languages to survive once a powerful second language were available to its speakers for communication with other folk. At first the international auxiliary would serve as everybody's communication channel with travelers or visitors, i.e., with everyone with whom one did not share a native tongue. Later it might be used preferentially even in

groups that did share a native tongue if the topic being discussed--such as travel, technology or science--was more advantageously addressed in Loglan than in their common natural language.²⁵ Although Loglan was not designed for this bright future, it may nevertheless have attributes that fit it for the job.

Some might say that the still-divided state of the world militates strongly against the adoption of an international second language even if we had a number of good ones to propose. Quite so; but the world is a shrinking place. It seems likely that within the next fifty years or so the desirability, even the practical necessity, of an international second tongue will become apparent to all those charged with the education of the world's children. This is not the place to discuss the merits of the many plans that have been proposed to meet this contingency should it arise. Not even the basic division between those who favor the teaching of a constructed language, such as Esperanto or Loglan, and those who favor the use of a widespread natural one, like English, may merit more than passing attention at this time. Even so, it is quite possible that, by the time this contingency does arise, research with Loglan, or with other Loglan-like laboratory tongues, will have disclosed certain large, unrealized functional potentials in the human language faculty that will settle the argument decisively in favor of a deliberately constructed international tongue. It is also possible, of course, that it will not.

Even supposing that the most detailed confirmation of the Sapir-Whorf hypothesis had taken place by the time the moment of decision arrived, I at one time doubted that a language of Loglan's severely ratiocinative cast, as I then thought of it, would prove the best choice. An international language, above all languages, it seemed to me, would be called upon to perform a multiplex function. Loglan was, I reasoned, a laboratory instrument: designed to optimize linguistic performance along a single, if important, functional dimension: rational thought. It was, in short, an uncompromising tool. It was even possible that the uncompromisingly logical character of the language might have some interestingly negative effects on literary productions in the language; see [Section 1.3](#). In Loglan, as I was fond of putting it then, one is forced to be clear.

I now believe this view to be mistaken, and that the fear it leads to is quite groundless. In the last ten years I have made some discoveries about Loglan, perhaps also about the language arts in general, that persuade me that Loglan's "severely ratiocinative cast" would *not* unsuit it to be an international auxiliary tongue for everyman. In the first place, Loglan does not wear its logical dress incessantly; it displays the propositional calculus only when its speakers wish to display it. In the second place, it turns out that the soul of Loglan is not its logicity but its optionality. It is as optionally illogical as it is logical. It is, in short, whatever its speakers wish it to be.

What has happened in the last ten years is that I have spoken a language that was designed from the ground up and heard it spoken; I have observed the struggles--quite common in second language learners--to convey old messages over new channels, to pour old wine into new bottles without spilling it. I have examined the sometimes poetic and often frolicsome literary inventions of my fellow loglanists...especially when they were not decanting old semantic wine but being outrageously inventive and loglandical in their new language. Above all I have come to realize that while a new language may liberate inventiveness in surprising ways, no language forces anything but its obligatory grammatical arrangements on its speakers.²⁶

Not even clarity. Clarity is there in Loglan if you wish it. And clarity is genuinely more available to the speaker of Loglan than of other languages. If you want to be clear in Loglan, you will not, for example, be tripped up by the massive, and largely unnoticed, ambiguity of your mother tongue, which I presume is English. But in Loglan, as in other languages, one is not obliged to be clear.

Can one, in Loglan, be unclear? Of course. One can use the same pronoun twice in the same utterance with different referents. One can use an argot word with listeners who do not know the argot. (Who could guess, for example, what modern particle physicists mean by 'charm'? Translating it into Loglan will not suddenly make it clear.) Or one can inadvertently use a bad metaphor, one that has little chance of getting one's message across. It is true that the grammatical structure of one's bad metaphor will be clear to one's auditors in Loglan; that is, the order in which its parts were joined by you will be known to them. And this will help those auditors try to decipher your bad metaphor. But it does not guarantee that any of them will ever succeed.

In these last ten years of engineering optionalities into Loglan I have formed a view of language which I suspect is very different from the one with which I began. I see language now as something very like a sign-painter's kit: a box of brushes, paints, templates and other tools which each of us carries about. With one's own personal sign-painter's kit--one's personal collection of English sign-parts, say--one constructs one's signs...in the air. One speaks English. Others similarly equipped with English sign-making tools, and so familiar with their use, listen to you and attempt to decode your signs. If you have labored well, if you have constructed your sign intelligently and taken carefully into account how those particular others are likely to interpret your efforts, your sign may very well succeed in doing what you wanted it to do: it may sing of your intentions to them. If not, it won't; and you may never know that you have failed.

If this view of language as a collection of sign-making instruments--acquired in bulk during one's childhood but which one never tires of refurbishing in detail--is generally correct, languages do not force anything on anyone. Particular brushes or colors or templates do not leap out of the box into your hand. You pick them up, use them in your often quite idiosyncratic ways, and, when either satisfied with or defeated in your efforts, you put them back down again. Others may "look at" your finished air-paintings, your utterances; and, if they choose, they may comply with or respond to whatever message you have succeeded in conveying to them. They may answer your question (if they understand it), or some other question that they thought you asked (if they didn't); but they will do all this as voluntary agents. They will not be responding to irresistible "forces" any more than you were. The language act, in both directions, is a totally voluntary, creative affair. It is a painting of signs in the air. And the watchers are free to invent for themselves what you mean, and act on it or not, as they choose.

Where does the Whorfian sense of our being limited by particular languages come from, then? It comes partly from the simple matter of conforming to their obligatory grammatical arrangements if we want to be understood. But it comes also, I suspect, from deprivation: from not having in your native language kit what you might, in some vague way, be ready or yearning to use. If you don't have mauve in your sign kit, you can't use mauve to paint a sign. The musical genius born on the ice floes off Northwestern Greenland will never make the music he or she was, as we

Europeans might say, "destined to make", because there are no grand pianos or other musical implements for miles around. In a precisely parallel way "illogical" languages lead to illogical speech because they don't make the machinery of logic easily available to their speakers, and so they don't direct the attention of their speakers to the logical dimension of their ideas. If this is so, then "logical" languages are those which *do* make the full machinery of logical analysis easily available to their speakers, and so *do* direct the attention of their speakers to the validity-conserving dimension of their own thinking. But the point is that no part of that machinery ever has to be used. We all know people who have never said--and in the remainder of their lives will never say--that something is A "if and only if" it is also B. That particular shade of logical English lies unused in their sign kits. It is there. Each of the words is there. Even the usage is there in the kits of other modern English speakers to be understood and copied if they choose to. But they don't choose to. Nothing except a stern schoolmaster could force them to.

Apparently no piece of the linguistic apparatus has to be used. English and the other Indo-European languages suffer, in the Whorfian sense, from exactly this kind of limitation of their tense systems (to take just one example). We do not have a "tenseless tense" in these languages. Nor do we have an "epistemic" one, like Hopi. So we make do with the present tense...or with our 'Probably's and 'Certainly's. We say 'Socrates is a Greek philosopher'. We pick from the sign kit a sign that is usually used to mean something else, and with the help of our infinitely cooperative auditors, we make the present tense serve as the eternal tense that we do not have in English. In the same way that we can use screwdrivers as tent-pegs and jackknives to drive screws, so we are free to use any part of our languages in any ways that work to convey our messages.

What is the bearing of this rough, tool-kit theory of language on the possible aptness of Loglan as an international auxiliary tongue? The bearing is this. Loglan takes limits off; it has not applied them in now directions...not even logical ones. All the logical apparatus of Loglan is optional, just as its tense system is. It also has an optional case system, which, paradoxically, means that we may also speak without cases if we choose. Its standard (unmarked) word-order is Subject-Verb-Object (S-V-O). But every other possible order of the main ingredients of a sentence may also be used. Such a boundless language, full of optionalities, is precisely what will be wanted in everybody's second tongue. For every user of it will have a native language which will have put, if Sapir and Whorf are right, the first impress on his or her mind. If that native language has cases, he or she will want at first to use cases in his or her second language, too; if it uses a Subject-Object-Verb order in subordinate clauses as German does, then in such places he or she will want to use that order in the auxiliary tongue as well. Loglan will allow all these variations. And it will make them mutually understandable to persons who come from very different language backgrounds, precisely through the agency of their invitingly boundless second tongue. Loglan, in short, is a kind of linguistic no-man's land. It therefore belongs potentially to everyman. While I once had some doubts about the utility of Loglan as an international auxiliary, I would argue now that it is precisely the boundless optionality of Loglan that makes it especially well-suited to be everybody's second tongue.

Loglan will have one doughty competitor for that role when the occasion for choosing a universal second language comes around, namely Esperanto. Much older than Loglan, and the only constructed human language that has ever successfully spread beyond the borders of

Europe, Esperanto has already captured the hearts of many of the internationally inclined. Loglan, as the newcomer, will have to acquire its adherents in a different metier, probably in the laboratories of science. So it is likely to have a very different kind of early adherent. It may well continue to draw them first from the world community of computer professionals, the programmers and engineers, or from artificial intelligence workers, or from the linguistics labs and anthropology departments where Whorf-talk is still spoken, and, were Loglan to prove useful as a medium of scientific translation, it may ultimately draw adherents from the international community of science itself.

But Loglan must not let itself be confined to such communities of intellectuals, or let them dominate any more of its affairs than are directly relevant to their concerns. If the language is to grow and spread, to make good its promise as a potential world auxiliary, it must have the support of plain people as well, and of the politicians and educators who will ultimately come to speak for them.

I have been making the tacit assumption all along in this section that Sapir and Whorf will turn out to be in some sense right, that Loglan will have a special mind-expanding contribution to make as the international auxiliary. But suppose Sapir and Whorf are not right? Suppose particular languages do not set limits on human thought? Then it hardly matters what language our children choose for our grandchildren to talk in when they travel. Thought is; and thought will be. For the commanding alternative hypothesis is that the forms of reason are, as Kant surmised, among the biological givens of the human animal.²⁷ In that case, such incidental features of a language as whether it is easily learned or not, or speakable by and to computers, or useful in translation, might well turn out to be decisive. So, ironically, Loglan may turn out to be the preferred alternative after all...even if the hypothesis that led to its construction is refuted.

1.9 Loglan as a Linguistic Toy

There is a final way in which Loglan may be viewed which I wish to acknowledge briefly but candidly. This is the perspective from which Loglan is seen by many individuals, not as a research tool, not as contribution to the machine-man interface, not as a candidate for the international auxiliary, but as a delightful and very human toy. Perhaps nothing is so playful in human behavior as language play. And one of the language games we play is building languages. Logicians do it; mathematicians do it; poets and children do it. Indeed the whole, long, outwardly solemn history of international language building may be in no small measure an expression of language play.

Moreover it gives me no pain to confess that building Loglan was also fun. And now that it is done, or nearly done, I am pleased to say that its smallness of scale makes it as apt for recreation in the living room as for manipulation in the laboratory. Learning any language is fun, and apparently the odder it is the better. Loglan is odd, no doubt about that; and many of the effects of learning Loglan are subjectively immediate and compelling. Whether those effects prove to be permanent or not--which is to say, whether Whorf is right or not--it is apparently fun to lose your English-speaking mind. There is, of course, nothing either strange or illegitimate about this playful use of Loglan. A telescope is a source of delight as well as a tool for collecting scientific

facts. It is not surprising that putting on a new pair of linguistic lenses should also furnish a measure of delight.

This book is quite openly addressed in part to those who are prepared to regard learning Loglan as pure fun--perhaps even useless fun--as well as to my more utilitarian scientific colleagues and to my fellow partisans of the international language movement. Many if not most of those who have written me about Loglan in the years since its earliest publication have quite plainly placed themselves in the first attractive category. To them, and to those others who may yet find joy in it, I confess my own delight--no matter what may be the outcome of my scientific labors--at providing them with an engaging toy. Besides, the first speakers of the language have come from just these playful learners. They and their motives are therefore no less important for the eventual capture of the Whorfian phenomenon--if Loglan proves to be its instrument--than the sober experimenters who may one day seek them out.

1.10 Learning Loglan

In the rest of this book I propose to treat Loglan as if it were a living, spoken tongue. Strictly speaking this is not quite yet the case. While sustained speech in the language has occurred, and while many of the 3,000 buyers of the 1975 books also learned to use the language in some way, that was some years ago. The engineering interest has been the dominant one in the Loglan community since the early 80's. But now, with the engineering phase of the project finally over, the language is ready to be learned and used...in some cases, as in my own, relearned and used again.

Learning Loglan was, when it first happened, a bootstrap operation. Its early speakers had to simulate its speechways, and these simulated bits of fluent speech then served as stimuli for the free response of others. Little by little the necessity for simulation receded. When it was completely gone, when veridical Loglan speech began passing spontaneously from speaker to speaker, as it did in the rooms of The Loglan Institute in 1977 and '78, the first recorded demonstration of a wholly synthetic linguistic phenomenon had taken place.²⁸ I had hoped that thereafter there would always be genuine speakers from whom others could learn the language in ways more natural to the race. But engineering soon replaced speaking among those early speakers, including myself; our skill died back from want of use; and that first generation of loglanists are now very largely incompetent again. This is because the successful re-engineering of Loglan augmented the language hugely, especially its morphology; and there is now much that is new to be learned.

I have no doubt that new masters of the language will quickly emerge with the publication of these 1989 books and their accompanying cassettes and teaching programs. Already groups exist that are waiting impatiently for these new materials to be issued. By the time you read this book, a new generation of Loglan speakers are likely to have leapt into the world. Still, in writing now about their "speechways" I confess I am engaging in a genial deception. The behavior and insights I will attribute to "speakers of Loglan" in the remainder of this book are partly based on what I learned about the Loglan-speaking process in the period 1975-80 when the Loglan world was new. But partly they have been derived from the Sapir-Whorf hypothesis, which as everybody knows is still untested; the crucial experiments have not yet been run. We do not yet

know what really happens to or in the heads of those who speak Loglan. Yet I have found the pretense of foreknowledge a useful, even an indispensable expository device. So what I will describe is the working out of at least one set of consequences of the Whorf hypothesis as it applies to Loglan. They will be tentative ones, to be sure. But one cannot, after all, entertain incessantly the possibility that Sapir and Whorf were wrong. Yet obviously they may be. To say so one more time is probably enough; the reader is forewarned.

The rest of the book is straightforward exposition. I shall first describe the sounds of the language. This will take only a few pages, for there are not many sounds. Then I shall enumerate its word-forms, and these, too, are very few. We turn next to the three departments of Loglan grammar: its "predicate" forms, its "argument" forms, and the forms of its "utterances"...all terms which you will presently understand. These three grammatical chapters will comprise the bulk of the book. Then I shall describe the provisions that have been built into Loglan for its future growth. Then a summary chapter on the Whorf hypothesis and some illustrative appendices will bring us to the end of the book. The reader will find among these appendices a glossary of the primitive predicates of the language, a list of its little words and affixes, and one or two grammatical paradigms.

This, obviously, is not all there is to a language. It is not even sufficient to learn a small one well. But we plan to accompany this 1989 edition of *Loglan 1* with a set of teaching programs as well as audio cassettes. The former will teach word recognition, construction and decipherment as well as the formation of simple utterances; and the latter will exhibit the speech sounds and utterance rhythms of the new language. A second volume, *Loglan 6: Formal Structures*, is planned for publication in 1990. This volume will give the technical user of Loglan a detailed formal exposition of all the lists, rules and algorithms that constitute the structure of the language. Then, if funding permits, we will staff the revision of the 1975 dictionaries and publish the Third Edition of *Loglan 4 & 5: A Loglan-English/English-Loglan Dictionary*.

A word about how we plan to finance these and further publications of The Loglan Institute. A certain proportion of the dues of those who elect to become members of The Institute--currently a large proportion, but it will be smaller as membership grows--will, be used to maintain the essential services which must stand behind any new language: the continuous update of its grammar, and, in our case, the maintenance of the unambiguity of its grammar; lexicon expansion and the continuous update of our master dictionary files; the building of a library of Loglan texts as these are generated by Loglan writers and translators; and the periodic publication for the Loglan-using public of new or updated printed materials such as primers, readers, dictionaries and reference manuals. The Institute invites readers to help provide these services to the Loglan-using by becoming members. Members will also enjoy, of course, the more usual benefits of membership such as interaction with fellow loglanists on topics of shared interest, as well as being regularly apprised of new publications and of the growth and spread of the language.

Notes

1 See Sapir (1921) and Whorf (1956), the latter a posthumous publication. References throughout this book will be made by author's name and parenthetical date of publication and under this heading complete particulars will be found in the Bibliography.

2 It should be pointed out that not all linguists agree with Sapir and Whorf's analyses; see, for example, C. F. Hockett, "Chinese versus English: An Exploration of the Whorfian Theses," (1954). The exceptions taken by Prof. Hockett were fairly typical. From his examination of Chinese and English he argued that their structures affect, not what can be said at all in these languages, but what can be said easily. He therefore disagreed with Whorf's thesis of the existence of a fundamental linguistic constraint on thought. But like most early criticisms of Whorf, Hockett replaced the rather simple, deterministic mechanisms Whorf supposed to be at work with more sophisticated, probabilistic ones which are, of course, equally hypothetical. What is wanted is experimental isolation of these mechanisms; for as Hockett himself points out, the Whorfian phenomena, if they exist at all, are bound to be particularly difficult ones to observe *in situ*.

3 Summaries of this early and generally confirmatory work are to be found in Brown and Lenneberg (1958) and Carroll and Casagrande (1958). In general, it seemed to show that intra-cultural perception, at least, tends to follow grammatical, morphological and even phonological lines. The most important apparent disconfirmation of the hypothesis to date is probably Osgood's (1960) finding of a large cross-cultural similarity in semantic response despite large linguistic differences. None of this work confronts Whorf with his largest claim, of course--that language furnishes both the mechanisms and the boundaries of thought--and therefore none of it can claim to be decisive.

4 A symposium on the scientific strategies available to linguists for dealing with the Sapir-Whorf hypothesis was held in the early 1950's and reported in Hoijer (1954). None of the members of this symposium, however, entertained the direct, experimental approach prepared for here. One gathers that for most anthropologically trained linguists languages, like mountains, are inimitable: a part of the extra-human macrocosm that one must be content to observe. Yet, questions of mass aside, a large, if as yet undetermined, part of every language is obviously artifactual, if not quite artificial, and hence as alterable as a city street. The interesting modern question, of course, is exactly which parts of language are artifactual, and which are not.

5 This is not quite true any longer. Semantic structures are currently being given a good deal of attention by linguists. See, for example, the "deep semantics" hypothesis of Geoffrey Leech (1981).

6 By 'second' I really mean 'second or subsequent', that is, second, third or fourth, etc. But this long phrase is awkward to reuse. It's a pity we're not writing and reading Loglan, in which the word for this important and surprisingly frequently used notion is **sutori**, a word which breaks up as **su** ('at least') + **to** ('two') + **ri** ('-th'). So what we are talking about in this section are, in loglanized English, "at-least-second" languages.

7 We shall have more to say about positive versions of the Whorf hypothesis--various ways in which languages and written notations may be suspected of facilitating, or even enabling, certain kinds of thought--in [Chapter 7](#).

8 For example, Bishop Wilkins' 17th Century project to construct "a philosophical language." Wilkins' efforts were preceded by *the Ars Signorum* of the Scot, Dalgarno, and were shortly followed by Leibniz' own efforts to construct an "algebra of thought." These, and other early essays in language planning, are described in Bodmer(1944).

9 Or at least the justifying arguments that accompany the results of thought, for certainly no logician would claim these days that he is engaged in the naturalistic modeling of human thinking. Even so, the conduct of a justifying argument is a kind of thought, even a very important kind, and for this the logician's formal reconstruction of the most direct routes over which thought *might* proceed provides a very interesting, and functionally unequivocal, paralinguistic model.

10 At least in English. Sometimes calling themselves the "ordinary language philosophers," this group is largely British and largely centered at Oxford; among representative works see Strawson (1952) and Ryle (1962).

11 For example, 30 days of an hour a day of vocabulary drill with flashcards plus somewhat less time spent in passive listening to cassettes seems to have been sufficient to prepare the four participants in the 1977-78 apprenticeship program for a month of face-to-face instruction in speaking the language. By the fifteenth or twentieth day of such instruction, three of these apprentices were sustaining Loglan-only conversation for 45-minute periods daily. These are the only hard data we yet have on the speed with which Loglan can be learned; and they are obviously strongly biased by the unusually high motivation of these early post-1975 subjects. Many other loglanists have, of course, learned to use the language in less intensive ways since then; but we do not have similarly quantitative records of their experiences. Data on this and other learning questions will soon be supplied, however, by our present, computer-based methods of recording the Loglan learning experience. These new methods will allow us to monitor the learning experiences of volunteer subjects even at a distance.

In connection with learning speed, I have made one observation that shows that the speed with which a language-like system is learned cannot be a simple function of its size. My earliest efforts to teach Loglan, in 1957, gave me definite indications that the language was then too small to be learned. Its then very small size--400 words and approximately 100 rules--seemed to retard, rather than facilitate, its learning. (Like a pea in a shoebox it seemed to rattle around in my subjects' heads.) This observation supports the current view that the organizational structure of language is innate, that whatever is learned as a language must first of all be a language. No such difficulties have arisen in recent teaching trials. Evidently something happened to the structure of Loglan between 1957 and, say, 1977, when the first sustained speech in Loglan was observed, that made the 1977 language better suited to whatever may be the "hard-wired" features of the language acquisition device in human heads.

12 For example, the Harvard translation grammar of English had well in excess of 6,500 sub-rules in the last report I received: Kuno and Oettinger (1963). The fewer than 200 sub-rules cited for Loglan are from the current (June 1988) formal grammar described in *Notebook 3* (Brown 1987), a book that will be replaced by *Loglan 6: Formal Structures* (Brown and McIvor, forthcoming).

13 The number of syntactic categories in the Harvard grammar; Kuno and Oettinger (1963).

14 I am using here Whorf's sense of the word 'metaphysical': the sense in which a particular view of the structure of reality is "forced" on the speakers of a language by its obligatory grammatical arrangements. Of course Whorf cannot mean literally forced; since we escape these metaphysical "obligations" by several routes, among them philosophical analysis and learning second languages.

15 The word 'primitive' has been adopted from formal logic where it means one of the *undefined* terms of a deductive system. In contrast, a "primitive predicate" of a given language is one that is *underived* within it, that is, a word that is derivationally simple in that language. The point here is that there is a crucial difference between definition and derivation, in that defined terms are susceptible to systematic logical transformation and derived terms are not. The use of the word 'primitive' in this book may, therefore, tempt the sophisticated reader to expect more of them than he will get.

16 These procedures are described from the standpoint of the word-maker in [Section 6.5](#).

17 One reason for this may be that languages, unlike the more consciously acquired parts of human culture, evolve mostly by accretion, only occasionally by sloughing off. Thus a bewildering variety of grammatical arrangements co-exist for engaging the same point in the semantical field; and this is so despite the fact that each once-new grammatical arrangement was presumably devised by some brave speaker to engage a new point in that field. But it inevitably does so by redundantly covering old points as well. Loglan, having been constructed all at once, can have less grammatical overlap in covering the same field.

18 The Installation of this property in the language was a two-stage process. Unambiguity was closely approached by a heuristic procedure in the years 1962-64. During those years I used systematic computer searches of the utterance domain of the language to locate and remove ambiguities. I carried on this work, experiencing lower and lower discovery rates, until the rate at which ambiguities turned UP on these searches fell to, and finally remained at, zero. Later, Aho, Johnson and Ullman's (1975) discovery of an algorithm for demonstrating conflict-freeness in certain classes of formal grammars allowed me and several co-workers to demonstrate that a formal analog of Loglan grammar was unambiguous in February 1982. In the course of obtaining this proof we discovered and of course removed the remaining ambiguities in the language (Brown 1982).

19 A possible second reason why natural grammars are so much larger than they apparently need to be (see Note 17) has been suggested by our work in disambiguating Loglan. There may have been, and may still be, a conflicting, and so possibly alternating, pair of behavioral pressures

driving the evolution of human grammars; see Brown and Greenhood (1985, and in press). One of these pressures is what we there call the burden of "incommunicable images": the body of complex images which the speaker can create in his or her own mind but which he or she cannot yet say to others with any hope of being understood. The other pressure is the "disambiguation burden" on the hearer: the number of possible, i.e., "grammatical", interpretations of a speaker's utterances among which his or her hearers are obliged to choose. The first of these pressures would lead human grammars to become ever more intricate, for they would do so as ideas which were once only thinkable became sayable. This would lead, in our model, to a temporary increase in the disambiguation burden; for any increase in the elaborateness of the grammatical apparatus is at first very likely to increase the number of legitimate interpretations elsewhere, largely as a consequence of the grammatical overlap phenomenon mentioned in Note 17. When, however, the disambiguation burden grows so large through these accretions as to become intolerable, this would lead once again to its reduction through either the further refinement of the grammatical grain of the lexicon ("lexemification") and/or to the addition of still more clarifying particles ("particization"). These, we argue on the linguistic evidence, are the two kinds of structural devices by which human grammars have become more powerfully disambiguating. Indeed, their application to the reduction of the disambiguation burden is what may have created human grammars in the first place. Loglan, having been deliberately engineered, is syntactically unambiguous; so its speakers place no disambiguation burden whatever on its hearers. In effect, the hearer's burden has been reduced to zero. If zero-disambiguation can be maintained in Loglan despite vigorous and widespread street-use--and this is a question to which we must, as scientists, be very attentive--and our model of the grammar-evolution process turns out to be approximately correct, then the further development of Loglan may well be driven by the pressure on speakers alone: by the self-renewing burden of their incommunicable ideas.

20 We do have some recorded Loglan speech output, namely the recordings of the daily Loglan-only sustained conversation sessions held between me and my apprentices in 1977-78; see [Note 11](#). But we were not yet fluent. So most of our pause-time was spent searching for words rather than in grammatical processing of complex sentences. Moreover, the grammar itself has changed in minor but relevant ways since that time. Still, it is a first step toward a recorded corpus of spontaneous Loglan speech.

21 Parsability does not of course exhaust the problem of meaning. What is left over is the meaning of individual predicates and the references of the designations in the parsed sentence. Where the Loglan lexicon is indecisive--and it is inevitable in a growing language that occasionally it will be--then the machine will be able to conduct inquiries: 'What kind of nucleus do you mean? Atomic? Or cellular?'...all carried out in Loglan, of course. The point is that such inquiries will take place within an implicitly agreed-upon grammatical structure. That is, the *role* of **nukli** in the Loglan sentence will be plain to both machine and human.

22 It was once thought that even ambiguous documents could be translated by machine-executed algorithms into other ambiguous documents, mainly by teaching the machine to thread its way through the maze of possibilities by using a kind of "plausibility calculus" as humans appear to do. But this effort, despite having been well-funded in the U.S.A in the 50's and 60's, was in the end abandoned. Natural language turns out to be too riddled with ambiguity, its multiword

predicate expressions (often called "idioms") too metaphorical, and those metaphors too culture-specific, for purely machine-translation from one natural language into another to succeed. The human translator of natural language text can be much aided by machines; but apparently he or she cannot yet be replaced by one.

23 I do not mean to suggest that the writing of such one-way "translation programs" out of Loglan into other languages would be trivial exercises. The writing of each program would be a major undertaking by Loglan-speaking scholars who were adepts in the given target language and in the sciences in which translations were to be produced. What I do mean to suggest, however, is that such undertakings, unlike the machine-translation projects of the recent past, are very likely to be feasible; since nothing stands in the way of expressing meanings more or less unequivocally--even in a normally ambiguous tongue--once the meanings to be so-expressed are known. For example, a Loglan-into-English machine-translation program already exists in skeletal form; it needs only to be fleshed out lexically for the various scientific vocabularies with which it might be used. The point is that once such one-way programs were available to the translating agency, their execution in a given case would be virtually instantaneous. In that sense their use would be a trivial step in the total information distribution task in which they were employed.

24 The prolegomena to Loglan were first published in the *Scientific American* (Brown 1960). This 16-page article generated a gratifyingly large and unexpectedly varied response, a substantial portion of which came from readers vitally interested in the international language movement.

25 The preferential use of one language over another according to topic often happens in the speech of genuine bilinguals when they are in the company of others known by them to be bilingual in the same languages. Usually speakers in such bilingual circles are quite unaware of having switched from one of their languages to the other; and their bilingual auditors are often similarly unaware that the switch has taken place, although both can easily remember such episodes in retrospect. If made aware, by an observer, that such language-switching has just been going on, both speakers and auditors report a general awareness that language-switching often happens in their circle; and they tend to explain the phenomenon as caused by what they believe to be the "functional superiority" of one of their two languages over the other for some topics of discussion, while the other language will be regarded as "superior" for other topics. This might be regarded as the banal sense of the Whorf hypothesis, the sense in which every bilingual traveller "knows" that it is true.

26 Let us distinguish between the way a language might be said to "force" something on a speaker, in the sense of compelling him or her to make a certain (therefore "obligatory") grammatical or lexical choice, and "inducing" something in him, in the sense of directing a speaker's attention toward, or creating awareness in him of, certain aspects of the speaking/thinking process, or of the world which is its target, and in that way cause some language options to become more frequently chosen than others are. What I am saying here is that Loglan (like all languages) will compel very few choices, but may induce a great many.

27 Curiously enough this view has become more, rather than less, plausible as modern research discloses larger and larger dimensions of the structure of language. For example, one argument for the existence of a large, innate component in the language structure is that the unconscious mass of orderly linguistic behavior is now known to be so large that no general learning theory can account for its acquisition. Besides, no society troubles itself to provide efficient instruction for its children in matters of speech behavior, though speech is the single most complex behavior that children evidently "learn." This is not to say that some people do not spend a good deal of time talking with their children and even correcting their speech behavior. But this is not instruction. It is providing data about the local language from which their children, like all human children, draw their own conclusions. Human children are apparently language-acquisition experts. What they require, and apparently all they require to learn a language, is a copious stream of the language itself. These modern observations have opened the door--so long-thought firmly closed--to the Kantian presumption that there are innate "forms" of "pure" and "practical reason"; and they do so by a curious twist of the Whorfian argument that deprives it of its relativity. We will return to this argument in [Chapter 7](#).

28 There have, of course, been other sudden emergents. Over a hundred thousand people once spoke Esperanto--the number has diminished now to around thirty thousand, according to Forster (1982)--and there must have been a time when learning Esperanto was just such a "boot-strap" phenomenon as I have described. Secular Hebrew is also the result of a boot-strap operation in that apparently one family, among the early Zionist settlers in Palestine, resolved to use Hebrew and nothing else for *all* their daily needs; and from that center of necessitous invention the Israeli language as it is spoken today apparently spread. Speaking Loglan will differ from these other deliberate efforts to promulgate "new" languages in two ways: (1) its focus is scientific, and it is very likely, therefore, to be more closely observed; and (2) its newness is total. The unnewness of modern Hebrew is a complement of the fact that a sacred tongue existed. The vocabulary of that sacred language had to be rapidly expanded, but very little else. And Esperanto has a grammar that in all important particulars is "Standard Average European," as Whorf would say, and is therefore housed in the minds of its learners before they begin. Thus Esperanto was not cut from whole cloth and Loglan is. In this lies one, perhaps the greatest, of its scientific values.

[\(Return to the Table of Contents\)](#)

Chapter 2

SOUNDS AND WORD-FORMS

2.1 First Impressions

When you first hear Loglan spoken it will probably remind you of Spanish or Italian. It has the same short list of curtly spoken vowels, and the same rhythmic alternation between consonants and vowels dominates the speech-flow. Spoken slowly Loglan has the same strongly marked pattern of stresses and pauses that characterizes these Romance languages. Yet at the same time, and like them also, it is also capable of being spoken with great speed, the effect then being of long staccato bursts of evenly stressed syllables.

Like these languages, too, we expect that the sound system of Loglan will be very easily mastered. No new sounds are required of a speaker of English, for example, and its word-forms are extremely simple and regular. Some of the rarer consonant combinations will seem odd to an English-speaking learner but none will be difficult to either hear or pronounce. The biggest difficulty for the English-speaker will be in learning to read; for some of the letters of the English alphabet are used differently in Loglan. But since spelling in Loglan is strictly phonemic--each instance of what we perceive to be the "same sound" will always be represented by the same single letter--even this difficulty is more apparent than real.

In short, and on first acquaintance, spoken Loglan will have a natural, familiar air. Appearances are deceiving, however. Loglan is in fact a very strange language; even its sound-system has properties which no natural language has. One of these is that no matter how swiftly spoken, any string of Loglan sounds will automatically resolve into a unique string of separate words. Moreover, it will have this property even for a newcomer who does not know these words. Some natural languages exhibit this useful property in some degree but none possess it perfectly. It will be the central theme of this chapter to show how this peculiar advantage for the learner is built into the sound-system of Loglan.

2.2 The Design Problem

The scientific plan for Loglan required that it incorporate a maximum amount of phonetic recognizability into its basic words.¹ This meant devising a sound system in which to build those words that would provide good phonetic approximations of the major distinctions, at least, that occur in the most widely spoken natural languages. At the same time it was hoped that a phonetic system that could do this would remain modest in size, regular in pattern, and present no insuperable pronunciation difficulties to speakers of any widely-spoken language. The system that resulted was a compromise; for it contains some sounds that are definitely not universal, and some sound clusters that will be difficult to pronounce for native speakers of some languages.

But the inclusion of these sounds and sound patterns has added notably to the regularity of the language, or to the over-all recognizability of its word-stock, or to both.

The languages selected in 1955 to measure recognizability in Loglan were the eight then most widely spoken languages in the world: English, the Beijing dialect of Chinese, Hindi, Russian, Spanish, French, Japanese and German. At the time, native and secondary speakers of these eight "source" languages comprised nearly 80% of the population of the earth. Today, they constitute a good deal more. Our source population was limited to speakers of just these eight because the trial inclusion of the ninth language, Arabic, made no significant improvement in the average recognition scores of Loglan words and did complicate the word-building process. So no languages beyond the first eight were included.

In contrast, the lengthening of the originally very short list of Loglan speech sounds did make some difference in recognition. The inclusion in 1958 of the widely used consonantal sounds **c** and **j**--**c** is the English [sh]-sound ([ʃ] in the International Phonetic Alphabet) and **j** is the French 'j' of 'Jacques' and English 's' of 'vision' ([ʒ] in IPA) and spelled [zh] in the phonetic guides--increased the recognition scores of the new words made with them from an average probability of about .35 of being recognized to one of about .50, a very substantial improvement indeed. The sounds [sh] and [zh] occur in one form or another in all the source languages. They had been excluded from the earliest Loglan phoneme set because neither is uniformly represented by a single letter in the European languages. In particular, the letters 'c' and 'j' do not always spell these sounds. Representing them as **c** and **j** has therefore diminished readability just as using them has increased the recognizability of spoken words.

Another improvement in recognition scores--this time at no cost in readability--was made by popular demand in 1977 when **h** was added to the language. This time the increase in recognition scores was smaller: an average of about .05 probability points was added to the scores of words remade with **h**. The sound of **h** is not universal in the source languages, however, being missing from Spanish² and all but missing from French. Curiously enough the letter 'h' does occur in these languages, but is silent in Spanish and often pronounced with a "glottal stop" (a very short silence) in French. So either in sound or appearance, **h** was already familiar to the source population and so could be added at relatively small cost.

In 1982 the letter **y** was added, and four years later the last three letters of the English alphabet, namely **q**, **w** and **x**, were added to the Loglan set. This was done to make the incorporation of the Linnaean vocabulary of biology possible. To spell this internationally standardized vocabulary the full European alphabet is required. These last four added letters have fairly peculiar pronunciations in Loglan, as indeed they have in most languages. The sounds they have been assigned are certainly not universal. But an unexpected bonus is that, in addition to their use in science, they are also being used to give more exact pronunciations to many borrowed names.

So Loglan sounds are, in the end, not quite universal. None of the sounds spelled by **q**, **w**, **x** and **y** is universal, and, as already noted, the sound of [h] does not occur in either French or Spanish. Even the original list included **v** and **l**; and there is no [v]-sound in Chinese, and neither [v] nor [l] occurs in Japanese. But the [r:l] contrast is absolutely necessary to distinguish a host of Indo-European word-roots, especially the Graeco-Latin ones used in science; and [v], while not

important in itself, is the voiced equivalent of [f], which is widespread. In fact the chief reason for the inclusion of **v** was to preserve the symmetry of the phonological system, a feature that is now thought by linguists to be minimally conserved even under conditions of swift phonological change. Thus if Loglan is to have a stable phonological structure, it is obviously better to start with a symmetrical phonology than an asymmetrical, and hence potentially unstable, one.

2.3 The Size of the System

The phonological size of a language can best be measured by the number of its phonemes, for these are the elements which must be separately mastered before it can be spoken or understood. A phoneme is a class of sounds in a given language all members of which are perceived by the speakers of that language as instances of "the same sound." We shall see that what constitutes the psychological sameness of two sounds for the speakers of a language depends more on how these sounds are distributed in the utterances of that language than on their acoustic similarity. But however the boundaries of a phoneme are determined, it is important to remember that a phoneme is not one sound, or even an acoustic asymptote toward which speech tends, but a group of sounds which may include several which seem acoustically quite different to the foreign ear.

Counting only its regular phonemes, then--its three irregular ones being used with few exceptions to spell only Linnaean and other "foreign" names--Loglan has 27 phonemes: 6 vowels, 17 consonants, 3 varieties of stress, and one juncture or pause. This contrasts well with the size of English, which by a similar count has 45 phonemes, and it falls at the low end of the human range, which lies between about 15 phonemes per language and about 85. Only Hawaiian is smaller than Loglan among the languages whose names you are likely to know.

Now in itself there is no virtue in smallness. The fewer the sound classes in a language, the longer its words must be; and there is certainly no virtue in long words. But it is also true that the fewer the phonemes of a language are, the larger the average phonetic distance between their sound values can be, and this last property, it turns out, does contribute greatly to intelligibility. Loglan is likely to be spoken in many quite different dialects. The mutual intelligibility of any two of those dialects will depend greatly on the readiness with which the phoneme boundaries of one dialect can be lined up with, or tuned in on, those of the other. In a language with numerous phonemic boundaries, such as French or English, this mutual realignment between dialects is difficult even for native speakers to make. The phonetic wavelengths are, so to speak, already too closely packed. This is probably the reason why dialects in phonemically large languages tend to be more difficult to understand than in phonemically smaller languages like Spanish or Italian. In a language like Loglan, which is almost as small as it can be, dialectical confusion can be expected to be at a minimum. There is, for example, only one class of /a/-sounds in Loglan. Therefore, it scarcely matters whether the letter 'a' is pronounced in Loglan as a Spaniard would pronounce it, or as a Frenchman or a Bostonian would. For there is no other class of Loglan sounds into which any of these national varieties of /a/ is likely to be sorted.

Throughout this book we will assume that it is the American English dialect of Loglan we are describing. This may not turn out to be the "standard dialect" of Loglan, if there ever is one. As we have already noted, Loglan has closer phonological affinities with vowel-rich languages like

Spanish than with consonant-rich ones like English. (By a "vowel-rich" language I mean one with a high incidence of vowels in the speech stream.) Still, English, Russian, French, German, Hindi, Japanese, Chinese, Arabic and Swahili students of Loglan are invited to pronounce any of its phonemes in any way which is "natural" in their languages. Eventually there may be a standard Loglan **r**. But at the moment the differences between the French uvular /r/, the Spanish trilled one, the English vocalic /r/ and the Chinese fricative one, are simply not phonemic in Loglan. They are, in short, differences that make no difference in Loglan.

In the next few sections we shall describe the four classes of Loglan phonemes--vowels, consonants, pauses and stress--and then turn to the few simple rules that govern their occurrence in the speech-flow.³

2.4 The Six Regular Vowels

The six regular Loglan vowels can be further divided into two groups: the five main vowels, **a e i o u** pronounced [ah eh ee oh oo], which may occur in any word of the language, and the sixth vowel, **y** pronounced [uh], which may occur only between the terms of a complex word--in this, it is rather like a hyphen--or, in a few exceptional cases, to form a borrowing. For example, the element Ytterbium, with its international symbol 'Yb', is spelled **yterbio** in Loglan; and this is an exceptional use of **y**. We will devote [Section 2.6](#) to the uses of this special vowel.

2.5 The Five Main Vowels /a e i o u/

The five main vowels are the five most commonly heard human vowels. They are heard in all our source languages although with some variation from language to language. They are **a** [ah] as in 'father' (in the French and Spanish dialects it will probably be the higher-pitched [aa] of 'la' and 'casa'), **e** [eh] as in 'met', **i** [ee] as in 'machine', **o** [oh] as in 'note' and **u** [oo] as in 'lute'. They are all short, "pure" vowels with no trace of the diphthongalization that is so common in English. Loglan **No**, for example, sounds a little angry...it is so curt. In this, it is exactly like a Spanish or Italian 'No!' if you have heard one recently. It has none of the prolonged, softened, almost disyllabic effect of English 'No-ooo!' [NOH-oo]. The other Loglan vowels are similarly shortened. Note that **i** and **u** have values that are rare for these letters in English. But if you speak other European languages you will probably recognize that [ee] for 'i' and [oo] for 'u' are in fact the most common pronunciations of these letters on that continent.

Note also that [ah eh ee oh oo] are in fact very widely spaced sounds. If a Frenchman pronounces the vowels of **matma** (Loglan for 'mother') as the French [aa] of 'la' ([ɑ] in IPA), or if an Englishman uses the short 'a' of 'sofa' ([æ] in IPA) for the final, unstressed vowel of this same word--as both are very likely to do--it hardly matters. For neither of these "free variations" of Loglan **a** will turn **matma** into **metma**, **mitma**, **motma** or **mutma** or into **matme**, **matmi**, **matmo** or **matmu**; and these are the only confusions with the vowels of **matma** that can occur in these positions in Loglan.⁴

The sounds of four of the main vowels vary systematically with the phonemic contexts in which they occur. When **i** precedes a vowel, as it does in the word **ia** (meaning 'yes'), it has the value of

English 'y' as in 'yes'. This gives **ia** a sound that we could write comfortably in English as 'yah'; and [yah] in fact is how we will represent the word **ia** in the pronunciation guides in this book. Similarly, when **u** precedes a vowel, as it does in **ui** ('gladly'), it has the value of English 'w', and that makes this word sound like [wee]. (The gleeful note is not accidental.) Similarly, **uo** is 'woe' [woh], **io** is 'yo' [yoh], and **iu** is pronounced like English 'you' to which our guide will be [yoo]. In general [y] and [w] will guide our pronunciation of **i** and **u** whenever they occur before vowels.

These consonant-like uses of **i** and **u** are regarded as instances of vowel phonemes in Loglan, and not as separate consonants, because they are distributed complementarily with the more usual, vocalic values of these letters. Thus, the [y]-value of **i** never occurs before consonants and the [ee]-value of **i** never occurs before vowels. So from the point of view of the Loglan-speaker--whatever his linguistic background--they may be safely regarded as instances of the same sound. That they will actually come to be so regarded by your own ear is a prediction we can confidently make on the basis of our knowledge of similar effects in the natural languages.

A third vowel that experiences contextual variation is **e**. Before vowels **e** has the curt, tense sound of [eigh] in 'eight'([e] in IPA), which is the same sound the letter 'a' has in English 'late', 'mate' and 'sate' spoken briskly. We represent this value of **e** by [eigh] in the guides because 'eigh' is the only spelling of this sound in English that never means anything else. The sound [eigh] is always the value of **e** when it occurs before vowels...as it does, for example, in **meo** [MEIGH-oh], a Loglan word that is pronounced exactly like English 'Mayo'. Any **e**-initial vowel-pair in Loglan has the sound [eigh] in first position: [eigh-ah] and [eigh-oo] are the pronunciations of **ea** and **eu**. The [eigh] value of **e** never occurs before consonants.

A more common value of **e** is the relaxed sound it has before consonants, which is the sound it has in English 'let', 'met' and 'set'([ɛ] in IPA). This second value of **e** is represented in the guides by either [eh] or [e], the former being a better guide to its sound when the **e** is final in a Loglan syllable, e.g., [meh], while the latter is unequivocal when the **e** is between consonants, e.g., as in [met]. Thus the guides to the pronunciation of Loglan **le me se** will be [leh meh seh], but of **let met set**, which contain the same relaxed **e**-sound, the guides [let met set] will be unmistakable. Perhaps the most frequent pronunciation error made by both English- and Romance-speakers learning Loglan is to use the tense value [eigh] for *[leigh meigh seigh] for **le me se**. (The asterisk '*' indicates that this is an incorrect pronunciation.) If your native language disposes you to make this error, please take the time now to notice that these three Loglan words--**le me se**--have the same sounds as English 'let' 'met' 'set' with the final 't's dropped off. In fact, the best way to learn to say Loglan **le** (which means 'the') correctly is to start to say 'let' and then surprise yourself by stopping with 'le-'. In short, **le** is an unfinished 'let'.

Sound-pairs, such as the [e/eh eigh] values of Loglan **e**, the [ee y] values of Loglan **i**, and the [oo w] values of its **u**, which are found in complementary distribution in some languages, are called *allophones* of some phoneme in that language. Among Loglan vowel phonemes there is one other important allophone-pair. The phoneme **o** has the value [oh] (IPA [o]) except before **i** or **r**. In just these two contexts **o** has the value [aw] in English 'law' (IPA [ɔ]). The same variation occurs in English. For example, notice how the value of English 'o' shifts from [oh] to [aw] in going from 'note' to 'nor', and how the same shift occurs phonemically in going from 'mower' to

'more' ([MOH-rr] to [mawr]) in English. Also note that the sounds of English 'noise' are in many dialects more closely approximated by the phrase 'gnaw ease' than by 'no ease' ([NAW-eez] and [NOH-eez]); for in the **i**-context, too, this same shift in the value of 'o' occurs in most dialects of English. Thus in Loglan as in most languages, if **o** is followed by **r** or **i**, a shift from [oh] to [aw] occurs.

2.6 The Vowel /y/

Y is not a consonant in Loglan but a vowel. Its sound is represented in the guides by [uh] which is the value of English 'a' in 'sofa' and 'above', of 'o' in 'of' and 'above', of 'u' in 'up' and 'under', and of 'e' in unstressed 'the'. The sound [uh] is a short, grunted vowel that is seldom stressed and is very common in the Germanic and Slavic languages but rare in Romance tongues. Thus in the special character strings used to explain Loglan pronunciation in this book, English 'love' would be written [luhv], 'above' would be written [uh-BUHV], and 'sofa' would be written [SOH-fuh]. See the page before the Foreword (p.14) for the whole list of English spellings used as guides.

As mentioned briefly in [Section 2.4](#), **y**'s most important function in most dialects of Loglan will be to serve as a kind of *spoken hyphen*. For example, the Loglan word for 'eye-doctor' is [MEK-uh-kyoo] or **mekykiu**. The first part, **mek-**, is derived from the word for 'eye', which is [MENG-kee] spelled **menki**, and the second, **-kiu**, from the word for 'doctor', which is [KEESH-moo] spelled **kicmu**. But if **mek-** and **-kiu** were spoken without the separating hyphen [uh], that fact would be lost; for the word would come out [MEK-yoo]. This could only be understood as the two-word phrase **me kiu** and not as a word at all. Inserting **-y-** not only holds **mek-** and **-kiu** together but also insures that both **k**'s will be heard. When **y** is playing this hyphenating role in complex words it is never stressed. In fact, it is a "non-syllable": one that is not even counted in fixing stress. In Loglan text, **y** is sometimes represented by the printed hyphen '-'. Thus **mek-kiu** is a variant spelling of **mekykiu** but is pronounced, of course, in exactly the same way.

Y also occurs as an ordinary sound in names. For example, [huhnt] **Hynt** is the Loglan transcription of the English surname 'Hunt', and [SUHM-trr] **Symtr** transcribes the surname 'Sumter'. (The sound [rr] in this second name is, as we shall see later, a "vocalic r".) In its name-spelling role **y** may occasionally be stressed. **Y** also occurs in borrowings when there is some compelling reason to preserve a 'y' in the textual form of a word. The compelling reason in the case of the words 'ytterbium' and 'yttrium' is that the letter 'y' occurs not only in the spellings of these element words in most languages (Spanish 'iterbio' and 'itrio' are exceptions) but in the internationally standardized symbols 'Yb' and 'Y' as well. Clearly the Loglan words for these elements should also be spelled with **y**. The results are [uh-TEHR-byoh] **yterbio** and [UHT-ryoh] **ytrio**. In these two cases, and currently in no others, **y** appears as a non-hyphen in a *regular word*. If the [yoh] sound for **io** in this context seems difficult to master, try saying [uh-TEHR-bee-oh] and [UHT-ree-oh] for a while. After a little practice you will find it easy to run these last two unstressed syllables together as [-yoh].

So the main uses of **y** are three: as a spoken hyphen; to give accurate respellings of some borrowed names; and to serve as a consonant buffer in the buffered dialects of Loglan, which is the topic to which we now turn.

2.7 Buffered Dialects

The most exotic use of Loglan **y** is as the *consonant buffer* in the *buffered dialects* of Loglan.⁵ In these dialects the more difficult consonant-pairs of "standard" (i.e., unbuffered) Loglan are *buffered*, i.e., their members are separated from each other by the *buffering vowel y*. For example, you may recall that the standard Loglan word for 'mother' is [MAHT-mah] **matma**. Suppose the consonant-pair **tm** is difficult for, let us say, Japanese learners of Loglan to produce, as in fact it is. In Japanese the sound /t/ is always separated from a following /m/ by a vowel or vowel-group. But Japanese loglanists are at liberty to buffer *any* Loglan consonant pair that is difficult for them to pronounce together. So they regularly insert the vowel [uh] between /t/ and /m/, saying [MAHT-uh-mah] for **matma**. Japanese loglanists could continue to spell their Loglan word as **matma**, or mark it as **mat'ma**, or use some other diacritical mark, or spell their pronunciation of it explicitly as **matyma**. But however they chose to spell the buffered word, their pronunciation of it would be [MAHT-uh-mah], a sound-sequence that would soon be as intelligible to loglanists speaking other dialects as [MAHT-mah] was. For if **y** is used exclusively as a consonant buffer in some dialect of the language, the presence or absence of its quick little sound [uh] between consonants would soon be heard as "linguistic noise" in that dialect. So in that dialect [uh] would become a "non-sound". Whether it was there or not in any given case would be another difference that made no difference in Loglan.

But for buffering to work, **y** must be used for no other purpose in the non-names of the buffered dialects. So in these dialects the role played by hyphen **y** in unbuffered ones is played by the *buffered hyphen* [yuh] spelled **iy**. Thus the word that was **mekykiu** in any unbuffered dialect of Loglan would be pronounced [MEK-yuh-kyoo] in every buffered one. Again this dialect word could be variously spelled, e.g., as **mekiykiu**, **mek-kiu** or even with a special hyphenating mark as in **mek=kiu**. But again, for hyphenating to work in buffered dialects, the sound segment [yuh] must have no other use except as it might appear in a borrowed name. For example the sequence [yuh] occurs naturally in the English surname 'Young'. The best approximation of this name in Loglan is [yuhn] spelled **Iyn**; but here the **iy** causes no problems. There is more on names in [Section 2.15](#).

Buffering foreign words has a long tradition in vowel-rich languages like Japanese and Chinese. For example, the Japanese name for the Dutch city of Amsterdam is 'Amusuterudamu'. The letter used to represent the buffering vowel in Romanized dictionaries of Japanese is clearly 'u'; but its phonetic value is in fact much closer to our Loglan [uh] than to our [oo].

We may expect a buffered dialect of Loglan to emerge among any group of speakers in whose shared native language the proportion of vowels in the speech stream was, by world standards, unusually high. In such languages utterances tend to be long strings of single consonants alternating with single vowels or vowel-groups. Consonant-clustering is therefore rare in such languages and the variety of permitted clusters is usually severely limited. Japanese is such a language. Chinese is somewhat less so but has a limited set of consonant-pairs. Among Europeans, Italians are perhaps the most intolerant of consonant-clustering and so most likely to employ the buffering principle in learning foreign languages. In the native languages of all these buffering peoples, the variety of consonant-pairs permitted is always very limited. In Japanese, for instance, the permitted set is /dj tc ts mb mp/ plus /n/ followed by any of a list of consonants.

We may expect any other pair of Loglan consonants to be buffered in the Japanese dialect of Loglan. Similarly distinctive buffering patterns are likely to develop in other buffered dialects.⁶

2.8 The Seventeen Regular Consonants

The regular consonants of Loglan are represented by the letters

b c d f g h j k l m n p r s t v z. These are all the English consonant letters except 'q', 'w', 'x' and 'y'. We have just seen that 'y' is a vowel in Loglan, and the other three missing letters occur only in irregular words. Their uses will be discussed in the next section. Of the seventeen consonant letters that do have uses in regular Loglan words, all but two have the same pronunciation in Loglan that they have most commonly in English. Thus **s** as in 'bus', but never as in 'busy'; **g** as in 'gate', but never as in 'gem'; **k** as in 'kit', but never silent as in 'knot'; and so on. The two exceptional letters are **c** and **j**. These we have already learned have the values of English [sh] and the French [zh] of 'j', this last also being the rather rare American English sound of 'z' in 'azure' or of '-ge' in some pronunciations of 'garage'.⁷ In the guides we will use [sh] and [zh] to cue the pronunciation of these two oddly-spelled sounds.

Of the two letters **c** and **j**, **c** is the only real stumbling-block in reading Loglan. Do you not agree that seeing **jo** as a new kind of 'Joe' (with the soft, French sound in 'azure') will be easier for your eye to do than learning to see 'shoe' in Loglan **cu**? Or 'sheep' in **cip**? Though seeing the German's 'schnapps' in **cnaps** might be a little easier. Still, while the letters **c** and **j** will be troublesome for your eye, neither sound will give your ear or tongue the least trouble. Say [zho shoo sheep zheep shnahps] and you have pronounced the Loglan letter-strings **jo cu cip jip cnaps**, an odd mixture of French and German sounds.

You may wonder how it happened that the letters **c** and **j** acquired these odd uses. You may recall that they stand for two sounds that were added to Loglan fairly early in the design work and that they made a very important contribution to the over-all recognizability of spoken Loglan. The reason I was reluctant to include these two sounds in the original phoneme list was not because they were *not* very widely used--because in fact they are--but because [sh], at least, is not spelled with the same single Latin letter in any group of languages that I knew of. (It is spelled with two different single letters in two languages, however: in Hungarian, where it is spelled by the letter 's', and in Portuguese, where it is one of the many values of the letter 'x'.) The sound [zh], in contrast, is spelled with the same single letter in at least four Latin alphabets: those of French, Turkish, Roumanian, and Portuguese, in all of which [zh] is spelled with 'j'. (Both [sh] and [zh] have single letters in Russian, which uses the Cyrillic alphabet. But the Latin alphabet is by far the most widely used alphabet on the planet and it was obvious it must be the Loglan alphabet as well.) Yet despite their irregular natural spelling, [sh] and [zh] not only proved to have great practical importance for building recognizability into Loglan, but the phonological symmetry of the language would in fact be weaker without them.

When it was clear that the sounds [sh] and [zh] had somehow to be accommodated in the Loglan version of the Latin alphabet, the letter **j** was an obvious choice for [zh], not only because [zh] is always represented by that letter in French and three other languages, but because it is also a component, on Loglan phonemic analysis at least, of the English sound of 'j' in 'judge'. This very

common English segment is actually composed of two sounds: [d] + [zh]. (This can be heard by constructing the word 'badger' from 'bad' followed by 'azure' stripped of its initial vowel: thus 'bad' + '-zure' = 'badger'.) This means that the sound 'j' usually has in English will be represented by a consonant pair in Loglan, namely the pair **dj**.

The letter **c** is a less obvious candidate for the [sh]-sound; but it is an inevitable choice even so. For one thing, the work 'c' usually does in other Latin alphabets is done in Loglan by **k** and **s**. For another, the letter **c** is not entirely unacquainted with the [sh]-sound in other languages. It appears in the German trigraph 'sch', which is the most familiar spelling of [sh] in German ('schuh', 'schwein', 'schiff', and so on); and it is the characteristic element in the French digraph 'ch' which is the invariant spelling of the [sh]-sound in French ('chez', 'chef', 'chien', and so on). In yet another language, Italian, a 'c'-containing digraph, 'ci-', is always used to write the sound we write in English with 'ch'...for example, in 'ciao', where it has exactly the same sound as English 'chow'. But Italian 'ci-' and English 'ch' also conceal a composite sound: in this case one composed of [t] + [sh], or Loglan **tc**. Thus the word we would write in English as 'cheap' may be rewritten in Loglan phonemes as **tcip**. (This can be heard by building the sounds of 'cheap' from 'fat sheep' by leaving off the 'fa-'. Thus 'fat' + 'sheep' - 'fa-' = 'cheap'. Evidently 'cheap' could be written 'tsheep'.) So **tc** and **dj** are in fact very similarly constituted consonant groups in Loglan, and they have symmetrical roles in the language. We will sometimes represent **tc** by [ch] and sometimes by [tsh] in the guides. Similarly, **dj** may be represented by [dzh] or sometimes simply by [j]. In each case, these are the same sounds.

Before leaving the consonant sounds, we must mention that there is one complementarily distributed pair of them in Loglan. (A "complementarily distributed" pair of sounds are such that if one ever appears in any context, the other never appears in that context; and *vice versa*.) These are the two allophones of the phoneme **n**. The first allophone is the usual English value of [n] as in 'new'. But this sound never occurs before **k** or **g** in either English or Loglan. The other is the [ng]-sound of 'sing', which never occurs elsewhere in Loglan. So the [n] of 'new' and the [ng] of 'sing' ([ŋ] in IPA) are in fact complementarily distributed sounds in Loglan. This same allophonic shift in the value of /n/ also occurs in English. Notice that the 'n' of English 'bank' does not have its usual value (i.e., the word is not 'bann-ickk') but the value of 'ng' in 'bang'. (Thus 'bang kit' and 'bank it', if spoken pauselessly, are indistinguishable in English.) But [n] and [ng] are not complementarily distributed sounds in English; for notice such contrasting English pairs as 'sin'/'sing', 'thin'/'thing', and so on. So in other contexts than before /g/ and /k/ the [n:ng] contrast is in fact phonemic in English. Not so in Loglan. The [ng]-sound does not occur anywhere else in Loglan except as a **g/k**-preceding allophone of the phoneme **n**.

The fact that there is no [ng] phoneme in Loglan will put loglanists with names like Young in a quandary. They will be obliged to choose among three not very handsome alternatives: [yuhn], which is spelled **Iyn**; [yuhngk], which is spelled **Iynk** (and rhymes with 'junk'); and a word spelled *Iyng* but pronounced [yuhngg], in which the second [g] is the hard 'g' of 'get', and rhymes with what 'bungle' would sound like if the '-le' sound at the end were left off...a common pronunciation of 'Young', in fact, in New York City. The last alternative *looks* best because it would be spelled **Iyng**. But unfortunately it cannot correctly be pronounced [yuhng]. On the other hand, German [YUHNG-krr] spelled 'Junker' can be exactly reproduced as **Iynkr**; for in

the German word the [ng] allophone of **n** is called for by the following **k**. There is still more on transcribing natural names into Loglan in [Section 2.15](#).

Finally, the seventeen regular consonants may be classified in a way that will be useful when we come to consider the pronounceability of adjacent pairs of them in the unbuffered dialects of the language. Crucial for this question is whether the consonant has a *vocalic* allophone or not, that is, whether it can be sustained in full musical voice like a vowel. If it does, it is called a *continuant*. There are four of these continuants in Loglan: the two nasals, **m** and **n** and the two liquids, **l** and **r**. Because any of these four consonants can be given a vowel-like quality, any of them may be pronounceably paired with any other consonant. Also, they are very useful in respelling foreign names taken from languages, like English, which happen to exploit this vowel-like potential of their continuants. For example, the sound spelled 'er' in the American pronunciation of 'Robert' is a vocalic /r/; so the Loglan transcription of American 'Robert' is **Rabrt**. The first **r** in this word is a consonant and it will be represented in the guides as [r]. But the second **r** is really a vowel. To show the difference between the two values of Loglan **r** in the pronunciation guides, we will write the vocalic **r** as [rr]...rather as one might record a dog's growl in a children's story as 'Grrr!' Thus the pronunciation of the Loglan word **Rabrt** is [RAH-brrt]. There is an ordinary **r** in first place and a "growly **r**" in second.

Each of the four continuants has two such allophones in Loglan, one of which might be called the *consonantal*, and the other the *vocalic* version of its sound. The consonantal version of a continuant will always be represented by the letter itself in the pronunciation guides, thus as [m n r l]; the vocalic version by the doubled letter: [mm nn rr ll]. This explains why the English names 'Earl', 'Myrtle' and 'Burton' will seem to have no vowels at all when they are rewritten in Loglan: **Rl**, **Mrtl** and **Brtn**. But when we write out the pronunciation guides for these words, we get [RR-ll], [MRR-tll] and [BRR-tnn]; and now we see that they do have vowels, namely the continuants used as vowels. There is a spelling option in Loglan that will make this feature plain if we want to use it. We can double the continuant letter when its value in a word is vocalic...just as we do in the guides. Thus **Rrll**, **Mrrtll** and **Brrtnn** are equally legitimate ways of spelling these three natural words in Loglan.⁸

The thirteen remaining consonants have no vocalic values. Twelve of them may be further divided into the *voiced* series, **b v d z g j**, and the *unvoiced* series, **p f t s k c**. Voice is the quality a consonant acquires when its production is accompanied by the vibration of the vocal chords. (The presence or absence of voice can be sensed by placing the tips of your fingers on your larynx, or Adam's apple, as you speak. For example, you may notice that the vibration due to voice disappears when you whisper any normally voiced sound.) All vowels and all continuants are, of course, voiced; but only half of the non-continuants are voiced. The other non-continuants are, in fact, whispered (i.e., voiceless) versions of the voiced series, as you can easily find out by trying to whisper the series **b v d z g j**. What you will actually produce by whispering is the unvoiced series **p f t s k c**. Thus each voiced non-vocalic consonant has an unvoiced equivalent, and *vice versa*. The sound **b** is the voiced equivalent of unvoiced **p**, **v** of unvoiced **f**, **d** of unvoiced **t**, and so on. This principle will be useful when we come to consider the pronounceability of certain consonant groups in constructing words.

The aspirate **h** is the seventeenth regular consonant and has a unique distribution in the language. Since **h** is a burst of voiceless breath, it takes the acoustic shape of the following vowel. So **h** may only precede vowels. Its voiced companion, **x**, is not widely distributed in nature, and is one of the irregular sounds of Loglan. This is the group we will take up next.

2.9 The Three Irregular Phonemes /q w x/

The three irregular sounds are **q**, **w** and **x**. They are used only in names and in some exceptional scientific words. For example, **x** is used in **Xai-kre** 'X-ray', and **w** is used in **wlframo** for 'wolfram', the word for the chemical element--usually called 'tungsten' in English--for which the international symbol is 'W'. These uses are typical. So they do not occur very frequently in the language.

q [th] is the same sound as the English 'th' in 'thin', 'theta' and 'Thule'. **Q** is in fact the sound that is spelled with the letter theta ('θ') in Greek. Capital 'Q' looks a little like capital 'Θ' with the bar slipped down. The **q**-sound is represented by [θ] in IPA.

w [u] is the vowel represented by 'u' in French and by 'ü' (as in 'München') in German. We will call it French 'u' and represent it by [eu] in the guides. Thus the odd word **wlframo** is pronounced [eulf-RAHM-oh] with a very French- or German-sounding 'u'. The IPA symbol for Loglan **w** is [y].²

x [kh] is the voiced version of **h**; it is the "rough breath" of Greek and Russian, and the sound spelled with the letter chi ('Χ') in Greek. In fact our European letter 'X' is derived from 'Χ'. **X** [kh] is also the sound represented by 'ch' in both German and Scottish. Thus **Xai-kre** is pronounced [KHIGH-uh-kreh], in which the [KH] is a very distinct but dry sort of gargle which will sound very Russian to you when you get it right. Notice that unlike **h**, **x** may precede as well as follow vowels. When [kh] does precede a vowel, as it does in **Xai** [khigh], it takes the acoustic shape of that vowel. Happily enough, the IPA for Loglan **x** is [x].

Two of the irregular phonemes are consonants and one, **w**, is a vowel. As noted, their chief use is in spelling scientific words like 'wolfram' and 'X-ray' that require that these letters be used if international conventions are to be obeyed. But a secondary and even more common use of the irregular letter-sounds is in respelling borrowed names. This is usually done in preparation for importing them into Loglan. Thus **q** may be used to transcribe English 'Theodore' faithfully as **Qiydor** [THEE-uh-dawr], **w** to pronounce French 'Pasteur' in the French way as **Pastw'r** [pahs-TEUR], and **x** to render German 'Bach' precisely as **Bax** [bahkh]. Russian 'Krushev' may be approximately rendered as **Xrustcyf** [KHROOS-chuhf]. In general, we loglanders try to pronounce foreign names in ways which are as much like the originals as our kit of letter-sounds will allow. But when we have respelled a name in a way that gives us as good an approximation as possible, we then pronounce it in a Loglan way. Thus phonetically, Russian 'Krushev' is [KHROOS-chawf]. But we have no [aw] phoneme in Loglan. We have the sound but it is an allophone of Loglan **o**, namely the value **o** has after **r** and **i**. So if we wrote 'Krushev' as **Xrustcof** we would be obliged to pronounce it as [KHROOS-chohf], which I judge to be farther from the original than [KHROOS-chuhf] is. In a simpler case, one must choose between [jeem] and [jehm]; for there is no [jihm].

2.10 Stress

Stress is an increase in the length, pitch or loudness of a syllable relative to other syllables in the same word or utterance. Three levels of stress are phonemic in Loglan: zero, light, and heavy (or emphatic) stress. In general, light stress is used to accent the syllables of words and heavy stress to emphasize some words in some sentences. Zero or no stress usually characterizes strings of monosyllabic words in Loglan and provides the monotonic background against which the tunes of light and heavy stress are played.

If we look at the stress-privileges of the syllables comprising Loglan words, we find that they fall into three exclusive classes: (i) those that are *always-stressed*, whether lightly or heavily; (ii) those that are *never-stressed*; and (iii) those that are *sometimes-stressed* (and sometimes unstressed). The always-stressed syllables are the penultimate, or next to the last, syllables of a certain form-class of Loglan words called "predicates", which we will define in [Section 2.16](#). The never-stressed syllables are all the other syllables of predicate words; and the sometimes-stressed syllables are all the syllables of all the non-predicate words in the language.¹⁰ We shall make use of these stress-classes again when we discuss how the various types of words are resolved in speech.

In the pronunciation guides to spoken Loglan we will write unstressed syllables in lower case letters (e.g., [leh-toh] for **le to** = 'the two'), lightly stressed syllables in capital letters (e.g., [leh-toh-MREH-noo] for **le to mrenu** = 'the two men'), and emphatically stressed syllables in bold-face capitals; e.g., [leh-toh-**ZHOON**-tee-MREH-noo] for **le to *junti* mrenu** = 'the two *young* men'; and, as in English, we will underline the emphasized word in text. Later on we will replace these phonetic guides with phonemic transcriptions in which the same stress conventions will apply. For example, /leto/, /letoMREnu/ and /leto**JUN**tiMREnu/ transcribe the same spoken strings phonemically, that is, as a string of phonemes. In these more compact transcriptions of Loglan speech we will pay less attention to the sounds of individual phonemes and more to the contours of stress and pause that shape the phoneme stream. But obviously you will need to know more about how the phonemes themselves are produced in their various settings before these phonemic transcriptions will be of much use to you. So for a while longer we will attempt to convey the audible rhythms of Loglan speech through these longer, but phonetically more informative, pronunciation guides.

A word about pauses...or rather, about pauselessness. In normally rapid speech in all languages, there are no pauses between words. Pauses, when they do occur, are usually grammatically or morphologically significant. So when the normal pronunciation of a Loglan utterance can be expected to be pauseless, we shall omit the spaces between words in both kinds of transcription, as in fact we have done in all the transcriptions given above. Thus as normally spoken 'The two young men' and **Le to *junti* mrenu** are pauseless "blurts" of sound in both languages. This fact is better conveyed about Loglan by /leto**JUN**tiMREnu/ than by [leh-toh-**ZHOON**-tee-MREH-noo], with its more languid marking of syllable joints, just as 'Thetwoyoung**MEN**' would bring the pauselessness of normal English to the reader's attention much more dramatically than 'The-two-young-**MEN**' would. But the present advantage of a clearly syllabified pronunciation guide is that it shows the English-speaker exactly how each Loglan syllable is to be produced. You will find this kind of phonetic detail useful for a while longer. If you use this information well, you

will soon be able to listen to "good Loglan" coming from your own lips. This will speed up your learning immeasurably.

When a pause does occur in Loglan speech we will represent it by a period (full-stop) '.' in both kinds of transcription. Thus [leh-**TOH** . ZHOON-tee-MREH-noo] and /le**TO** . JUNtiMREnu/ both show that, when the number word in **Le to junti mrenu** is stressed, a pause must follow it. The same stress-pause pattern often occurs after emphasized words in English: 'The *two* (pause) young men'. While variable in English, this is quite a general rule in Loglan. *No* stressed syllable may be allowed to precede a predicate unless there is an intervening pause. There is more on this in [Section 2.14](#).

The phrase **Le to junti mrenu** happens to contain instances of all three stress-classes of Loglan syllables. Thus **Le** and **to** are sometimes-stressed monosyllables. Indeed, as we have just seen, **to** may either be emphasized or left completely unstressed. The first syllables **jun-** and **mre-** of **junti** and **mrenu** are, in contrast, instances of the always-stressed penultimate syllables of predicate words. And the final syllables **-ti** and **-nu** of these same two disyllables are instances of never-stressed syllables. Thus the emphatic pronunciation of **junti** is not */**JUNTI**/ (the leading asterisk indicates that the sequence so-marked is impermissible) but /**JUNti**/.

2.11 Pause

There is only one pause phoneme in Loglan although it has many allophones. As mentioned in the previous section, pauses are represented by [.] , [.] or /./ in the guides and transcriptions. They are also sometimes marked in text by commas (,) or periods (.), and sometimes not marked at all in written Loglan. For example, pauses are required before all connectives and after all names; and pauses in these two contexts are marked by commas. Thus, the connective [eh] ('and') in [leh-MREH-noo . eh-leh-BOHT-shee], a phrase which means 'The man (pause) and the boy', is not only preceded by an obligatory pause, but that pause is marked by a comma in writing: thus **le mrenu, e le botci**. Similarly, all names are separated from their sequelae by pauses; and except in the middle of a serial name (**Djan Pol Djonz**), such post-nominal pauses are also regularly marked by commas. Thus, we say [lah-JAHN . MREH-noo] for 'John (pause) is a man' in speech; and we write this sentence as **La Djan, mrenu** in text. We also say [lah-jahn . pohl . JOHNZ . MREH-noo]; but we write **La Djan Pol Djonz, mrenu**, celebrating only the last of those pauses in text. Thus both connectives and names are rather special words in the Loglan utterance, and the flow of speech is always broken--even if briefly--before the former and after the latter.

Another, even longer pause normally occurs between the utterances in an extended speech. Thus [YAH . ee-mee-KEESH-moo] really consists of two utterances. The little word [YAH], spelled **Ia**, which means 'Yes' in the sense of 'Yes, that's true' or 'Yes, I agree with you', is the first of the two utterances. (Though a single word, **Ia** is an utterance because it sends a potentially complete message. That is, the speaker could have stopped with **Ia**, but chooses not to.) The second utterance is [mee-KEESH-moo], spelled **Mi kicmu**, means 'I'm a doctor'. These two independent remarks are joined by the "utterance connective" [ee]--which is of course spelled **I**--and this important word is sometimes translated into loglanized English as 'And' with a capital 'A'. Of course the word **I**, like all connectives, is required to be preceded by a pause. But the **I**-

connective signals an even greater break in the flow of ideas than connectives between words and clauses do. So **I** (and its numerous kin) is always preceded by a period or full stop (.) in text. Thus we make this little speech [YAH . ee-mee-KEESH-moo], in which the pause is just another Loglan pause. But we write **Ia. I mi kicmu** with a period (.), rather than a comma before the **I**. This textual mark has the same grammatical significance as the full stop between sentences in English has; that is to say, between any pairs of them, things should parse. In *literal* translation-- by which I mean word-for-word, or word-for-phrase, translation--**Ia. I mi kicmu** would come out 'Yes. And I am-a-doctor.' Notice that it takes an English phrase to render that one word **kicmu**. We will learn why in the next chapter.

Some allophones of the Loglan pause phoneme do not appear as anything but the standard interverbal space in writing. We have already mentioned that the pauses that occur between the parts of a serial name are not marked with commas in text; for example, 'John Jones' is pronounced [jahn . JOHNZ] but written **Djan Djonz**. If a serial name were spoken without a pause, the listener would hear it as a single word and write it as one: **Djandjo'nz**. So the interverbal spaces in serial names are, in a sense, acknowledgement enough that there are pauses there. The pauses required before vowel-initial words that are not connectives are similarly invisible in text. Thus, the space between the otherwise adjacent /a/s in the phrase **la Aili'n** ('the-one-named Eileen') is marked by the briefest of pauses in speech, a "glottal stop": [lah.igh-LEEN]. But such pauses are unmarked in text: **la Aili'n**. The short pause in the phrase **le iglu** [leh.EEG-loo] ('the igloo') is similarly invisible. The pause used in nearly all these intervocalic contexts is a *glottal stop*. This is the sound--or rather, the brief absence of sound--that replaces intervocalic /t/ in some Northeastern dialects of American English...in Brooklyn [BAH.II] for 'bottle', for example. (Try pausing briefly instead of saying the /t/ of 'bottle' in order to hear your own glottal stop.) Glottal stops are always represented by "close periods" in the guides, i.e., by periods without spaces around them.

All the pauses that we have discussed so far have been *obligatory*. They are always present in these contexts in faultless speech. There are some other contexts that call for obligatory pauses which we will encounter later. But let us now consider briefly the uses of *optional* pauses.

If you think about it for a moment, you will realize that the joint *between* a pair of words in any language may be occupied by a pause but that no joint within a word should ever be. In fact, this is pretty close to being a satisfactory definition of what a *word* is: a word is any segment of speech that can be separated from other such objects by pauses, and within which pauses never occur correctly. Pauses may of course occur inside a word by accident or hesitation; but it is never correct to put one there. That is to say, it would not be *correct* to tell someone "'Never(pause)theless" is a word in English.'

So let us agree that a speaker may pause at any *word-juncture*, as linguists call these "pausable" joints in the speech stream. It is the Loglan writing convention to represent any such intended use of an optional pause by a comma. What such commas mean is that the writer intends the reader who is reading aloud to pause at at least these places...possibly more. By this convention, we help preserve the isomorphism of the two forms of the language...including differences in individual phrasing styles. The main use of optional pauses (and the commas that go with them) is, of course, as *phrasing pauses*: those breaks in the flow of speech or text which allow the

speaker or writer to gather up the threads of what he or she has just been saying, and to make plans to say more. Judiciously placed, such pauses also allow the listener/reader to knit up what he or she has just heard or read; and this of course readies him or her to hear more. So pauses are a reasonably important part of the listening/speaking interaction, just as commas are in the reading/writing act.

Note that since pauses may be used at any juncture, they may be used at every juncture in a given utterance. Thus nothing prevents us from saying [leh . MREH-noo . eh . leh . BOT-shee] to help a novice hear the words in what we are saying. But if we do speak that way, or intend what we write to be read aloud in that fashion, then convention requires that we mark all the pauses in such didactic sentences with commas when we write them down. Thus **Le, mrenu, e, le, botci** is the textual equivalent of the above utterance. What is "not allowed"--that is, what would be counted as an error--is pausing *inside* a word; for example, *[leh-MREH . noo-eh-leh-BOHT . shee]. This is of course exactly the kind of helpless hesitation that a newcomer to the language might easily fall into...especially one who hadn't acquired much confidence in his or her control of the vocabulary. Everyone except machines will be tolerant of such errors, of course. Indeed, we human listeners hardly hear them. It is an interesting fact about human listening that we correct other people's slips of speech so swiftly and automatically that we are often unaware that errors have occurred. Still, the point is that pausing inside a word can occasionally be genuinely misinforming to one's human listeners, and will probably always be so to even the most amiable of our machines.

2.12 Intonation

Most natural languages have more pause phonemes than Loglan's one. English, for example, has four pause phonemes, or "junctures" as they are often called. The reason Loglan can get by with just one is that, in natural languages, the many varieties of pauses are combined with the sentence-long rise and fall of musical pitch called intonation to produce composite effects that serve the same classifying function for the spoken tongue as punctuation marks do for the written form. They identify the varieties of utterances: questions, declarations, imperatives, and so on. But, as we have already seen in the case of hyphens, commas, and full-stops, most Loglan punctuation marks are actually "spoken aloud"...even if the "speaking" is a bit of silence. Thus the sound **y** is often a spoken hyphen, and the word **I** is like a spoken period in that it always calls for one in text. But there are also spoken question-marks, spoken parentheses, spoken quotation marks, and so on, in this language. This not only makes possible a very substantial isomorphism between the written and spoken forms of Loglan, it also permits the pause structure of the language to be very simple.

A related simplification of Loglan phonology is that intonation, or the rise and fall of musical pitch that accompany most human sentences, is not phonemic in Loglan. Thus, whether a speaker accompanies a question with falling pitch, or with rising pitch, or with no pitch-change at all, is a matter of structural indifference in Loglan. All differences between sentence-types in Loglan--between its questions, imperatives, declarations, and the like--are either marked with special grammatical patterns or by special punctuation-like words. For example, there are many question-asking words in Loglan, but the one that turns any statement into the kind of question that takes yes or no for an answer is the little word [eighee] spelled **ei**. Thus if [dah-MREH-noo]

or **Da mrenu** means 'He is a man', as it does, then [EIGHÉE-dah-MREH-noo] or **Ei da mrenu** means 'Is he a man? ('Eh, he's a man?'). But this question can be accompanied by any intonation contour whatever in Loglan, including a perfectly level (i.e., monotonic) one.

Allowing tonal matters to vary freely over the full linguistic range of the native languages of its speakers may have the interesting consequence of making Loglan not only easier to learn--for intonation patterns are usually among the last features of a second language to be mastered by adults--but also remarkably expressive. For here is an entire dimension of language structure which may have been freed for non-structural purposes...for example, expressiveness. On the other hand, we may find that intonation is a biologically necessary part of the human speech performance.¹¹ In that case a structure of intonation will grow up redundantly in Loglan whether we design it or not. Either result would be scientifically interesting.

Having completed our list of the sounds and sound contours that are, and are not, phonemic in Loglan we may now turn to the various forms of Loglan words.

2.13 Three Kinds of Words

A major distinction between the words of any language may be drawn between those relatively few, short but frequently used words that convey the grammatical structure of a sentence--words like 'the', 'of', 'is' and the various affixes of English like '-ing', '-ed', '-es', and so on--and the relatively numerous, but longer and less frequently used words that convey its particular referential content: words like 'cat', 'run', 'John', and 'democracy' in English. Let us call the first kind *structure words*, and the second *content words*. Occasionally we will call the simple structure words *little words* because all of them are.

Content words always refer to something outside the sentence ('That's a cat'); structure words seldom do. But this extralinguistic reference may be made in two quite different ways. It may be made by *naming* a unique person, place or thing--many capitalized words like 'John', 'France', or 'Democracy' do this work in English ('That's John')--or by *predicating* some property of it--which means ascribing to it some feature--that may, in principle, be shared by many things: 'cat', 'run', 'blue' and 'democracy' with a small 'd' ('That's a cat'). Let us call the first type of content words *names*, and the second, *predicates*.

Every content word is either a name or a predicate. We are using the word 'predicate' to refer to the second and largest category of Loglan content words, and not more detailed grammatical labels like 'noun', 'verb', 'adjective', 'adverb', and so on, because one of the most surprising things about Loglan grammar is that no sharp distinction can be drawn in it between these several ways of ascribing properties to things. The word 'predicate' suggests their common grammatical role, even in English. It happens also to be the word favored by logicians to describe the general class of property-ascribing words.

Summing up, we have three main classes of words in Loglan: structure words, names, and predicates. We are about to see that each has an exclusive set of permissible word-forms. These have been devised in such a way that any word may be classified by the listener from its shape alone.

2.14 Structure Words

Structure words are relatively few in number but among the most frequently used words in any language. They also tend to be among its shortest. Thus, the shortest words in English--'a', 'an', 'of', 'to', 'if', 'so', and so on--are all structure words. This is also true in Loglan. Words composed of single vowels like **e** [eh] (V-form words), of vowel pairs like **ia** [yah] (VV-form words), of a consonant followed by a single vowel like **le** [leh] (CV-form words), and of a consonant followed by a pair of vowels like **sui** [swee] (CVV-form words) are all structure words in Loglan. All such monosyllabic structure words are called *little words*. They have the following linguistic formula:

$$(C)V(V)$$

Elements contained in parentheses are optional, i.e., may occur one or zero times. Thus **e** ('and'), **ia** ('yes'), **le** ('the') and **sui** ('also') represent the four permissible forms of little words.

Compound structure words are formed by combining two or more little words in some order. Thus **leva** ('that') is made from **le** + **va** ('the' + 'there') and **anoi** ('if') is made from **a** + **noi** ('or' + 'not'). So compound little words have the formula:

$$(C)V(V) [(C)V(V)]$$

Here the square brackets mean 'one or more instances of (whatever is enclosed)'. In general, compound little words are the less frequently used structure words of a language. For example, 'nevertheless' and 'howsoever' are relatively infrequently used structure words in English; and not surprisingly they are compounds of simpler English words. Loglan also has a few such polysyllabic monsters. For example, [pah-sheh-NOY-nah] or **pacenoina** means literally 'before-and-not-now' and translates the claim of English 'no longer' quite precisely. Similarly, [soo-TAWR-ree] or **sutori** means literally 'at-least-two-th'. It is derived from **su** = 'at least', **to** = 'two', and **-ri**, the general ordinal suffix (hence '-th'); and so is an elegant rendering of that awkward phrase 'second and subsequent' that we need so frequently in talking about Loglan. For brevity compound little words are sometimes called simply *compounds*. Thus there are two kinds of structure words: little words and the compounds made from them.

There are few phonological restrictions on the formation and use of structure words in Loglan. For example they may be stressed or unstressed as the speaker chooses. Moreover, every possible pairing of the 17 regular consonants with the 5 main vowels, **a e i o u**, is permitted in the CV- and CVV-form words. Also, every possible combination of the main vowels with each other is permitted in VV- and CVV-form words. But the 25 vowel-pairs so generated fall into three distinct classes on the basis of how they are pronounced.

The Four Monosyllables: **ai ao ei oi** are always monosyllabic. These are the four natural diphthongs that occur monosyllabically in most languages. In Loglan **ai** is invariably pronounced [igh] as in 'high', **ao** [ow] as in 'how', **ei** [ey] as in 'Hey!' and **oi** [oy] as in 'ahoy'. The [ey] of **ei** is sometimes written [eighee] in the guides to reveal its two component vowels more clearly. Thus **ei** starts with [eigh] and ends with [ee]; and there is a smooth transition or "glide" between them.

All the monosyllabic vowel-pairs are glides in that sense: they start out being one vowel and end up another. Notice that three of the invariable monosyllables end with **i**. The fourth, **ao** [ow], is special. The way to remember the un-English spelling of [ow] is to think of Chairman Mao. In the word-formulas, a monosyllabic vowel-pair will be represented by 'vv'.

The Eleven Disyllables: **aa ae au ea ee eo eu oa oe oo ou** are always pronounced as two syllables. Either the first or second vowel may be stressed, but so long as they are unlike, neither need be. Either the first or second syllable of a doubled vowel (**aa ee oo**) must, however, be stressed. Thus **aa** is [AH-ah] or [ah-AH], but never *[ah-ah]. The pronunciations of the unlike pairs are given here with level stress, which is perhaps their most common stress contour: **ae au** [ah-eh ah-oo], **ea eo eu** [eigh-ah eigh-oh eigh-oo], **oa oe ou** [oh-ah oh-eh oh-oo]. A brief glide may occur between the two vocalic syllables, but not a glottal stop. The latter would cause the resolver to perceive a word-juncture between the two vowels. Some of these vowel pairs--especially **oo** and **ee**--look like English monosyllables but are not ([OH-oh] and [EIGH-eh]). Fortunately for English-trained eyes, these last two pairs are rare. Notice that it is always the prevocalic allophone of **e**--the [eigh] of 'late' 'freight' and 'sate'--that is called for when **e** is in first position in any of these words, while it is the primary allophone [eh] that is always called for in second position. In the formulas, a disyllabic vowel-pair will be represented by 'VV'.

The Ten Optional Disyllables: **ia ie ii io iu ua ue ui uo uu** are normally and preferably pronounced as monosyllables but may occasionally be spoken as disyllables. When one of these optionals is difficult for some speaker to produce as a monosyllable, he or she may opt to spread its sounds out over two syllables. This is especially tempting for the learner when the vowel-pair comes after any of the vocalic consonants **m n l r**. Thus while [mwee] [nwee] [lwee] and [rwee] are all possible pronunciations of **mui nui lui** and **rui**--these are all very brisk sounds and have rather a French air--[MOO-ee] [NOO-ee] [LOO-ee] and [ROO-ee] are easier for the newcomer to Loglan to produce and also permitted. Note that all the optional disyllables commence with either **i** [y] or **u** [w]. The **i**-initial series **ia ie ii io iu** is pronounced monosyllabically as [yah yeh yee yoh yoo] and disyllabically as [EE-ah EE-eh EE-ee EE-oh EE-oo]. The **u**-series **ua ue ui uo uu** is pronounced monosyllabically as [wah weh wee woh woo] and disyllabically as [OO-ah OO-eh OO-ee OO-oh OO-oo]. In the word-formulas the optionals are represented by either 'vv' or 'VV' depending on how they are actually being pronounced.

In rapid speech the stress in compound little words is usually level; that is, there is no distinctively stressed syllable. On the infrequent occasions when there is one, it is usually penultimate, the second from the last syllable. Any order of V-, VV-, CV- or CVV-form segments is permissible in a compound except that V-form segments may only be initial or follow a CvV-form (monosyllabic) three-letter segment. Thus [AH-tigh] **Atai** = **a** + **tai**, [ah-TEIGH-oh] **Ateo** = **a** + **teo**, and [TIGH-ah] **Taia** = **tai** + **a** are all permissible compounds; and because they are all acronyms, that is, quasi-predicates, they are all penultimately stressed. But ***Teoa** [teigh-OH-ah] is not permissible. If it were, it could be heard either as the phrase **te oa** or as a compound derived from **teo** + **a**; and that would be ambiguous. The limited distribution of V-form segments in compounds prevents that ambiguity from arising; and [teigh-OH-ah] in fact resolves as the phrase **te oa**.

A second rule--one that we have already seen at work--is that any V-initial word, whether it is a structure word or not, must be preceded by a pause...usually, a glottal stop. Thus in both [lah.igh-LEEN] **La Ailin** = '(The one named) Eileen' and [leh-MREH-noo . ah-noy-leh-BOHT-shee] **Le mrenu, anoi le botci** = 'The man (pause) if the boy', the pauses in the two Loglan utterances are both obligatory. Only the second is marked with a comma, however.

A third rule--also mentioned previously--is that if any emphatically stressed syllable immediately precedes a predicate, the two words must be separated by a pause. Thus [leh-**VAH** . MREH-noo] **Leva mrenu** = '*That* (pause) man' and [leh-**VAH**-teh-MREH-noo] **Leva te mrenu** = '*Those* three men'; but not *[leh-**VAH**-MREH-noo]. (Again, the '*' indicates an impermissible form.) This rule prevents a terminally accented structure word from becoming part of the following predicate word.

2.15 Names

In all languages spoken by peoples with frequent contact with other peoples, proper names are phonologically irregular. Thus neither 'Constantinople' nor 'Robert' was originally an English word. This will be emphatically true in Loglan. Loglan is a culturally neutral language. Its job is to reproduce the products of a great diversity of human cultures as faithfully as possible, including their proper names. So nearly all Loglan names are linguistic borrowings from the natural languages most closely associated with the things named. Thus 'France' is [frahns] spelled **Frans** in Loglan and 'England' is [EENG-gluhnd] spelled **Inglynd**; but 'Germany' is [DOYTSH-lahnt] and spelled **Doitclant**. For we are obliged to follow the phonetic habits of the Germans, not the English, in giving the country of the Germans its Loglan name. **Doitclant** illustrates still another point. The German word is 'Deutschland'. But since Loglan spelling is phonemic, and that of few natural languages is, we must follow the pronunciation of the natural word rather than its spelling when the two diverge.¹² And [DOYTSH-lahnt] is in fact the way a German would pronounce this German word.

There are, of course, certain "universal" objects, or at least non-local ones, on which no language has a special claim. These, like the Sun and the Moon, the days of the week, and the months of the year, are usually named in Loglan by using simple constructions based on widely shared roots, e.g., [sohl] **Sol** and [loon] **Lun**. The CVC-form turns out to be an attractive formula for these constructed name-words, and its use has introduced a modicum of regularity into the otherwise riotous phonology of Loglan names.¹³

Yet even the most imitative Loglan names are regular in one way. You may have noticed that all Loglan names end in consonants and that no other Loglan words do. This is no accident. That final consonant serves to distinguish Loglan names in the speech-flow. The convention is that if the natural name does not end in a consonant, the Loglan version is provided with a final **s**. Thus the Romans' name for Rome is 'Roma', so the Loglan word is [ROHM- ahs] **Romas**. (Not **Rom**, by the way; for this blunt English monosyllable would offend the Roman ear far more than the addition of the sibilant **s** to their graceful disyllable.) The Italian word for Italy is 'Italia', so the Loglan word is [ee-TAHL-yahs] **Italias**. Mary's English name in Loglan phonetic transcription is [MEH-ree]; in Loglan phonemes this is /MEri/; so her Loglan name is [MEHR-ees] **Meris**. And so on. Sometimes a happy accident occurs. The French pronunciation of 'Paris' is [paa-REE].

(Recall that the [aa] I've used in this guide is the French and Spanish 'a' of 'la'. It is more tense and higher-pitched than the Germanic [ah] of 'father' and 'Vater'. [aa] and [ah], then, are dialectical variants of Loglan **a** and you may use either one. But if one can, one prefers to pronounce the capital of France in a French way.) Phonemically, [paa-REE] is /paRI/. Adding final **s** to it produces **Paris** again, but the word may now be stressed in the French way: [paa-REES]. Since stressing a word on its final syllable is not a standard Loglan move--standard stress in all types of words is penultimate in Loglan--the non-penultimately stressed vowel must be marked in the written form so that other loglanists will pronounce it as the maker intended. We'll follow the Spanish custom of marking unexpected stresses. But rather than use an accent mark we'll use the typographically simpler apostrophe after the abnormally stressed vowel. So the final rewriting of French 'Paris' in Loglan is **Pari's**.¹⁴ In copying the stress, at least, and perhaps the French [aa] as well--not to mention the uvular Parisian 'r' which we loglanists would also regard as an acceptable variation of **r** in such contexts--we acknowledge the prior phonological claim of the source language.

Just as abnormal stress can be preserved in names, so can abnormal syllabification. Take the name 'Lois'. In English the word is distinctly two-syllables: [LOH-ihs]. (The [ih] in the guide stands for the non-Loglan sound of 'i' in 'this', 'miss' and 'Jim'.) But if, as before, we decide that Loglan **i** gives the best approximation to non-Loglan [ih] and write **Lois**, we come face to face with the rule that **oi** is one of the "invariable monosyllables", and so must be pronounced [oy]. Whence unmarked **Lois** will be pronounced [loyss], and will rhyme, unhappily, with 'Joyce'. To avoid this fairly large distortion of a natural name we use another diacritical mark, this time a *close-comma*, that is, a comma without the usual following space. Now when we write **Lo,is**, the close-comma will mark a *syllable break*. So to any Loglandical reader, the correct pronunciation of **Lo,is** will be [LOH-ees] as desired. Note that if we had accepted **e** [eh] as the best approximation of English [ih], as many English-speakers are inclined to do, then **Loes** would automatically be pronounced disyllabically as [LOH-ess] and would need no mark. **Oe** is one of the invariable disyllables; so no close-comma would be required. In general, close-commas are used as sparingly as possible. When there are no close-commas in a name, the default convention for any string of vowels is to pair from the right. Thus unmarked **Uaos** syllabifies as /U,aos/ and is pronounced [OO-owss]. If the pronunciation [WAH-ohss] had been intended, one would have spelled the name **Ua,os**.¹⁵

Note that after all attempts at good approximation have been made, the resulting name-word is a *Loglan* word composed of Loglan phonemes, and so must be pronounced in a Loglan way. Thus the closest Loglan approximation of the English word 'Jim' is probably **Djim**. But, since there is no [ih] in Loglan this word must be pronounced [jeem], not [jihm]. Alternatively, Jim might choose [jem] **Djem** for his Loglan name. In either case, there will be some distortion. Distortion is, of course, quite natural. In fact whenever a word from one language is taken into another its sounds are likely to be distorted in some way.

Any name that is not final in a sentence must be followed by a pause. This requirement, like the final consonant which it thereby isolates, helps names to be heard as such in the flow of speech.

Apart from adding final **s** when necessary, marking non-penultimate stresses and abnormal syllable breaks with apostrophes and close-commas respectively, and finding good

approximations in the Loglan phoneme set to the phonemes of the natural name, there are no phonological restrictions on names beyond the modest ones that they be at least two phonemes in length and be followed by a pause. So the formula for Loglan names is very simple:

[V/C]C .

This means that any sequence of one or more consonants or vowels, however long and in whatever order, if followed by a consonant followed by a pause, is a permissible Loglan name. Thus both **Rl** ('Earl') and **Ibn Saud** [EE-bnn . SAH-ood] are permissible Loglan names but **Babi** ('Bobby') isn't. [BAH-bee], in fact, will be heard by any loglanist as the pair of little words **ba bi** ('something is...').

We have already noted that any syllable of a name word may be stressed or unstressed in any way that reflects the conventions of the language of origin. Therefore names, like structure words, may be thought of as composed of sometimes-stressed syllables.

2.16 Predicate Words

Predicate words form the bulk of the vocabulary of any language. About 90% of most dictionaries is composed of them. They range in English from short, frequently used words, like 'egg', 'run' and 'boy', to very long, seldom-used (and usually short-lived) technical predicates like 'antidisestablishmentarianism'. In Loglan, too, predicate words vary in length from short words like **iglu** [EEG-loo] to long technical borrowings like **trifenilmethani** [tree-feh-neel-met-HAH-nee] ('triphenylmethane'), the only requirement being that they have all the properties of a Loglan predicate. There are five of these:-

1. Predicates must be *vowel-final*. They share this property with structure words. It distinguishes them absolutely from names.
2. Predicates must contain at least one pair of *adjacent unlike consonants*, a CC. This distinguishes them from structure words.
3. Predicates must have *at least two syllables*. Thus **glu** and **drei** (pronounced [gloo] and [drey]) have the first two requirements but not the third. So they may not be predicates. If monosyllables were allowed to be predicates, they would steal any stressed syllable that preceded them, and grow into other predicates. Thus [gloo] would steal [EE] and become [EE-gloo] **iglu**; [drey] would steal [SHEE] and become [SHEE-drey] **cidrei**.
4. Predicates must be *penultimately stressed*. This, as we have seen, is the Loglan standard for polysyllabic words. All unmarked names and many compound structure words also follow this standard. But in predicates, penultimate stress is invariable.
5. Each predicate must be *uniquely resolvable* as a single word.

What the last property means is that anyone who wants to add a new predicate to Loglan must first make certain that it does not break up into smaller words. Thus, just as ***Babi** won't do for a

Loglan name because it is not C-final and breaks up as **ba bi**, so ***neutroni** [neigh-oo-TROH-nee] won't do as the Loglan predicate for 'neutron' because it breaks up as **neu troni**. Also, the builder must make certain that the new word is not capable of attaching itself to other words in its neighborhood. For example, ***proa** [PROH-ah] won't do as the word for 'proa' because it will steal any unstressed CV-word that happens to precede it. Thus **te *proa** [tep-ROH-ah] will be heard as **teproa**, which is a predicate, alright, but not the one intended.¹⁶

How to make Loglan words that will resolve as you intend them to is a matter that belongs properly to Chapter 6. There we will consider word-making and all its joys and hazards. But in this chapter we are concerned only with correctly-built words, in particular, with how well-made ones may be separated from one another in the speech stream.

One kind of information we'll need to do this is whether a particular consonant-pair may be initial in a word or not. The rules say that at least one CC must reside in every predicate. It is easy to detect CC's in the speech stream, but as an English-speaker you will find it practically impossible to tell whether the one you're hearing can be initial in its predicate or not...not, that is, until you've become familiar with the Loglan set of *permissible initials*. The complete set of permissibly initial consonant pairs is given in [Table 2.1](#).

Table 2.1 The 36 Permissible Initial Consonant Pairs

	-b	-c	-j	-k	-l	-m	-n	-p	-r	-s	-t	-v	-z
b-					bl				br				
c-				ck	cl	cm	cn	cp	cr		ct		
d-			dj						dr			dz	
f-					fl				fr				
g-					gl				gr				
j-						jm							
k-					kl				kr				
m-									mr				
p-					pl				pr				
s-				sk	sl	sm	sn	sp	sr		st		
t-		tc							tr	ts			
v-					vl				vr				
z-	zb												zv

Any CC that is not in this set cannot be initial in a Loglan word. We'll call the complement of the tabled set the **impermissible initials**.

Sixteen of these pairs do not occur initially in any English word. Yet none of them is particularly difficult for an English-speaker to produce. For example, the **c-initial series ck cl cm cn cp cr ct**, which, with added [uh], become [shkuh shluh shmuh shnuh shpuh shrueh shtuh], do not occur in English; but all occur in German and are surprisingly easy for us English-speakers to pronounce.

Having found that out, why not try the other foreign-looking pairs? Try **dz** in [DZOH-soh] **dzoso** ('soap'), **jm** in [ZHMEE-teh] **jmite** ('meet'), **mr** in [MREH-noo] **mrenu** ('man') which you already know, **sr** in [SREE-teh] **srite** ('write'), **ts** in [TSEHR-oh] **tsero** ('error'), **vl** in [VLAH-koh] **vlako** ('lake'), **vr** in [VRAH-noh] **vrano** ('liver'), **zv** in [ZVOH-toh] **zvoto** ('out/outside of') and **zb** in [ZBOO-mah] **zbuma** ('explode'). You may have been surprised to learn that, while these words may *look* odd to you, they are not at all odd for your English-trained ears and tongue to hear or say...despite their unmistakably Slavic ring.

You may well ask how Loglan acquired such a formidable set of permissible initials...far larger, for example, than the English set. Certainly this is strange for a vowel-rich language, as Loglan very largely is. The reason is simple. In order to build as much cross-cultural recognizability into Loglan primitive predicates as possible, the phonological features of many quite different language groups had to be combined in deriving its primitive words. For there are Slavic, Germanic, Oriental, Indic and Romance languages in the source set. For example, **vl** is common in Russian; and the pair **dz** is quite common in Chinese. The Loglan word for 'go' is largely made from English 'go' and Chinese 'dzou', and came out [GOHD-zee] **godzi**. So it is the very internationality of Loglan's word-sources that has led to its very wide range of permissible consonant-pairs.

Table 2.2 The Impermissible Medial Consonant Pairs

Any pair of consonants C_1C_2 is permissible in the middle of a word unless they are one of the following:

$C_1 = C_2$	E.g. *kk
C_1 is h	*ht
C_1 is the unvoiced variant of C_2	*pb
C_1 is in /p t k f/ and C_2 is in /j z/	*pj
Both are in the set /c s j z/	*cs
They are *bj or *sb .	

Consonant-pairs which occur in the middle of words ("permissible medials") are much less restricted, of course. They are defined by means of their complement set, the impermissible medials, in [Table 2.2](#). We will not need to use this information until we consider matters of word-building in Chapter 6. But the permissible and impermissible initials are critically involved in word resolution, which is the topic we will take up in [Section 2.20](#).

The general formula for predicates is a trifle complicated; but the interested reader will find it in the chapter notes.¹⁷

2.17 The Varieties of Predicates

There is one variety of Loglan predicates we can dispose of immediately. These are the numerical, logical or alphabetical words ("acronyms") which are used grammatically as predicates but are morphologically indistinguishable from structure words. These include the *mathematical predicates*, the ordinals and cardinals like English 'first' and 'dyad' which are [NEHR-ee] **neri** and [TAWR-ah] **tora** in Loglan; the *acronymic predicates* like 'DNA' which is [digh-NIGH-ah] or **DaiNaiA** in Loglan; and the *identity predicates* of which the prototype is **bi** [bee]. **Bi** is the 'is' of identity, as in [lah-JAHN . bee-let-see-TOH-ah] **La Djan, bi le tsitoa** = 'John is the thief'...a clear case of a predicate masquerading as a little word. All words like **bi**, **neri** and **DaiNaiA** are semantic predicates even though morphologically they are structure words. We will take up the construction of such little word predicates in Chapter 6 and their uses in the appropriate places of the grammar chapters. But we will not be concerned with them any longer in this one.

Of morphologically recognizable predicates--that is, of the words that have the properties described in the previous section--there are three distinct types: *primitives*, *complexes* and *borrowings*. Let us consider these important divisions of the predicate vocabulary one at a time.

Primitives are the fundamental building blocks of predicate meaning in any language. They are the 'dog' and 'cat' and 'girl' and 'boy' words of any language, and are never derived from anything else in it. In Loglan, such words are always five letters long and they come in just two forms: the CCV'CV form of [MREH-noo] **mrenu** 'is a man' and the CV'CCV form of [FOOM-nah] **fumna** 'is a woman'. Primitive predicates often have reduced or combining forms that we'll call *affixes*. These are usually shortened versions of the primitives themselves that appear as parts of longer words. Short affixes (there are longer ones) are three-letter forms like [mreh] spelled **mre** from **mrenu** and [foom] and [fwah], spelled **fum** and **fua**, from **fumna**. The longer words constructed from these affixes are the complex predicates.

Complexes are predicates that are composed entirely of affixes.¹⁸ Thus [MRESH-lee] or **mrecli** means 'manly' or 'man-like' and is composed of two affixes: **mre-** from **mrenu** and **-cli** which comes from [SHLEE-kah] **clika**. **Clika** is also a primitive predicate and means 'is similar to' or 'is like' something else in some respect. Thus, standing behind each complex there is a *defining metaphor*, in this case **mrenu clika** or 'man-like'. In a similar fashion, the word for 'womanly' is derived from the phrase **fumna clika** or 'woman-like'. The word is [FWAHSH-lee] or **fuacli** because the preferred affix of **fumna** in this position is **fua**. We have already seen how 'eye-doctor' can be made from two affixes plus a separating hyphen: [MEH-kuh-kyoo] or **mekykiu**. In that complex, **mek** was derived from [MENG-kee] **menki**, which is the primitive for 'eye', and **kiu** from [KEESH-moo] **kicmu**, which is the primitive for 'doctor' or 'physician'. The metaphor behind the word for 'thief' in Loglan is "criminal-taker". The word for 'crime' or 'criminal' is [TSEE-meh] **tsime**; its affix is [tsee] **tsi**. The word for 'take' is [TOHK-nah] **tokna**; its affix is [TOH-ah] **toa**. Thus you will not be surprised to learn that the word for 'thief' is [tsee-TOH-ah] **tsitoa**, a word you have already seen.

Borrowings are predicates that imitate words of similar meanings in other languages. If they are Loglan borrowings, they must have all the properties of a Loglan predicate--see [Section 2.16](#)--but not be either primitive or complex. Formally, they are whatever is left over in the domain of predicates once the primitives and complexes have been accounted for. As you might imagine,

that embraces a huge variety of shapes and sizes. The flexibility of Loglan borrowings is a deliberate design feature of the language. It allows good imitations of words from an extremely wide variety of source languages. For example, **protoni** is an excellent imitation of English 'proton'; it is an even better one of Italian 'protoni'; and it meets all the other requirements of a Loglan borrowing.

Obviously a Loglan borrowing must never imitate a complex by resolving into affixes. For if it did, it would be treated by the "resolver"--your computer or some other unforgiving auditor--as that complex. That is to say, you couldn't borrow a word shaped like **mekykiu** and expect it to be heard by your fellow loglanists as anything but **mek + y + ki**. But there is a sense in which borrowings may be shaped like primitives. For if a potential borrowing does look like a primitive--that is, if the natural word is already of either **mrenu-** or **fumna-**form, as the Swahili word 'simba' and the Aleut word 'parka' both are--it may be taken into the language anyway, but as something that is morphologically, at any rate, a primitive predicate. Thus, there are many borrowed words in Loglan that are morphologically not borrowings at all but primitives. These are labelled *S-Prims* in the dictionary when they are borrowed from science (e.g., [SHLAWR-roh] **cloro** for 'chlorine', [FLOOR-roh] **fluro** for 'fluorine'), *I-Prims* when they are local words that have recently become international (e.g., [FOOT-boh] **futbo** for '(a player of) international football' and [TEL-foh] **telfo** for 'telephone'), and *N-Prims* when they are still "native" to, or characteristic of, some local people or place, such as [PAHR-kah] **parka** for 'parka' and [SEEM-bah] **simba** for 'lion'. Collectively, these borrowed primitives are called *single-source* primitives to distinguish them from the *composite* primitives that are derived from multiple sources. The latter tend to be mosaics of natural fragments--**mrenu** and **fumna** are examples--while the former tend to be Loglan variants of an already widely-traveled single word (**futbo**).

Let us consider briefly how borrowings are made. The full story will not be told until Chapter 6. But we need enough information now about borrowings to recognize them in the speech-flow. The loglanist's aim in making a borrowing is, first, to satisfy him- or herself, and then The Loglan Institute, that the new concept should be made as a borrowing and not as a complex; and two, once the borrowing strategy has been decided upon, to make the best possible imitation of the source word, or family of source words, given the resources and limitations of Loglan morphology. Thus [proh-TOHN-nee] **protoni** and [et-HEEL-lee] **ethili** are both excellent borrowings because they are unmistakable members of the international sets of scientific words to which English 'proton' and 'ethyl' belong. On the other hand, [aht-HOHM-mee] **athomi** is not so good a member of the international family to which 'atom' belongs, although clearly it is a member of it. It is, for example, very similar to the Italian plural, which is 'atomi'. But **athomi** is the best we can do given the requirement that each Loglan predicate must contain at least one consonant-pair. None of the natural words for 'atom' do. But without that inserted **h**, [ah-TOHM-mee], for example, would "fall apart" as the phrase **a to mi**; that is, it would appear to the listener to be that phrase. Thus the phoneme **h** is conventionally introduced into such borrowings to prevent them from falling apart.

At the moment the international vocabulary of science and technology is being freely incorporated into Loglan by making scientific primitives and borrowings. Local food, tool, clothing and music words are also being freely borrowed, especially if their local names, like 'kayak' and 'atyl-tyl'--yielding Loglan [kah-YAHK-hoo] spelled **kaiakhu** and [aht-LAHT-loo]

spelled **atlatlu**--have already been appropriated by international scholarship. But the current policy of The Institute is to recommend that writers and translators working in areas other than science make the new words they require as complexes. Such policies will of course be subject to change as the language and its uses unfold. Institute policy is discussed as an aspect of word-making in Chapter 6.

2.18 Affix Shapes

Before we leave the topic of predicates we need to say a word about the affixes out of which complex predicates like **mekykiu** and **tsitua** are made. An understanding of the range of affix sizes and shapes is crucial for discovering whether a given predicate is a complex or not; and that, in turn, is crucial for recognizing a borrowing. For borrowings, the reader will recall, are just those predicates which are *not* of primitive shape and which do *not* resolve as complexes.

You may have noticed that there were three affix-shapes involved in the examples of complex predicates given above: the CCV-shape of **mre** and **cli**, the CVC-shape of **fum** and **mek**, and the CVV-shape of **fua** and **kiu**. This is the complete set of "short", i.e., three-letter, affix forms. But four- and five- letter affixes are also derivable from any primitive. For example, the word for 'is a science of' is [SEN-see] **sensi**; and any primitive may itself be the final affix in a complex, as in [tahr-SEN-see] **tarsensi**, which is the word for 'astronomy'. In this complex the three-letter affix **tar** comes from [TAHR-shee] **tarci** 'star'. In addition, the final vowel of any primitive may be replaced by **y** to produce a hyphenated four-letter form to be used in non-final positions. For example, [mreh-nuh-SHLEE-kah] **mrenyclika** is another and plainer form of **mrecli** 'man-like' in case a writer or a teacher should require its length or transparency. Furthermore, *irregular affixes* may be derived from any borrowing by simply dropping its final vowel or vowel- group. But all such irregular affixes must, like the four-letter ones derived from primitives, be attached to the rest of the word with the hyphen **y** [uh]. For example, the word [ah-oos-trr-ah-loh-peat-HEK-wee] **austrralopithekui** (notice the doubled continuant) is borrowed from the Linnaean genus name '*Australopithecus*' and is a paleontological term meaning '(is an) australopithecine'. Suppose someone wanted to make an even finer-grained scientific complex from the idea '(is) australopithecine in form'. In scientific English the word 'australopithecoid' conveys this meaning. 'Form' is [FAWR-mah] **forma** in Loglan, and it has a CVV affix, [FO- ah] **foa**, which we are free to use in this position. So [ah-oos- trr-ah-loh-peat-heh-kuh-FOH-ah] **austrralopithekuyfoa** is the desired word and says it all. This new word consists of exactly two affixes, one very long one derived from **austrralopithekui** by dropping its final vowel group (giving **austrralopithek-**), and one very short one derived from **forma** by dropping both its medial consonants (giving **-foa**); and the two are connected by the spoken hyphen **y**. The doubled continuant /rr/ in **austrralopithek-** does the same kind of work as inserted /h/ does: it is preventing the /au/ from falling off.

This is not all of the morphology of predicates, but it is enough to take us a good way into this book. The primitive predicates of Loglan are found in Appendices B and C; their affixes may be looked up in Appendix D; a short list of scientific borrowings will be found as Appendix E; and a sample of complex predicates may be examined in Appendix F.

2.19 Predicate Joints

We must now consider what can happen at the joints of a complex predicate. Some types of joints between affixes are disallowed. For example, if a word-maker is planning to join a CVC-shaped affix to either a CVV-shaped affix (like **fua**) or a **fumna**-form primitive, but the C/C joint between them is not a permissible medial pair--the impermissible ones are shown in [Table 2.2](#)--then that joint must be either hyphenated or avoided. It is this consideration that puts the **y** in **mekykiu**. It would also prevent us from making a word like ***hap+balma** ("happy-ball"), because the **p/b** joint, too, is disallowed by [Table 2.2](#). (Even in conditions of low noise, such pairings of an unvoiced sound followed by its voiced companion tend to be unintelligible. The pair reduces to its voiced member, in this case **b**; and what will be heard is **ha balma**.¹⁹)

Another type of joint is made when a CVC-form affix is joined to a CCV-form affix or to a CCV'CV-form primitive. In either case this forms a C/CC-type joint such as those tabled in [Table 2.3](#). All such joints must be carefully checked against the proscribed forms found in that table, for a considerable number of them--nineteen, in fact--have been found to be unintelligible.

Table 2.3 Unintelligibility at the C/CC Joint

The following combinations are unintelligible and should be hyphenated or avoided:

c/dz	c/vl			n/dj	n/dz
d/cm	d/ct	d/ts		p/dz	
g/ts	g/zb			s/vl	
j/dj	j/tc	j/ts	j/vr	t/vl	
k/dz				v/ts	
m/zb					

For example, suppose one was making the word for 'understand' in the sense of understanding the meaning of a sign. Suppose one was basing the construction on the metaphor "sign-know", which in Loglan is [SAHN-pah-JAHN-noh] spelled **sanpa djano**. An attractive pair of affixes from these two words is **san+dja**. But there is one problem. Even in conditions of virtually no noise the **n/dj** joint promptly reduces to **dj** in the ear of the listener, and therefore it is one of those proscribed by [Table 2.3](#). What would be heard if the **n/dj** joint were used is [SAH-jah] **sadja**. **Sadja** is a legitimately shaped word; but it is not the one intended.

The correct move in this case is to use the **saa** affix of **sanpa**, and make the complex as [sah-AHD-jah] **saadja**. We shall consider such problems under word-making in Chapter 6. But the point here is that, as a consequence of using [Table 2.3](#) to check their C/CC-joints, word-makers will sometimes hyphenate these otherwise proscribed joints in their creations. Thus a word like [SAHN-nuh-jah] spelled **sanydja** could turn up in the language.

Another thing that can happen at the joints of a complex is *consonantal hyphenation*. This happens when someone has built a complex from two CVV-form affixes like **fua** and **saa**. The

preliminary result, **?fuasaa**, would have the form CVV+CVV, and so would be a word without a pair of adjacent consonants; and such a word could not be a predicate.²⁰ To turn such constructions into predicates, a consonantal hyphen-like infix must be used. We use the pair of continuants /r n/ for this purpose. The sound /r/ is the primary allomorph of this hyphenating morpheme; it is used whenever the following consonant is not another /r/. The sound /n/ is its secondary and used only when the following consonant *is* /r/. An example of a word that might be made with this /r n/ hyphen is [BOUGH-rr-mough] spelled **baormao**. It is composed of **bao** + **r** + **mao**, and **bao** and **mao** come from the metaphor **bakso madzo**, which means 'box-maker'. And **baormao** now has the consonant-pair that the resolver needs to recognize it as a predicate word.

2.20 Resolving Words

We commenced this chapter with the observation that the word-forms of Loglan are so regular that the boundaries between them can be quickly and easily sensed by a newcomer even if he hears no pauses. We suppose that this feature of the language, which no natural language shares but all approximate, will not only contribute to its usefulness as a laboratory instrument, and perhaps also to its effectiveness as an interface between humans and their machines, but will also make it remarkably easy for adults to learn. Children, note, do not suffer so keenly from the word-boundary problem. Even in learning second languages they tend to learn words one at a time and in known sentence-frames. E.g., 'C'est la plume', 'C'est le chat', and so on. But to adult second-language learners, the way the speech stream of their new language either does or does not sort itself out into words is a crucially important fact about it. Let us now explore the process of determining word-boundaries in Loglan informally.²¹

Suppose you hear the pauseless utterance:

[yoh-dah-pah-KAHM-lah]

Your first job is translate what you hear into a stream of Loglan phonemes, a task that we predict you will soon be performing swiftly and automatically. Thinking back over what you heard--assuming you pronounced this string of sounds according to the guide--let's assume you are able to translate these sounds into the following phoneme string:

/iodapaKAMla/

Let us suppose further that you have never heard any of these words before. Yet you probably sense that the utterance is composed of three little words (**io da pa**) followed by a predicate (**kamla**).

You're right; but how did you know this? Well, the /ioda/-part of the unstressed initial sequence /iodapa/ can be nothing but a pair of little words, or a compound structure word, or two syllables of a longer structure word, for no predicate can begin that way. And if /iodapa/ were part of a name, there would be a final consonant somewhere followed by a pause, and there isn't. As for /KAMla/ we sense intuitively that it is a primitive predicate, that it can't be anything else. For example, if we thought that /KAMla/ were only part of some predicate and that /da/ were its

head, making the trial word **?dakamla**, we would sense immediately that the /da/ would fall off. Since we can't make anything stick to /KAMla/, **kamla** must be the word. (Here and in the sequel we will mark trial words with a prefixed '?' whenever the reader cannot yet be expected to know whether they are good Loglan words or not.)

So much is correct, informally. But what if you had heard a pause, for example, after /IOD/?

*/IOD.apaKAMla/

Then you would know that **Iod** was a name-word; and the rest of the string would resolve just as uniquely as the structure word **a** followed by **pa** followed by **kamla**. And why is not /KAM/ a name and /la/ a structure word? Because again the hypothetical name is not followed by a pause. **Io da pa kamla**, by the way, means 'Probably X came'. ***Iod, a pa kamla**, in contrast, is not grammatical and is for that reason starred. But it can be literally translated anyway, and into equally ungrammatical English: ***'Yode; and/or came'**.

But what about finding word boundaries between polysyllabic predicates? Here is an utterance with one or more long words:

[tah-brah-GIGH-grah-tahr-SEN-see]

Let us suppose you can hear the phonemes correctly, and so hear this:

/tabraGAIgratarSEnsi/

First, we note that there are no names. If there were one, there would be a consonant followed by a pause; and there isn't. So we have only structure words and predicates to disentangle. Second, we recall that no structure word can contain a consonant pair and that all predicates do contain at least one pair. We note that we have four CC's in this string (/br gr rs ns/) and that the first one is /br/. Like any consonant-pair /br/ must be part of some predicate or some name; and there are no names. So /br/ is part of some predicate, and because it is a permissible initial (see [Table 2.1](#)) it may be the start of one. In fact, since it is the first CC in the utterance, if /br/ is not the start of the first predicate, it must be very near its start; for only a CV-shaped segment may precede it in the predicate. (See Note 17 again.) Third, we recall that every predicate has exactly one stressed syllable, and that that syllable is always the penultimate one. Well, the first stressed syllable in this utterance is /GAI/. Since /GAI/ is later than /br/, it must be the penultimate syllable of the same predicate of which /br/ is, or is near, the start. If /GAI/ is the penultimate syllable of some predicate, then the /gra/ that follows it is the ultimate syllable of that same predicate. So we have found at least one of the word boundaries we seek, namely, the one between /tabraGAIgra/ and /tarSEnsi/. Let's write that word-boundary with the usual interverbal space in this partial resolution:

/tabraGAIgra tarSEnsi/

We now notice that /tarSEnsi/ is pretty obviously a single predicate. It consists of two CVC-shaped syllables and a final CV-shaped one, and the stressed syllable is where it belongs:

penultimate in the word. In fact /tarSEnSi/ can be nothing but the predicate **tarsensi**. We already know that it is made of two affixes: **tar** from **tarci** [TAHR-shee] which means 'star', and the full five-letter primitive form **sensi** [SEN-see] which means 'science'. So it is a word that means 'star-science' or 'astronomy'. It is obviously a complex and not a borrowing or a primitive.

But what about the sequence to the left of our word-boundary, /tabraGAIgra/? /GAIgra/ could be a predicate because it, too, resolves as a complex; but so could /braGAIgra/. Each is a string of affix-shaped triplets. But /GAIgra/ does not contain the other piece of the predicate we have already located, namely the consonant-pair /br/. We know that /br/ must be inside the predicate whose stressed syllable is /GAI/. There is only one stressed syllable in this sequence, and that is /GAI/. So of the two possibilities, the predicate can only be /braGAIgra/.

From an entirely different perspective we can see that /tabraGAIgra/ can't be a predicate. It is not a string of affix-shaped triplets and it has no hyphens; so it is not an irregular complex, that is, one made with an irregular affix. It is certainly not a primitive. So if it is a predicate at all, it must be a borrowing. But if it is a borrowing, its first syllable /ta/ will "fall off". That is to say, it can resolve as the string **Ta bragra** with **Ta** as a separate word; and if it can, it will.

Evidently ***tabragra** does not have Property 5 of [Section 2.16](#). It does not resolve uniquely as a single word. Since ***tabragra** is not a word, and **bragra** can be, we now have only that one possibility left to consider. So **bragra** must be the predicate we have been looking for. We have found the last word-boundary in this pauseless utterance, the one between **Ta** and **bragra**. We have resolved the utterance as a three-word string:

Ta bragra tarsensi

But what does it mean? **Ta** is obviously a structure word. In fact, it is the demonstrative pronoun 'That'. **Ta** is followed by two predicates. We already know that the second one means 'astronomy'. The first one is composed of three affixes **bra + gai + gra**. If we looked up **bra** in Appendix D, we would find it is derived from [BRAH-nah] **brana** 'born/born to'; **gai** is derived from [GAHR-nee] **garni** '(to) govern/rule' or '(be a) governor/ruler'; and **gra** is short for [GRAH-dah] **grada** 'great'. The defining metaphor of this complex is evidently **brana garni grada** or 'born-ruler-great'. Well; what is a "born ruler"? An hereditary monarch, a king or queen. What is a kingly kind of greatness? Well; possibly majesty or magnificence. Let's guess.

If you guessed that the sentence may be translated as 'That's magnificent astronomy' you would be right.²²

I do not mean to imply by these few examples that learners listening to the flow of Loglan speech will actually go through these lucubrations to find these boundaries out. What I do mean is that it has been one of my research hypotheses in building Loglan that the presence of such deducible regularities in the morphological structure of utterances, as well as in the structure of complex words, will lead to rapid and largely unconscious inferences on the part of listeners--in this case, to inferences about the identity of elements in the speech-flow and about the components of the words themselves--and that this in turn, will enhance learning. This hypothesis remains to be tested by controlled experiment. But the descriptive evidence about the way these matters work in the natural languages, together with the kinds of errors learners do and

don't make when listening to spoken Loglan, already gives it a certain plausibility. What we have done, as we will many times do again, is taken a natural tendency of the genus *Language* and pushed it outward toward some formal limit. What we have yet to discover is whether such deductively discoverable regularities in the speech-flow have any functional bearing on the listener's role in speech.

2.21 A Summary

We have learned that Loglan has a phonemic alphabet of 26 letters and that its letters are identical to those of the English alphabet:

a b c d e f g h i j k l m n o p q r s t u v w x y z

All except eight of these letters are pronounced as they usually are in English. The exceptional eight are **c**, which is sounded like [sh]; **i**, which is sounded like [ee] or [y] depending on context; **j**, which is sounded like the 'z' in American 'azure' or the French 'j' of 'Jacques' and is written [zh] in the guides; **q**, which is the 'th' of 'thin' and 'theta' and written [th] in the guides; **u**, which is sounded like [oo] or [w] depending on context; **w**, which is French 'u' and written [eu] in the guides; **x**, which has the "rough breath" of Greek chi and is [kh] in the guides; and **y**, which is the slack, short sound of 'a' in 'sofa' and is written [uh] in the guides.

q [th], **w** [eu] and **x** [kh] are irregular sounds used only in names and in some exceptional predicates and structure words, mainly scientific ones.

y [uh] has a special role in the language in that, like the irregular sounds, it is used to spell some borrowed names and two exceptional predicates, but in addition it plays the role of a hyphen in complex predicates like **mekykiu**, and it buffers words like **matyma** in the buffered dialects. Buffered dialects are those that use **y** [uh] as a consonant-buffer and **iy** [yuh] as a hyphen.

There is some contextual variation. The letter **e** sounds like [eigh], **i** like English [y], and **u** like [w] before vowels; the letter **o** sounds like [aw] before **r** and **i**; and the letter **n** sounds like [ng] before **g** and **k**. The consonants **m n l r** have vowel-like values that are spelled [mm nn ll rr] in the guides, but these are used only in names and in some borrowings.

Names unless final are always followed by pauses. Emphatic syllables before predicates are always followed by pauses. Vowel-initial words are always preceded by pauses.

Any syllable of a name or structure word is free to be stressed or not stressed; but if its stress is not penultimate, then the vowel of the abnormally stressed syllable is marked either with an accent mark or with a following apostrophe (**Pari's**). The penultimate syllable of every predicate is always stressed in some degree, but hyphens don't count in determining stress; hence /MEKykiu/, not /meKYkiu/. No other syllable of a predicate word is ever stressed.

Predicates are of three types: primitives, which are either of **mrenu-** or **fumna-**form; complexes, which, like **bragaigra**, **tarsensi** and **Xai-kre**, resolve into unique strings of affixes; and borrowings, which, like **iglu**, **protoni** and **athomi**, are neither primitive nor complex.

These rules, together with certain restrictions on consonant-pairing and the rules for pronouncing vowel-groups, are sufficient to guarantee that any grammatical string of Loglan sounds, no matter how rapidly spoken, can be uniquely resolved into words.²³

Notes

1 The exact means by which this was done is given in Chapters 3 and 4, of Brown (1969a). An approximate account is given in Chapter 6 of the present volume.

2 The sound of [h] does not occur in standard Spanish. For example, it is not even listed as a variant of [x] by Wise (1957) in his chapter on "Spanish, Including Mexican". There is, to be sure, a variety of "Californian", or "Northwestern Border Mexican", in which IPA [x] (Loglan [kh]) has disappeared altogether, and has apparently everywhere been replaced by English [h]. In that dialect, I was myself astonished to hear, Spanish 'Jorge' has become [HAWR-heigh], with no trace of the "rough breath" of [x] remaining.

3 A more complete account of Loglan phonology and morphology is planned for in **Loglan 6: Formal Structures**.

4 The addition of schwa ([uh]) as the sound of Loglan hyphen in 1986 weakened this argument but did not quite destroy it. Considerations of stress are still capable of distinguishing an Englishman's **matma matma** from his hyphenated **matnymatma**. Thus [MAHT-muh-MAHT-muh] differs from [maht-muh-MAHT-muh] in one clear way. But certainly the argument that this distinction will regularly be drawn in this dialect is now weaker. The only safe thing for English- and German-speaking loglanists to do, in fact, if they want to be certain of being understood by their computers now that [uh] is with us, is to speak Loglan like a Spaniard; for the Spaniard's [MAAT-maa-MAAT-maa] will differ from his [maat-muh-MAAT-maa] in two particulars rather than one.

5 The sound schwa ([uh]) spelled by the letter **y**, was originally introduced in Loglan as a consonant-buffer in 1982 (see Brown 1982b). At the time the morph **r** with three allomorphs **r n l** was being tried out as the hyphen in complex words. B. Walsh (1983) and R.A. McIvor (1983) both proposed that **y** replace **r** as the hyphen as **y** would require no allomorphs. R.J. LeChevalier (1985) strengthened the case for hyphen **y**. In 1986 **y** was officially adopted as the Loglan hyphen and retained as its buffer when certain modifications of the original proposals were made to enable it to play both roles. The dual role of **y** was described for the first time in Brown (1987).

6 Dr. R.A. McIvor has suggested that "vowel-buffering" may generate another set of Loglan dialects, namely those spoken by loglanists in whose shared native language *vowel* clusters were rare or difficult. The sounds he suggests as vowel-buffers in such dialects are the two semi-vowels [y] and [w]. They could be used to turn the **i**- and **u**-initial VV-series of the standard dialect into definite disyllables. Thus **ia**, which is standardly [yah], would become [ee-yah]; and **ua**, which is standardly [wah], would become [oo-wah]; and so on.

7 In British English the 'z' of 'azure' is often pronounced as in 'size'. For such speakers the 's' of British 'vision' is a better clue to the sound of Loglan *j*.

8 Some word-makers feel that only the stressed syllable in these three words deserves the doubled continuant; and they therefore write them as ***Rrl**, ***Mrrtl** and ***Brrtn**. But this is a mistake (and so I have starred them); for all three words have two syllables, and both syllables require the vocalic value of its continuant. To be sure, all the stressed syllables are longer. But the short, unstressed syllables also require vowels. To see this--or rather, to hear it--consider the two English words 'burn' and 'burin'. The first is a monosyllable with just one vocalic consonant, and would be written **Brnn** (if it were a Loglan name); the second is distinctly disyllabic, and so would be written **Brrnn** (if it, too, were a name). The only difference between these two natural words is that one has the consonantal, the other, the vocalic allophone of Loglan /n/ in final position. Again this is a difference that is phonemic in English but not in Loglan...except, of course, in just such borrowed names.

9 The difference between the two sounds represented in IPA by [y] and [Y], both of which occur in German, is too small to differentiate in Loglan. Both 'Muhler' which contains [y] and 'Münster' which contains [Y] may be written with Loglan **w**.

10 That there is still a category of sometimes-stressed syllables in Loglan morphology reflects the fact that the production of certain classes of Loglan words, principally the compound structure words, has not been observed long enough to furnish us with a clear understanding of the pause- and stress-regularities that will undoubtedly develop in this portion of the Loglan speech system as they have elsewhere. Indeed, perhaps they have already but have not been noticed.

11 Greenhood's and my conjecture (Brown and Greenhood, 1985) that early human speech was song would predict that it is.

12 Possible exceptions to this rule are the names of famous personages which now appear as quasi-predicates in the literature of science or scholarship: 'Marx', 'Freud' and 'Einstein', for example, as in 'Einsteinian relativity'. Do we borrow such names by sight or sound? Do we write **Einstein** and say [EYN-steyn], or say [IGHN-shtighn] and write **Ainctain**? This is an open question; there are good reasons in support of each policy. At the moment, among the scholars who have offered opinions on the matter, a slight preponderance seems to favor **Einstein** over **Ainctain**...that is, appearance over sound.

13 The other closed monosyllable VC, which yields such words as 'of', 'in', and 'at' in English, is at present largely unused in Loglan.

14 With typographically more sophisticated equipment than has been used to set this book, and in handwriting, using an accent mark on the abnormally stressed vowel (as in Spanish), may come to be preferred.

15 The original form of this rule was to pair vowels from the left; for it was obvious that the pair-from-the-right rule had some fairly nasty formal consequences. For example, consider the two

names (i) **Loioioioioioiois** and (ii) **Loioioioioioioios**, the addition of the eighth **o** to the latter being their only difference. Given pairing from the right, (i) would be pronounced [loy-oy-oy-oy-oy-OY-oyss] while (ii) would be [loh-yoh-yoh-yoh-yoh-yoh-YOH-yohss]. Left-pairing gives the same result for (i) and the not-very-different [loy-oy-oy-oy-oy-oy-OY-ohss] for (ii), and it is all accomplished with no, or little, backtracking. (I am indebted to Dr. Guy L. Steele Jr. for this example.) For this essentially formal reason, pairing from the left was the earliest (1985) form of the pairing rule. But sadly enough empirical considerations soon overturned it. While using the pairing rule in the borrowing process described in Chapter 6, I found that about 90% of the odd length vowel-strings were of length 3; so not much backtracking is required whichever end you start from. More decisively, about 80% of the length-3 strings paired more naturally from the right than from the left. For example, once the Linnaean ending **-ea** is augmented by /i/, as turned out to be necessary to preserve the distinctions effected by the natural endings of Linnaean words, then the augmented ending **-eai** is a 3-string which pairs much more naturally as /-Eai/, that is, from the right, than it does from the left, which gives the trisyllable /-eAi/. The first result is pronounced as [-EIGH-igh], the second as [-eigh-AH-ee]; and it is clear that the first is far more reminiscent of the natural ending. Cases of this kind could be multiplied by the hundreds. The outcome of the pairing-rule study is one of the rare cases when a formally superior solution had to be abandoned in favor of a formally weaker one dictated by distributional considerations.

16 The sequence /tePROa/ will be heard in Loglan, not as the phrase **te *proa** with its disallowed word-form CCV'V, but as the word **teproa**, which resolves as the two-term complex **tep+roa**. This, in turn, deciphers as **tepli rodja** or "temple-grow". At the moment this is an unassigned metaphor in Loglan, that is, it is not the deriving metaphor of any Loglan complex. The temple-growers haven't arrived yet. But the point is, they could; and so **teproa** could become a word tomorrow afternoon.

17 Letting '#' stand for word-boundaries, 'Ø' for a null segment of a predicate word, '|' for a boundary of some segment, '/' as the mark of equally permissible alternatives, 'cc' for an impermissible initial consonant-pair, 'CC' for a permissible initial pair, 'vv' for a vowel-pair pronounced monosyllabically, and '(x)' for the statement that the segment x may occur none or more times, there are three types of predicate words: Type I, in which the stressed syllable comes just before the first C-pair; Type IIa, in which the stressed syllable comes after the first C-pair when it is a cc; and Type IIb, in which the stressed syllable follows the first C-pair when it is a CC. Their formulas are as follows:

I # C/. | (V) | Ø | Ø | V'/vv' | CC/cc | (C) | V/vv #
IIa # C/. | (V) | Vcc | (C/V) | V'/vv' | Ø | (C) | V/vv #
IIb # CV/Ø | Ø | CC | (C/V) | V'/vv' | Ø | (C) | V/vv #

What these formulas say is that the Loglan predicate has a uniform center composed of a stressed vowel or a stressed diphthong V'/vv', and a uniform tail which is the next occurring instance of a V or vv after the stressed center. In a Type I predicate a consonant-pair must by definition occur between the center and the tail; it may be either an impermissible initial cc or a permissible initial CC, hence CC/cc. Additionally, there may be a string of none or more consonants (C) between the CC/cc and the tail. (**Iglu** is a Type I predicate in which there are no additional C's.) In Type IIa and IIb there may also be none or more consonants (C) between the stressed center

and the unstressed tail. The Type I head is composed of the first instance of a consonant or a pause C/. that occurs to the left of the stressed center. The head C/. may be optionally separated from the center by a string of none or more vowels (V). In Type II there must be a consonant-pair of some kind (CC/cc) to the left of the stressed center, and between that pair and the center there may be a string of none or more consonants or vowels (C/V) in any order. In Type IIa the earliest consonant-pair in the predicate is, by definition, an impermissibly initial cc. The cc must therefore be preceded by a V, and the V in turn must be preceded by either a consonant or a pause C/.; so the minimum Type IIa head is .Vcc (e.g., **alk-** in [ahl-KAHL-ee] **alkali**, a Type IIa predicate). But between the head C/. and the obligatory Vcc segment of a Type IIa predicate may be a string of none or more vowels (V). (**Alkali** has none.) In Type IIb predicates the earliest C-pair is, by definition, a permissibly initial CC. The CC is either initial, as it is in the predicate **mrenu**, or preceded by a CV-pair, as it is in **pasnaodei** = 'yesterday'; hence by CV/0. Whether the first CC of the Type IIb predicate has CV or 0 as its prequel is settled by the "Slinkui Test" described in Chapter 6.

18 'It seems repugnant to me--if not linguistically immoral--to have something *composed entirely of affixes*.' (Prof. P.D. Seaman, personal communication and jocular.) I agree that 'affix' is not going to be comfortable for most linguists in this context. What I really mean is almost but not quite 'bound form', which would include some stems as well as affixes. But that phrase is both too long, and too technical to be used as frequently as the word that conveys this notion must be used in this book. 'Affix' is the next most accurate word and quite commonly understood to indicate bound forms. The inaccuracy of both technical terms for the current use is that some of the objects I shall be calling "affixes" are free forms, e.g., **-sensi** in **tarsensi**. But most Loglan complexes *are* "composed entirely of bound forms", namely all those made entirely of three-letter segments. In these cases, all segments of the word are (in my sense) affixes because, except in a rather pale semantic sense (in which I suppose the modificand in the defining metaphor could be argued to provide the stem), there is no stem. If Prof. Seaman can agree that many linguistic objects can be, and often are, composed entirely of such "bound forms", then perhaps he (and others) will be kind enough to place that interpretation on my usage of the English word 'affix'. If we were speaking Loglan, I would suggest **djifoa** ("join-form"), a word which is itself composed entirely of *djifoa*s.

19 The intelligibility studies on which this section and Tables [2.1-3](#) are based were reported in Brown (1982b).

20 Words of CVV+CVV form do exist; but they are acronyms: for example, **TaiVai** = **TV**. As acronyms, such words are treated grammatically as predicates, but they are not morphologically detectable as such. Morphologically, CVV+CVV-form words are compound little words, and it is as such that the resolver discovers that they are acronyms and feeds them as predicates to the parser.

21 A computer-executable algorithm that accomplishes word-resolution in well-formed Loglan utterances will be found in **Loglan 6**.

22 One of the three emphatic versions of this sentence, the one that would translate '*That's magnificent astronomy!*', would have to have a pause between the stressed /TA/ and the rest of

the sentence, according to the rule on [p.80](#). This gives the production /TA . braGAIgratarSEnSi/, which then resolves, as desired, as **Ta bragaigra tarsensi!** Without that pause, however, /TAbraGAIgratarSEnSi/ becomes something else, namely **Tabra gaigra tarsensi!**, which is an imperative which I can't translate for you because **tabra** is not yet a word. This illustrates the importance of the rule on p.80 that stressed syllables that just precede predicates must be separated from those predicates by pauses.

23 The evolution of the morphology described in this chapter was reported in a series of papers over an eight-year period (Brown, J.C. 1979a,b,e, 1980a,b, 1982b, 1983a,b,c, 1987). Works that also contributed to the unfolding morphology were Barton (1978a,b,c), Brown, J.R. (1979), Carter (1981), Chapman (1987), Darwin (1978b, 1979), Johnson, R.W. (1978), Lovatt (1977), McIvor (1980, 1981a,b,c, 1983), Parks-Clifford (1977a,h,i, 1978, 1979, 1980), Parlette (1978), Prothero (1981), Rosenberger (1981) as well as the papers of Walsh and LeChevalier cited in Note 5.

Chapter 3

GRAMMAR 1: PREDICATES

3.1 What Grammar Is

Grammar is the art of stringing words together in understandable ways. You have spoken grammatically, in any language, when your hearers have understood what you said. Thus a grammar is not a collection of rules for speaking elegantly, or correctly, or even sensibly. For much that is nonsense is understandable, and what people usually mean by "incorrect" speech is simply unfashionable. Thus 'Ain't that man coming?' is grammatical in English simply because it is regularly produced in several dialects of that language, and understood in all of them. 'Coming ain't man that' is ungrammatical in every English dialect because it is unfathomable. And this, in turn, is true because there are no rules by which such a string of words can be formed in any English dialect. As a consequence no listener can guess how it *was* formed, and this is a large part of what understanding really is. We are therefore concerned, in this chapter, not with how people will talk sensibly in Loglan but with how they will talk at all in it; that is, with the rules they will use, or might use, to say anything at all.

Now construed in this modern, scientific way it is clear that the domain of grammatical sentences in any language must be very, very large. For grammars must not only account for what is in fact said in a language, or is likely to be said, but for what *might* be said under any circumstances at all. Do green ideas sleep furiously?¹ Who knows? Is it possible to say that they do? Of course. But is it grammatical to say so? Again, of course. For grammar is the art of the possible. Like language itself it is not exclusively, nor even primarily, concerned with what is.²

The number of rules in Loglan grammar is about 200. If this seems large, it will interest you to know that linguists have devised about 6,000 rules to deal with a very small part of written English. One guesses that they have at least as many more to go. Loglan, then, is reasonably small as human grammars go; yet the domain of its grammatical utterances is very large. Therefore we cannot hope to discuss every possible kind of Loglan utterance in this book, or even all the 200-odd rules that define their domain. A complete list of those rules is given in **Loglan 6: Formal Structures**, where they are given in a form suitable for writing instructions to machines. Our purpose in this book is a different one, however. It is to explore the possible effects of the human uses of the language on the mind. So only the most instructive of the immense variety of grammatical utterances are discussed informally in this chapter and in Chapters 4 and 5.

In this chapter and the next two, then, we will try to exhibit not the whole grammar of Loglan but the essential part of it. And we will discuss that part in a way designed to increase not your mastery of the grammar but your understanding of it as a whole. In particular we would like to show you *why* Loglan has the kind of grammatical arrangements it does have, and how these

arrangements are related--or may be thought to be related--to the processes of thinking which are our main concern.

3.2 The Divisions of the Grammar

We will divide our discussion of Loglan grammar into three parts, taking up the first part in the rest of this chapter, and assigning the next two chapters to the others. In the first of these parts, we will deal with the fundamental notion of Loglan grammar: the idea of the predicate and its most important elaborations. In doing this, we will keep the designative apparatus of the language very simple: we will use only pronouns to refer to things.

In the second part of our grammatical discussion (Chapter 4) we will describe the variety of ways in which things *can* be designated in Loglan. We will find that all the designative apparatus of English is present here--pronouns, descriptions, the Loglan equivalent of common and proper nouns--plus a good deal more besides. One of our tasks in that chapter will be to show how the predicate constructions of this chapter are used in the machinery of description.

In the third part (Chapter 5) we will consider the varieties of sentence-forms in Loglan. In particular, we will consider how simple sentences may be combined to express logically complex ideas and how these may be strung together in discourse. Here at last we will be dealing with Loglan at that level of language with which ordinary logic deals.

I will supply either a pronunciation guide or a phonemic transcription for each numbered Loglan specimen you encounter in this book. We'll be using guides for the shorter specimens in the first third of this chapter, then transcriptions for the occasionally longer specimens thereafter. You will learn the language faster if you pronounce each specimen as you come to it and listen carefully to the sound of your own voice. If you do this, you will be supplying yourself with the audible stimuli that are indispensable for sutori (second and subsequent) language learning. A rewarding consequence of such an effort will be that you will hear ever more competent Loglan speech emerging from your mouth each day. As you listen to your own Loglan speech, and then compare what you hear with the "good Loglan" described in the guides and transcriptions, you will find that the difference between them is growing less and less. It's for this reason that I've put the guides *after* the specimens. Remember that you know *all* the sounds of Loglan before you begin. They are just arranged in new patterns and have new associations. And the best way to learn those new patterns is to listen to yourself producing them.

3.3 The Simple Predicate

In the previous chapter you learned that the great bulk of the Loglan vocabulary is composed of its predicate words, and that predicate words in Loglan correspond to the nouns, verbs, adjectives and many of the adverbs and prepositions of English. It is not surprising, then, that the fundamental constructions of Loglan grammar concern the use of predicate words. Let us look at the sentences below:

(1) Da mrenu

He is a man.

- [dah-MREH-noo]
 (2) Da blanu It is blue.
- [dah-BLAH-noo]
 (3) Da madzo de She makes it (i.e., is a maker of it).
 [dah-MAHD-zoh-deh]

It is as if we said in a kind of Pidgin English 'He man', 'It blue' and 'She make it'.³ The Loglan words **mrenu**, **blanu** and **madzo** are, of course, predicates. The little word **da** means 'he', 'she', 'it', 'they' or 'them', or simply 'X' as in the language of mathematics. In the third sentence, **de** appears. It too means either 'he', 'she', 'it', 'they' or 'them', or simply 'Y'.⁴

The important thing to notice is that the meaning of the predicate words in these sentences evidently includes the English notion of a verb. It is now apparent that **mrenu** and **blanu** do not really mean just 'man' and 'blue' as we have loosely said, but the whole expressions '...is a man' and '...is blue'. Moreover the word **madzo** means not only the verb 'to make', it may apparently also mean the whole phrase '...is a maker of...'. In fact, **madzo** and **blanu** mean more than that, for look at these sentences:

- (4) Da madzo de di X makes Y out of Z.
 [dah-MAHD-zoh-deh-dee]
- (5) Da blanu de X is bluer than Y.
 [dah-BLAH-noo-deh]

If now we are to believe that **madzo** means '...makes...out of...', and that **blanu** means '...is bluer than...', as well as the simpler phrase '...is blue', then it is clear that Loglan predicate words mean a great deal more than the individual English nouns, verbs and adjectives with which you will be tempted to equate them. They do. They mean whole sentences. More precisely, they have the meanings of sentences with blanks in them.

This is the fundamental notion of Loglan grammar. Each predicate word or construction represents a potential claim about the world. And it is that whole claim--or the longest of the several claims that might be made with it--that is the meaning of that predicate.⁵ Thus, the *whole* meaning of the Loglan word **madzo** is, in English, '...makes or is a maker of...out of material...'. That's a lot to pack into one word.

Now the devices that fill the blanks in a predicate expression are known as the *arguments* of that predicate. The word 'argument' is adopted from mathematics, where it means whatever appears between the parentheses of some functional expression. Thus 'x' is the argument of the function 'f(...)' in the expression 'f(x)'. (The parallel between the mathematical function and the Loglan predicate will probably be clear.) The arguments of a predicate designate the persons, objects, or things of which the predicate is claimed to be true. Thus in (4), above, the pronouns **da**, **de** and **di** are the arguments of the predicate expression ...**madzo**... . They are the designations of the three things the sentence is about: a maker X, a made thing Y, and a material Z. The two

arguments of the predicate ...**blanu**... in (5) above are **da** and **de**. Clearly they must refer to a bluer thing X and a less blue thing Y if the claim of the sentence is to be true.

Now no one is obliged to say all that he might say every time he speaks. Thus:

- | | |
|-----------------|--|
| (6) Da blanu | X is bluer than. (I.e., X is bluer than something...probably some standard patch of blue.) |
| | [dah-BLAH-noo] |
| (7) Da madzo | X is a maker of. (I.e., X makes something from something.) |
| | [dah-MAHD-zoh] |
| (8) Da madzo de | X is maker of Y from. (I.e., X makes Y from something.) |
| | [dah-MAHD-zoh-deh] |

are all perfectly permissible, if incomplete, claims. They are called *incomplete utterances* in Loglan; for in Loglan, unlike English, they are obviously incomplete. People do not say 'It is bluer than' and stop in English. If they did, they would sense what the Loglan speaker means when he says **Da blanu**. Thus the Loglan forms *invite* completion, and questions about completion, in open and obvious ways. We can easily imagine the sense of the incompleteness of most ordinary human speech becoming a very powerful aid to the Loglan-user when interacting with machines.

We now see that all by itself, and without inflection or adornment, the Loglan predicate word carries a great deal more specific meaning than the usual natural language word. This accounts for the fundamental simplicity of Loglan grammar, but also for its genuine difficulty for the newcomer. For simple (atomic) sentences do not really have to be "constructed" in Loglan. They already exist in the specific claims embodied in its host of predicate words.⁶

3.4 Varieties of Predicates

It will be clear from the foregoing that predicates may be classified by considering the largest number of arguments they may take. Thus **mrenu** takes one argument and never more than one;⁷ **blanu** takes either one or two arguments, but never more than two; and so on. We will call predicates that take exactly one argument *one-place* predicates. Predicates which, like **blanu**, take at most two arguments, will be called *two-place* predicates. Among the predicates which take at most three arguments, are of course, **madzo**, but also words like **godzi** ('...goes to...from...'), **corta** ('...is shorter than...by amount...') and, even more surprisingly, **matma** ('...is the mother of...by father...'). For a predicate may take as many arguments as it needs to make its meaning clear. Finally, there are a few *four-* and *five-place* predicates. The word **vedma** ('...sells... to...for price...') is one of these. There are no six- or higher-place predicates presently defined in the language, although certainly there could be.⁸

One-place predicates express categorical ideas, or the properties of things viewed in isolation. Many English nouns ('book', 'monkey', 'hammer'), a few English adjectives ('perfect', 'complete') and some intransitive verbs ('sleep', 'sneeze') express categorical ideas in that language. There are relatively few of these one-place predicates in Loglan, because few things are viewed in isolation in that language. Thus two-, three- and four-place predicates are much more common in Loglan, for they express the relations by which things are connected to other things: mothers, children and fathers; travelers, destinations and points of departure; parts and wholes; talkers and the people and things they talk to and about; shorter things and longer things and the amounts by which they differ; seers, seen things, and the backgrounds against which they are seen; and so on. Since Loglan abounds in relational predicates of this kind, it might well be called a relational language. But not because there are in fact more relational ideas in Loglan than in other languages, for probably there are not; but because it is much more obvious in Loglan than in other languages when its predicate ideas *are* relational. For Loglan grammar makes all its relational notions very plain where the grammatical arrangements of many other languages tend to obscure the relational character of their ideas.⁹

3.5 On the Metaphysics of Predicates

Now you have probably sensed that a vast simplification of language is achieved by this device. If predicates express both properties and relations, then there is hardly anything in language that cannot be said by means of predicates, for relations and properties are all we usually talk about. Thus the claim of the English transitive verb ('John hit Pete') is always a relation; of intransitive verbs ('John sneezed'), a simple if short-lived property. The claim of most English prepositions is either a relation ('John is in the house') or part of a more complex relation ('John went into the house'). We have seen that the claims made with English nouns and adjectives are either properties ('That was perfect') or relations ('John is the father of Jack'); and so on. If Loglan predicates do all this work in Loglan, then what is there left to talk about?

Actually, quite a lot. For while Loglan is simple in just these content words where the natural languages are complex, Loglan is complex in its handling of little words where natural languages are still rather rudimentary. The point is, it can afford to be. For with the great savings which are achieved in Loglan by regarding each predicate word as a potential sentence--and this is the idea of the propositional function which is the great achievement of modern logic--we can now elaborate the logical functions of the language far beyond their natural limits. In effect, we have simplified the content-handling machinery of language in order to elaborate its machinery for handling thought. But to do this we have paid a price, or rather we have arranged for you to pay one. For if you learn the language you will find that while the mechanics of the predicate grammar are very simple for your tongue to master, its metaphysics are not easy for the mind. For your mind, gentle reader, has almost certainly been shaped by an Indo-European language. It is therefore admirably equipped to deal with a world of enduring objects (nouns), of actions and processes (verbs), of permanent qualities (adjectives), of transitory qualities (one kind of adverb), and of qualities of qualities (another kind of adverb); and it is just this partition of the world you will miss in speaking Loglan. Your world is a time-bound world; it makes its fundamental distinctions on the basis of permanence or change. The world you will gradually come to see in speaking Loglan is time-free; for its fundamental notions contain no hint of time. Your world has hard, categorical boundaries between one thing-class and another; in the Loglan

world the classifying qualities of things are more softly viewed. Your world is a world of separate objects; the things of the Loglan world are caught up in a web of relations. In short, the world of Loglan is just that time-free world of continuous qualities and things-in-relation that science has taught us to expect to find under the appearances we see. Perhaps if it helps us see that world a little more directly, it will have been worth the price of these wrenches to our minds.

3.6 The Simple Tenses *pa na fa*

We have said that the Loglan world is time-free because its fundamental notion--the unadorned predicate--contains no hint of time. But time and events in time must obviously be accommodated. This is simply done. We can now adorn the predicate with the optional apparatus of tense. To begin with, we need only three little words: **pa**, **na** and **fa**. Look at the following sentences:

- | | |
|--------------------|------------------------|
| (1) Da pa madzo de | X made Y. |
| | [dah-pah-MAHD-zoh-deh] |
| (2) Da fa godzi de | X will go to Y. |
| | [dah-fah-GOHD-zee-deh] |
| (3) Da na blanu | X is now blue. |
| | [dah-nah-BLAH-noo] |
| (4) Da pa mrenu | X was a man. |
| | [dah-pah-MREH-noo] |
| (5) Da fa fumna | X will be a woman. |
| | [dah-fah-FOOM-nah] |

What could be simpler? Every Loglan predicate may be "inflected" in this way; but no predicate needs to be. Thus, the tense machinery of Loglan is strictly optional. You use it when you are concerned with time; you don't when you are not.¹⁰

The optional character of the Loglan tenses permits the direct expression of many things that are hidden in certain arbitrary-seeming usage-patterns of the natural languages. In English there is no "time-less" tense. But we need one; therefore we make one up. We use the present tense of verbs like 'swim', 'dance' or 'fly' and expect our listeners to know when we say 'He swims', 'She dances well', and 'John flies to New York' that we do not mean these remarks literally. For when we use the so-called "present" tense in these sentences we do *not* intend to claim that he is swimming now, or that she is dancing now, or that John is flying now, but only that he *can* swim, she *can* dance well, and that John *does* fly to New York when he goes there at all. We expect--and get--the cooperation of the listener in these non-literal uses of the English present tense because we need a time-free tense in English and do not have one.¹¹ Loglan has one. Therefore in speaking Loglan you can mean what you say. The difference between the following sentences

- | | |
|-----------------|-------------------------------|
| (6) Da sucmi | X swims (i.e., is a swimmer). |
| | [dah-SOOSH-mee] |
| (7) Da na sucmi | X is swimming (i.e., is now |

swimming).

[dah-nah-SOOSH-mee]

is just what it seems to be. In the first we are imputing a certain time-free property to X, namely that he can swim if you let him. He is a swimmer. In the second we are asserting that he is exhibiting that property right now. He is swimming.

Note that English usage requires the little verb 'can' to express the time-free sense of its verbs unequivocally. The suffix '-able' also communicates this notion. Thus, problems are solvable, people are lovable, substances are flammable, and so on. In Loglan we assert these properties nakedly and directly; for they are just what the naked predicate is about. Thus, the difference between

(8) Da cabro X burns (i.e., is flammable).

[dah-SHAH-broh]

(9) Da fa cabro X will burn (i.e., will actually burst into flames).

[dah-fah-SHAH-broh]

is again just the difference between the assertion of a time-free property and the prediction of a future event.¹² Thus if (9) is to be true, the event of X's burning must actually occur. We now see that Loglan really has *four* simple tenses; they are formed by putting **pa**, **na**, **fa** or nothing at all in front of any predicate word.¹³

There are also some compound tenses in Loglan but these are straightforward elaborations of the simple tenses and need not concern us here. Lists of these more complex time-binding operations will be found in **Loglan 6** under Lexeme PA.¹⁴ We may remark in passing that all European tenses--and some extra ones besides--are easily accommodated in the complete Loglan tense system.

3.7 Location with vi va vu

Words which locate predicated things or events in relation to the speaker--words like 'here', 'there' and 'far away' in English, which are **vi va vu** in Loglan--are often used in *inflecting position* in Loglan, that is, like tense operators. Thus

(1) Da vi madzo de X here makes Y.

[dah-vee-MAHD-zoh-deh]

(2) Da fa va cabro X will there burn.

[dah-fah-vah-SHAHB-roh]

(3) Da vu fa vedma X away will sell.

[dah-voo-fah-VED-mah]

are quite normal forms in Loglan. But there are both other positions and other uses of tense and location words in Loglan which we will consider in Chapter 5 on sentence forms.

Just as there are compound tenses so there are compound location operators in Loglan. An account of these is also given under Lexeme PA in **Loglan 6**. Grammatically speaking, location operators are indistinguishable from tense operators in Loglan. Where no difference is required grammatically, no distinction is drawn. This principle of grammatical parsimony has been a general rule in the construction of Loglan grammar.

3.8 Conversion with nu fu ju

Putting a tense or location word before a predicate is called an *operation*; and the words that accomplish the operations of Loglan grammar are called its *operators*. Several operations may be performed on Loglan predicates. The one that we will consider now is called conversion. Look at the following sentences:

- | | |
|-----------------------|---|
| (1) Da pa bloda de | X hit Y.
[dah-pah-BLOH-dah-deh] |
| (2) De pa nu bloda da | Y was hit by X.
[deh-pah-noo-BLOH-dah-dah] |
| (3) Da cluva de | X loves Y.
[dah-SHLOO-vah-deh] |
| (4) De nu cluva da | Y is loved by X.
[deh-noo-SHLOO-vah-dah] |

In sentences (2) and (4) the meanings of the predicates **bloda** and **cluva** have been converted into what we call, in English, the "passive voice". But notice that all we have really done is exchanged the meanings of the first and second places of these predicates. Thus 'X loves Y' and 'Y is loved by X' make exactly the same claim about X and Y. All that has happened is that the order of the places in the predicate expression has been changed. The operator '...-ed by' serves notice of this rearrangement in English. The operator **nu** serves the same function in Loglan.

But the little word **nu** exchanges the meanings of the first and second places of *any* Loglan predicate. This includes those with adjectival and noun-like meanings as well as those that behave like verbs. Thus

- | | |
|--------------------|--|
| (5) Da nu blanu de | X is less blue than Y.
[dah-noo-BLAH-noo-deh] |
| (6) Da nu matma de | X is an offspring of mother Y.
[dah-noo-MAHT-mah-deh] |

are also permissible forms. Thus it will not do to think of conversion as simply the Loglan version of the "passive voice." *Any* predicate having at least two places can have those places

exchanged by the operation with **nu**. Thus **madzo** and **vedma** are three- and four-place predicates respectively, but they too can be converted with **nu**:

- (7) Da pa nu madzo de X was made by Y.
[dah-pah-noo-MAHD-zoh-deh]
- (8) Da fa nu madzo de di X will be made by Y from Z.
[dah-fah-noo-MAHD-zoh-deh-dee]
- (9) Da pa nu vedma de di X was sold by Y to Z.
[dah-pah-noo-VED-mah-deh-dee]
- (10) Da na nu vedma X is now being sold.
[dah-nah-noo-VED-mah]

Notice that the **nu**-conversion does not disturb the meaning of the third (or higher) places of such predicates. Thus, in (8) **di** is still the material, and in (9) **di** is still the buyer. For all **nu** does is switch the meanings of the first and second arguments. Notice also that incomplete forms of converse predicates, as in (10), are just as sayable as the incomplete forms of normal ones.

Notice also that the word **nu**, as in **pa nu vedma**, comes between the tense operator and the predicate word. This is because the operation of conversion may only be performed upon the naked predicate; it should not be applied to the tensed one. It is therefore this converse predicate (**nu vedma**) that is then tensed (**pa nu vedma**). English word-order expresses this same conception. Thus, in translating 'X was sold' by **Da pa nu vedma**, the word **pa** performs some of the offices of English 'was' and the converse form **nu vedma** has approximately the sense of the past participle 'sold'. But note that the separation of these two operations is not so neat in English.

In exactly the same way the operators **fu**, and **ju** work to bring third-, and fourth-place arguments into the first-place of predicates of higher form. Thus in

- (11) Da fa fu madzo de di From X will be made Y by Z.
[dah-fah-foo-MAHD-zoh-deh-dee]

the positions of the material X and the maker Z have been exchanged. So it is the position of the made-thing Y that is now unchanged. In normal form this same claim would be **Di fa madzo de da** ('Z will make Y from X'). Note that the made-thing Y is in second place in both forms. Again, in

- (12) Da pa fu vedma de di do X was sold Y by Z for price H
(i.e., X bought Y from Z for H).
[dah-pah-foo-VED-mah-deh-dee-doh]

it is the first and third places which are exchanged. Should we wish to bring the fourth arguments of longer predicates into first place, the little word **ju** exists to make such conversions. For example:

(13) Da pa ju vedma de di do	X was the price of Y to (buyer) Z from (seller) H.
	[dah-pah-zhoo-VED-mah-deh-dee-doh]

Should fifth and higher higher places of extremely long predicates be required, then a subscripting system is repaired to. Thus **nufe** will exchange the first and fifth places of any predicate long enough to have one:

(14) Da pa nufe ketpi de di do du	X was the accommodation for travel to Y from Z on carrier H secured by ticket Q.
	[dah-pah-noo-feh-KET-pee-deh-dee-doh-DOO]

In this way, the price and the accommodation (seat, cabin, berth, etc.) implicit in the predicates 'sell' and 'ticket', respectively, have been brought into first place.¹⁵ In the **ju**-and **nufe**-conversions the second- and third-place meanings remain unchanged.¹⁶

Now these are complicated notions, in any language. But what is complicated about them is their derivation, not their uses once derived. Thus the Loglan speaker will almost certainly regard **ju vedma** as a distinct predicate meaning '(is the) price (of some merchandise)', and not just a variant of the predicate meaning 'sell'. We may so regard it, for we are interested in examining the structure of the language. But it may be that to the practiced speaker of Loglan the predicate expressions **ju vedma** and **vedma** will seem about as closely related--or as distantly--as 'vocal' and 'vocation' are in English. In any case, he or she will almost certainly regard them as distinct ideas, each with a pattern of uses to be mastered separately. He will certainly not *contrive* the uses of one from what he knows about the other by "transformations" performed in the course of speech.¹⁷

But returning to our structural examination, we now see that the chief practical function of the conversion operation is not to switch meanings around in the complete forms we have been considering, but to bring higher order arguments into prominence in incomplete forms. Here are some examples:

(15) Da pa ju vedma	X was a price (of some sold object).
	[dah-pah-zhoo-VED-mah]
(16) Da fa fu madzo	X will be a material (from which something will be made).
	[dah-fah-foo-MAHD-zoh]
(17) Da na nu godzi	X is now a destination (a place now being gone to by some unspecified goer).
	[dah-nah-noo-GOHD-zee]
(18) Da nu blanu	X is less blue (than something

- else).
[dah-noo-BLAH-noo]
- (19) Da nu cluva X is lovable.
[dah-noo-SHLOO-vah]

If the last translation startles you, reflect on this (in a Loglan way): **Da cluva de** means 'X loves Y'. To say **Da cluva** (incompletely) must therefore mean that X loves someone or something in a time-free sense--in short, X *can* love; he or she is a lover. But **Da nu cluva de** means 'X is loved by Y' in a timeless sense. Whence **Da nu cluva** must mean--again incompletely--that X is a beloved. That is, he, she or it can evidently be loved; whence X is lovable. Thus we encounter the time-free sense of the Loglan predicate in converse as well as normal form. Here are some other examples of converse potentialities:

- (20) Da nu madzo X is makable (i.e., can be made).
[dah-noo-MAHD-zoh]
- (21) Da fu ditca X is teachable (i.e., can be taught something).
[dah-foo-DEET-shah]

The complete form of the predicate **ditca** means '...teaches...to...'; whence the teachable person or animal is normally designated in the third place, thus requiring the **fu**-conversion. But now notice:

- (22) Da nu ditca X is a teachable (i.e., a teachable topic or subject).
[dah-noo-DEET-shah]
- (23) Da nu titci X is edible (i.e., can be eaten).
[dah-noo-TEET-shee]

Thus **titci** must be at least in part a two-place predicate meaning '...eats...'. But note that 'X is eaten' and 'X is taught' are *not* good translations of (23) and (22). These English expressions involve the hint of time; they seem to suggest that the eating and teaching did in fact take place. This is contrary to the spirit of Loglan. For in Loglan the fundamental thing about an object is not whether it *has* been eaten or taught, but whether it is the kind of thing that *can* be eaten or taught.

This is a troublesome notion to the English mind. But it can perhaps be clarified by the following example: If I show you a drawing of a tool that has never been made but which I believe can be made, I will impute that property to it in Loglan with the grammatically simple claim **Da nu madzo**; and I will sense, as I am saying it, that what I have said about this still imaginary thing is somehow more fundamental than the more elaborate claim I might make about it tomorrow, when it has been made. Thus the tensed Loglan form **Da pa nu madzo** feels more elaborate to me because it *is* more elaborate, grammatically. The untensed form **Da nu madzo** feels more fundamental because it *is* more fundamental, again grammatically. For in Loglan the direction of

grammatical simplicity is nearly always the direction of observational simplicity. If something has in fact been burned it must have been burnable; the second state precedes the other observationally. But many burnable things exist which have never been, and will never be, actually burned. In English the direction of grammatical simplicity goes the other way. 'Burnable' is a more elaborate word than 'burned'. Yet you probably now agree that being burnable is a simpler state than being burned. Just so with 'made' and 'makable', 'loved' and 'lovable', and every other property of this still-potential world. Again we see how European grammars are more complicated than they would otherwise need to be by their metaphysical commitment to the idea of time.

3.9 Negation with **no**

The little word **no** is called the negative operator in Loglan and is used in a wide variety of ways. Some of these ways will not concern us until we consider negative arguments and sentences in Chapters 4 and 5. For the present, we are only concerned with the ways in which the negation of predicates can be arranged.

There are two such ways. One is when **no** precedes a tense operator, as in sentences (1) and (2); the other is when it precedes a predicate, as in sentence (3). When **no** precedes the tense word, as in

- | | |
|--|---------------------------------|
| (1) Da no pa gudbi mrenu ¹⁸ | X was not a good man. |
| | [dah-noh-pah-GOOD-bee-MREH-noo] |

([GOOD] rhymes with 'food', not 'good') and

- | | |
|--------------------------|-----------------------------------|
| (2) Da no fa bakso madzo | X is not going to be a box-maker. |
| | [dah-noh-fah-BAHK-soh-MAHD-zoh] |

it has the effect of negating the whole predicate expression. Thus the claim of (1) is consistent with X's having been a bad woman, or a good butterfly, for that matter, for it is the whole predicate expression **pa gudbi mrenu** that has been contradicted by **no**. At any rate, sentence (1) does not mean, as its translation sometimes does in English, that X was a man but not a good one. To say the latter in Loglan, we shift the negative operator to a position immediately before the particular predicate word it is intended to negate. Thus:

- | | |
|--------------------------|--|
| (3) Da pa no gudbi mrenu | X was a non-good man. |
| | [dah-pah-noh-GOOD-bee-MREH-noo] |
| (4) Da fa no bakso madzo | X will be a non-box maker (i.e., a
maker of something other than
boxes). |
| | [dah-fah-noh-BAHK-soh-MAHD-zoh] |

Here **no** has the exact sense of English 'non-'. Thus in (4) X is going to make something alright, but not boxes. And in (3) X was a man alright, but not a good one. Precise distinctions of this

kind can be clearly made in English--for witness these translations--but it is not the custom of English speakers to do so. Instead, the difference between the meanings of (2) and (4) is usually suggested in spoken English by a shift in stress:

- | | |
|---------------------------------|---|
| (5) Da no fa bakso madzo | X is not <i>going</i> to be a box-maker. |
| [dah-noh-fah-BAHK-soh-MAHD-zoh] | |
| (6) Da fa no bakso madzo | X is not going to be a <i>box</i> -maker. |
| [dah-fah-noh-BAHK-soh-MAHD-zoh] | |

In Loglan such logical distinctions are important enough to deserve distinct grammatical arrangements. These will function equally well in both the written and the spoken forms.

The pronunciation guides are now probably supplying you with more phonetic information than you need. So from this point on I shall supply phonemic transcriptions of the numbered specimens instead of phonetic guides--that is, I shall use /e/ rather than [eh] or [eigh], and /da MREnu/ rather than [dah MREH-noo] to show the production of the sentence **Da mrenu**--and use the guide form only to give the pronunciations of new words as they are introduced. Transcriptions, you will see, are often more compact than the specimens themselves. More important, they will concentrate your attention on the stress- pause contour of the sentence as a whole. It is now time to do this. But you may wish to refer back occasionally to Chapter 2 to assure yourself of the correct pronunciation of an old sound in a new context.

3.10 Abstraction with po pu zo

Abstraction is one of the most powerful devices in natural language. The step from 'red' to 'redness' must have been one of the most important linguistic advances ever made...perhaps as important as the invention of negation. Yet abstraction is logically one of the more obscure linguistic acts. Where *are* the things created by it, such things as Virtue, Perfection and Democracy? Or, for that matter, where is the color Red? It is hard to know what one is talking about when one uses such words. Yet to be able to see the world in terms of just such properties as "redness," "length" and "mass"--and not merely as endless collections of "red things," "long things" and "massive things"--must have been one of the linguistic requirements for the development of science itself. It is hard to see how a taste for causal analysis could have developed in minds surrounded wholly by concrete particular things. Perhaps it was; we do not know. Science did develop extensively in the hands of the Greeks, and Greek is abundantly furnished with the machinery for talking about abstract ideas. But so were other ancient tongues, for example, Sanskrit, and the ancient Hindus did not raise the questions that led the Greeks to science. In short, language may supply the *necessary* conditions of cultural events, but the linguistic factor is certainly never sufficient to guarantee some cultural result.

However this may be, it is clear that if Loglan is to be, among other things, a language for contemporary scientific thinking, we must provide it with the apparatus of abstraction. In English that apparatus exists but is most irregular. There is a group of suffixes--like '-ion', '-ship', '-ness', '-ence', '-hood', '-acy', and '-ity'--that sometimes mean properties and sometimes mean states of affairs; and then there are some special words like 'vice', 'wit', 'force', 'mass' and 'evil' that are

abstract but show no outward signs of it. One "knows" they are abstractions only by "knowing" that they...well, refer to abstract things. Obviously we must do better than that.

Analysis shows that at least three kinds of abstraction occur in ordinary speech. One is the abstraction of properties ('Honesty is a common trait among Englishmen', 'Mass is an important concept to physicists', and so on). Another is the abstraction of events or states of affairs ('The race was short', 'His childhood was unusually long', 'The singing took place between 8:00 and 8:30', and so on). And the third and currently the rarest form of abstraction is the one which forms the quantitative sense of some predicates ('There is more blue in that picture than in this one', 'His love was greater than hers', 'There were thirteen inches of snow', and so on). There may be other varieties of abstraction in current use and still others may yet be invented. If so, Loglan can easily accommodate them. But at the moment only three abstract operators have been coined. These are **pu**, which means 'is a property of being (something)', **po**, which means 'is an event, state or condition of being (something)', and **zo**, which means 'is an amount of being (something)'. The three operators are used in grammatically identical ways. In translating English, the event operator **po** will be most commonly used. It may be that translations from other languages will reveal quite different patterns of abstract thought.

Let us look at the following sentences:

- | | |
|-----------------------|--|
| (1) Da po mrenu | X is a manhood.
/dapoMREnu/ |
| (2) Da po de mrenu | X is Y's manhood (i.e., the state
of Y's being a man).
/dapodeMREnu/ |
| (3) Da pu gudbi | X is a goodness (i.e., a property of
something's being good).
/dapuGUDbi/ |
| (4) Da pu de gudbi di | X is a/the property of Y's being
better than Z.
/dapudeGUDbiDI/ |
| (5) Da zo blanu | X is an amount of blue.
/dazoBLAnu/ |
| (6) Da zo de blanu | X is the amount of blue in Y (i.e.,
the amount of Y's being blue).
/dazodeBLAnu/ |

In each of the odd-numbered sentences an abstract operator is used generally. That is, it generates a predicate expression (**po mrenu**, **pu gudbi**, **zo blanu**) that might be applied to many things. Thus, there are at least as many manhoods as there are men, at least as many goodnesses as good things, and so on. But in the even-numbered sentences the field of application of the predicate has been much narrowed. For the predicate which is the basis of the abstraction has been furnished in each case with one or more arguments. In sentence (4), for example, the operator **pu** transforms the whole expression **pu de gudbi di** into a predicate of which **da** is the

first and only argument. Within this predicate expression **de** and **di** are the first and second arguments of the predicate **gudbi**.

We sense that such specified abstract predicates apply to unique things. Of course they may not. In (2) Y may have been a man several times and may thus have had several manhoods; in (4) Y may be better than Z in several ways; and so on. But these are matters of fact, not grammar. *Grammatically* the predicate expression **po de mreanu** is a general term; like **mreanu** itself it may in principle be applied to many things.

We will see in the chapter on arguments how these general abstract notions can be turned into unique designations; how, for example we can translate the English word 'virtue' in 'Virtue is nice'. Obviously the word 'virtue' is *some* kind of unique designation in this context; but we have clearly not provided for it yet. For we are still talking about predicates, and hence about the claims people make about the world. We have not considered yet how speakers designate the things about which they make those claims. Yet it is true in English at least that the chief use of abstract predicates is in designation. Thus the Loglan names of "Liberty, Equality and Fraternity" have not been constructed yet. We will see, however, in the next chapter how their construction depends essentially on the abstract forms of predicates which we are now considering.¹⁹

Before we leave abstract predicates, there is one feature of event-abstraction which needs pointing out. That is that Loglan makes no distinction between short events (happenings) and long ones (states of affairs). Thus the following sentences,

- | | |
|------------------|---|
| (7) Da po tsani | X is a sneeze (i.e., an act of sneezing). |
| | /dapoTSA ²⁰ Ani/ |
| (8) Da po mreanu | X is a manhood (i.e., a state or condition of being a man). |
| | /dapoMREnu/ |

are grammatically identical; both are formed with the event-operator **po**. In Loglan both sneezes and manhoods are events. And a thing X is an event of sneezing, or a manhood, provided it is an interval of space-time in which, or during which, some other thing Y sneezes or is a man. Obviously it cannot matter logically how long Y sneezes, or how short a time he is a man. Again it is worth recalling that neither grammar nor logic is concerned with what is, but only with what might be. Can we say that his sneeze was longer than his manhood? Of course we can. It would be wrong to contrive a grammar which precluded such nonsense, or such irony.

3.11 Metaphor: The Modifier-Modified Relationship

The simplest of operations on the predicate involves no operator at all. Yet it is logically one of the most complicated, and historically, the most important, for it is undoubtedly the major source of language growth. This operation is the one by which a speaker may modify the meaning of one predicate simply by preceding it with another. Thus the meanings of the predicates in the following sentences:

- | | |
|--------------------|---------------------|
| (1) Da corta mrenu | X is a short man. |
| | /daCORtaMREnu/ |
| (2) Da gudbi matma | X is a good mother. |
| | /daGUDbiMATma/ |
| (3) Da blanu hasfa | X is a blue house. |
| | /daBLAnuHASfa/ |

are as easily interpreted in Loglan as they are in English. Note that the modifier precedes the modified word. This is the most widespread arrangement among the natural languages,²¹ and therefore we have followed it. In Loglan this order is uniform: it is the order of adjective-like words modifying noun-like ones, and of adverbial ones modifying verb-like or adjective-like predicates. Thus even when the modifier is adverbial in the English sense, the modifying word comes first in Loglan:

- | | |
|--------------------|--|
| (4) Da kukra prano | X runs quickly (is a fast runner). |
| | /daKUKraPRAno/ |
| (5) Da bilti sucmi | X swims beautifully (i.e., is beautiful as a swimmer). |
| | /daBILtiSUCmi/ |

There is a way of modifying this order that we will look at in [Section 3.13](#). But we must now inquire more closely into the meaning of such phrases. If X is a short man, does this mean that he is short *and* a man? Not necessarily; for he might be fairly tall...for a woman, say, or a child. All we can surmise is that he is short *for* a man; that is, a short type of man. What about blue houses? And beautiful swimmers? Can we expect them to be really blue? And really beautiful? All over? Inside and out? Certainly not; for blue houses and beautiful swimmers, like short men, are blue *for* houses and beautiful *as* swimmers. That is, they are blue among houses and not among skies, and it is their *swimming* that is beautiful, never mind their eyes. And good mothers? Good *as* mothers, perhaps, but not necessarily good cooks or good wives. And so on.²²

Clearly we are dealing here with metaphorical extensions of primitive ideas. We know what a mother is, and a man and a house. And we know what good, blue, beautiful and short mean, as primitive ideas. The first time we hear the metaphor 'good mother' we are in a fair position to guess what the speaker means, from our knowledge of the uses of these simple predicates in the language. But we cannot be sure. Neither--until one has seen one--can one be sure what a blue house is. How blue does a house have to be to be blue? How short is a short man? More puzzlingly, how watery is a water-pistol? How intellectual is an intellectual dwarf? And what is a bicycle pump anyway? Does it pump bicycles? Into what?

In Loglan we surmise, with most logicians, that such questions are unanswerable by direct analysis. We suppose that the meanings of predicate expressions formed of two or more constituent predicate ideas are like the meanings of simple predicates themselves: essentially unitary and unanalyzable.²³ A blue house is...well, a blue house. Like houses themselves, or blue things, you have to be shown one to really know. And intellectual dwarfs? Well, here again it is not the art of logical inference, but a sense of irony that helps one to understand this phrase; that

3.12 Grouped Modifiers with ge

Despite its many restrictions, the meaning of a modified predicate is sometimes very unclear in English. A classic case is the sentence 'It's a pretty little girls' school'. What on earth does it mean? A school for pretty little girls? A school for girls who are pretty little? A pretty type of *little* girls' school? A pretty type of little *girls'* school? Take your pick. There are at least five equally legitimate grammatical interpretations of this innocent remark.²⁶

The question behind this confusion in English is, of course, what modifies what? In English we cannot be sure.²⁷ In Loglan we can be. For there is an operator **ge** [geh] which groups the modifiers in a string of modifiers in such a way that what-modifies-what is clear. Look at the following sentences: (In them the word **bilti** [BEEL-tee] means 'beautiful', **cmalo** [SHMAH-loh] means 'small', **nirli** [NEER-lee] means 'girl', and [SHKEH-lah] **ckela** means 'school'.)

- | | |
|--|--|
| (1) Da bilti cmalo ckela nirli | X is a beautifully small girls' school (i.e., a school for girls who are beautifully small). |
| /daBILtiCMAloNIRliCKEla/ | |
| (2) Da bilti ge cmalo nirli ckela | X is beautiful for a <i>small</i> girls' school. |
| /daBILtigeCMAloNIRliCKEla/ | |
| (3) Da bilti cmalo ge nirli ckela | X is beautifully small for a girls' school. |
| /daBILtiCMAlogeNIRliCKEla/ | |
| (4) Da bilti ge cmalo ge nirli ckela | X is beautiful for a small (type of) girls' school. |
| /daBILti.geCMAlo.geNIRliCKEla/ ²⁸ | |

In the absence of other markings of the predicate string--like **go** and **cue** which we will take up presently--the operator **ge** groups everything that comes after it into what may then be regarded as the modified term. Thus in (2) what **bilti** modifies is the whole expression **cmalo nirli ckela**; X is evidently beautiful for a *small* girls' school. In (3) **bilti** modifies just the word **cmalo**, whence X is a beautifully small something. The **ge** operator groups **nirli ckela** into the single idea which remains to be modified, and we see that that something is a girl's-school. Thus the whole claim of (3) is that X is beautifully small for a girl's-school, or slightly rephrased, a girl's-school that is beautifully small. Sentence (4) has both the groupings that occur separately in sentences (2) and (3). Thus it claims that X is a beautiful type of small type of girls'-school. Notice that the English phrase 'type of', while sometimes leading to awkward translations, is nevertheless the best all-around translator of the Loglan operator **ge**. If English speakers regularly used such a phrase to indicate how they meant their modifiers to be grouped, we could more often understand what they say. But they do not. And therefore what they say can often be interpreted in several equally correct ways.²⁹ This is, of course, just the problem of syntactic ambiguity. The operator **ge** removes a large potential source of it from the language.

(3) Da mrenu go corta de X is a man of a type which is
shorter than Y.
/daMREnugoCORtade/

In all these sentences, phrasing pauses before **go** are natural but optional. So we might have:

(4) Da hasfa, go blanu de X is a house of a type that is bluer
than Y.
/daHASfa.goBLAnude/

When a pause is used, note that a comma appears in the corresponding text.

(5) Da prano, go kukra de X is a runner of a type who is
faster than Y (i.e., X runs faster
than Y).
/daPRAno.goKUKrade/

In each case, inversion with **go** reverses the normal modifier-modified word order; and the modifying word is then conveniently last.

Now there is a deceptive simplicity in all this, deceptive because the only short English translations we can contrive for these Loglan remarks do not quite mean what the originals do in Loglan. Consider the sentence:

(6) Da matma go gudbi de
/daMATmagoGUDbide/

The simplest English translation of this sentence is 'X is a mother who is better than Y.' But better in what? As a mother? Or in general? Of the English, one cannot be sure. Of the sense of the Loglan, we *can* be sure, for we know how the sentence was formed. Thus just because we know that **gudbi** is a displaced modifier of **matma**, we know that the phrase **gudbi de**--in this sentence at least--means 'better-as-a-mother than Y'. If we wanted to say that X is a mother *and* better-in-general than Y, we could easily do so. And we shall see how presently. But this is not the way.

Here are other examples of modifier strings inverted with **go**:

(7) Da nirli ckela go cmalo
/daNIRliCKElagoCMAlo/

What does it mean? Exactly what **Da cmalo ge nirli ckela** means; for it is nothing but an inverted form of the same remark. Thus (7) means exactly what we mean in English when we say that it's a girls' school that is small. From this it follows that (7) must be equivalent to

(8) Da ge nirli ckela go cmalo X is a girls' school that is small.
/dageNIRliCKElagoCMAlo/

with its redundant **ge**. And it is clear that it is. For (8), in turn, is equivalent in meaning to

(9) Da cmalo ge nirli ckela X is small for a girls' school.
/daCMAlogeNIRliCKEla/

as required. Good usage in Loglan requires that we not use punctuation words like **ge** redundantly. So we will not ordinarily speak sentences like (8) unless we want to point something out in them...as we just have. And of course we would usually use inversion on sentences like (9) only if we then wanted to specify an argument of the modifier **cmalo** after doing so, as in the sentence below:

(10) Da nirli ckela go cmalo de X is a girls' school of a type that
is smaller than Y.
/daNIRliCKElagoCMAlode/

Note that it is often impossible to translate such Loglan constructions literally into English. The little word **ge** frequently defies exact translation. But perhaps by this time it doesn't matter. For you may have begun to sense what the Loglan sentences mean directly, without the intervention of these English approximations of its very precise operations.³⁰

As we shall see in a later section, there are still other Loglan meanings to be teased out of the English sentence 'It is a pretty little girls' school'. But these require the notion of "connected" predicates, to which we now turn.

3.14 Connected Predicates with e a o u and noa

One of the simplest--and yet ultimately most powerful--devices of natural language is the one that enables us to make remarks about the connections between ideas. In English the words which permit us to talk about connections are called "conjunctions," and the most popular of them is 'and'. Thus in the sentence,

(1) X is a teacher and a father. Da ditca, e farfu
/daDITca.eFARfu/

the predicate ideas 'is a teacher' and 'is a father' are connected with the conjunction 'and' and with the Loglan word **e**. (The pause before **e** is obligatory, by the way, as before all such connecting words.) In Loglan, words of this kind are called *connectives*, and the simplest of them are the four one-letter words **e**, **a**, **o**, and **u**. (The fifth one-letter word **i** has a special connective role between sentences which we will not discuss until Chapter 5.) Making connections in Loglan is very similar to using conjunctions in English, as the following examples show:

- | | |
|-----------------------------------|---|
| (2) Da gudbi mrenu, e sadji farfu | X is a good man and a wise father. |
| /daGUDbiMREnu.eSADjiFARfu/ | |
| (3) Da groda bakso, a cmalo hasfa | X is a large box or a small house, and possibly both. |
| /daGROdaBAKso.aCMAloHASfa/ | |
| (4) Da na clivi, o na brute | X is now alive if and only if it is now breathing. |
| /danaCLIvi.onaBRUte/ | |
| (5) Da na clivi, u na brute | X is now alive whether it is now breathing or not. |
| /danaCLIvi.unaBRUte/ | |

Notice how simply the Loglan connections are made in contrast to the rather elaborate forms of the English connecting phrases. This is because connecting predicates is a grammatically simple operation in Loglan whereas frequently in English it is not.

In all these sentences the speakers of both languages are making claims not about properties but about the connections between properties. With the connective **e** in (2) the predicates 'good man' and 'wise father' must both be true of X in order for the claimed connection to be true. Thus (2) claims what we will call the logical *conjunction*³¹ of two ideas. With **a** in (3) either or both of the connected predicates may be true of X if the claimed connection is true, and the connection is false only if both predicates are false of X. Thus only if X is neither a large box nor a small house is (3) false. This is the *inclusive* sense of English 'or', a sense which we sometimes express in English with the odd expression 'and/or'. We will call this second kind of connection *alternation*, for it expresses the relation between alternatives...but remember that these are alternatives that may be taken several at a time.

The connections made with **o** and **u** in (4) and (5) represent sharply different claims about the same two predicates. In (4) the connection with **o** is true just in case the individual predicates are either both true or both false of X; thus X must be either dead and not breathing, or alive and breathing, for the sentence as a whole to be true. This kind of connection is called *equivalence*. In a certain rather formal sense, equivalent predicates "mean the same thing."³² In (5), however, the sentence as a whole is true whenever the first predicate **clivi** is true of X, and false otherwise, no matter what may be the case for the predicate **na brute**. Thus we may describe the **u**-connection by saying that X's aliveness is "independent" of its breathing. So we call the **u**-connection *independence*.

Independence, equivalence, conjunction and alternation are the four elementary logical operations of Loglan; and the simple one-letter words that express them are the building blocks out of which the whole system of Loglan connectives is constructed. For these four ways are obviously not the only ways two properties may be connected. There are, in principle, sixteen possible ways of talking about two things simultaneously and fourteen of them are linguistically useful. English provides for all fourteen by one circumlocution or another. Loglan provides for all fourteen with single words, though sometimes these words are compounds constructed from

Suppose we want to say that someone is a father who is both good and wise. We want therefore to make a connection between the two predicates in 'He's a good father' and 'He's a wise father'. We have already considered one way of forming such connections in Loglan.

Thus we say:

- (1) Da gudbi farfu, e sadji farfu X is a good father and a wise father.
/daGUDbiFARfu.eSADjiFARfu/

But the word **farfu** seems unnecessarily repetitive here. Is there any way to say 'He's a good and wise father' in Loglan as clearly as we do in English?

Of course. But to do so unambiguously--which is the constant aim of Loglan grammar--requires an entirely different series of Loglan connectives, namely **ce ca co** and **cu** [sheh shah shoh shoo].³⁷ Recall that the connectives **e a o** and **u** were used *between* predicate expressions, as in **Da gudbi, a sadji** ('X is good and wise'). We will now see how this new series of connectives is used only *within* predicate expressions. Thus they form connections inside what is grammatically a single, if elaborate predicate, expression. Yet we will also see that the connections they assert are of the same logical type. Thus **ce**, like **e**, asserts conjunction; **ca**, like **a**, asserts alternation; **co**, like **o**, asserts equivalence; and so on. The same claim that is made with **e** in (1) can be made with **ce** in (2) below:

- (2) Da gudbi ce sadji farfu X is a good and wise father.
/daGUDbiceSADjiFARfu/

We will now call expressions like **gudbi ce sadji farfu** *internally connected* predicates. They represent internally complex ideas. Note that we do not pause before **ce** and **kin**.³⁸

Here are some other sentences with internally connected predicates:

- (3) Da groda ce redro bakso X is a big, red box (i.e., big and red).
/daGROdaceREDroBAKso/
- (4) Da kamla ca godzi, trena X is a coming or going (pause) train.
/daKAMlacaGODzi.TREna/

Note that a pause before **trena** would be quite natural...in both languages. In Loglan, as in English, such "phrasing pauses" are, of course, optional. In the haste of rapid speech, pauses of this kind are often omitted. But whenever pauses are intended in the spoken form, they are represented in the written form by commas. Remember that, unlike other languages, Loglan is audio-visually isomorphic. This means that a writer of Loglan, like a composer of music, may compose his text in a way which will indicate how he intends it to be read aloud.

In English we would prefer the inverse form 'It's a train which is coming or going' for sentence (4). It is possible of course to invert the predicate in Loglan, too. Thus for (4) we may say:

- (5) Da trena, go kamla ca godzi X is a train which is coming or
going, and possibly both.
/daTREna.goKAMlacaGODzi/

It is hard to find instances of equivalence and independence used internally in English. Here are some rather strained examples:

- (6) Da forli cu kukra, prano X is a strong--whether fast or not-
-runner.
/daFORlicuKUKra.PRAno/
(7) Da clivi co brute, nimla X is a living--if and only if a
breathing--animal.
/daCLIvicoBRUte.NIMla/

Again, all these pauses are optional. Note that to forge such internal connections in English it is often useful to pause rather definitely on both sides of the internally connected word or phrase. This is suggested by the use of dashes (--) in the English translations given above. In contrast, the Loglan forms are simple and swift, although a pause before the modificand of such connected modifiers is often helpful to one's auditor. Moreover, the Loglan forms accommodate the rarer forms of internal connection--like equivalence, independence and implication--just as easily as they do the more common forms. As a consequence, internal equivalence, independence and implication may not *be* so rare in Loglan.

Here is an example of internal implication which is easy to say in Loglan but difficult to be clear about in English:

- (8) Da crina noca denli cetlo X is a rainy--only if a wet--day.
/daCRInanocaCETloDENli/

For just as **noa** is derived from **no...a**, so the internal connection **noca** is derived from **no...ca**. One can easily imagine logically intricate predications of this kind becoming far more frequent in spoken Loglan than they have ever been in natural speech.

So far we have considered only internally connected modifiers, such as **gudbi** ('good') and **sadji** ('wise'). But the modified parts of metaphors, that is, their "modificands", may also be connected. Thus the external connection in:

- (9) Da gudbi mermeu [mehr-MEIGH- X is a good husband (married-
oo], e gudbi farfu man) and a good father.
/daGUDbimerMEu.eGUDbiFARfu/

may be as easily transformed into an internal connection as the connection between modifiers.

There is a style of "punctuated" Loglan text in which hyphenating **y's** are represented by hyphens (-), number-words by numerals, letter-words by letter-characters, and in which the logical connectives are sometimes represented by their symbols. In this style the word **ci** may be replaced by a *low hyphen* (a hyphen dropped to the baseline):

(7") Da sadji ce mutce_gudbi junti_mermeu ce farfu

The interverbal hyphens are pronounced [shee] as before. But from this written formulation it is immediately clear to the eye what the ear may only have guessed, namely that we may infer the conjunction of four separate claims from this sentence: (i) **Da sadji junti_mermeu**, that X is wise for a young husband; (ii) **Da mutce_gudbi junti_mermeu**, that X is very good for a young husband; (iii) **Da sadji farfu**, that X is a wise father; and (iv) **Da mutce_gudbi farfu**, that he is also a very good father. Incidentally, in sentences (ii) and (iv) the **ci's** between **mutce** and **gudbi** have become redundant. Good usage would therefore dictate (ii') **Da mutce gudbi junti_mermeu** and (iv') **Da mutce gudbi farfu**, for "grouping left" is what unmarked predicate strings in Loglan do automatically.³⁹

This is perhaps more than one can say univocally with an internally-connected predicate expression in spoken English. Note however that in written English this rare hyphenating style would do the clarifying job just as well as the Loglan hyphen does in Loglan. The only difference is that the Loglan hyphens are spoken. So their clarifying role is available to the speaker as well as to the writer of Loglan.⁴⁰

Let us now consider some of the English ambiguities that are resolved by these devices. Suppose someone says 'It's a fast bicycle pump'. Does he mean that it's a pump for fast bicycles? A fast type of bicycle pump? Or a pump which is both fast and for bicycles? These meanings are almost impossible to distinguish in spoken English, no matter what intonation or pause-stress pattern one adopts. In fact we rely almost wholly on plausibility inferences from the context in which the speech occurs to resolve such meanings in English. As a consequence there is a limit to the new meanings we can produce with any hope of being understood.

Not so in Loglan. The word for 'pump' is **dampa** [DAHM-pah]. 'Bicycle' is a complex notion in Loglan, as it is in English, being derived from two elementary notions: the combining form of **to** ('two'), which is **tor-** [tawr], and the word for 'wheel' which is **krilu** [KREE-loo]. So **torkrilu** [tawr-KREE-loo] is the required word. (The English word 'bicycle' is also derived from two primitive roots, but one is Latin 'bi-' and the other Greek 'cycle'!) And 'fast', we already know, is **kukra**. With this trio of predicates we can now assert the three possible meanings of 'It's a fast bicycle pump.' The version which is grammatically simplest in Loglan is:

(8) Da kukra torkrilu dampa	X is a fast bicycle pump (that is, a pump for fast bicycles).
/daKUKratorKRILuDAMpa/	

Here, as we learned in the section on metaphor, each predicate modifies the next word in the string. Like 'pretty *little* girls' in English, the first word modifies the second, which so-modified

It is perhaps an appalling thought that our minds may be helplessly filled with grammatical puns. But it is just this possibility which analysis of this kind reveals.

Let us look once more at the intriguing remark 'It's a pretty little girls' school' from the point of view we have just uncovered. On the pattern of 'It's a big, red box' (**Da groda ce redro bakso**) it is clear that we must now count certain connections amongst these modifiers as among the possible legitimate interpretations of this sentence. In a previous section we considered the various ways in which the string of modifiers in a corresponding Loglan sentence might be grouped or not grouped with **ge** and its optional right-mark **cue**. There were five such ways: (i) **Da bilti cmalo nirli ckela**, (ii) **Da bilti ge cmalo nirli ckela**, (iii) **Da bilti ge cmalo nirli cue ckela**, (iv) **Da bilti cmalo ge nirli ckela**, and (v) **Da bilti ge cmalo ge nirli ckela**. We must now consider whether certain internal connections with **ce** may not yield equally plausible interpretations of this remark. (The other logical connections seem not to occur implicitly in English.) In fact **ce** does permit several new interpretations of the original remark:

- | | |
|---------------------------------------|---|
| (12) Da bilti ce cmalo nirli ckela | It's a beautiful and small girls' school (that is, a school for girls who are beautiful and small). |
| | /daBILticeCMAloNIRliCKEla/ |
| (13) Da bilti ce cmalo ge nirli ckela | It's beautiful and small for a girl's school. |
| | /daBILticeCMAlogeNIRliCKEla/ |

Now a speaker of 'It's a pretty little girls' school' might easily intend either of these two additional constructions. But how many more are there? It turns out that there are twenty-two clear and distinct ways in which the four Loglan predicate words may be strung together in this order and either connected with **ce**, or grouped with **ge** and **cue** or **ci**, or both. Only thirteen of these twenty-two Loglan sentences are legitimate interpretations of 'It's a pretty little girls' school', however; for the other nine constructions, while clear enough in Loglan, simply cannot be the intended meanings of the English remark. Still, thirteen is rather a lot. The English sentence is richer in interpretations than one at first suspects. On the other hand, that there are so many equally legitimate interpretations of *any* English sentence means that there is a substantial amount of ambiguity in that language, much more than we are ever aware of in speech.⁴²

In any case we have found in these examples an area of Loglan grammar which not only accommodates the rich intricacy of a great natural tongue, but far exceeds it. For simply by recognizing these two grammatical operations among modifiers--conjunction with **ce** and grouping with **ge** or **ci**, both of which we evidently if unconsciously perform in speaking English--and then making all the logically possible combinations of these operations explicitly available to the speaker of Loglan (as well as the full battery of logical connections instead of only one) we may surmise that we have exceeded the modification provisions of *all* the natural tongues. What that may mean, in time, to the speaker of Loglan, is hard to guess. But there are some interesting possibilities which we will consider in the closing section of this chapter. First, however, we must consider briefly how internally mixed modifiers are formed.

Given this forethought way of speaking, we can make any intended grouping pattern within a sequence of connected predicates unmistakably clear. For example,

(3) Da ke prano ki ka sucmi ki valti X both runs and either swims or jumps.

/dakePRAnokikaSUCmikiVALti/

Clearly this means that X runs, and, in addition, that X either swims or jumps...presumably the speaker has forgotten which. With ordinary afterthought connectives, this particular grouping of terms cannot be conveyed...at least not when spoken in that order. Thus

(4) Da prano, e sucmi, a valti X runs and swims, or jumps.

/daPRAno.eSUCmi.aVALti/

means that X both runs and swims, or X jumps...and again the speaker has apparently forgotten which. Notice that the trailing expressions **a valti** and 'or jumps' are genuine afterthoughts in both languages...always in Loglan and usually in English. By this we mean that they are added onto already complete thoughts. Thus, in the following sentence, **Da prano** was complete before **e sucmi** was added.

(5) Da prano, e sucmi X runs, and swims.

/daPRAno.eSUCmi/

And in (4), **Da prano, e sucmi** was complete before **a valti** was added. It is in this sense that the **a e o u noa** series are afterthought connectives. They add connections to already completely formed ideas. Thus,

(6) X runs...and swims or jumps.

cannot be the sense of Loglan sentence (4) no matter how one pauses in it. The reason is that the connectives in (4) are afterthought connectives and will not group that way. To obtain the sense of English (6), which is of course the sense of (3), one must use at least one forethought connective. Here is the sense of (3) and (6) as minimally marked:

(7) Da prano, e ka sucmi ki valti X runs, and either swims or jumps.

/daPRAno.ekaSUCmikiVALti/

When used with predicates, connectives of the **ka**-series are assumed to connect whole predicate expressions--not just predicate words--unless they occur non-initially in a predicate string, that is to say, inside one. Thus, **ke...ki...** in

(8) Da ke nurmue ckano ki sadji farfu X is both moderately kind and a wise father.

/dakeNURmueCKAnokiSADjiFARfu/

will be taken to embrace **nurmue ckano** ('moderately kind') on the left--**nurmue** may be pronounced either [NOOR-mweh] or [noor-MOO-eh], as you prefer--and **sadji farfu** ('wise father') on the right. But in

- (9) Da nurmue ke ckano ki sadji farfu X is moderately both kind and wise as a father (i.e., a moderately kind father and a moderately wise father).

/daNURmuekeCKAnokiSADjiFARfu/

the **ke...ki...** connection embraces only the two predicate words **ckano** and **sadji**. In other words, inside predicate strings, **ke...ki...** has the same one- word scope as the internal connectives of the **ca**-series. Outside them, it has the scope of **a**-connectives.

One consequence of this arrangement is that the first term in a predicate string cannot be **k**-connected...unless that string is the operand of a description; see [Section 4.8](#). But among the predicate strings we are considering in this chapter, the **ke...ki...**-pair in the following sentence

- (10) Da ke nurmue ki ckano sadji farfu X is both a moderate (person) and a kindly wise father (a father who is wise in a kindly way).

/dakeNURmuekiCKAnoSADjiFARfu/

connects the whole predicate expressions **nurmue** and **mrenu sadji farfu**. So it cannot mean 'X is both a moderately and a kindly wise father.' The sense of the latter can be expressed in Loglan, of course, and indeed very simply:

- (11) Da nurmue ce ckano sadji farfu X is a moderately and kindly wise father.

/daNURmueceCKAnoSADjiFARfu/

But it cannot be done with **ke...ki...** . In the vernacular of Loglan grammarians, the "head predas of pred-strings may not be kekked" unless they are to be used in descriptions. We will see what this restriction means when we study descriptions in [Section 4.8](#).

3.20 Metaphor and Insight

We have seen in the last few sections how the devices for reporting the internal structure of one's metaphors are in Loglan unusually clear. Moreover, the freedom with which one can modify any predicate word of the language with any other predicate word should lead, in Loglan, to an unusually large store of potential metaphors in which to clothe one's ideas. Through both these characteristics, the structure of Loglan should facilitate the coinage of new ideas. For *because* the speaker of Loglan will be able to speak clearly although metaphorically, there will be some point in doing so, the point of being understood. And *because* any predicate which occurs to him is a legitimate modifier of any other predicate, there will be some ease in doing so, the ease of

unbridled choice. We can, I think, confidently expect the play of metaphor to be rich and strong in Loglan speech.

But what has metaphor to do with thought? If it were our purpose to construct a language that would best serve the poetic impulse in man, then to enlarge the veins of metaphor in that language would perhaps be our chief concern. But it is not. Our purpose is to facilitate thought, whatever thought may turn out to be. If, in doing so, we also enrich other functions of the language, so much the better. But our hand must first be moved by the requirements of thought.

For a long time philosophers believed that there were, in the main, just two varieties of thought: deduction, or the movement of the mind from the general to the particular, and induction, or its movement from the particular to the general. By deductive thinking we prove our mathematics and grind out the consequences of our theories. By inductive thinking we survey data, examine trends, and form new hypotheses by extending what we find beyond those data and those trends. Viewed this way, thinking is a single, two-way street. We deduce going one way; we induce going the other.

For some time now we have known that this traditional schema is too neat. Where do we get the theories from which we then happily deduce? From what do we derive the fresh insight with which we look again at the old world and happily find new data in it? How, in short, does novelty in either thought or perception arise? For neither new premises nor new facts can be got either from deduction or from induction, as these processes are presently understood.

The fact is the mind creates bold new hypotheses, fresh hunches, new ways of looking in old corners of the world in ways which we as yet only dimly understand. And when it does, it seems to obey no law of logic that we yet understand. In fact, insight-formation seems to be a wholly *illogical* process on our present understanding of that word. Even so, the American philosopher, C. S. Peirce, once called this third variety of thinking "abduction" to distinguish it from the other two, and hoped to found a logic for it that would be distinct from, and yet joined to, the logics of deduction and induction that we know so well. So far that new abductive logic has not developed far beyond the rudimentary state in which Peirce left it, though the mathematician Polya (1954) has perhaps gone as far as anyone toward that new logic with his analysis of the art of plausible reasoning in the mathematical domain. But at the present time we can only report that while very much is known about the arts of deductive and inductive thinking, almost nothing is known about the art of generating insight. For this, in the end, is what Peirce's abductive logic will be about.

Yet we *have* insight, and insights about insight. And one of them is that scientific and mathematical hypotheses arise by the same, or by a very similar, mental process as the one by which a poet coins new metaphor; and that is apparently by the free combination of old elements in new patterns. Let us see how this might arise. (But first let us borrow the Loglan variables **da**, **de**, **di**, etc., and use them as genderless, numberless and caseless English pronouns hereafter.)

Let us note that poets are not content with red houses and tall men. Whatever a poet's business is, it forces *da* outside the domain of stale metaphor which is the "good usage" common in *da*'s time. What *da* wants to write about, and us to see, is evidently what we have not seen before. And *da*

will use language we have not heard before to make us see it. Like the logician, the poet is intent on taking our linguistic blinkers off. But unlike de, da makes no new languages, but simply sets off boldly for the unused regions of the old. Convinced that we are blinded by usage, da transcends that usage by coining new images, new predicates, new ways of looking at new worlds. That the number of predicates in every language seems implacably to grow may be in large measure the result of da's poetic labors; or that our stock of predicate ideas is now immensely large may be the accumulated result of the poetic impulse in us all.

The second thing to notice is that poetry tends to be ungrammatical. For not only does the poet's search for metaphor drive da outside the bounds of ordinary usage, but it apparently also sends da out to look for new methods of constructing sentences as well. There is little that is "good English" in e.e. cummings or Emily Dickinson. For these poets invented new parts of speech and new methods for combining them, as well as coining new ways of using what they found at hand. Evidently the domain of English as it stood was not large enough to contain the vision of these poets. English was the tool de used; but English was also the prison from whose walls de broke.⁴⁴

Why is this? And what does the linguistic law-breaking of the poet have to do with thought?

The accounts of scientific and mathematical invention set down long afterward by the scientists and scholars who made them seem to suggest that there is a lawlessness in scientific creation that is strikingly similar to the linguistic prison-breaking of the poet. Orderly, careful surveys of the possibilities seem not to lead in any regular way to new theorems, new hypotheses, new concepts or new hunches about the world. Instead, the process of invention seems to look something like this: The worker steepes da's mind in what is known about some unsolved problem that interests da. Then da relaxes, plays, toys with ideas, or better yet, forgets about them for a time. Then, one day while boarding a train (Poincare), taking a bath (Archimedes), huddling by a stove (Descartes), or watching a falling apple (Newton), the new idea flashes, descends, strikes. The person who is now to become renowned hastens to write it down. Nearly everybody to whom such an experience has occurred is convinced that the unconscious mind played a great role in de's invention. To be sure, it is the conscious mind that verifies the new idea, works out its consequences, joins it solidly to the old; and these activities all involve the most disciplined departments of the mind. But it is apparently the unconscious mind that, once supplied with the elements with which it toys, seems to do the actual abductive work of inventing new ideas.

The unconscious part of the human mind is, as Freud told us, among other things a law-breaker. Not only does it break moral laws (the dreamer murders) but also physical laws (the dreamer flies). Is it not also possible that among the laws it breaks are the laws of linguistic usage? The laws of plain-speaking? The canons of "common sense"? Ultimately the laws of grammar itself? If so, then what has happened unconsciously in the thinker may be very similar to what happens consciously in the poet: the fancied flight; the illegal leap; in short, the contrivance of new metaphor.

A new metaphor, if it is a good one, points to some hitherto-unnoticed corner of the world. What is in this corner may not be important; or it may be. If it is important, beautiful, or permanently interesting to its hearers, it supplies a new predicate: the wine-dark sea, or the "uncuttable" atoms

with which the poet-scientists of ancient Greece endowed our modern world. If it is not, the unconscious thinker or the conscious poet tries again; for *da* is unembarrassed by the bizarre, the unseemly, the "illogical" content of the creative mind.

If there is, then, this profound but unconscious connection between scientific invention and the linguistic law-breaking which goes on semiconsciously in the poet's mind, then a language which encouraged the poetic art of metaphor might also encourage the growth of Peirce's logical art of abductive reasoning in strange, new ways. Loglan, by its very nature, will almost certainly encourage metaphor. It may also encourage thought in these as yet unfathomed ways.⁴⁵

Notes

1 This specimen of weird but grammatical English is a shortening of an even longer one built by N. Chomsky. It has the interesting property that all adjacent pairs of its words ('green ideas', 'ideas sleep', etc.) have extremely low probabilities of co-occurrence. The probability of the string as a whole occurring naturally must therefore be vanishingly small.

2 Linguists will recognize that the definition of grammaticality implied in these remarks is broader than the ones currently favored by natural language grammarians. However, in the absence of facts about usage it may be the only reasonable view to take of grammaticality in a constructed language. That it may also be a theoretically defensible view is suggested by McCawley (1979:236) when he says that the "sentences universally judged to be 'grammatical'" in a given language "are simply those for which no one has any difficulty in thinking of uses".

3 Loglan is similar to the languages called pidgins in many ways. This fact may have an important bearing on its cross-cultural learnability, for it may mean that Loglan's grammatical arrangements are closer to the biological "bone" than those of more elaborate tongues. Bickerton's (1981) hypothesis is that the grammar of pidgins is the product of children being left to their own linguistic devices by parents who have been transplanted from their native cultures to work-settings dominated by foreign employers. The employed parents are so involved in the struggle to acquire enough of the dominant language to work effectively that they do not take the time to create the linguistic atmosphere that will teach their native language effectively to their own children. So it is the children of transplanted laborers, according to Bickerton, who build the world's pidgins. The vocabulary of each pidgin comes in the main from the language of the dominant people in its region; but its grammar, on Bickerton's hypothesis, comes from the human genome.

4 In European mathematical usage, the standard three variable sequence is X, Y, Z as it is in Loglan. It is also the early part of the longer sequence X, Y, Z, W, Q which we require to translate the Loglan third-person variables **da de di do du** into the logically-flavored English favored in this book.

5 The technical problems connected with this view of meaning are discussed in *Loglan 2*, Chapters 8 and 9.

6 The student of logic will recognize the propositional function in this description of the basic grammar of the Loglan predicate.

7 Except when its place-structure is extended metaphorically, as in the metaphorical use of the English word 'man' in 'He was a man about it'. But such "metaphorical misuse" of a well-established predicate is often a first step toward shaping a new literal meaning for it in its language. We will assume in this book, however, that Loglan is holding still while we describe it, which among other things will mean that the places of its predicates are as described.

8 See Note 15 for a possible sixth place of the predicate **ketpi** = 'is a ticket to travel to...from...on carrier...with accommodation...!'

9 For example, that 'mother' is a noun in English, and one which seems superficially to behave like the noun 'man', obscures the fact that the first expresses a relational idea and the second does not.

10 Or when the time-frame of the discourse has already been established. In one recommended style of Loglan story-telling the narrator uses unmarked predicates once the pastness of the action has been established. Explicitly tensed predicates are needed only when the time-frame shifts again; see Parks-Clifford (1980b:21-7).

11 It is probably a mistake to call the English "present" tense a time-binding tense at all. For by giving up its time function to the present progressive, it has acquired something of the sense of the unadorned predicate in Loglan. This is not true in languages like French and Spanish, where the present tense still functions as a genuine indication of present time. Thus English is better equipped than these languages to accommodate the time-free tense of Loglan.

12 The English-trained mind yearns for a third alternative: 'X will be flammable' as of something that is presumably not flammable now. In truth, this cannot be said easily in Loglan. But the notion of an emerging time-free property not present now is either self-contradictory or redundant. If something will be flammable, then it is flammable "now" in the time-free sense; and if something is not flammable in this same time-free sense, then no circumstantial change can make it flammable later. If an English-speaker tells us that a piece of wet wood is such an object, then he has simply added drying the wood to the list of steps which, like lighting a match, must be taken in order to ignite it. On the Loglan view wet wood *is* flammable, just as cold wood is. Never mind that the conditions for its actual burning (dryness, temperature, the presence of oxygen, etc.) have not in fact been met. Oddly enough, this means that such expressions as English 'X will be flammable' may be translated into Loglan simply as **Da cabro**. Other meanings suggested by the English phrase are usually contradictory, e.g., that a time-free property can come and go like a flashing light. There is more on the potentiality question in McCreight and Brown (1978) and McCreight, Brown and Parks-Clifford (1979).

13 Occasionally the punctuation word **ga** is used in place of "nothing at all" to signify the time-free sense of the predicate. See [Section 4.14](#) for the uses of **ga**.

14 A *lexeme*, in the technical language of Loglan linguistics, is a class of grammatically interchangeable words, often called a "syntactic category". We need a single word since we use it so frequently in our grammatical work; so the word 'lexeme' was coined about 30 years ago as an analog of 'phoneme' and 'morpheme'. See *Loglan 6* for more exact definitions of this and related terms.

15 The speaker who wishes to use a sixth place of **ketpi** for the price of the ticket, on the grounds that vehicular travel accommodation on this planet is never gratis, is free to do so. Sixth place conversion would of course be accomplished with **nuso** (**so** = 6). Thus Loglan provides such speakers with an infinite series of conversion compounds formed of the principal allolex **nu** of this lexeme suffixed by any integer: **nufe**, **nuso**, **nuse**, **nuvo**, etc., sometimes spelled **nu5**, **nu6**, **nu7**, **nu8**, etc. Usually this series of numbered compounds commences with the integer **nu5**. But for certain purposes **nu** itself may be replaced by **nuto** (**nu2**), **fu** by **nute** (**nu3**) and **ju** by **nufo** (**nu4**). For the rest of the integers see [Section 4.21](#).

16 It is one of the limitations of Loglan that one cannot speak of the first and third arguments of a predicate without also speaking of the second; and this is true even of converse forms. But vague references to intervening arguments can be made by dummy variables just as we do in English; thus 'something' in 'He made something out of it' is such a variable. In the same spirit we can say **Da pa madzo ba de** in Loglan, for **ba** is also a "dummy variable", i.e., a word that occupies the position of an argument without referring to anything. By using **ba** in this way we permit the third argument **de**, which does refer to something, to be accurately specified. Other uses of dummy variables are discussed in [Section 4.30](#).

17 The linguist will recognize in this remark my differences with the Chomskian, or transformational, approach to human grammar. Nothing in my own research with grammars over the past 30 years has suggested that speakers actually do make grammatical transformations in the course of speech, however elegant this contrivance may be for the *description* of a grammar. My own approach to grammar-writing has been simulative and experimental rather than descriptive, and so not directly concerned with formal economy. But then Loglan grammar is much smaller than English grammar, which has been Chomsky's chief concern, and does not require "compaction devices" to be completely described. More on this problem will be found in *Loglan 2*, Chapter 7.

18 The word **gudbi** in this position modifies **mrenu**, as **bakso** modifies **madzo** in sentence (2). The modifier-modified relation is discussed in [Section 3.11](#).

19 Philosophical analysis tends to ignore the role of abstract predicates as general terms and to leap immediately to the more interesting problem of what it is that "abstract singular terms" like 'virtue' name; see [Section 4.11](#) for this naming apparatus in Loglan. What I will show, however, is that providing the machinery for abstract predication now, before considering how abstract entities are to be named, very much simplifies the latter problem...even if it means discussing a type of predication of which little use is made in English.

20 When an initial consonant-pair is completely new to you, as [ts] probably was, it may help to split the two consonants between two syllables, for example, to practice saying them as [dah-

poht-SAH-nee]--as if the sentence were ***Da pot sani**--for awhile. What such practice does, however, is inform your tongue that these C-pairs are possible for it to pronounce. Once it learns that, it will naturally slip back into the standard syllabifications given in the text and you will be saying (and hearing) [dah-poh-TSAH-nee] again.

21 That is to say, it is the standard modifier-modified arrangement in 6 of the 8 most widespread languages: English, Chinese, Hindi, Russian, Japanese and German. Only Spanish and French have modifiers last; and even these prefer the modifier-modified word-order for their most common modifiers. But see *Loglan 2*, Chapter 6, The Word-Order Problem, for data supporting other views.

22 Quine (1960) calls these relationships "syncategorematic" and regards them as the atypical case of the modifier-modified relationship. He argues that most modifier-modified predicate pairs can be analyzed as conjunctions, thus that whatever is a red house is red and a house. We oppose this view, arguing that scarcely any modifier-modified pairs in English (and, by fiat, none in Loglan) can be properly analyzed as conjunctions. In fact, we would go further and argue that the predicate 'is red' in the sentence 'That house is red' is not used literally at all, but as an abbreviation for 'is a red house'; in short, that the speaker means to claim that the house in question is red for and as a house. On this view the two sentences 'That house is red' and 'That's a red house' have identical truth-conditions provided their designata are the same. Weinreich (1966) gives an analysis of the modifier relationship that accords with this view.

23 Proposals have been made, however, that would change this for Loglan. In response to suggestions by R.W. Meijer (1977) and R.W. Johnson (1979), I proposed in 1979 (Brown 1979e) that studies be made of human metaphor-production, or, what amounts to the same thing, of the varieties of predicate modification in the world's languages, with a view to designing a descriptively exhaustive set of "modification infixes"--including the null infix, which we all use now --which would allow the speaker to specify, when da chose to, the "modification pathway" between the terms of a given metaphor. Optional, as always, such a system would permit a coiner of fresh metaphor--say the ironist who first said 'intellectual dwarf'--to indicate to da's listeners the way in which da meant its terms to be imaginatively combined. Da would do so by choosing among the set of infixes the one that best matched da's intended meaning. Those studies have still to be made. When they are made, and a set of infixes has been accordingly designed, Loglan grammar will accommodate them easily; and yet another extension of the domain of the "logically analyzable" will have been made. Readers are invited to contribute to our growing catalog of modification pathways.

24 The Brown and Greenhood scenario of language evolution (1985, 1988) makes explicit use of this hypothesis. See Note 7 for another sense in which new predicate meanings are generated by apparent misuse, i.e., by place-structure extension.

25 Where three or more predicate words occur in a string, Loglan, like normal English, is left-associative. That is, such strings parse by grouping to the left: (**mutce corta**) **menru**. What this means is that unless we are otherwise informed, the first term modifies the second ('very short'), the second so-modified modifies the third ('very-short man'), and so on. [Section 3.12](#) shows how other patterns of association can be obtained. See Note 40 for more on associativity in Loglan.

26 Many more than five if we count implicitly connected modifiers, like 'pretty (*and*) little for a girls-school'. We will consider this source of equivocation in [Section 3.17](#).

27 The main source of this ambiguity in English is, of course, that 'pretty' may be an adverb meaning 'moderately' as well as an adjective meaning 'attractive'. But it is the confusion caused by its uncertain grammatical role (adverb vs. adjective) rather than the semantic confusion between the ideas of moderateness and attractiveness with which we are mainly concerned in this section. For this reason we have translated the Loglan word **bilti** in what might be called its "adverbial" position in sentences (1) and (3) with the English word 'beautifully'; for the English suffix '-ly' helps to clarify the grammatical role played by the corresponding Loglan word in the Loglan sentence.

28 It is easier to speak a long string with multiple **ge**'s by pausing before each **ge** as shown. These pauses are not obligatory. With practice it is possible to speak such sentences pauselessly.

29 The fact that stress, pause and intonation help to sort out *some* of these ambiguities in spoken English is not really relevant; the point is that no method of pronunciation will remove all of them.

30 Formally, **ge** and **go** are closely related, as the following transformations and their parsings show. Case I: To **go** an un-**ge**-ed and un-**go**-ed string without changing its meaning: (1) write the last word, (2) write **go**, (3) write the rest of the string. Thus ABCD, which parses as ((AB)C)D, inverts in just one way, namely as **Dgo**ABC, which then parses as **Dgo**((AB)C) and is thus of meaning equivalent to ABCD. Case II: To **go** a **go**-ed string that has at least one un-**go**-ed joint: (1) write the front part of the string through the last **go**, (2) treat the remainder as an un-**go**-ed string under Case I. Thus **Dgo**ABC, which parses as **Dgo**((AB)C), inverts again as **DgoCgo**AB, which parses as **Dgo**(**Cgo**(AB)) and inverts yet again as **DgoCgoBgo**A--thus using up the last un-**go**-ed joint--which now parses as the completely inverted right-grouped string **Dgo**(**Cgo**(**Bgo**A)). This parse, by inspection, has the same meaning as the parse ((AB)C)D of the original left-grouped unmarked string ABCD. Case III: To **go** a **ge**-ed string: (1) write the portion after the first **ge**, (2) write **go**, (3) write the portion that precedes **ge**. Thus the first of the three **ge**-ings of ABCD, namely **Age**BCD, which parses as **Age**((BC)D), inverts as **BCDgo**A, which in turn parses as ((BC)D)**go**A. The second **ge**-ing, namely **ABge**CD, parses as (AB)**ge**(CD) and inverts as **CDgo**AB, which parses of course as (CD)**go**(AB); and the third **ge**-ing, which gives **AgeBge**CD, parses as **Age**(**Bge**(CD)) and inverts as **Bge**CD**go**A, which in turn parses as (**Bge**(CD))**go**A and is thus of meaning equivalent to **AgeBge**CD. Inverting at other points produces strings of non-equivalent meaning. For example, wrongly inverting ABCD, with structure ((AB)C)D, as **CDgo**AB produces (CD)**go**(AB). From this we see that **CDgo**AB has the same meaning as **ABge**CD, with its parse of (AB)**ge**(CD), of which it is, therefore, the proper inversion. These notes are for readers interested in the formal behavior of the **ge/go** system, which can be further explored with LIPTM, the Loglan Interactive Parser.

31 This is a different sense of the word 'conjunction' than the English grammarian uses.

32 In that they have the same "truth-conditions." Thus the two sentences 'X is unmarried and a man' and 'X is a bachelor' are either both true or both false for any X. Their predicates are

therefore equivalent in the precise sense that the extensions of those predicates are the same. That their *intensions* differ, however, may be seen by the fact that it is informative, when learning English, to be told 'Whatever is a bachelor is unmarried and a man' while it is not informative to be told 'Whatever is a bachelor is a bachelor'.

33 The word 'implication' is reserved by some logicians for the relationship between a sentence and any other sentence which may be validly derived from it by a logical law of the 'if...then...' form. Among these logicians the 'if...then...' connection itself is usually called the "conditional." Thus 'Fx' is said to imply '($\exists x$)Fx' because 'Fx \Rightarrow ($\exists x$)Fx: is a valid conditional, i.e., true under all possible interpretations of its terms; see, for example, Quine (1961). In this same language the connection we have called equivalence is called the "biconditional." I have elected not to follow this strict technical usage because I find it stylistically awkward. For example, it would deprive us of such an ordinary use of the word 'implies' as occurs in sentence (8). Moreover, there is no English noun, on a par with 'conjunction' or 'alternation', say, by which to refer to the linguistic act of speaking conditionally or biconditionally. Do we call it "conditionalization," for example? But we need to make such references. So we have used the words 'implication' and 'equivalence' to round out our list of fundamental connective forms and acts.

34 In reading this sentence aloud one should leave a distinct pause before **noa**. This recognizes the connective character of the new word and its derivation from the pause-bearing elementary connective **a**. It is as if the pause built into **a** were not lost in this construction, but simply promoted to the head of the new word: thus /no.a/ becomes /.NOa/.

35 The reader who is impatient to see the other derivations of the system may turn to Appendix B, The Fourteen Logical Connectives.

36 Leaving 'liger', astonishingly enough, for the offspring of a male lion and a tigress. I am indebted to G. P. Esainko for this intelligence.

37 John Parks-Clifford, the first editor of *The Loglanist*, dubbed these **c**-adorned connectives "sheks" and the act of using them "shekking". These words are still used in the Loglan technical literature, e.g., in *Loglan 6*.

38 The internal connectives are *not* preceded by obligatory pauses. They sustain rather than interrupt the flow of sound. Thus [GOOD-bee-shah-SAHd-zhee] contrasts with [GOOD-bee . ah-SAHd-zhee] as a minor *vs.* a major move in the logic game.

39 The associativity rules are these: (1) Unmarked predicate strings group left: ABCD parses as ((AB)C)D. (2) **Ce**-ed strings group left: **AceBceCceD** \Rightarrow ((**AceB**)**ceC**)**ceD**. (3) **Ge**-ed strings group right: **AgeBgeCD** \Rightarrow **Age**(**Bge**(**CD**)); in fact **ge** is a left-parenthesis. (4) **Go**-ed strings also group right: **AgoBgoCgoD** \Rightarrow **Ago**(**Bgo**(**CgoD**)), which is equivalent in meaning to the unmarked string DCBA with its left-grouped parse ((DC)B)A. And (5) **Ci**-ed strings also group right: **AciBciCciD** \Rightarrow **Aci**(**Bci**(**CciD**)). **Ci**'s are used, therefore, when normal left-grouping is to be departed from, as in (A(BC))D, which can be expressed as **ABciCD** \Rightarrow (A(**BciC**))D or as **AgeBCgeuD** \Rightarrow (**Age**(**BCgeu**))D as the speaker chooses. That all these systems work unambiguously together in Loglan speech and writing is one of the astonishing things about its

grammar. It still astonishes me, at any rate, when I think of the massive ambiguity of the natural languages and how it has been reduced to zero in this constructed one.

We may note in passing that there is yet another optionality lurking in these associativity arrangements, for the choice between the left-associativity (or "left-branching", as it is sometimes called) of the unmarked form and the right-associativity ("right-branching") of the fully inverted string with multiple **go**'s matches two apparently quite natural proclivities. Some languages, like English, Chinese and Loglan, are left-branching; others, like French, are right-branching. So a French speaker of Loglan has the option of using right-branched speech like **Da ckela go nirli go cmalo go bilti** ('It's a school for girls who are small in a beautiful way') if da is willing to use the Loglan inversion operator **go** to its maximum extent. The above sentence parses as **Da (ckela go [nirli go [cmalo go bilti>])** and means exactly the same thing as the unmarked string **Da bilti cmalo nirli ckela**, with its parse **Da ([[bilti cmalo> nirli] ckela)**, which is the left-branched (**go**-less) form that will probably be preferred by native English- and Chinese-speaking loglanists. Of course the French-style, **go**-laden Loglan will pay the penalty of being marked; so our prediction is that fewer francophones than would otherwise be expected to will follow the right-branching route. That unmarked Loglan is left-branching reflects our hypothesis that the human head is naturally a left-grouper, an idea supported by the fact that the most widespread human languages are A-N ("adjective-noun" in word-order), which I take to be strong evidence that they are left-branching in other particulars as well. But there are other scholars, notably Bichakjian (1988), who disagree.

40 The positional and size differences between the ordinary, short, "high" hyphens used to replace **y** in words like **mek-kiu** and the long, low hyphens used to replace **ci** in phrases like **junti_mermue** are supported by a contextual difference as well. The long low hyphens always occur between well-formed predicate words, while the short high hyphens usually occur between fragments like **mek** and **kiu**. Even when **y** does occur between apparent words, as it does, for example, in **Xai-kreni** (which is the spelling out of **Xai-kre** = 'X-ray'), the words so joined are never both predicates. Thus **Xai** (upper-case 'X') and **kreni** ('radiates/produces rays') are both words, but only one of them is a predicate. So quite apart from considerations of its size and position we know that this hyphen is inside a word formed by joining a letter-word to a predicate. This joint is always made with **y**, never with **ci**.

41 Here again Loglan's optionality will provide a kind of natural experiment for language scientists. Will loglanists prefer prefixing with **ge** or infixing with **ci**? Will they do this from all linguistic backgrounds, or just from some? If only from some, what does the pattern of distribution mean about their native languages? If from all, what does that result suggest about either some non-biologically fixed but nevertheless universal pattern in human languages or, more likely, about the biological wiring of the human head? In short, we are likely to find out a good deal from Loglan's optionality if the language spreads cross-culturally. Wherever as language designers we have said 'Let usage decide', later observers will have an opportunity to observe and then reflect on the patterns of human usage that actually emerge.

42 Susumo Kuno (1963) found that the average number of legitimate syntactical interpretations of a group of English sentences with an average length of 20 words was about 10. Thirteen for a seven-word sentence ('It's a pretty little girls' school') is on the extreme side, according to this

standard, but not so far from the mean as to suggest rarity. Our sentence is more than usually ambiguous but not improbably so.

43 The logician will recognize a variant of the Polish, or "parenthesis-free," notation in this device. The reason we use **kanoi...ki...** for 'if...then...', and not ***noka...ki...** is two-fold. First, there is a learning advantage to be gained in preserving the derivational parallel between the marked and unmarked forms of each connective, e.g., between **kanoi...ki...** and **...noa...** through their intermediate forms **ka no...ki...** and **no...a...**. Second, there is a transformational advantage in being able to move a negation operator from the left connectand to the suffix position on the prefix, as in transforming **ka no preda ki prede** into **kanoi preda ki prede**, and from the right connectand to the suffix position on the infix, as in changing **ka preda ki no prede** into **ka preda kanoi prede**. Both advantages would be lost if words like **noka** were used prepositionally. Note that a medial marker of some kind--**ki** or **kinoi** in our system--is necessary to separate strings of which the boundaries are not clear. This is true of both predicate expressions and of sentences in Loglan, though not of arguments, where **ki** is in a certain sense superfluous except as an occasional bearer of **-noi**.

44 My English usage of the Loglan free variables is well-illustrated in this paragraph. The rules I follow are these: (1) I regard each new paragraph as a fresh field in which to redeploy them, that is, to reassign them if they have been used earlier in the same document. (2) The first one I introduce is 'da'. In this paragraph 'da' replaces 'the poet', that is, the "mass poet", all the poets there are. (3) The one I use next is 'de'. Here it replaces 'these poets', a phrase which refers in turn to Cummings and Dickinson. (4) I would continue with 'di', 'do' and 'du' if required. (5) I try to make each backward reference span the shortest possible interval consistent with English style. In none of this am I as rigorous as I expect loglanists will be in their use of this same apparatus in the language for which it was designed; see [Section 4.4](#).

45 The grammar of predicates which may have liberated these ways in Loglan has turned out to be one of the more stable parts of Loglan grammar. Since 1975 the grammar of the predicate has changed in only three ways: (1) A former distinction, **ze/zea**, between mixing within predicates and between them turned out to be unnecessary. **Ze** now serves in both contexts and **zea** is unassigned. (2) The use of the old commas **gi** and **gu** as scope-delimiters, both between predicates and within them, turned out to generate ambiguities, so the new delimiters **cui** and **cue** were adopted for use within them. (3) Closely related to (2), the grouping operator **ge** turned out to require a rightward delimiter for logical completeness, and the new delimiter, **geu**, was originally adopted for this role. The incompleteness that precipitated the last two changes was that there was no way, in the 1975 language, to express the four-term grouping (A(BC))D and other longer expressions like it. This was the "Missing 18th Case" in the 'Pretty Little Girls' School' paradigm that appeared in the 3rd Edition. This problem led to a flurry of papers in the Spring of 1977. The solution that led to the present arrangements emerged very quickly from this published work, and has remained in force ever since. In fact, one might say that the entire grammar of predicates has proved hyperstable since 1977 despite considerable movement in other departments of the grammar. In short, the Loglan predicate seems to have settled into place fairly early. The analytic work that gave us this happy result was done by J.R. Brown (1977a,b), D. Hickerson (1977), R.W. Meijer (1977a,b,c), W. Mengarini (1977a,b), J. Parks-Clifford (1977b,c,d,e,f,g), R. Thomas (1977), K. Wright (1977) and myself (J.C. Brown 1977b,c).

Chapter 4

GRAMMAR 2: ARGUMENTS

4.1 Designation vs. Predication

In the previous chapter we talked about the ways in which a speaker could use the predicate apparatus of a language to make claims, to give information, to frame new insights, and so forth. But to use a predicate is also to indicate one's willingness to show one's listeners how to use or test the truth of the relationship or perception that it claims. If I tell you 'X is taller than Y' or 'Z is an intellectual dwarf', I must evidently be prepared to answer such questions as 'How do you know?' 'In what way?' 'How can I tell?' and so on. For if I am a knowing and responsible speaker, I must be able to follow up any such use of a predicate with such remarks as 'Well, if you talk to Z, you will find he is no intellectual giant', or 'If you put X and Y back to back and hold a carpenter's level over their heads, and then keep it level while you lower it, you will find that it touches X's head before it touches Y's.' In fact if I cannot follow up my predications with instructions of this--or some other--sort, people will begin to suspect that I don't know what I am talking about.

But you might also ask an entirely different kind of question about either of these same remarks. You might ask 'Who's X?' or 'Who's Z?' Obviously the most elaborate instructions for testing the claim that X is taller than Y, or the most illuminating comment on Z's dwarfed intellectuality, will not be of much use unless you know the identity of the individuals to whom these predicates are supposed to apply. And again, just by using such arguments as 'X', 'Y' and 'Z' in such remarks I am evidently indicating my willingness to help you locate the objects to which my predicates apply. For example, I might answer 'X is that red-haired fellow standing over there.' And again, if I am unwilling or unable to give you locating information of this--or some other--sort, people are likely to suspect that I don't know *who* I am talking about.

But the two kinds of information are very different. To tell you what I mean by a predication is to give you a recipe for testing it, on anything. But to tell you to whom or on what I intend that predication to apply, is to give you the address, so to speak, of just those objects. Predicates make claims. Arguments designate the individuals, or sets of individuals, those claims are about. By one linguistic convention or another, they help the listener to locate those things in space-time.

Suppose I say 'I am taller than you are.' You will not, if you understand English, have to inquire who or what I mean to designate by the arguments 'I' and 'you'. For you will know that anyone who uses 'I' in an English sentence means to designate himself, and here I am. Similarly, if I am gazing directly at you when you hear me say 'you', you will have no difficulty in locating the second object I have designated. For by a similar convention of spoken English you know that 'you' designates the person addressed, and here you are, too. In contrast, the references of 'X' and

'Y', like those of the pronouns 'he', 'she' and 'it', are not so easily located. Like the Loglan variables **da**, **de** and **di**, they require a context of previously-spoken sentences from which to infer what they mean. I can start out talking about you and me, for you know immediately who we are; but I cannot usually start talking to you in sentences in which the only arguments are 'he' and 'she' or **da** and **de**. For, as we shall see, the conventions of both Loglan and English require that I use these "third person" variables to refer to things which have already been referred to in some other way.

This, then, was the essential artificiality of the sentences we studied in the preceding chapter. None of their arguments designated anything; for no listener could have located the things to which those arguments apparently referred. We must now look more closely into these matters. We will find that very special conventions surround the machinery of designation in any language. When successfully used, these conventions lead to the possibility of the listener's locating the things to which the speaker has referred. Just how these locating conventions are arranged in Loglan is the subject of the present chapter.¹

4.2 The Demonstrative Variables **ti ta**

The simplest way a speaker can locate something for a listener is by pointing to it. Then if, in addition, he wishes to say something about the object at which he is pointing, most languages provide one or more convenient little words to serve as arguments of the predicate which says that thing. In Loglan the variables **ti** [tee] and **ta** [tah] serve this "demonstrative" function, as in the following sentences:

- | | |
|---------------------|-----------------|
| (1) Ti bukcu | This is a book. |
| | /tiBUKcu/ |
| (2) Ta bakso | That's a box. |
| | /taBAKso/ |

Just as in English there are two of these words. The convention is that if two objects are to be demonstratively designated, **ti** will be used for the closer or the later of them, while **ta** will be used for the farther or the earlier. If only one object is to be referred to, either **ti** or **ta** may be used.

The relationship between both **ti** and **ta** and the thing it refers to is usually a transitory one. Thus in the same context of speech I may use the word **ti** many different times to refer to many different things. For example, I may walk down a row of objects on a shelf and refer to each of them in turn as **ti**, just as I may say 'This is a cat; this is a dog; this is a mouse' in English. In this respect, the demonstrative variables differ from the other variables we are about to study in that their references may vary within the same context of speech. They are in this sense the *most* variable of the Loglan argument forms.

4.3 The Metalinguistic Demonstratives **toi toa tio tao**

Sometimes when we use 'this' and 'that' in English we aren't referring to objects in the world immediately around us but to something someone has said or alluded to. Thus when someone says something we agree with, we often say 'That's true.' In a logical language one must keep references of that kind distinct from references to the object world. This is the same difference--first pointed out by the positivist philosopher Rudolf Carnap--that philosophers now refer to as the difference between the "object language" and the "metalanguage". In its simplest terms the *metalanguage* is the language we use to talk about language. 'That's true' is an excellent example. We use the pair of demonstratives **toi** [toy] and **toa** [toh-ah] for this metalinguistic purpose in Loglan.

- | | |
|---------------------------|--|
| (1) Toi tradu | That's true (literally, this is true). |
| | /toiTRAdu/ |
| (2) Toa falji [FAHL-zhee] | That's false (that earlier claim was false). |
| | /toaFALji/ |

On most occasions of their use, disyllabic operators like [toh-ah] will have "level stress"; that is, neither syllable will be stressed.

But there is still another kind of demonstrative pronoun. Suppose someone tells you 'John is sick today.' You say 'That's bad!' Is it da's sentence you are referring to? No; it is the situation described by that sentence that you are saying is bad. So neither **Ta zavlo** ('That object over there is bad!') nor **Toa zavlo** ('That sentence you uttered is bad, i.e., ill-formed') will do. In a logical language we need still a third pair of demonstratives to refer to the absent situations to which the sentences spoken in our immediate vicinity often refer. In Loglan we use **tio** [tyoh] and **tao** [tow] for this *meta*-metalinguistic purpose.

- | | |
|---------------|--|
| (3) Tio zavlo | This is bad (i.e., the situation just alluded to is bad). |
| | /tioZAVlo/ |
| (4) Tao gudbi | That's good (the situation previously alluded to is good). |
| | /taoGUDbi/ |

In English we tend to use 'that' in both these situations. We say 'That's bad' and 'That's good' whether the allusion was made in the most recent sentence or not. Possibly this is because of the remoteness from the scene of speech of the meta-metalinguistical world.

So in Loglan we have three pairs of demonstratives: **ti ta** for immediately perceived things; **toi toa** for pieces of recent speech or writing; and **tio tao** for absent situations to which pieces of recent speech or writing allude.

As a speaker of a logical language you will find these distinctions very useful...even though the chances are very good that you have never made them before.²

4.4 The Free Variables da de di do du

These are the argument-forms that we used without comment throughout the previous chapter. You sensed in that context that they were very like the X Y Z's of the mathematician. This is correct; for unlike the English third person pronouns which they often translate, the Loglan free variables may stand for anything at all: single things or plural sets of things ('it' or 'they'), subjects or objects ('he' or 'him'), animate or inanimate things ('she' or 'it'), and males or females ('him' or 'her'). Moreover, each of the five free variables may be used in any of these ways.

Like English third person pronouns, Loglan free variables are usually introduced into speech as short replacements of other, longer designations that have already been made. For example, in the sequence of English sentences,

- (1) Christopher Columbus visited the Queen of Spain.
- (2) He persuaded her that the Earth was round.

the pronouns 'he' and 'her' in (2) replace the longer designations 'Christopher Columbus' and 'the Queen of Spain' that first occurred in (1). In Loglan we often make the same kind of replacement with free variables. As in English, they may replace (i) names, (ii) descriptions, and (iii) demonstratives. They may *not* replace each other or the Loglan equivalents of 'I' and 'you'. In a moment you will see why.

Now the reason that pronouns are often inflected for number and gender in the natural languages is primarily to allow the listener to make a fair guess at the identity of the name, description or demonstrative for which each pronoun is a substitute. For example, it is because we know the genders of Christophers and queens, that we can be fairly certain that 'he' replaces 'Christopher Columbus' and 'her' replaces 'the Queen of Spain' and not the other way round. But the Loglan variables are totally uninflected. Obviously, some other system of identifying the objects they replaced must be found.³

In Loglan the replacement system governing the references of free variables is based on the order in which they are used. It is as if, when speech commences, the five free variables were sitting on a shelf in alphabetical order in both the speaker's and the listener's mind. Then as speech progresses they are continually matched up with the arguments they might replace in the sentences that have already occurred. When a free variable *is* used to replace another argument, it is taken off the shelf, so to speak, and the others are shifted along it to form a new order. The matching with potential replacements then proceeds as before. Let us illustrate this process with an example.

Suppose someone commences a conversation by pointing to something and saying:

- (3) La Djan, pa vedma ta le fumna John sold that to the woman.
 /laDJAN.paVEDmataleFUMna/

(6) Di pa mercea da

Z married X.

/dipamerCEada/

For at the time he spoke, **di** was matched with the name **la Pit**.

This seems tricky, but you will probably find it easy and natural to assign up to three free variables in this way. It will usually be clear to you when you are listening to or speaking Loglan just which among the five free variables have been used. The rest remain in alphabetical order on their shelf waiting for the speaker to use them. Thus after sentences (3), (4) and (5) the variables **da**, **de** and **do** have been used to replace **le fumna**, **ta** and **la Djan**, respectively. Throughout the rest of this conversation--or the current paragraph in text--these three variables will remain more or less permanently assigned to the objects and persons designated by the original expressions, i.e., to their designata. At the end of utterance (5) only **di** and **du** remain unused. These will be ready to be matched to whatever is the last and next-to-last replaceable designation, respectively, at any subsequent moment in the conversation. Experience has shown, however, that even a fourth free variable is rarely used in speech.

Writing is a different matter. With one's text in front of one, not only can all five replacing variables be rapidly assigned, but one can run out of variables fairly fast. When this happens, subscripted variables may be used. These are compounds like **dacine** [dah-shee-neh], **dacito** [dah-shee-toh], etc.--these compounds, too, normally get level stress--which are the Loglan equivalents of expressions like English 'X-sub-one', 'X-sub-two', and so on. There are in principle an infinite number of these, of course, so once the writer starts on them, **da** is not likely to run out of variables again. But the five unsubscripted variables **da de di do du** will suffice for organizing the references in most ordinary text.⁴

4.5 The Personal Variables **mi tu** and Their Derivatives

The personal variables of Loglan are much more numerous than the personal pronouns of English, but they are used in much the same way. The basic words are **mi** [mee] and **tu** [too] which, as you may easily guess, mean 'I' (or 'me') and 'you', respectively. Thus:

(1) Mi cluva [SHLOO-vah] tu I love you.

/miCLUvatu/

(2) Tu cluva mi You love me.

/tuCLUvami/

Note that neither of these words is inflected for its position in the sentence. It is as if we said 'Me love you' in English, as, in fact, some children and speakers of Pidgin English do.⁵

There is no distinction in Loglan between the formal and informal senses of 'you' as there is in French and German. In this respect Loglan is like modern English and unlike nearly all of the other European languages. For almost all these languages still carry this mark of the sharp class-distinctions amongst the people who spoke these languages in the past.⁶

A third personal variable is **mu** [moo], a phonemic mixture of **mi** and **tu**. Naturally it means 'we' or 'us'. In fact, **mu** is an abbreviation of the "mixed" argument form **mi ze tu** ('I and you jointly'), the exact meaning of which we will consider in [Section 4.35](#). For the moment it is enough to know that this is the "proposing" or "planning" sense of English 'we' or 'us', as in the sequence 'Let's go. We'll visit Jack. Then we'll eat.'

There is another sense of the pronoun 'we' in English. For example, the sense of 'we' in the following sentences is not that of **mi ze tu**: 'John and I went to Spain. We stayed there for a while, and then we went on to Italy.' Obviously I do not mean to include you, my listener, in this "narrative" sense of 'we'. So for precision of reference we have another set of personal variables in Loglan which mean 'X and I', 'Y and I', and so on. These are **mia mie mii mio miu** [myah myeh myee myoh myoo]. As you may easily infer, these words are abbreviations of the mixed forms **mi ze da** ('I and X jointly'), **mi ze de** ('I and Y jointly'), and so on.

Like the free variables, replacement with these mixed variables is determined by order. Thus in translating the English narrative above, we would use **mie** for 'we' because the name 'John' in 'John and I went to Spain' is the second-to-the-last replaceable designation at the moment the replacement occurred ('Spain' was the last). Note that 'I', being a permanent designation of any speaker, is not replaceable and therefore is not counted in reckoning the replacement order of 'John'. Since all designations made with personal variables are permanent in the passages in which they occur, they are never replaced by free variables.

There is a third, less frequently occurring sense of 'we' in English for which Loglan also provides distinct words. This is the **mu ze da** sense of 'we': the mixed first, second and third person sense of the pronoun 'we' in 'We (you and I and the children) will visit the Louvre first, then we'll go to Notre Dame, then the Left Bank...' and so on. This is the "group planning" sense of 'we'. So this mixture of references is expressed in Loglan with the **mua**-series, **mua mue mui muo muu** [mwah mweh mwee mwoh mwoo]; and **mua** is, we see, a very compact abbreviation of **mi ze tu ze da**.

The final series of personal variables is one in which the members have the sense of English plural 'you' when it means a mixture of second and third person references: thus 'you (the listener) and X', 'you and Y', and so on. These abbreviations are of course generated from the mixed argument forms **tu ze da**, **tu ze de**, and so on, and are simply **tua tue tui tuo tuu** [twah tweh twee twoh twoo]. Again the rules of replacement for free variables apply.

The total number of Loglan personal variables is a formidable eighteen. But as fifteen of these come in five-member series, and as all but the primitive elements **mi** and **tu** are plain abbreviations of **ze**-linked phrases, they hardly have to be learned. Once the **da**-series and **mi tu** are in hand, then **tui** will be seen and heard as **tu ze di**. There is hardly any more to it than that.

With the personal variables we complete our account of the words which function as pronouns in Loglan. In summary, these are (i) the six demonstratives **ti ta, toi toa** and **tio tao**, (ii) the five free variables of the **da**-series **da de di do du**; and (iii) **mi tu mu** and their fifteen derivatives. There are many other variables, of course, since Loglan is a heavily mathematized language. The most numerous are the letter variables we will take up in the next section.

4.6 The 100 Letter Variables

Loglan, which frequently uses those compact visual forms beloved by mathematicians, has an unusually large supply of letter variables: the 'a' 'b' 'c' 'd's of the mathematician and logician. Each letter variable is available in two forms, first as a word--in most cases three-letters long, e.g., **bei**--and second as a single-character written sign, in this case **b**. The Loglan letter words and letter signs are used exactly as the English number words ('one') and numerals ('1') are used, in that each numeral is a visually compact form of its corresponding word that is used optionally in print or writing. In fact, Loglan letter signs are called "letterals" on the model of the English word 'numeral'.

There are a hundred of these word/letteral pairs in Loglan. There are the 52 words for the 52 Latin letterals, the 26 lower plus the 26 upper case ones. (**A** and **a** are different letterals in Loglan, as indeed they are different graphs in English, and so deserve different words by which to speak them.) But there are only 24 three-letter words for the 48 Greek letterals, because the 24 capital letter words are made by prefixing **gao-** [gow] to the three-letter word for the corresponding lower-case letteral. This is because so few Greek capital letterals differ from the corresponding Latin capitals that there is little use for upper-case Greek letter-words.

The words loglanists use for reading letterals aloud--words like the seldom written but often spoken English 'tee', 'eks', 'eff' and 'cue', and the both written and spoken 'alpha', 'beta' and 'gamma' of Greek--are generated in Loglan by adding **-ei** [-ay] and **-ai** [-igh] to the lower and upper case Latin consonant letters, respectively. This generates the series **bei cei dei**... [bay shay day...] for the lower-case letterals and **Bai Cai Dai**... [bigh shigh digh...] for the capitals. The Latin vowel words are either the seven vowel letters pronounced according to their sounds, **a e i o u w y** as [ah eh ee oh oo eu uh], when it isn't important to distinguish them from the connectives **a e i o u**, and when case and language (Greek or Latin) doesn't matter, or by three-letter words formed by attaching **-si** and **-ma** to the vowel letterals when it is. Thus **asi esi isi**... [ah-see ess-ee ee-see...] are the three-letter words for the lower case Latin vowels, and **Ama Ema Ima**... [ahm-ah em-ah eem-ah...] represent the capitals. Again, the most typical pronunciation of these disyllables is with level stress.

The Loglan words for the Greek letters--words which function like 'alpha', 'beta', 'gamma', and so on, in English--are formed in Loglan by adding the suffix **-eo** [-eigh-oh] to all the consonants except **c** because there is no sound in Greek that corresponds to Loglan [sh]. This generates **beo deo feo**... [beigh-oh deigh-oh feigh-oh...] for the lower-case Greek consonant letter-words. As mentioned above, **gao-** is added to these three-letter forms to make the occasional Greek capital. Thus **gaoseo** [gow-seigh-oh] is the word for capital sigma, whose letteral does in fact differ from Latin 'S'. **Seo** [seigh-oh] of course is lower case sigma. Greek lower-case vowel-words are made in forms parallel to the Latin ones by adding **-fi** to all the Loglan vowel-sounds except **w**--like **c**, Loglan **w** [eu] is not assigned to any letter in the Greek alphabet--whenever it is useful to distinguish between cases or languages: **afi efi ifi**... [ah-fee eff-ee ee-fee...]. The words for the Greek capital vowels--on the rare occasions when they are required--are **gao,afi gao,efi gao,ifi**... [gow-ah-fee gow-eh-fee gow-ee-fee...]. (Note the close-commas. This forces vowel-pairing from the left, and is one of the rare occasions when the "pair-from-the-right" rule mentioned in [Section](#)

[2.15](#) is departed from in non-names. Because it is a departure from standard pronunciation, it is marked.)

Remember that each of the 100 three- and six-letter words so generated may be represented in text in two ways: first, as a phonemically spelled word--**Tai**, for example, which translates the phrase 'capital tee' in English--and second, by its single-letter abbreviation, in this case the letter **T**. Both representations are pronounced as the word itself is spelled, in the case of **T** and **Tai** as [tigh]. Thus the two differently written sentences:

- | | |
|---------------------------|---|
| (1) Tai ditca [DEET-shah] | Tee is a teacher (unusual in English text, but understandable). |
| | /taiDITca/ |
| (2) T ditca | T is a teacher. |
| | /taiDITca/ |

are read aloud as the same utterance. This is exactly what we do when reading numerals aloud in English, of course. Thus 'He ate 3 doughnuts' and 'He ate three doughnuts' evoke exactly the same sounds.

A common use of letter variables in Loglan is to shorten longer designations, often as an alternative to using the replacing variables described in [Section 4.4](#).⁷ Thus **T** in (2) might well have been an abbreviation of the longer designation **la Tam** in

- | | |
|--|-------------------------------|
| (3) La Tam, merji le kicmu [KEESH-moo] | Tom is married to the doctor. |
| | /laTAM.MERjileKICmu/ |

(**La** is the Loglan name operator, and **le** is a "descriptor" like English 'the'. These are operations which we will consider more carefully in the next two sections.) Thus we could rewrite (3) as

- | | |
|------------------------|-------------------------------|
| (4) Tai merji le kicmu | Tee is married to the doctor. |
| | /taiMERjileKICmu/ |

Conventionally, upper case letter variables are used to abbreviate names, while lower case ones are used to abbreviate predicates used as designations, as **kicmu** is used in **le kicmu**. Thus (4) could be further shortened by using a second letter word--this time a lower case one--to abbreviate **le kicmu**:

- | | |
|-------------------|------------------------|
| (5) Tai merji kei | Tee is married to kay. |
| | /taiMERjikei/ |

or even to

- | | |
|---------------|--------------------|
| (6) T merji k | T is married to k. |
|---------------|--------------------|

/taiMERjikei/

in text.

The text is now in the maximally condensed visual form we see in mathematics books. But the sentences of (6) are pronounced exactly like those of (5)...in both languages. Note that the case information in the Loglan letter words is not conveyed in the spoken English ones. That is to say, we do not say 'Capital tee is married to lower-case kay' in English. In effect, we do in Loglan...thus doubling our kit of speakable letter variables.

The mathematized style of Loglan is still being explored. At the moment, using letter variables is neither more nor less admired than using the replacing variables of [Section 4.4](#), which, although more difficult to keep track of, seem somehow to be more natural. Which system of third person pronouns will be preferred in what contexts remains to be seen. Perhaps both systems will have permanent roles.

In replacing a longer designation with a letter word, the Latin letter is used first. The Greek one is used only after the corresponding Latin letter has been assigned. For example, to abbreviate the designations in,

- (7) Le kicmu pa furvea [foor-VEIGH-ah] The doctor bought (2nd converse
le ketpi le ditca of sold) the ticket from the
teacher.

/leKICmu.pafurVEaleKETpileDITca/

we use **kei** for the first **k**-initial predicate, **keo** for the second, and **dei** for the **d**-initial one. Rewriting (7) with those letter words we get:

- (8) Kei pa furvea keo dei Kay bought kappa from dee.

/keipafurVEakeoDEI/

If text is to be printed, and if the fonts available to the printer include Greek letterals as well as Latin ones, then the following even more abbreviated textual form is possible:

- (9) k pa furvea κd k bought κfrom d.

/keipafurVEakeoDEI/

Greek letterals have, of course, been routinely used in science and mathematics for several centuries. As the century of the computer unfolds, the use of such fonts in ordinary home-generated text may well spread to non-mathematical domains.

4.7 Naming with la

We must now make explicit a convention that we have used informally for some time. That convention is that when names are used as designations in Loglan, they are preceded by the little

word **la** [lah]. For example, the presence and absence of **la** is the only difference between the following two sentences:

- | | |
|--------------------|----------------|
| (1) La Djan, godzi | John goes. |
| | /laDJAN.GODzi/ |
| (2) Djan, godzi | John, go! |
| | /DJAN.GODzi/ |

In sentence (1), the name operator **la** has made a designation out of the name-word **Djan** which follows it. That is, **La Djan** refers to something, namely to a person named John. Since it refers to something, it is an argument, namely the first argument of the predicate **godzi**. Therefore the sentence as a whole is a statement; it claims something to be true of John, namely that he goes.

In sentence (2), however, the name-word **Djan** is used vocatively, that is, used to call the attention of someone named John. This leaves the predicate **godzi** without a first argument; and, as we will see in detail later, a sentence whose predicate does not have a first argument is not a statement but an imperative. It forms the injunction 'Go!'. Evidently the presence or absence of the little word **la** makes some difference in Loglan.

The distinction between the designative and the vocative use of names is not regularly drawn in the natural languages. And yet there is a very important difference in meaning. People designate someone by using da's name in much the same spirit that they describe someone by using some predicate that fits da. Thus we may designate someone by saying 'He's the fat one over there' or by saying 'He's the one named John over there.' Thus having a name is a kind of property, namely the property shared by all who have that name. We use this property in using names to make designations. We say, in effect, 'the one named John'.

This is exactly what the name-operator **la** does in Loglan. In sentence (1) **La Djan** means literally 'The one person I mean whose name is John'. This is a mouthful, and no one would ever translate Loglan into English in this way. But English is not explicit about these matters. Loglan is. It perhaps expresses the sense of the Loglan best to write sentences like (1) as '*The* John goes' whenever a literal translation is desired. Again, this is not a routine one would care to impose on unwarned ears. But it does suggest, as 'John goes' does not, the sense in which the Loglan sentence, but not the English, explicitly recognizes that there are many Johns.

4.8 Description with **le**

Just as names may be used to form designations, so may predicates. Thus the little word **le** [leh] operates on predicate expressions to make designations out of them in a way that is similar to the way **la** operates on name-words. We will call the designations made with **le** *descriptions*, and **le** itself, the *descriptive operator*. For in this context we are using predicates, not to say things about the world, but to locate those things *in* the world about which we have something to say. Thus with **la** we locate things by naming them; with **le** we locate things by imputing other properties to them. For example, in

(1) Le fumna pa cluva le mreanu The woman loved the man.
/leFUMnapaCLUvaleMREnu/

the predicate words **fumna** and **mreanu** are not predications, for they claim nothing. Instead, they function in this sentence to help the listener locate the two objects in the world about which the speaker *does* have something to say, namely that one of them loved the other. Thus, descriptions are not true or false of the things they describe, but merely helpful or not helpful. This can best be seen by considering a fanciful example.

Suppose someone who looks like a woman is arrested by two detectives on suspicion of some crime. Later the suspect is more thoroughly examined and found to be a man. Suppose the first detective reports this fact to the second by saying 'That woman was a man.' Is this a contradiction? Certainly not. For by describing the suspect as 'that woman' the first detective has not *said* that the suspect is in fact a woman. It is not the linguistic business of designation to assert facts, but to *use* facts, or apparent facts, to help listeners locate individuals. The fact is that the suspect looked like a woman. And that fact is useful in locating him.

For we can now ask a very different kind of question. Was it *useful* to the listener to have the suspect described to be as 'that woman'? Certainly. For this is exactly what he needed to know in order to locate the person who was in fact a man. Suppose the second detective had been told 'That man was a man.' Would this have been useful to him? We suppose not. We suppose, in fact, that nothing would have been more misleading to that as yet uninformed listener. For it is worse than useless to be told to locate an object by means of a property you think that object does not have!

Notice that the sentences 'That woman was a man' and 'That man was a man' are both true under the circumstances we have assumed. But only one of them has any chance of communicating that truth to the listener; and that is the one that uses a "false" but useful description as the designation of the individual the sentence is about.

But, however these matters may be interpreted in English, the sentence

(2) Le fumna pa mreanu The woman was a man.
/leFUMnapaMREnu/

is not a contradiction in Loglan. The reason is that the descriptive operator **le** does not simply mean 'the', or 'the one that is', but more exactly 'the one thing, or set of things, which I intend to designate with this phrase and which is apparently a...'. Thus there are many women, and many things which look like women, but the speaker of sentence (2) intends to designate just one of them, and a certain one of them, when she says that it was a man. That one intended thing *is* the reference of the descriptive phrase. And the sentence containing that phrase is true or false depending only on whether its predicate, not its description, is true of that intended thing.⁸

Now any untensed and unspecified predicate expression of the language can become the basis of a description with **le**. Thus the predicate expression **bilti cmalo ge nirli ckela** provides the description

(8) Le ke gudbi ki sadji mrenu pa hijri The both good and wise man was here.

The reason this sense is unequivocal in descriptions and not in predications is that **kek** **whole** predicate expressions may not be made the basis of descriptions. Thus there is no rule in the machine's grammar that allows **kek** predicates to be operands of descriptors. In descriptions, therefore, the scope of a **kek** is **always** the next pair of individual words, or the next pair of expressions that may replace individual words. Thus, in the case in hand, the parser will hear (8) unequivocally as

(8') (le [[ke gudbi ki sadji> mrenu]) (pa hijri)

and now

(8'') *(le [ke gudbi ki [sadj i mrenu>]) (pa hijri)

will be impossible for it to hear.¹⁰

4.9 Mass Description with lo

Suppose we say in English 'Butter is soft' 'Water is wet' and 'Man is in trouble.' Are the words 'Butter', 'Water' and 'Man' descriptions? In a sense they are, for they use predicates (in the Loglan sense) to help us locate--or think about, for such objects are mighty hard to locate--the peculiar objects they do designate. And what are these objects? Well, if you think about it, anyone who talks like this in English is talking about all the butter there is, all the water there is, and all the human beings there are, for this is the sense of the English noun when it is used without an article. (Contrast '*The* man is in trouble.') But is this a legitimate way of talking? Perhaps; but it is certainly a different way than talking about pieces of butter, glasses of water, or individual human beings.

In Loglan we recognize this important difference explicitly by providing a different operator **lo** [loh] to form these *mass descriptions*, as we will now call them. (To English-listening ears [loh] has a very abrupt, even truncated sound. It is *not*, for example, the sound of English 'low' [loh-oo].) Let us consider some examples.

The Loglan predicate **batra** means 'is a piece, portion or lump of butter'. The predicate **cutri** means 'is a drop, portion, body or expanse of water'. The predicate **humni** means 'is a human being'. Thus **le batra**, **le cutri** and **le humni** designate the particular lump of butter, the particular drop (let us say) of water, and the particular particle of humanity which the speaker has in mind. But **lo batra**, **lo cutri** and **lo humni** designate just what the English words 'butter', 'water' and 'man' designate when used without articles, namely those three massive, widely distributed but discontinuous individuals composed respectively of *all* the butter, *all* the water, and *all* the human beings there are. Looking back, we will now call descriptions made with **le** *particular descriptions*, to contrast them with the mass descriptions with which we are now concerned.

English permits us to talk of these massive individuals in a wide variety of ways. In the case of what some grammarians call the "uncountable" nouns--substance words like 'butter', 'sand', 'wood', 'meat', 'iron', etc.--the procedure is very simple. One simply uses the unadorned noun, as in 'Iron is hard.' What is awkward in the case of *these* nouns is talking about individual pieces. For one must say in English 'The piece (lump, fragment, chunk) of iron', not simply **le fernu** ('the iron-thing') as one can in Loglan. For other nouns--the "countable" English nouns like 'book', 'chair', 'spoon', etc.--we sometimes use the plural to express this massively constructed individual ('Books are important to man'), and sometimes the singular with the definite article ('The lion is found all over Africa'). It is usually obvious from the context that the speaker does *not* mean to talk about all or any books or lions as individual particles. Thus it is not the case that every book is important to humankind, and it is certainly not true that any particular lion is found all over Africa. It is the mass individual *Felis leo* who has spread his tawny presence over Africa. But the trouble with these English designations is that they are not very distinctive. Thus with the same grammatical constructions one can also designate quite particular things or sets of things ('The lion roared', 'Books were on the table'). The English listener must, as usual, guess from context what kind of creature the speaker has in mind...although we are so used to doing this in English that it does not seem to us to be a very difficult thing to do.

In Loglan a distinct grammatical form exists for each of these distinct mechanisms of designation. There can be no doubt that the Loglan speaker who says **lo simba** is designating lion-kind, and that **lo bukcu** means that massive individual composed of all the books there are or have been or ever will be. For there is no restriction in Loglan on the kind of predicate to which the **lo** operator may be applied. Even the most countable things can be massified, and the most uncountable things particularized; for Loglan does not divide the world up in this way.

Before we leave mass descriptions it is worth pointing out that the languages of some preliterate peoples apparently employ the idea of mass description as the elementary meaning of their basic predicate words. Thus the Trobriand Islanders are reported to place this interpretation on all their nouns; whence the curious world-view arises that what we Indo-Europeans would call a single instance of a thing is, to them, nothing but a part, or reappearance, or manifestation of the same, massive individual thing. Thus every rabbit is just another appearance of Mr. Rabbit; every yam just another manifestation of Mr. Yam; every baby just a part of Mr. Baby all over again. I don't know if many Trobrianders will learn Loglan, but if they do they will find an apparatus readily available in it with which to describe the world exactly as they see it. And the **lo**-operator will be as common in their speech as **le** will be in yours and mine.¹¹

4.10 Quotation with **li...lu** and **liu lie**

In the last three sections we have discussed three very similar ways of forming designations in Loglan: (i) naming with **la**, (ii) describing particular things with **le**, and (iii) describing masses of things with **lo**. There is a fourth kind of designation, namely description by quotation; and for this we will need the marks **li...lu** [lee...loo], **liu** [lee-oo] and **lie** [lee-EH], the second syllable in the last word being nearly always stressed.

Not only are all punctuation marks spoken words in Loglan, as we have observed before, but the affinities of quotation marks with the other descriptive operators of Loglan is phonemically clear.

Thus the very sound of the word **li** suggests that it is related to the descriptors **la**, **le** and **lo**, all in some sense meaning 'the'. And so it is. For just as **le** means 'the one I mean that is...', and **la** means 'the one I mean named...', so **li** means 'the thing I mean that looks or sounds like...'. Thus quotation is really description by imitation.

- (1) Li, Kristobal Kolo'n, lu logla namci la 'Kristobal Kolo'n' is the Loglan
Kristobal Kolo'n name of Christopher Columbus.
/LI.krisTObal.koLON.luLOGlaNAMcilakrisTObal.koLON/

In (1) the speaker has imitated a portion of Loglan speech or writing--perhaps copied it from a book--and put the imitation between the marks **li**, and **lu** in order to quote it. Note that pauses--represented as usual by commas in text--are also required around the quoted string. This style of quotation is called *weak quotation*. With it any string of well-formed Loglan may be unambiguously quoted.

But sometimes we wish to quote ill-formed strings...including some that might have an extra *lu* in it, which would baffle the machine. Even foreign utterances, in which there's no predicting how many stray *lu*'s there might be, also need to be quoted. For these two occasions Loglan has a more robust style of quotation called *strong quotation*. This is done with **lie X**, ..., **X**, in which the repeated boundary marker **X** is any arbitrary Loglan word, usually a letter word, that does not occur within the quoted string. For example,

- (2) Lie gei, Christopher Columbus, gei 'Christopher Columbus' is the
gleca namci la Kristobal Kolo'n English name of Christopher
Columbus.
/liEgei.Christopher.Columbus.geiGLEcaNAMcilakrisTObal.koLON/

Here **gei** (**g**) has been chosen as the repeated letter-word because the quoted string is an expression of English (**gleca** [GLEH-shah]) and because the sounds [gay] of **gei** do not occur in it. If we had quoted the Spanish (**spana**) name of Christopher Columbus, or the German (**dotca**) one, we could have used **sei** or **dei** because neither [say] nor [day] occur in it as well. For example,

- (3) Lie sei, Cristobal Colo'n, sei spana 'Cristobal Colon' is the Spanish
namci la Kristobal Kolo'n name of Christopher Columbus.
/liEsei.Cristobal.Colon.seiSPAnaNAMcilakrisTObal.koLON/

The second and fourth pauses are optional; the ones before and after **sei** are required to make strong quotation work.¹²

Note that the argument **la Kristobal Kolo'n** designates a once-living person, while the arguments **Li, Kristobal Kolo'n, lu; Lie gei, Christopher Columbus, gei; and Lie sei, Cristobal Colo'n, sei** all designate portions of human speech, namely a Loglan, an English, and a Spanish name. **Kristobal Kolo'n**, 'Cristobal Colo'n' and 'Christopher Columbus' are different names; but they name the same person, namely Cristobal Colo'n.

Weak quotation with **li** and **lu** is used much as ordinary quotation marks are used in written English. The chief difference is that in Loglan they are spoken words. In fact **li** and **lu** are used exactly as the words 'quote' and 'end quote' are used in certain styles of spoken English, especially the style that is invoked when the speaker wishes to be very certain that someone else's words are not mistaken for his own.¹³ In Loglan the motivation of the speaker's use of **li** and **lu** is logical, and hence less circumstantial. For there is a difference between the name of a thing and that thing. This difference is fundamental in a logical language. So quotation marks are never omitted in Loglan even when their presence might be thought to be assumed. Thus, of the two sentences,

- | | |
|---------------------------|-------------------------|
| (4) Liu Djan, corta purda | 'John' is a short word. |
| | /li,uDJAN.CORtaPURda/ |
| (5) La Djan, corta purda | John is a short word. |
| | /laDJAN.CORtaPURda/ |

only one is true if, as we assume, John is not a word of any length but a man. Here **liu** (a blend of **li** and **lu**) is the *single word quotation* operator and may always be translated "The word '...'". **Liu** may only be used with confidence on Loglan words.¹⁴

In spoken English all these clarifying marks are commonly left out. The usual form of the sentence which means (4) is spoken exactly as it would be spoken if the speaker had meant (5). We rely on the "good sense" of the listener *not* to infer that the speaker actually meant (5). Again, the interpretation of English depends on context. Loglan does not. In Loglan we wish to be able to speak nonsense when we want to.¹⁵ Thus (4) and (5) in Loglan are invariably distinct forms.

In some forms of written Loglan the words **li** and **lu** may be replaced by their signs '«' and '»'.¹⁶ So written, (1) becomes:

(6) «Kristobal Kolon» logla namci la Kristobal Kolon

But, as always, such signs are pronounced as words in speech.

Summarizing, there are three kinds of quotation words in Loglan: (i) ordinary or weak quotation with **li...lu**; (ii) single word quotation with **liu**; and (iii) strong quotation with **lie X...X**. In the latter **X** is any exactly repeated boundary marker that does not occur in the quoted string. When convenient **X** may be the letter word for the initial letter of the Loglan predicate for the language of the quoted string. Strong quotation can handle any kind of quoted string including nonsense and non-Loglan.

4.11 Abstract Description with lopo lopu lozo

We are now ready to deal with the abstract entities we left hanging in Chapter 3. You may recall that the abstract operators **po**, **pu** and **zo** which we discussed in that chapter permitted us to form predicate expressions like **pu gudbi** which meant '...is a property of being good', but that

- (4) Da pa godzi le farfu je la Rabrt, jue la X went to the-father-of-Robert-
Meris by-Mary.

/dapaGODzileFARfujelaRABrt.juelaMERis/

and **je** and **jue** now hold the entire description **le farfu je la Rabrt jue la Meris** together. And to attach three or more arguments to a description, we use **je** first, and then as many instances of **jue** as we require:

- (5) Da pa godzi le vedma je le horma jue X went to the-seller-of-the-horse-
la Djan, jue lo nema dalri to-John- for-the-hundred-dollars.

/dapaGODzileVEDmajeleHORmajuelaDJAN.juelonemaDALri/

I have hyphenated the whole English phrase starting with 'the-seller-' and ending with '-dollars' to show that the Loglan construction is similarly linked by its **je**'s and **jue**'s into a single term. **Jue** is the general link for all arguments in third or higher places of a descriptive predicate. (The word **nema**, by the way, is a number word meaning 'one hundred'.)

Now a world of English ambiguities is avoided by this device. For though the number of English prepositions is very large, they do not work as effectively in keeping descriptive meanings straight as the pair of Loglan linking words **je** and **jue**.

For example, suppose I say in English 'I talked to the teacher of many things.' What do I mean? That we talked *about* many things? Or that the teacher taught many subjects? In English, one cannot be sure. In Loglan, one cannot be in doubt. The little word **ro** means 'many'; and the predicate **bekti** is the general word for 'thing'. The predicate **takna** means '...talks to...about...'. Therefore, the two possible interpretations of the English sentence can be said unequivocally in Loglan in these two ways:

- (6) Mi pa takna le ditca ro bekti I talked to the teacher *about* many
things.

/mipaTAKnaleDITcaroBEKti/

- (7) Mi pa takna le ditca *je* ro bekti I talked to the teacher-*of*-many-
things.

/mipaTAKnaleDITca.JEroBEKti/

(Both pauses are phrasing pauses.) The difference, of course, is the presence in (7), and the absence in (6), of the linking operator **je**. Accordingly, the phrase **le ditca ro bekti** in (6) represents *two* arguments, the second and third arguments respectively of the predicate **takna** ('...talks to...about...'). While in (7) the linked phrase **le ditca je ro bekti** ('the teacher *of* many things') functions as a *single* argument, namely as the second argument of that same predicate. What could be clearer? A little experimentation with the linking operators will show that they settle nearly all prepositional ambiguities of this kind. For example:

- (8) Le furvea je le kamla *je* la Romas The buyer of the thing that comes
from Rome.

major source of ambiguity were no special provision made to prevent such--evidently futile--intentions from arising. That special rule is that whenever a predicate word is the last word to appear before an unadorned predicate expression, then we use the marker word **ga** in the position of the tense operator to mark the point at which the description ends and the predicate expression begins:

- | | |
|-----------------------|------------------------|
| (3) Le sadji ga mrenu | The wise one is a man. |
| | /leSADjigaMREnu/ |

This is an awkward rule;²¹ but it preserves the economy of such expressions as **Da mrenu** and **La Djan mrenu** which require no marker word. It is the price we willingly pay for the logical advantage that all predicate words in Loglan belong to a single part of speech.²²

4.15 Tensed and Located Description with *lena lepa lefa levi leva*

We can now consider several other varieties of description. In [Section 4.8](#), where we first talked about description, we said that only untensed predicate expressions could become the basis of descriptions. This seems arbitrary. Suppose we *do* want to add a time particular to some description, as in 'the present king of England'. Can we do this in Loglan? Of course; but it turns out to be more parsimonious, grammatically, to generate a set of tensed descriptors--such as **lena** [leh-nah] ('the present'), **lepa** [leh-pah] ('the-former') and **lefa** [leh-fah] ('the-future')--to do this work, rather than permitting tense operators to occur within descriptively used predicates. But with these modified descriptors one *may* make tensed descriptions in Loglan after all:

- | | |
|--|--|
| (1) Lena bragai [BRAH-gigh] je la
Inglynd [EENG-gluhnd] | The present king (born-ruler) of
England. |
| | /lenaBRAGaijelaINGlynd/ |
| (2) Lepa ditca | The former teacher. |
| | /lepaDITca/ |
| (3) Lefa matma | The future mother. |
| | /lefaMATma/ |

and even tensed mass descriptions as in

- | | |
|-----------------------|--------------------------|
| (4) <i>Lofa</i> humni | <i>Future</i> humanity. |
| | /loFA.HUMni/ |
| (5) <i>Lona</i> simba | <i>Present</i> lionkind. |
| | /loNA.SIMba/ |

Notice that when a stressed syllable precedes a predicate word it must be separated from the predicate by a pause. As noted in Chapter 2, this is a general rule. No stressed syllable may pauselessly precede a predicate.

Perhaps more important for translating English than the *tensed* descriptors, however, are the spatially particularized descriptors formed with **vi** and **va**. As we saw in the chapter on predicates, these two little words mean 'here' and 'there', and are used in many ways as tense operators are used in Loglan. Like tense operators, they may be combined with either **le** or **lo** to form just those demonstrative descriptions which we would translate into English with 'this' and 'that', as in the sentences below:

- | | |
|-------------------------|--|
| (6) Levi bukcu ga redro | This book (i.e., the-here book) is red. |
| | /leviBUKcugaREDro/ |
| (7) Leva fumna ga mrenu | The-there woman is a man. (That woman is a man.) |
| | /levaFUMnagaMREnu/ |

and even:

- | | |
|--|---|
| (8) Lovi cutri ga kofhatro [kohf-HAHT-roh] | The (mass of) here water is warm (comfortably-hot). (The water here is warm.) |
| | /loviCUTrigakofHATro/ |

The distinction between **lovi cutri** and **levi cutri** ('the mass of all the water here' and 'this particular puddle of water here') will not seem immediately useful to the English mind. For the noun 'water' seems incorrigibly masslike in English and the adjective 'this' in the phrase 'this water' does little to particularize it. But the Loglan mind starts with integral bits and pieces of water and will therefore be tempted to use **lo cutri** and **lovi cutri** only when some synthesis of these elementary bits and pieces is intended. In short, to use this apparatus intelligently we shall have to think about the distinction between **le** and **lo** in a Loglan way.²³ The distinction between these operators arises, of course, from the fact that every Loglan predicate is a general term. Thus while the Loglan mind starts with pieces of water and bits of better-than, it can be carried by abstraction and mass description to whatever lofty abstractions of "waterness" and virtue we Indo-European thinkers might require. And by the operations of specifying predicates, or tensing them or locating them, we can stop anywhere we like along the way. Thus with **lovi cutri** we pause to glance at the local mass of water on our way.

4.16 Possessive Description with **lemi letu leda**

The mechanism of "possession" in language ('my hat', 'your mother', 'John's book', etc.) is a widely misunderstood phenomenon. It is unfortunate that the grammarians who first studied it called it "possession", for usually the relationship it specifies has nothing to do with possessing things at all. Thus, in English I can talk of my son's clothes (which he doesn't really own any more than I own him), of your mother (whom you certainly don't own), of my skin (which is simply attached to me) or even of his corner of the room (which is where he is). Thus a huge variety of predicate relations is evidently hidden in these slippery little "possessive" words.

In sentence (5) a curious thing happens. A possessive description has been formed, not with a predicate, but with a variable in the usual place of the predicate (**da** in **lemi da**). What this means is that the explicit portion of the possessive description has been omitted, and we are left with its implicit portion only: namely that I am referring to some X that is related in some way to me. This is, of course, exactly what we mean by 'mine'.

Now you have probably sensed that the utility of the possessive form lies not only in its economy but in its vagueness. For it is not only simpler to say 'my hat' than 'the hat which I regularly use' in both English and Loglan (**lemi kapma** as opposed to **le kapma ce nu plizo je mi** = 'the thing which is a hat and used by me'), but just as in English, the very vagueness of the unspecified relation is sometimes useful. Suppose I don't know how Johnny is related to the car I see him driving (it is probably *owned* by his father). When I call it **le la Djanis, tcaro** ('the-Johnny car') I avoid committing myself on this delicate matter. But suppose there is no doubt about the relationship which I want to impute. Suppose I am talking about his mother. Do I say **le la Djanis, matma** in Loglan?

I *may* do so if I wish; but it is an unnecessary circumlocution for what can easily be said directly, in Loglan. For **le matma je la Djanis** ('the mother of Johnny') provides what will almost always be a better designation in Loglan of Johnny's mother, that is, a more useful one, than **le la Djanis, matma** is. For **le matma je la Djanis** is a specified description which relates Johnny as an offspring to his mother: a much more exact relation than "possession". Similarly, the predicates for body-parts are all two-place predicates in Loglan. It is therefore unnecessarily vague to say **lemi barma** ('the-me arm') when you can say **le barma je mi** much more explicitly. One is not related to one's arm vaguely, at least not in Loglan.

Mass descriptions may also be possessive in Loglan. Thus **lo resfu** means 'clothing in general' (**resfu** = 'is a garment, an article of clothing'), whereas **lomi resfu** means 'my clothing'. This is another momentary specialization of a mass term--or partial massification of a general term, as we might now prefer to say--which is similar in mood and structure to the located mass term **lovi cutri**. Thus semantic parallels often exist between one grammatical construction and another in Loglan, and these are usually reflected in their having similar structures in a Loglan-viewed reality.

4.17 Possession with pe

The possessive form **le la Kristobal Kolo'n, botsu** ('Christopher Columbus's boat') is as clumsy an expression in Loglan as it is in English. A simple operation exists to reverse these terms...in both languages:

(1) Le botsu pe la Kristobal Kolo'n The boat of Christopher Columbus.

/leBOTsupelakrisTObal.koLON/

Notice the structural parallel between this designation and the following one:

- (2) Le matma je la Kristobal Kolo'n The mother of Christopher
Columbus.

/leMATmajelakrisTObal.koLON/

Now **je** warns us that Christopher is related in a very definite way to his mother; that is, she bore him. But **pe** [peh] is a kind of vague, all-purpose linking marker saying only that he's related in *some* way to his boat: that he owns it, sails around on it, goes to sea in it, is its captain or its cabin-boy.

But now suppose that we wish to talk of that man's boat. 'That man' is easy enough; it is **leva mrenu**. But if we put **leva mrenu** in the position of **la Djan** in **le la Djan botsu**, we encounter a difficulty. For ***le leva mrenu botsu** seems to say 'the that man type of boat', which says nothing at all in Loglan. Obviously we need to terminate the internal description **leva mrenu** with some kind of marker. We may do so with the comma-word **gu** [goo], and **gu** may or may not be accompanied by a pause.

- (3) Le leva mrenu gu, botsu That man's boat (the that-man
boat).

/lelevaMREnugu.BOTSu/

But we may feel that this, too, is clumsy, especially if we want to say more about the man. So we might prefer the inverse possessive forms with **pe**:

- (4) Le botsu pe leva mrenu The boat of that man.

/leBOTsupelevaMREnu/

- (5) Le botsu, pe le bilti ce cmalo ge nirli The boat of the pretty little girls'
ckela school.

/leBOTsu.peleBILticeCMAlogeNIRliCKela/

Thus **pe** is used most effectively when the speaker wishes to designate the "possessor" with a longer and more elaborate construction than da plans for the "possessed."

4.18 Predicate Names

A maneuver that looks like description but is not is to use the name operator **la** to turn a predicate or predicate expression into a name. The predicates used for this purpose are always predicates that may be used as calls, that is, to call the attention of someone, just as we may use the predicate 'father' to call 'Father!' in English. We will learn how to make attention-calling expressions of this kind (vocatives) in the next chapter. But in this one we are concerned with how predicate names may be used to talk about the people whose attention may be called with them.

In English we express our intention to make a name out of a predicate by dropping the article and capitalizing its initial letter when we use it in writing. 'Father', we say or write, 'got back last

We are still concerned, in short, with the ingredients of utterances rather than their structure.

4.19 Names from Predicates and Little Words

A name in Loglan is any consonant-final word. Therefore a very natural way of making names is to drop the final vowel or vowels from a predicate word, getting **Mren** from **mrenu**, for example, or to add a final consonant to a little word, getting **Tun** from **tu**. We may call the names made in these ways *internal names* because they come from inside the language. Most Loglan names, of course, are borrowed.

For example, The Institute has a dog named **Cimr** [SHEE-mrr] and it once had a cat named **Gro'katm** [GROH-kah-tmm]. The name **Cimr** was made from the predicate **cimra** [SHEEM-rah], which means 'summer' and fits the sunny temperament of its referent. The predicate **groatma** [groh-KAHT-mah], which means 'big-cat', was the source of **Gro'katm**...with its abnormal and therefore marked stress, notice. **Groatma**, from **groda katma**, was a complex derived on the spot for that monstrous cat.

Tun itself is an excellent example of an internal name made from a little word. It is the name of You, or of whatever person the speaker can get the attention of by shouting it. Spoken like 'You, there!' into a crowd of inert bystanders, **Tun** is the temporary name of whoever will respond. We'll see in [Section 4.27](#) how numerical names, like **Ten** and **Fon** ('Three' and 'Four') may also be made by the consonant-adding route. Conventionally, the consonant that is always added to make little word names is **n**.

All the predicate names in the last section could have been made as calls first by the vowel-dropping route. Thus, **la Farfu** could have been **la Farf** or **la Far**, 'Mom' could be **Mat** or **Matm** ([MAH-tmm] to rhyme with **Gro'katm**), and the name of the personage called Rat in the children's story could have been rendered with either Loglan **Rat** [raht] or **Ratc** [rahtch] as the writer preferred. Similarly, the character of Dog could have been Loglan **Kan** or **Kang** [kahngg], with the hard [g] after [ng] definitely pronounced, and Cat could have been Loglan **Kat** [kaht] or **Katm**, again as the writer preferred.

Indeed, using a predicate as a name is a rather formal thing to do, just as 'Father' is formal in English. But dropping a vowel, or a vowel and a consonant, from the same predicates is an informal, even familiar move. It yields **Mat** and **Far**, which, like 'Mom' and 'Dad', amount to nicknames. So with Loglan words like **Rat**, **Kan**, **Kat**, **Fum**, **Mat** and **Far** we enter the affectionate world of nicknames.

4.20 Set Description with *loe leu lea*

There are three other little words that have grammatical distributions which are identical to that of **le** and **lo**, and these are the set descriptors **loe leu lea** [loh-eh, leigh-oo, leigh-ah]. Each has a special variety of 'the' to convey that lends precision to description in Loglan. Each involves sets in some way. In the following discussion we will use the Loglan word **preda** to stand for any

Loglan predicate expression and the English nonce word 'preda' for its translation into English as a common noun.

Loe preda designates the characteristic or typical individual preda which best exemplifies the set of predas in the given context. At bottom this is a statistical construct. For instance,

- (1) Loe femdi cimpanizi [sheem-pah- NEE-zee] ga forli loe mendi ce humni athlete is stronger than the typical) male human athlete.
/loeFEMdicimpaNIzi.gaFORliloeMENDiceHUMni.atLEte/

would require the mounting of a fairly extensive experimental enterprise in order to confirm or refute it. Indeed, (1) might be the conclusion of such an investigation, or a result remembered from reading about one.

In English we would usually say 'The chimpanzee female is stronger than the human male athlete' and leave the listener to figure out what sensible thing we might have meant. In Loglan we must do better than that. We make such statements more precise by using **loe**, a special kind of 'the' in which the notion of typicality is built in.

Leu preda designates the set of predas--not the individual predas, note, but the particular set--which the speaker has in mind. It means 'the set of some (predas)'.
(2) Leu monca gorla ga cmalo [SHMAH-loh] The (set of) mountain gorillas (I have in mind) are few (literally, is small).
/leuMONcaGORlagaCMAlo/

Like **le**-designations, **leu**-designations are intentional. That is, they designate whatever set the speaker intends to designate with da's description. But unlike **le**-designata--the things that **le**-phrases designate--**leu**-designata are sets, not individuals. Thus, we may compare their properties with those of other sets, for example, in size, diversity, longevity, and so on. Certainly the speaker of (2) does not mean that any particular mountain gorilla is small, much less that all of them are, as **Ra monca gorla ga cmalo** ('All mountain gorillas are small') would claim. The universal quantifier **ra** will be taken up in Sections 4.23 and 4.24.

Lea preda designates, for any preda, the non-empty set of all the predas. It is universal, not intentional. Like **leu**, its designatum is always a set, not the members of some set. Unlike **leu**, it means 'the set of all (predas)'.
(3) Lea ficli ga laldo lea mamla Fishes are older than mammals.
/leaFICligaLALdole,aMAMla/

Certainly we would not mean to claim by this English sentence that every fish is older than every mammal, or even that any individual fish is. We could only sensibly mean that the non-empty set

of fishes has endured longer, i.e., has had members in it longer (on this planet, anyway), than the non-empty set of mammals.

In Loglan we wish to make these ideas clear.²⁵

4.21 Numbers

One of the cleverer things we do with language is to apply numbers to arguments. Thus when I say in English 'Those ten men are teachers' I have said something that is strictly equivalent to looking at each of them in turn and saying 'That man is a teacher' ten times. But this is not the only way in which numbers may be used. Numerical concepts may also occur as predicates (for example 'We are three', 'It was a football eleven', 'He was first in line'), as proper nouns ('The number three', 'The year 1937'), and also as indefinite descriptors ('I saw three men', 'One of the teachers smoked'). We will provide for all these uses in due course. But we must first supply the basic number words themselves. Here are the digits from zero to nine:

ni 0 (zero)	fe 5 (five)
ne 1 (one)	so 6 (six)
to 2 (two)	se 7 (seven)
te 3 (three)	vo 8 (eight)
fo 4 (four)	ve 9 (nine)

There are some obvious regularities. First, note that the digits are divided into five pairs and that each pair has a characteristic consonant: **n t f s v**. Second, note that the odd-numbered member of each pair (**ne**, **te**, **fe**, **se** and **ve**) ends with **e**. Third, note that all the even-numbered digits except **ni**, that is, **to**, **fo**, **so** and **vo**, end with **o**. The word **ni** (zero) is evidently the one irregular word in the system. But this makes sense. Zero is the sign of the re-cycling of the system with every tenth member and so ought to be different. Thus 'ten' is **neni** (10), 'twenty' is **toni** (20), 'thirty' is **teni** (30) and so on; but 'twelve' is simply **neto** (12) and 'one-hundred-and-twenty-three' is simply **netote** (123).²⁶

For larger numbers there are two extra "zeros", as we might call them: **ma** (θ) which represents multiplication by a hundred, or the double zero ('00') in English; and **mo** (ϑ) which represents multiplication by a thousand, or the English triple zero ('000'). Thus 'one-hundred' is **nema** (1θ) in Loglan, 'a thousand' is **nemo** (1ϑ), 'two-thousand' is **tomo** (2ϑ), 'twenty-thousand' is **tonimo** (20θ), 'two-hundred-thousand' is **tomamo** (2θθ), 'two million' is **tomomo** (2ϑϑ), and so on. Normally, compound number words, like compound little words generally, receive level stress. Thus [toh-mah-mah-HOOM-nee] and [veh-moh-moh-HOOM-nee] are the usual pronunciations of the Loglan phrases corresponding to 'two-hundred-thousand humans' (**tomama humni**) and 'nine-million humans' (**vemomo humni**), respectively, in which there are no pauses and in which only the penultimate syllable of the predicate word is stressed. On the other hand, any syllable in a number word may be emphasized to mark contrast: [*TEH*-veh-moh-moh-KAHT-mah] 'thirty-nine-million cats'. Such emphasis is often shown by underlining the emphasized syllable in text: **tevemomo katma**.

To round out the number system, the little word **pi** represents the decimal point, so that 'point-five' is **pife** (.5) and 'twelve and thirty-four hundredths' is simply the compound word **netopitefo** [neh-toh-pee-teh-foh] (12.34). Similarly, there is a set of arithmetic operators of which **kua** [kwah] ('divided by'), **tia** [tyah] ('multiplied by'), **piu** [pyoo] ('plus'), **niu** [nyoo] ('less'), **pea** [peigh-ah] ('positive') and **nea** [neigh-ah] ('negative') are the most useful. (The complete set of mathematical operators will be found in **Loglan 6**.) So **nekuato** [neh-kwah-toh] (1/2) is 'one-half'. What could be simpler? Let us now consider the uses of these number-words as argument quantifiers.

4.22 Quantified Arguments

Quantification is the art of applying numbers to arguments. Sentences with quantified arguments, or, as we shall sometimes call them, plural sentences, are equivalent in meaning to those same sentences without quantified arguments (singular sentences) repeated n times; and the number of repetitions n is always equal to the product of the numbers used as quantifiers in the original sentence. Thus if I say:

- (1) Levi to fumna ga corta leva ne mrenu These two women are both shorter than that one man.

what I have said is equivalent in meaning to the singular sentence,

- (2) Levi fumna ga corta leva mrenu This woman is shorter than that man.

spoken twice. But if I say

- (3) Levi to fumna ga corta leva *te* mrenu These two women are (all) shorter than (each of) these *three* men.

then what I have said is equivalent to speaking sentence (2) *six* times.

There are several things to notice about this. First, there is evidently no plural form of the Loglan descriptors **levi** and **leva**, and no plural inflection of the Loglan predicate. For with **levi to fumna** we are evidently not literally saying 'these two women', but '*this* two woman'. Again, Loglan sounds like pidgin. There is a logical advantage as well as an obvious simplicity in this grammatical plan. For it reveals more clearly than English does what the claim of such plural sentences is about. For note that the equivalently repeated sentence--sentence (2) above--is identical to both (1) and (3) except for the presence in the latter two of the number words. Second, the meaning of the Loglan quantifier evidently includes the meaning of such occasional clarifying phrases in English as 'each of', 'all', 'both', and so on. We will see why this is so in a moment. Finally, note that the two things designated by the quantifying phrase **levi to** in (1) and (3) are *definitely* designated. For suppose I had said:

- (4) *To* levi fumna ga corta *ne* leva mrenu Two of these women are shorter

than one of those men.

- (5) *To levi fumna ga corta te leva mreñu* Two of these women are shorter than (some) three of those men.

Notice that if *any* two of the women designated in (4) are each shorter than some one of those men, then (4) is true. And if there exists a pair of women and a trio of men belonging to the two sets designated in (5), such that each woman of the pair is shorter than each man of the trio, then that sentence is true. We will have a look at the mechanism of indefinite quantification more closely in [Section 4.24](#) on indefinite description.

Just as in English, the *indefinite quantification* of an argument may be freely alternated with its *definite quantification*. Thus, the following forms are all possible.

- | | |
|-------------------------------|---|
| (6) <i>Le te fumna</i> | (Each of) The (set of) three women (I have in mind). |
| (7) <i>Te le fumna</i> | (Some) <i>Three</i> of the (set of) women (I have in mind). |
| (8) <i>To le te fumna</i> | (Some) <i>Two</i> of the (set of) three women. |
| (9) <i>Le to le fumna</i> | (Each of) The (subset of) two of the (set of) women. |
| (10) <i>Le to le te fumna</i> | (Each of) The (subset of) two of the (set of) three women. |

And so on. Note that in these sentences **le** has the sense of the English phrase 'the set of', whether we are then told how many members the set has (as in **Le te fumna**), or not (as in **To le fumna**). Thus when we say **To le fumna** it is assumed that there are enough women in the set to yield at least two. Again we need no plural inflection of the predicate word to make this idea clear.

So far we have been concerned with quantifications of descriptions made with the particular descriptive operators **le**, **levi** and **leva**. But now let us consider the effects of quantifying descriptions made with the mass operator **lo**. As usual, we will approach our problem obliquely by first considering an English ambiguity. Suppose I tell you:

- (11) The two men carried that log.

The question immediately arises: Together? Or separately? It makes a difference. For if I mean that a *team* of two men has carried that log, I have asserted only one thing, namely that a single individual thing--albeit two-headed--carried that log. But if there had been a log-carrying contest, say, and each of two men succeeded in carrying that particular log, then I am, in effect, asserting two things when I say "they" carried it. Namely, that one of them did, and that the other of them did, too, presumably on different occasions.

Thus the cardinal predicates may be used alone, as in (1); they may modify other predicates, as in (2); and they may be modified by other predicates, as in (3). No particular difficulty attends the use of these words. They are obviously one-place predicates; they may be used in particular descriptions (**le fora** = 'the foursome'), or in mass descriptions (**lo tora** = 'pairs', that is, 'all the twosomes there are'); and they may even figure in abstract descriptions. For example, **lopu tera** means 'threeness', or the property that all threesomes share. Obviously, there is an infinite number of such abstract individuals. They may, in fact, be nothing more than the abstract creatures called numbers themselves.

Like all predicates, the numerical predicates are stressed penultimately. This means that their front-ends must be protected from accidentally absorbing whatever number words may precede them. How do we say 'Bring me those five five-gallon cans' in Loglan? And do so in such a way that our listeners will know that we don't want the fifty-five-gallon cans? The answer is simple. We pause in the first case, and scrupulously *fail* to pause in the second. (After all, *fefera* = 'fifty-five-some' is a single word; and we know that pausing inside a word can sometimes be misinforming.) These are the two utterances we seek:

- (4) Kambei mi leva fe, fera galno veslo Bring me those five five-gallon cans.

/KAMbeimilevaFE.FERaGALnoVESlo/

- (5) Kambei mi leva fefera galno veslo Bring me those fifty-five-gallon cans.

/KAMbeimilevafeFERaGALnoVESlo/

Note that it is clarifying to stress the last syllable before the crucial pause in (4). The stress needn't be emphatic; but there should be at least a slight rise in the stress contour immediately before the pause. Whether one uses a comma (,) or not to mark these obligatory pause in text is optional.

The second class of numerical predicates are the *ordinal predicates* like 'first', 'second', 'third', and so on, in English. These are the predicates which describe the positions of things in ordered series. In Loglan they are formed with the suffix **-ri**: **neri**, **tori** and **teri**, and so on.³¹ Like the cardinals, the ordinal predicates are handled grammatically like all other predicates; and like them, too, they have initial stress. Unlike the cardinals, the ordinals are two-place forms:

- (6) La Djan, pa neri John was first.

/laDJAN.paNERi/

- (7) Da pa neri lepo prano He was first in the race (that is, in the running).

/dapaNERilepoPRAno/

- (8) Mi pa neniri le clina I was tenth in the line.

/mipaneNIRileCLIna/

For obviously, if one is to be tenth in something, there must be something to be tenth in. Perhaps not quite so obviously, that something must be a series long enough to have ten members. This

consideration, incidentally, shows that there are not only an infinite number of ordinal predicates, but also an infinite number of *converse* ordinal predicates of the following form:

- | | |
|-------------------------|---|
| (9) Da nu neniri | X is a series with ten or more members. |
| | /danuneNIRi/ |
| (10) Da nu teri la Djan | X is a series in which John is third. |
| | /danuTERilaDJAN/ |

Now there is no reason why we cannot also apply the suffixes **-ra** and **-ri** to the non-numerical quantifiers of the preceding section and produce even more of these predicates. Thus **Da rara** means that X is literally everything (that is, an "allsome"); **Da rora**, that it has many members (a "manysome"); **Da sura**, that it has at least one member (a "somesome"); and so on. The non-numerical ordinals are even more interesting. For example, **Da rari** must mean that X is the last member in some series, for literally it is the "allth" member. We can also talk in Loglan of the "manyth" member (**Da rori**), and even of the "fewth" member (**Da riri**); for nothing prevents our extending the ordinal ideas of Loglan in this curious direction, too. Again, in the effort to accommodate the natural languages, we have overshot them. And if someone asks you (in Loglan) if your position in the movie queue is close enough to the box office to make success probable, you have the splendid opportunity to reply laconically:

- | | |
|--------------|------------------|
| (11) Mi ruri | I am "enoughth". |
| | /miRURi/ |

Apart from these curiosities, there are a great many quite ordinary English expressions that can be translated into numerical predicates with great directness. A 'big group', for example, is simply a set with many members, that is, a 'manysome' or **rora**. A 'little group' is clearly one with few members, that is, a 'fewsome' or **rira**.

Note that ordinals, too, are penultimately stressed.

4.26 Numerical Description with lio

Sometimes one wishes to separate a number from the designation that it might be used to quantify and talk about it separately. For example, instead of talking about sixteen apples (**neso pligo**) one might wish to say that "the number of apples" in some set is sixteen. In such styles of speech the number sixteen itself requires to be designated. In Loglan we do this with the *numerical descriptor* **lio** ([lee-oh] or [lee-OH]). It means 'the number...'. The predicate **konte** means 'is the count of...'. So we may say

- | | |
|-----------------------------------|-------------------------------------|
| (1) Le pligo ga nu konte lio neso | The apples have a count of sixteen. |
| | /lePLIgoganuKONtelioNEso/ |

- (4) Da cmalo X is small.
/daCMAlo/
- (5) Lio da cmalo The number X is small.
/liOdaCMAlo/

In (5) the variable **da** is used mathematically; that is, **Lio da** is the designation of a number whose identity is (usually) unknown. Perhaps all we know about it is that it is small. But in (4) the argument **da** may designate anything the speaker wishes to designate...including a number. One may also use letter variables as the operands of **lio**-descriptions. For example, **lio b**--pronounced [lee-OH-bay]--means 'the number b'.

Another important use of **lio** is in connection with the *scalar predicates*. These are the words in every modern language that name the units of our numerous measurement scales. Some examples are **dalra** ('is a dollar/be worth...dollar(s)'), **metro** ('is a meter/be... meter(s) long'), **gramo** ('is a gram/weigh...gram(s)'), and we have already encountered **galno** ('is a gallon/be...gallon(s) in volume'). The "default" value of the argument in the second place of all scalar predicates is **lio ne** /liOne/, that is, 'the number one'. Thus **Ti dalra** is short for **Ti dalra lio ne** /tiDALraliOne/ and means 'That's a dollar' or 'That's worth a dollar', or in literal translation--which is always worth trying to figure out for each new usage you encounter--**Ti dalra** means 'This is worth in dollars exactly one'...a dollar-bill, perhaps. Similarly, **Ta gramo** means 'That's a gram' or, literally, 'This weighs in grams exactly one'...a one-gram weight, almost certainly. (Hardly anything else comes out that neatly!!)

But if, now, we wish to say that something that we have weighed with some care weighs 33.1 milligrams, say, description with **lio** is available to help us do it: **Ti milgramo lio tetepine** /timilGRAMo.liotetePINE/, or, in the abbreviated textual style we prefer for numerical expressions in both English and Loglan, **Ti milgramo lio 33.1**. The second expression is, of course, read aloud in exactly the same way as the first. And remember that stress remains determinedly penultimate in **lio**-descriptions whether it falls on a decimal point or not.

The affix **mil-** in the scalar predicate **milgramo** comes from **milti** 'is a thousandth part of...'. **Milti** is one of a series of *multiplier predicates*, which includes **pikti**, **nanti**, **mikti centi**, and **decti** on the small side, and **dekto**, **hekto**, **kilto**, **mirdo**, **megdo** and **gigdo** on the large side. These provide Loglan renderings of the familiar scientific measurement affixes: **pik-** ('pico-'), **nan-** ('nano-'), **mik-** ('micro-'), **mil-** ('milli-'), **cen-** [shen-] ('centi-'), **dec-** [desh-] ('deci-') as well as the ascending series **dek-** ('deka-' or 'deca'), **hek-** ('hekt(o)-' or 'hect(o)-'), **kil-** ('kilo-'), **mir-** ('myri(a)-'), **meg-** ('mega-') and **gig-** ('giga-'). So Loglandia, too, can eventually learn to spend its *gigdalra*. The multiplier predicates themselves predicate metrical properties of individuals or sets. Thus, if I say **Da gigdo de di**, I am saying that X is a billion times bigger than, or more than, Y on dimension Z. If Z is not mentioned, it is usually assumed that the dimension is numerical; that is, that set X has a billion times more members than set Y. Similarly, **Da nanti de di** says that X is a billionth part of Y on dimension Z...whence **De gigdo da di**. In short, **nanti** = **nu gigdo**; **decti** = **nu dekto**; and so on.

There is another, sometimes more convenient, way of talking about numerical facts than using either scalar or multiplier predicates; and this requires another kind of predicate, the *dimension*

predicate. Fewer than the scalar predicates but more commonly used, they are the words for the various dimensions humans have so far succeeded in measuring. Examples are **langa** [LANG-gah] ('is longer than...by amount...'), **aldo** [LAHL-doh] ('is older than...by amount...'), **tidjo** ('is heavier than...by amount...'), **nerji** [NEHR-zhee] ('has more energy than...by amount...'), and so on. Notice that, when specified, the third arguments of all these dimension predicates will be designations of amounts. To be meaningful, these amounts must, of course, be expressed in units appropriate to that particular dimension, that is, they must be *dimensioned numbers*. For example, 'three inches' is a dimensioned number in English, which, when properly expressed in Loglan, might be used with the predicate **langa**. In another example, '33.0 cg', which we would read aloud in English as 'thirty-three-point-zero centigrams', might be suitable for use with **tidjo**; and '700 MYA' which, if we know what the English letters stand for, we would read aloud as 'seven-hundred-million years ago', might be appropriate to one of the many scales on which **lopu aldo** is measured. Loglan, too, has a full array of dimensioned numbers. The ingredients from which they are made will be found in Appendices A, B and D.

With both dimension predicates and dimensioned numbers we can now make quantitative comparisons. Suppose that brass object over there is a standard 5-kilogram weight. Suppose this sack of flour weighs 8.1kg. Then we can say

- (6) Ti tidjo ta lio 3.1kg This is heavier than that by 3.1 kg.
/tiTIDjoTA.liotepineKEIgei/

Lio 3.1kg is, of course, the Loglan designation of the international dimensioned number 3.1 kg, a designation which could be translated literally as 'the number 3.1 kg'. We might think that the numerical part of the Loglan expression was just another instance of the familiar Loglan quantifier, but in fact the expressions **3.1kg** and **3** have exactly the same grammatical privileges in Loglan. Both may be preceded by **lio**. Both may function as quantifiers. Thus we may speak of **3.1kg sulfo** ('3.1 kg of sulfur') as readily as we may speak of **3 sulfo** ('3 sulfurs', three lumps of sulfur, perhaps?), and of course a good deal more precisely. For example, we may now say

- (7) Nensea [nen-SEIGH-ah] 3.1kg sulfo Put in (in-set) 3.1 kg of sulfur (any 3.1 kilograms).
/nenSEatepinekeigeiSULfo/

just as we may still say

- (8) Nensea 3 sulfo Put in three sulfurs (any three lumps, handfuls, etc.).
/nenSEateSULfo/

more roughly and with the same construction we may use to say

- (9) Ridle te bukcu Read 3 books (any 3 books).
/RIDleteBUKcu/

With the dimensioned numbers we reach the level of precision required by science. Yet no grammatical novelties are afoot here. Sentences (6) through (9) have exactly the same grammatical structure. Evidently a Loglan quantifier may be any mathematical expression whatsoever.

Let's now look at the dimension part of dimensioned numbers. The **kg** part of the expression **3.1kg** stands for the pair of letter-words **keigei** [kay-gay]. These are the words for the lower-case Latin letterals that constitute the Loglan, as well as the international, symbol for this unit of measurement, the kilogram. The Loglan scalar predicate for this unit is **kilgramo** as it might be used in **Ti kilgramo**, 'This weighs a kilogram.' The word is derived from **kilto gramo** = 'thousandfold-gram', with obvious affinities with English and French 'kilogram(me)', Spanish 'kilogramo', Italian 'chilogramma', and so on. But when loglanists read the written expression **3.1kg** aloud, they will read it, not as **tepine kilgramo** on a misleading analogy with the English 'three-point-one kilograms', but as the compound little word **tepinekeigei** /tepineKEIgei/; and this spoken word may always be generated simply by reading the individual numerals and letterals in the textual expression aloud. It is just as if we read '3.1kg' aloud as 'three-point-one-kay-gee' in English. We don't but could, and in Loglan we do.

Tepine kilgramo does mean something, of course, but not 'three-point-one kilograms'. It means '(any) three-point-one things that weigh one kilogram each'. There are contexts in which this curious designation might be useful. In any European supermarket, for example, there are many things that weigh (approximately) 1 kilogram. Any 3.1 of them would satisfy this designation.

The utility of comparative measurements like (6) is fairly limited, however. More frequently we wish to say that this single object in our hand, for example, weighs 30 grams, or is 5 inches long, or is probably 37,000 +/- 500 years old, without comparing it to anything else. In short, we wish to report our measurement of it directly. There is a third group of predicates that enable us to do that, namely the *measurement predicates*. These are all complex predicates made by attaching **mel-** or **mely-**, a prefix derived from **merli** = '(to) measure...to be...on scale...', to some dimension predicate like **tidjo**, **langa** or **laldo**. For example, **melylanga** [mel-uh-LAHNG-gah] means '...is measured-in-length to be...'.

(10) Ta melylanga lio 5i [lee-oh-feh . EE- That is 5 in (5 inches) long.
see]

/tamelyLANGa.liofe.Isi/

The letter word **isi**, being the pronunciation of the letteral **i** and vowel-initial, requires the briefest of pauses--usually a glottal stop--between it and the preceding number word. The letteral **i** is the symbol assigned to the scalar predicate **inca** [EEN-shah], an obvious borrowing. We might translate (10) more exactly as 'That measures-in-length the-number five-inches.' Here's another measurement statement:

(11) Ti meltidjo lio 30g This weighs 30 g (30 grams).

/timelTIDjolioteNIgei/

Again Loglan gives options to its speakers and scope to their inventions.³³

4.27 Numerical Names

The last class of number words need not detain us long. These are the names of the objects we sometimes wish to hail by their numerical properties. Years are such objects; times of day; musical compositions ('The Beethoven Quartet') and groups ('The Dreadful Dozen'); and last but certainly not least, those abstract creatures called numbers themselves.

All such objects are very simply named in Loglan. As suggested in [Section 4.19](#), we may always make a name from a little word or little-word compound by adding the suffix **-n**. Thus **Nen, Ton, Fon**, etc., form an infinite class of names which may then be used exactly as the name-words **Djan, Pit, Bab** and **Kat, Kan, Rat** and **Far** are used. If you want to talk *to* something with a numerical name, you may address it by using that name vocatively ('Oh 1988, how cruel you have been!'). But more frequently, you will want to talk *about* these things, and this requires the use of the name operator **la**. Thus **la Ten** may be used to designate the number three, the local musical trio, three in the afternoon, or anything else that has three parts or members. For it may serve, of course--just as 'John' does--as the name of many things. Thus **la Ten** is often used in Loglan as the translation of 'three o'clock', and **la Nevevoven** /laneveVOven/ is one of the expressions you may use if you wanted to talk about, and not to, the year 1989. Normally, of course, polysyllabic names are penultimately stressed.

The loglanist should remember, however, that anything that may be given a numerical name (**la Nevevoven**) may also be given a predicate name of roughly the same import by using one of the numerical predicates. Thus **la Nevevereri** /laNEvevoVERi/ would mean '(the) Nineteen-Eighty-Ninth (Year)', and the Dreadful Dozen might be more mellifluously named **la Nu Firpa Netora** /lanuFIRpaneTORa/, using the techniques of [Section 4.18](#), than **la Nufirp Neton** /laNUfirp.NEton/, using those of 4.19 and this section. Mellifluousness may not be what is wanted here, however.

But whatever is wanted, the Loglan name-coiner has many colors on da's palette.

4.28 Indirect Designation with *lae* and *sae*

Occasionally we designate something by pointing to a sign or address of that thing. We say 'Bring me 129' when what we really want is something with that number pasted on it or written next to its name on a list. This is indirect designation. We first designate something that can serve as a sign of something else--a label or a title or an address, or a bit of smoke in the room--and then indicate that it is the thing behind that label or title or bit of smoke that we really want to talk about. In English we can do this quite openly by saying 'Bring me the car with the number 129 pasted on the windshield'; but we seldom bother. We content ourselves--as we often do in natural language--with saying something that we don't really mean, confident that the listener will understand that we mean something else.

Sometimes **me**-predicates are used to express such fleeting notions that there would be no point in ever building literal predicates for them. Predified quotations are often instances of such ephemeral predications:

- (8) La Kan, pa meli, Mi danza lepo hasfa Dog "I want to go home" looked
godzi, lu bleka mi at me (i.e., gave me that "I want to
go home" look).

/laKAN.pameLI.miDANzalepoHASfaGODzi.luBLEkami/

In this last sentence, the whole phrase **meli, Mi danza lepo hasfa godzi, lu** has been predified by its leading **me**, and the predicate it precedes and therefore modifies is the main predicate of the sentence **bleka** = 'looks at'.

In English, we don't quite know what to make of such constructions...especially when we try to use them in text. Sometimes we hyphenate them ('He gave me that I-want-to-leave look'); sometimes we put them in a different style of quotation marks from the ones we use for ordinary speech ('She shot back a "Don't be silly!" frown'); and sometimes (in despair) we capitalize the initial letters of the principal words in the predified phrase to indicate that something special is afoot here but we don't quite know what: 'It was God Save the King week when we arrived in London.'

In Loglan, the predifier **me** always makes it clear what we are doing. We are turning these bits of copied or invented speech into predicates, and we are then free to use them in any way that other predicates might be used to get the job done. Often the semantic effect is pleasantly vague. But as mentioned above, we often make do with predified arguments because we don't know of any proper predicates with which to say what needs to be said.

In sentence (8) a speaker might feel that the long predified term might be more conveniently spoken last. To put it last, da may invert the predicate string with **go** just as if the **me**-ed expression were a single predicate word:

- (9) La Kan, pa bleka je mi go meli, Mi Dog looked at me I-want-to-go-
danza lepo hasfa godzi, lu home-ishly (i.e., in an "I want to
go home" sort of way.)

/laKAN.paBLEkajemigomeLI.miDANzalepoHASfaGODzi.lu/

But to do this, notice that we must first link **mi** to **bleka** with **je**. This is because when a deferred modifier is to be linked to its modificand with **go**, the modificand must first be linked to all its (soon to become internal) arguments with **je...jue...**(See [Section 4.12](#)). Notice how linking with *je* advises the ear that an adverbial **go**-phrase is probably coming up. There is no other reason to link arguments to the main predicate of a sentence than that they are about to become internal.

Finally, here's a **me**-expression that is applied to **me** itself:

- (10) Ba pa meliu me forma holdu le lengu There was (i.e., something was) a

"me"-shaped hole in the language.

/bapameli,umeFORma.HOLduLENGu/

After **me** was invented in 1978 many loglanists felt that way. How had we ever gotten along without it?³⁵ In fact, how does *English* get along without it now? Obviously these are historically new constructions, in the natural languages, whose grammar has not yet jelled.

4.30 The Non-Designating Variables **ba be bo bu**

When a speaker of English wants to talk about something or someone da cannot properly designate, da frequently uses the words 'something' or 'someone'. In Loglan the four variables **ba be bo bu** are used for this same purpose. (Note that **bi** is missing from this series; **bi** is the identity operator and will be discussed in the next chapter.)

- | | |
|--------------------|--|
| (1) Ba pa ditka mi | Something bit me. |
| | /bapaDITkami/ |
| (2) Ba na kokfa be | Someone's cooking something. |
| | /banaKOKfabe/ |
| (3) Ba pa crina | Something rained. (Usually 'It rained'). |
| | /bapaCRIna/ |

All these sentences express in both languages the speaker's inability to locate the thing or things the sentence is about. Or, as we might say from sentence (1), da doesn't know what bit him. All da knows is that da was bitten. And da infers from this that there exists something x that did the biting.³⁶ Similarly, who is prepared to designate the cloud from which rain falls? We will use the lower-case letters x, y and z in English text to represent these non-designating variables.

Logicians call sentences which make claims of this kind *existential propositions*. Their claims are minimal. For all that is necessary to establish the truth of (1), for example, is to find that there exists something somewhere that bit the speaker.³⁷ How different this is from the same sentence with a definite designation:

- | | |
|---------------------------|---------------|
| (4) <i>Da</i> pa ditka mi | X bit me. |
| | /DApaDITkami/ |

For sentence (4) accuses a definite culprit, X, where (1) only vaguely proposes that the crime occurred. As a consequence, (4) is easy to refute, for the accused--whom we can presumably locate--is either guilty or da is not. In contrast, (1) is almost impossible to refute. For how many "somethings" do we have to examine before our failure to find one that satisfies some given predicate may be taken as conclusive? The answer is, all of them. And that is everything there is. It is in this sense that existential propositions make minimal claims about the world.

Logically, the non-designating variables are very important. For example, they permit the clear expression of just these minimal claims that are often disguised with the indefinite article in the Indo-European languages. Thus the mystery of English 'a' and 'an' is resolved at once with this device. For consider what it means to say:

(5) A man came.

Is it not equivalent to saying?

(6) Something was a man and came.

And this in turn finds its very clear expression in Loglan:

(7) Ba mrenu, e pa kamla Some x is a man and came.³⁸
/baMREnu.epaKAMla/

As we saw in [Section 4.24](#) on the art of indefinite description, we may also translate (5) into Loglan with what amounts to Loglan's indefinite article, the quantifier **su** ('at least one'):

(8) Su mrenu pa kamla At least one man came.
/suMREnupaKAMla/

Logically (7) and (8) make identical claims, and the Loglan speaker is free to use whichever form da pleases. (8) is a little more economical than (7) in that the implied connective **e** and its associated pause do not have to be spoken in the **Su pred**a-form. On the other hand, the **Ba pred**a e-form is logically more explicit, and loglanists will often prefer to use it for that reason.

In choosing between forms like (7) and (8), one must also be wary of the temptation to follow one's English habits, some of which, I am sorry to say, are almost certain to be bad. For example, the English translation I have given for (8) ('At least one man came') is often an incorrectly abbreviated form of quite a different English claim:

(9) At least one of the men (I have in Su le mrenu pa kamla
mind) came.
/suleMREnupaKAMla/

Many English speakers regularly use the English of (8) when they mean the English--and therefore the Loglan--of (9). If you have such speech-habits in English, it would be wise to use the more explicit existential form of (7) when making claims of this kind in Loglan.

The difference between the claims of (8) and (9) is not trivial. Its importance may be sensed if we remember that (8) is actually an abbreviation of

(10) Su le ra mrenu pa kamla At least one of the set of all men
came.

And when we also consider that the sets involved in sentences like (9) hardly ever have more than ten or a hundred members, the large logical difference between the two kinds of claim becomes apparent. Sentences like (10) claim the existence of an unknown and unlocatable man that came, hardly more. Sentences like (9) identify the man that came as a member of a locatable set. That is a long way toward having his address.

In short, it is alright to use **Su preda** when one really does mean to make the minimal existential claim of (7) and (10), but at no other times. The logically safest bet--in any language--is to speak existentially (i.e., with 'something's and 'someone's or **ba**'s and **be**'s) when one's claim is existential. So in a logical language, the **Ba preda e**-form of (7) may come to be preferred over the simpler indefinite description of (8).

There is another reason why the longer **Ba preda e**-form may be favored by loglanists who are attracted by the idea of "talking symbolic logic". The original English sentence (5) seems to involve only one predicate idea, namely that something came. But as (6) and (7) suggest, *two* claims are actually afoot here, namely that something came *and* was a man. How obscure the English form with the indefinite descriptor 'a' really is! For on the misleading parallel with a very similar sentence containing the definite article,

(11) *The* man came.

we are tempted to think in English that sentence (5) uses the predicate word 'man' in a designation, and hence that it is not part of the speaker's claim at all.³⁹ This is the first error. The second is that we are tempted to think that the phrases 'a man' and **su mrenu** are designations, but "indefinite" ones, as an English-speaking grammarian might call them. They are indefinite *quantifications*, as we have already seen. But the set over which the quantifiers **su** and 'at least one' operate is the set of *all* men; and so to qualify as *some* man, one must be something x which really *is* a man; and this is not designation but predication.⁴⁰ We are claiming that this indefinite something x, whoever and wherever it may be, actually is a man.

This is an important and subtle difference. The thing I mean when I say 'The man came' needn't be a man for my sentence to be true. That man may be a woman. But the thing I mean--but do not know the location or identity of, and therefore cannot designate--when I say 'A man came' *must* be a man for my sentence to be true. Thus two predications are afoot in the sentences with indefinite descriptions as we originally surmised. And unlike all other variables, the non-designating variables **ba be bo**, with which we make such claims, do not designate anything at all. Hence their name. Their use reveals, in fact, the speaker's intention *not* to designate--not to give the perpetrator's location away ('Someone broke it')--even when da can.⁴¹

Another use of the non-designating variables is in "universals." These are the general claims about the world that people make when they are feeling incautious ('All crows are black') or didactic ('All whales are mammals'). Here is an instance of the incautious variety, first in rather literary English:

(12) All who love the Sun, love Spain.

Then in a style of English that is logically more sophisticated:

(13) If anyone loves the Sun, then he loves Spain.

Then in Loglan:

(14) Raba cluva la Sol, noa la Espanias Each something x loves the Sun
only if (it loves) Spain.

/rabaCLUvalaSOL.noala.esPANias/

(The pause before /esPANias/ is the one required everywhere in Loglan before vowel-initial words, and is usually very short: a glottal stop.)

Now we may observe two things about this Loglan sentence. First, by quantifying the non-designating variable **ba** with the "all"-operator **ra**, we are suddenly talking about everything there is. For every something x is indeed everything, for each something x can be anything at all. This apparently reckless move is called "universal quantification",⁴² and we will deal with it more fully in Chapter 5 (specifically, [Section 5.17](#)). But for the moment we need only remark that it allows us to convert the weak existential claim of

(15) Ba cluva la Sol, noa la Espanias Something x loves the Sun only if
(it loves) Spain.

/baCLUvalaSOL.noala.esPANias/

into a conjunction of an infinite number of such claims about all the somethings that there are. It is in this sense that **Ra ba** means that for every something x, some specified thing about each x is true.

Second, note that each time we apply (14) to a new something it says only that *if* that particular something is a lover of the Sun, *then* it is (also) a lover of Spain. But this implication will almost always be trivially true. For the vast majority of somethings--including your pencil, the Moon, and the electron hovering at the tip of your nose--do *not* love the Sun; and this makes it true of them that if they love the Sun (as they don't) they also love Spain (but don't have to). It is the genius of modern logic to have discovered that an infinite number of trivialities, plus a few non-trivialities--and these concern in this case those relatively few somethings that love the Sun--adds up to something that is not trivial, namely a generalization. In this case, what is non-trivial is the generalization we can now make about Sun-lovers without designating them--or even pretending that we can--namely, that whoever and wherever they are, they all love Spain.

Logicians call such sentences *universal propositions*; and though they are built, as you see, on the same non-designating variables as the existential sentences are, they claim much more.

Here are some further examples of universals built with **Raba** and **noa**:⁴³

(16) Raba mrenu, noa razdou [rahz-DOH-oo] Each something x is a man only if (it) reasons (gives reasons). ('All men are rational.')

/rabaMREnu.noarazDOu/

(17) Raba mrenu, noa nu matma be Each something x is a man only if (it) is mothered by something y. ('Every man has a mother.')

/rabaMREnu.noanuMATmabe/

(18) Raba simba, noa miotci [MYOH-chee] Each something x is a lion only if (it) meat-eats. ('Lions eat meat.')

/rabaSIMba.noaMIOtci/

The grammar of these Loglan remarks is plain. Each involves a connected predicate formed with the implicative connective **noa**; and each involves a non-designating variable of the **ba**-series which is quantified with the universal quantifier **ra**. Other argument terms may be involved, and these may either be designations, like **la Sol** in (14), or other non-designating variables, like **be** in (17). But the essential requirements of a universal claim in Loglan are that it contain, first, at least one universally-quantified non-designating variable, and second, a connection made with **noa**. As we have already suggested with sentence (14), and as we will see in detail in the next section, this essential connection may involve one of the arguments instead of the predicate of the sentence.

But how elegant the natural languages are! 'Lions eat meat' is surely a most satisfying abbreviation of the complex notion shown explicitly in **Raba simba noa mitro titci**. But also how obscure! For 'Lions live in Kenya' (*some* lions do, but some do not) and 'Lions are found all over Africa' (lionkind is so distributed, but no individual lion or set of lions is) are English sentences which use the same grammatical form to make entirely different claims. In Loglan we have sacrificed this elegance to penetrate this obscurity; and the result is sometimes clumsier but always clear. Besides, we can imitate the Indo-European languages fairly closely when we want to, and we will often want to when translating from these natural tongues. Thus

(19) Ra simba ga miotci All lions meat-eat.

/raSIMbagaMIOtci/

(20) Le ra simba ga miotci Each of the set of all lions meat-eats.

/leraSIMbagaMIOtci/

(which make the same claim) are available for these natural-language-imitating purposes. Thus we do not insist that the good loglanist "talk symbolic logic" every time da open's da's mouth. *Logicality is a style of Loglan speech that is available to any loglanist should de wish to use it.*⁴⁴

But Loglan has an even more telling advantage over English in the matter of universals. For observe that nearly every grammatical form of the English noun can be used to make a universal claim. Thus, not only the plural noun without an article, as in 'Lions eat meat', but also the plural noun with an article can be used to make the same claim:

(21) The lions eat meat (as opposed to the zebras, say).

But we also say,

(22) The lion eats meat.

and mean exactly the same thing, though grammatically this is now the singular noun with the definite article. And even the singular noun without an article is occasionally used to make a universal claim:

(23) Man eats meat.

This last sentence definitely suggests the sense of the mass description in Loglan. Even so, it may be argued that in some contexts sentence (23) might be used to make a universal claim about individual men. But curiously enough even the singular noun with an *indefinite* article sometimes expresses a universal claim. For

(24) A man eats meat.

in the same sense that 'A man fights back' ('if he is a man', we are tempted to add) also makes this universal claim. In fact there is only one form of the English noun construction that, so far as I know, is never used to make a universal claim; and that is what is called the "indefinite plural" form in 'Some men eat meat.' Thus five out of the six ways in which nouns are used in English are occasionally employed to make universal claims.

But the riotous way in which the speaker of English uses noun constructions to make universal statements suggests that something has gone wrong. It suggests that the frequency of use of universals has increased markedly since the grammatical bones of the language were laid down, and that the grammar of the language has not kept up with these new needs. At least *something* in the English mind seems to resist the explicitly provided universal form 'All men eat meat' in favor of the wildly-varied but abbreviated noun forms we have just surveyed. Perhaps the transformational clumsiness of the "all"-form compared to the elegant transformability of the more precise conditional, as in 'If something is a man then it eats meat', has already been felt by users of English. The suggestion of a suppressed conditional in the form 'A man eats meat (if he is a man)' seems to forecast even further development along this line.

However this may be in English, or may become in the English usage of the future, the preferred form of the universal claim in Loglan compositions--as distinct from translations into Loglan from the natural languages where more imitative styles may be preferred--is the conditionally expressed claim with the universal quantifier:

(25) Raba mrenu, noa miotci

Each something x is a man only if
(it is) a meat-eater.

/rabaMREnu.noaMIOTci/

For this is the form that is most readily transformed into other forms. Many variations on this theme are possible as we shall see. But all of them involve the non-designating variables and a connection made with **noa**, or some other connection equally capable of expressing the conditional idea.⁴⁵

4.31 Optional Case Tags

The prepositions that sometimes precede the arguments of Loglan predicates are called *case tags*. They "tag" selected arguments for their role in the sentence, especially when those arguments are out of their standard order. The standard order of the arguments of a Loglan predicate is, of course, the order in which they are spoken when that predicate is unconverted and its arguments are untagged. This is the "dictionary order" in which you have been shown the places of at least some of the predicates we have used. It is also the order in which you will find the places of predicates shown in Appendices B-F.

Here is a sentence in which a tagged argument is not in standard order:

- (1) Da pa donsü, beu [beigh-oo] de di X gave object Y (to) Z.
/dapaDONsu.beudeDI/

The standard order of the arguments of **donsü** is donor-recipient-gift. This is the same as the unmarked order in English: 'X gives Z Y.'⁴⁶ But by tagging **de** with the case tag **beu**, which we have translated 'object', we make it clear that Y is the gift. So we are free to put the new designation of the recipient, which is **beu de**, in an unusual position, namely in second position instead of third, which is the usual order of the designation of a gift in both Loglan and English.

Once the gift is tagged, we may also tag the recipient:

- (2) Da pa donsü, beu de, dio [dyoh] di X gave object Y to recipient Z.
/dapaDONsu.beuDE.dioDI/

This move would seem unnecessary to a loglanist unless da suspected da's listener de might profit from this "extra" information...as de would do if de were a learner, say. For the benefit of that learner, da might even tag the giver place and speak all the arguments in their standard order:

- (3) Kao [kough] da pa donsü, beu de, dio Actor X gave object Y to
di recipient Z.
/kaodapaDONsu.beuDE.dioDI/

Although rare in English, this move gives the learner a maximum amount of information about the place-structure of the predicate de is learning. A similar move might be made by an instructor attempting to teach the idioms of English to foreigners.

Let's look at a more usual English sentence involving the same predicate notion:

(4) John gave his sister the puppy.

All the arguments in (4) are untagged. While the character of their designata allows us to guess who is giver, what is gift, and who is recipient, in the end it is the order of the unmarked arguments that determines their role in the sentence. To see this, let us exchange the second and third arguments of sentence (4) while leaving them unmarked:

(5) John gave the puppy his sister.

The claim is still clear enough. It's an absurd one now, or at best a sentimental one expressed metaphorically. But clearly with (5) the speaker is making a sharply different claim from that of (4). What emerges from exercises of this kind is that it is the *position* of an unmarked English argument that determines its role in the sentence.

Now let us see the effect of tagging. If we tag 'his sister' in (4) with the preposition 'to', we may successfully speak its claim in two quite different orders:

(6) John gave the puppy to his sister.

(7) To his sister, John gave the puppy.

We might even try the unusual move of putting the tagged argument before the verb:

(8) John to his sister gave the puppy.

That would also be understood in English. Tagged arguments are evidently quite mobile...in both languages.

We might try to explain the mobility produced by tagging in the following way. English prepositions like 'to' are evidently signs of particular English "cases", where by *case* we mean a category of sentential roles: for example, the roles played by subjects, objects, indirect objects, and so on, in sentences. 'To' is often a sign of the "dative" case in English; and that is the case to which all sorts of indirect objects--which include designations of destinations, beneficiaries and other recipients--are always assigned. English has several such cases, but only its pronouns are ever inflected for them. For example, 'he/him/his' and 'I/me/my' are the "nominative", "accusative" and "genitive" cases, respectively, of two English pronouns. But unlike the nouns of Latin and Greek, English nouns are never inflected for case. So if we want to mark English nouns and noun phrases for case--that is, for their role in the sentence--we must tag them with prepositions. (Notice that these are called "prepositions" because in English they are positioned *before* the objects they tag.) Once tagged, English nouns and noun phrases may be moved around at will without losing their case-identities.

This is just what we do in Loglan. Loglan, of course, is a completely uninflected language. Moreover, it has no nouns, just predicates which may be used as arguments. But, like English, Loglan does have a set of optional prepositions with which speakers may tag the cases of their arguments when they want to move them around.

This is of course much more information than anyone but a learner of the language will ever require...especially as the arguments are still in their standard order. But notice that, once the three arguments have been tagged in this way, we may now speak the four elements of the new sentence (the predicate and its three tagged arguments) in any order we like:

- | | |
|--|--|
| (11) Beu le cinkau kao la Djan, pa donsu
dio leda sorme | A Patient, the puppy, an Actor,
John, gave to a Recipient, his
sister. |
| /beulecinKAu.kaolaDJAN.paDONsudioledaSORMe/ | |
| (12) Dio leda sorme beu le cinkau kao la
Djan, pa donsu | To a Recipient, his sister, a
Patient, the puppy, an Actor,
John, gave. |
| /dioledaSORMe.beulecinKAo.kaolaDJAN.paDONsu/ | |
| (13) Kao la Djan, beu le cinkau dio leda
sorme pa donsu | An Actor, John, a Patient, the
puppy, to a Recipient, his sister,
gave. |
| /kaolaDJAN.beulecinKAu.dioledaSORMepaDONsu/ | |
| (14) Dio leda sorme pa donsu beu le
cinkau kao la Djan | To a Recipient, his sister, gave a
Patient, the puppy, an Actor,
John. |
| /dioledaSORMe.paDONsubeulecinKAu.kaolaDJAN/ | |
| (15) Pa donsu kao la Djan, dio leda sorme
beu le cinkau | Gave an Actor, John, to a
Beneficiary, his sister, a Patient,
the puppy. |
| /paDONsukaolaDJAN.dioledaSORMe.beulecinKAu | |

These are only six of the 24 ways in which four distinct elements may be arranged. But the other 18 orders are equally understandable.

Now the thing to notice from this exercise is that our understanding of these sentences is *not* dependent on their being presented to us in any particular order. Despite our minds having been trained in the ways of an order-dependent language like English, we are apparently able to understand the giving relationship between John, his sister, and the puppy he is giving her when its participants are mentioned to us in any order...provided *only* that the role of each in that relationship be known. It is this remarkable fact about our "sentence understander"--remarkable, that is, to those of us who speak order-dominated languages like English (it would not surprise an ancient Roman...Latin poetry, for example, apparently exploits the freedom to be disorderly in a most exuberant way)--that makes the optional case system of Loglan workable. In short, order is dispensable. And that *is* a surprise.⁴⁷

[Table 4.1](#) gives the eleven Loglan cases. Each is represented by its letter symbol, its tag, the Loglan source of the tag--a predicate which is also the name of that case in Loglan--an English keyword which gives a clue to the meaning of the case name, some English prepositions commonly associated with that case (if any are), and examples of typical roles played in sentences by arguments assigned to that case. Notice that the case letteral is always the initial

letter of the Loglan tag but not always of the case name. We will often use these letterals to tell the reader what case assignments have been given the places of some predicate in which we are interested. For example, case letterals are often used as dummy variables in Loglan dictionary entries.

B	beu	Bekti	(object)	'-/in'	Patients, Parts, Properties
C	cau	Canli	(quantity)	'by/for'	Quantities, Amounts, Values
D	dio	Dirco	(direction)	'to/for'	Recipients, Beneficiaries, Destinations
F	foa	Folma	(full)	'in/of'	Wholes, Sets, Collectivities
J	jui	Junti	(young)	'than'	Lessers in greater/lesser than relations
K	kao	Kakto	(act)	'-/by'	Actors, Agents, Doers
N	neu	Nerbi	(necessary)	'under'	Conditions, Fields, Circumstances
P	pou	Proju	(produce)	'-'	Products, Outputs, Purposes
G	goa	Groda	(big)	'than'	Greaterers in greater/lesser than relations
S	sau	Satci	(start)	'from'	Sources, Origins, Reasons, Causes
V	veu	Vetci	(event)	'by/via'	Events, States, Deeds, Means, Routes, Effects

We may expect loglanists to use their optional case system under at least three circumstances: (1) When the argument so-tagged is to be used out of its standard order, as may be desired to preserve the natural word-order in a translation, for example, or for writing poetry, when the freedom of maximum disorder may be desired. (2) When the tagged argument is a fourth or higher-order argument of its predicate. Experience has shown that the meanings of the first three places of even long predicates are easily remembered, but that later arguments--*sufori* ones, as we might say in Loglan--are easily confounded. The habit of routinely tagging the *sufori* arguments of *sufora* predicates prevents this. (3) When the listener is suspected of not knowing the place-structure of some predicate, as is often the case, for example, when the speaker is a teacher and the predicate is still new. In most other circumstances we expect that many loglanists will be charmed, as logicians and mathematicians often are, by the transformational elegance of Loglan's preposition-free forms.

But again we must be prepared to be surprised. The interesting scientific question is, How will the Loglan case tags actually be used? What kinds of users will use them and in what contexts? Again, we have the outcome of an interesting natural experiment to observe.⁴⁸

4.32 Connected Arguments with *anoi enoi onoi*

In Chapter 3 we saw how predicate expressions could be connected in an afterthought way with the connectives **e**, **a**, **o**, **u**, and **noa**. This same apparatus is available for connecting arguments as well. For just as we can say **Da mrenu, e farfu**, and mean that **Da mrenu** and **Da farfu** are both true, so we can say:

/GODzilaROmas.anoilapaRIS/

differs from

(8) Godzi la Romas, a no la Paris Go to Rome and/or not to Paris.

/GODzilaROmas.anolapaRIS/

only by that single letter. And note that (7) and (8) are grammatically distinct forms, even though they make exactly the same claim. Notice, too, that in Loglan it is *obvious* that they do. That their translations are also equivalent is not at all obvious in English.

Now just as we can construct the connectives **noa** and **anoi** from the negative affixes **no-** and **noi**, so we can construct other compound connectives from these same affixes by attaching them to other bases. Here are some of those other compounds:

(9) Godzi la Romas, *onoi* la Paris Go to Rome *or* Paris, but not to
both.

/GODzilaROmas.OnoilapaRIS/

The word **anoi** expresses the "exclusive" sense of English 'or'. This is the sense of 'or' we use when we tell our children that we can go to the mountains or the seaside, but not to both. Since the word **anoi** is formed on the base **o**, you may assume that the connection of exclusive 'or' is based on the notion of equivalence even in English...that it is, in short, *negative* equivalence. We can see this best by breaking the word **anoi** in Sentence (9) into its parts:

(10) Godzi la Romas, o *no* la Paris Going to Rome is equivalent to
not going to Paris.

/GODzilaROmas.oNolapaRIS/

And in English we would like to add 'and vice versa'. In short, a negative idea (not going to Paris) is said to be equivalent to the positive expression of another idea (going to Rome). Since what equivalence requires is that both its terms be true (not going to Paris and going to Rome) or both false (*not* not going to Paris and not going to Rome, or *going* to Paris but not to Rome), we see that this is exactly what we mean by the exclusive sense of 'or' in English. We shall call this connection *disjunction*, to distinguish it from the inclusive sense of 'or', or alternation.

We may now observe that **anoi** and **anoi** are parallel forms. We might think of them as *negative equivalence* and *negative alternation*, respectively. This is true logically in English, but not lexically. For it is impossible to tell from their verbal forms alone that both '...or...but not both' and '...if...' involve an implicit negation of their second terms. You will have to take it on faith that they do, or take a moment to study the generating formulas of the Loglan forms.

Let us now consider some more transparently negative forms. There are several senses of *negative conjunction* in Loglan. One of them is '...and not...' or **enoi** [en-noy]; the other is 'not...and...' or **noe** [no-eh]:

4.33 Forethought Argument Connections

The reader will recall that certain **k**-marked connections (which we there called keks) were used in the previous chapter to make forethought connections between predicates, i.e., to "kek" them. These were **ka ke ko ku** and **kanoi** as derived from the basic set of five afterthought connectives **a e o u** and **noa** (often called eks). All the keks were to be positioned before the pair of elements to be connected and the infix **ki** was to be placed between them. Thus, **ka...ki...** meant 'either...or...', **ke...ki...** meant 'both...and...', and **kanoi...ki...** meant 'if...then...'. (Please note in passing that the phonemically similar **...anoi...** is also translated with English 'if'.) Let us now extend this set of five keks by deriving an additional six **k**-connectives from the six compound eks, namely **anoi enoi onoi noe noenoi** and **noanoi**, that were derived in the previous section.

Take **anoi** = '...if...'. To get the kek that corresponds to **anoi**, we prefix /k/ to its significant vowel **a**, getting **ka**, and then add **-noi** to the infix **ki**, getting a new infix **kinoi**. Thus the whole kek that corresponds to **anoi** is **ka...kinoi....** This makes sense if we remember that the defining form of **anoi** is **...a no....** Thus **ka...kinoi...** expresses the same connection as **...a no...** does but with the forethought version of the connective. Similarly, the keks for **enoi** and **onoi** are **ke...kinoi...** and **ko...kinoi...**, both of which also use the new infix **kinoi**.

But now let us derive the kek for **noe** = 'not...but...'. Here the defining form is **no...e....** Just as we derived **kanoi...ki...** ('if... then...') from **noa** and **no...a...**, so we will now get **kenoi...ki...** from **no...e....** Similarly, the kek for **noenoi** will be **kenoi...kinoi...**, and **noanoi** gives us the kek **kanoi...kinoi....** All these new keks apply retroactively to [Section 3.18](#) on kekking predicates, of course, and all these same keks, new and old, may now also be used to kek arguments. For example,

- | | |
|--|---|
| (1) Ke la Djan, ki la Pit, stude | Both John and Pete are students. |
| | /kelaDJAN.kilaPIT.STUde/ |
| (2) Ke la Djan, ki ka la Pit, ki la Meris, ditca | Both John and either Pete or Mary are teachers. |
| | /kelaDJAN.kikalaPIT.kilaMERis.DITca/ |

Sentence (1) is of course equivalent to

- | | |
|------------------------------|-----------------------------|
| (3) La Djan, e la Pit, stude | John and Pete are students. |
| | /laDJAN.elaPIT.STUde/ |

But (2) is not equivalent to

- | | |
|--|--------------------------------------|
| (4) La Djan, e la Pit, a la Meris, ditca | John and Pete, or Mary are teachers. |
| | /laDJAN.elaPIT.alaMERis.DITca/ |

but to

(5) La Djan, e ka la Pit, ki la Meris, ditca John and either Pete or Mary are teachers.

/laDJAN.ekalaPIT.kilaMERis.DITca/

For, since all unmarked connections are to be interpreted as afterthoughts in Loglan, the listener will group the elements of (4) in the following way:

(4') [(la Djan e la Pit) a la Meris] ditca

This rule is quite general. *Any* string of unmarked connections in Loglan will group naturally to the left...; or, as we will sometimes say, such strings are *left-associative*. Thus in **A e B a C** the association must be as (i) [(**A e B**) a C] and not as (ii) [**A e (B a C)**]. The reason is that in afterthought mode each new connected element must be connected to a construction that is in some sense already complete. So to get the right-associativity of (ii), one must use a marked connective to embrace the final pair of elements in a group (**ka B ki C**), and this expression may then be connected as an afterthought to the initial element **A**. This produces (iii) [**A e (ka B ki C)**] which has the same right-grouping as (ii); and this is the interpretation of (2) and (5) already given. Indeed, (5) will parse as:

(5') [la Djan e (ka la Pit ki la Meris)] ditca

If now we go back and look at the twice **k**-connected (2), we see that it, too, will evidently parse as:

(2') [ke la Djan ki (ka la Pit ki la Meris)] ditca

Thus both (2) and (5) are right-associated groupings of the same elements and so make the same claim. Evidently kekking the conjunction in (2) was unnecessary. Of the two equivalent forms, the minimally kekked form used in (5) tends to be preferred by loglanists over the one with the unnecessary kek in (2). In general, it is considered good style in Loglan to use unmarked connections when the normal left-associativity of the language accomplishes what is meant, and to kek connections only when the abnormal condition of right-associativity is required.

Let us consider a somewhat longer example of a sentence with unmarked, and therefore left-grouped, connections.

(6) La Bab, a la Djan, e la Pit, anoi la Djos, stude

/laBAB.alaDJAN.elaPIT.anoilaDJOS.STUde/

This can only mean '([Bob or John> and Peter] if Joe) were students' whatever may be the case with similar unmarked strings in English.⁵⁰ If, therefore, we want to express a different grouping pattern than the simple left-associative one which the listener will assume on hearing (6), we must use one or more marked connections. (In the next few examples we will translate **ka...kinoi...**, which is the marked form of **...anoi...** = 'if', with the curiously backward expression 'then...if...'. This is by analogy with 'if...then...' which translates **kanoi...ki...**, the converse of

ka...kinoi... There is no marked form of '...if...' in English. So we have to invent one to translate the Loglan.) Thus both of the following sentences

- (7) La Bab, a la Djan, e ka la Pit, kinoi la [(Bob or John) and (then Pete if Djos, stud Joe)] are students.

/laBAB.alaDJAN.ekalaPIT.kinoilaDJOS.STUde/

- (8) La Bab, a ke la Djan, ki ka la Pit, (Bob or [John and [then Pete if kinoi la Djos, stude Joe>]) are students.

/laBAB.akelaDJAN.kikalaPIT.kinoilaDJOS.STUde/

are minimally marked. By this I mean that the groupings intended--here shown by parenthesizing the English--cannot be expressed with fewer keks...given this order of elements, anyway. As you may now guess, the most difficult connections to understand are precisely those in which the stylistic sin of unnecessary kekking has been most exuberantly indulged, namely the completely kekked left-associated pattern. For in these, of course, no kekking at all is really necessary. Here is an extreme example of such "bad form":

- (9) Ka ke ka la Bab, ki la Djan, ki la Pit, (Then [both [either Bob or John> kinoi la Djos, stude and Pete] if Joe) are students.

/kakekalaBAB.kilaDJAN.kilaPIT.kinoilaDJOS.STUde/

Both the English and the Loglan specimens are very nearly incomprehensible (although the parenthesizing does help us glimpse the meaning of the English). But since (9) is equivalent to (6), which is readily comprehensible in both languages, (9) is hardly likely to occur.

In general, then, one uses marked forms for right-associative structures in Loglan, letting the left-associated ones take care of themselves. This avoidance of redundantly marked connections is a little like our reluctance to use the predicate grouping operator **ge** unnecessarily even though doing so is perfectly grammatical; see [Section 3.12](#).

Here is an example of a sentence which is sparingly kekked in both languages:

- (10) La Bab, ditca, e stude, e kanoi gudbi Bob is a teacher and a student,
stude ki gudbi ditca and if a good student, then a good
teacher.

/laBAB.DITca.eSTUde.ekanoiGUDbiSTUdekiGUDbiDITca/

Note that the claim, though complicated, is quite comprehensible. The single kek is necessary, by the way; for the wholly unmarked version

- (11) La Bab, ditca, e stude, e gudbi stude, noa gudbi ditca

/laBAB.DITca.eSTUde.eGUDbiSTUde.noaGUDbiDITca/

does not make the same claim as (10). The reader may enjoy figuring out what claim (11) does make and deciding whether it is likely to be a true one. Again, the reader is reminded that the full connective system may be examined in Appendix B.⁵¹

4.34 Negative Arguments

In the two previous sections we used negative arguments without comment in such sentences as:

- (1) Mi pa godzi la Romas, e no la Paris I went to Rome and not to Paris.
/mipaGODzilaROMas.enolapaRIS/

The advantage of using **no** in such positions is that it allows us to express two related claims economically in the same sentence. But how are we to interpret **no** before arguments in sentences which have no connectives? Consider the following sentence:

- (2) Mi pa godzi no la Paris I went not to Paris.
/mipaGODzi.nolapaRIS/

Clearly this is one of the two sentences (the other being **Mi pa godzi la Romas**) which have been implicitly connected to form the compound claim of sentence (1), the legitimacy of which we have already accepted. We are plainly obliged to accept its constituent (2) as a grammatical form as well. Yet the English version of sentence (2) has a curiously archaic ring. When we revive this archaism in Loglan we do so to obtain certain transformational advantages, not the least of which is the disentangling of just such negative connections as occur in (1). There are other advantages, but before considering them let us first be clear what **no** means before argument terms. Consider the next three sentences:

- (3) No la Paris, pa nu godzi mi Not Paris was gone to by me.
/nolapaRIS.panuGODzimi/
- (4) No, la Paris, pa nu godzi mi It is not the case that Paris was
gone to by me.
/NO.lapaRIS.panuGODzimi/
- (5) No, mi pa godzi la Paris It is not the case that I went to
Paris.
/NO.mipaGODzilapaRIS/

Sentence (3) is obviously the converse of sentence (2), the one in which we first found the argument **la Paris** negated. In (3) we brought the negative argument to the head of the sentence. Sentence (4) is evidently a permissible transform of (3) in which the scope of the negation has been extended to the whole sentence. Evidently this can be done simply by pausing after the now-initial **No**. Sentence (5) is apparently a reconversion of (4) back into the original order of arguments as they appeared in sentence (2) but with the negative **no** left at the head of the sentence. Are we justified in doing this?

By the rule of conversion given in Section 3.18 it is clear that (3) makes the same claim as (2),⁵² although with the different emphasis expressed by the new order in which the arguments **la Paris** and **mi** now appear. But the interesting thing is that **no**, which has accompanied **la Paris** in its migration to the position of first argument in sentence (3), has now turned up at the head of the sentence. In this new position we may recognize **No** as a potential modifier of the entire sentence, and turn it into one simply by pausing after it and generating sentence (4), which is evidently what **No** was implicitly before. In (4), **No** with its following pause now has the sense of contradicting the whole sentence. So we may translate the **No**-comma sequence in sentence (4) by that curious phrase 'It is not the case that' which occurs so frequently in the argot of logicians. Such phrases occur only rarely in everyday speech and then mainly in argument ('That's not so!') and often very awkwardly ('What you said when you said that John came to dinner just isn't true!'). The truth is that the Indo-European languages have no simple operator by which unequivocal contradictories of given sentences may be formed.

But in Loglan we need one. Sentence (5), which is the reconversion of (4), shows that **no** before at least some kinds of arguments has this sense of the sentential contradictor ('It is not the case that'); and the transformation rule by which we can always get from sentences of type (2) to sentences of type (5)--without bothering to go through such intermediate forms as (3) and (4)--is called the "rule of exportation." We may now state this rule explicitly: **No** before designative arguments may always be exported to the head of the sentence.⁵³

But negatives before non-designative arguments may *not* be so easily exported. Suppose we wish to claim that some people are not fathers using the non-designating variables of [Section 4.21](#):

(6) Ba farfu no be	Something x is the father of no something y.
	/baFARfunobe/

If, now, we export this **no** to the head of the sentence we get:

(7) No, ba farfu be	It is not the case that something x is the father of something y.
	/NO.baFARfube/

which means *no* one is a father. This is not what we intend. Evidently the easy transformation leading by double conversion from sentence (2) to sentence (5) is not applicable to sentences with non-designating variables. Let us see why.

Suppose we try to convert the predicate of sentence (6) as follows:

(8) No be nu farfu ba	No something y is fathered by something x.
	/nobenuFARfuba/

But this means that no one *has* a father! Evidently we are not allowed to convert predicates with non-designative arguments. To do so would clearly be to change their meanings.⁵⁴

The reason is that every non-designating variable is an implicit sentence quantifier--which is a matter we will take up in Chapter 5 when we consider quantified sentences--and the order of these quantifiers is often very important in logic. Conversion changes their order, sometimes illegitimately. Suppose, for example, we rewrite the English portions of sentences (6) and (8) in the style of English speech that is favored by logicians. Sentence (6) then becomes

(9) There is an x such that there is no y such that x is the father of y.

or, less tediously, at least one x is not a father. Sentence (8) becomes

(10) There is no y such that there is an x such that x is the father of y.

Or no one has a father. But the only difference between (9) and (10) is the order of the quantifying expressions 'there is an x such that' and 'there is no y such that'. Evidently the order in which such quantifications are applied to the same basic sentence makes some difference to those operations of the human mind that collectively we call logic.

If, now, we examine the Loglan sentences of (6) and (8) more closely, we see that the order of appearance of the non-designative arguments **ba** and **no be** differs in these two sentences in a way that exactly reflects the order of the explicit quantifying expressions in their English translations as sentences (9) and (10). Moreover the negative part of the argument **no be** is, in a sense, "stuck to" its variable: it may be transformed but it may not be simply moved. The difference in meaning, then, between (6) and (8) inheres essentially in the order of these arguments. So they may not be converted without changing that meaning.

Before leaving the matter of negative arguments, let us go back and qualify something we said about negative predicates in [Section 3.9](#). We said there that if the negative **no** applied to the entire predicate expression--as it does in **Da no pa gudbi mrenu**--it could be moved to the head of the sentence without changing the claim of that sentence. And so it may, if the sentence contains no non-designating variables or indefinite descriptions...objects we had not then encountered. Thus, because **Da no pa gudbi mrenu** ('X was not a good man') is a complete sentence (**mrenu** is one-place) it does not, therefore, even implicitly contain non-designating variables. The predicate negative may, therefore, be exported without changing its claim: **No, da pa gudbi mrenu** = 'It is not the case that X was a good man.' But suppose we alter the sentence so that it contains the non-designating variable **ba** in place of the designating variable **da**:

(11) Ba no pa gudbi mrenu Something x was not a good man.
/banopaGUDbiMREnu/

Now the exportation of **no** produces an entirely different claim:

(12) No, ba pa gudbi mrenu It is not the case that something x
was a good man.

/NO.bapaGUDbiMREnu/

which, as it turns out, makes the same claim as the pauselessly spoken sentence:

(13) No ba pa gudbi mrenu No something x was a good man.
/nobapaGUDbiMREnu/

The difference between (11) and (13) is the same as that between

(14) Ba no breba Something is not bread.
/banoBREba/

(15) No ba breba Nothing is bread.
/nobaBREba/

This is clearly a difference to which every language must attend. In Loglan we attend to them by assigning difference in meaning to different orders of the same small set of words (**ba**, **no**, **ra**, etc.). In English these matters are attended to with a host of different pronomial words and expressions ('nothing', 'no one', 'everything', 'something', 'some', 'none', etc.) as well as by strict rules governing the interpretation of each order: 'Nothing is related to everything' vs. 'Everything is related to nothing.' In both languages negatives tend to be "stuck to" their arguments if that argument is a non-designating word.

The most important thing we have learned in this section is that negatives before arguments may be exported to the head of the sentence if and only if those arguments are of the designating kind. Incidentally we have also learned that negatives before predicates may also be transported to the head of the sentence if and only if that sentence as a whole contains no non-designating arguments such as non-designating variables or indefinite descriptions.⁵⁵ This restriction is broader than it sounds. We have already noted ([Section 4.30](#), Note 36) that every incomplete sentence implicitly contains a non-designating variable: an existential if the predicate is positive, a universal if it is negative. Thus the innocent claim **Da corta** ('X is short') implicitly contains the minimal claim that X is shorter than something (**Da corta ba**) but the negative claim, **Da no corta**, is really quite extravagant, meaning as it does that X is non-shorter than, i.e., longer than or equal to, literally everything there is (**Da no corta raba**). From this sentence we may *not* export the negative, as in **No da corta raba** = 'It is not the case that X is shorter than every something x', for to do so produces the absurd result that the X that was once claimed to be among the longest things in the world is now satisfied to be anything but the shortest.

The handling of negatives is evidently fairly important in a logical language. We shall complete our discussion of Loglan negatives in [Section 5.26](#) on negative sentences.

4.35 Mixed Arguments with ze

Just as we may say **Da pa dzoru ze prano** ('X walked-and-ran') and mean something quite different by it from **Da pa dzoru, e prano**, so we can form mixed arguments in Loglan with the same mixing operator **ze**. The distinction between mixed and connected argument forms need not

puzzle us long. It is exactly the same distinction we have already encountered between quantified descriptions made with **le** and those made with **lo** in Loglan. Thus the difference in reference between the following pair of sentences,

- (1) La Djan, *e* la Pit, pa pinduo [peen- DOO-oh] le hasfa John *and* Pete (both) painted (paint-did) the house.
/laDJAN.ElaPIT.papinDUoleHASfa/
- (2) La Djan, *ze* la Pit, pa pinduo le hasfa John and Pete *jointly* painted the house.
/laDJAN.ZElaPIT.papinDUoleHASfa/

is exactly the same difference as we might have drawn with the quantified descriptions below:

- (3) *Le* to mrenu pa pinduo le hasfa *Each* of the two men painted the house.
/LEtoMREnu.papinDUoleHASfa/
- (4) *Leu* to mrenu pa pinduo le hasfa The *team* of two men painted the house.
/LEutoMREnu.papinDUoleHASfa/

For in both (1) and (3) we are talking about two independent events, both of which we assert to be true. Evidently they painted it at different times. Either that or they painted it at the same time while trying to avoid each other's brushes, for each is obliged to paint the whole house if sentences (1) and (3) are both to be true. Sentences (2) and (4) are more sensible. John and Pete now evidently constitute a team, and jointly, by dividing the work, they got it painted. From neither of these last two sentences can we legitimately infer that either of them painted the house.

While the distinction between mixed and connected arguments is now plain to us--for we have learned to see it as potential speakers of Loglan--it is surprising how frequently the unmodified word 'and' is used in English to report a designation of a set and not a true connection at all. Thus all the following sentences almost undoubtedly contain pairs of arguments that the typical English speaker would intend to be regarded as a single designation of something composed of several parts: 'John and Mary own their own house', 'Joe and Sally are good at mixed doubles', 'Roger and Carl went downtown', 'He sold the horse and saddle to the boy.' In every case the most usual interpretation of the word 'and' would certainly be that it formed a lump of two things which, taken together (e.g., 'the horse-and-saddle'), behaved in a certain way (e.g., was sold in a single transaction). But note that this way does not necessarily, or even very frequently, characterize the two things taken separately. Thus Joe may *not* be good at mixed doubles when he is teamed with anyone but Sally.

The truth is that while the English phrase '...and jointly...' *can* be used to replace 'and' in each of these sentences, it does not occur to the ordinary English mind to do so. For the metaphysical orientation of English suggests no such distinction. Therefore the word 'and' does not really mean **e** in Loglan; nor does it mean **ze**. Instead it means some curious unresolved blending of the ideas of connection and mixture which are in Loglan utterly distinct. Just what this idea is, would be

hard to describe. But it is probably a mistake to think that the Loglan distinction is implicit in English. It can be made, and some careful English speakers do sometimes make it; but it is evidently not natural in English to think about the differences between lumps of things and sets.

But we have seen in this chapter that in Loglan the distinction between lumps or masses of things, on the one hand, and two or more individual things of which some same thing may be true or sets of things, on the other, is the most fundamental distinction in the Loglan grammar of arguments. And we have just now seen that the fundamental operation underlying this distinction is the connection of arguments with **e** as opposed to their consolidation into sets and teams with **ze**. Then by repeated applications of this set-forming operation with **zewe** arrive eventually at a single designation of all the butter there is. And this is exactly what we mean by **lea batra**. We then see that the distinction between **lea batra** and **ra batra** can be logically generated for every predicate in the language. In doing so, we become systematically alert to a very important matter that is only dimly felt in the natural languages. Are we talking about sets? Or about individuals who happen to share some property? This distinction is implicit in English at just one point: in the difference between the grammatical treatment of its mass and collective nouns, like 'butter' and 'team', and its countable nouns, like 'men' and 'books'. In Loglan this important distinction is fully generalized, and is available to us whenever we talk or think.

Again we see how Loglan metaphysics is sharply different from that of English...indeed, from the metaphysical assumptions of all the natural tongues. For the Loglan world starts with pieces of butter and bits of better-than, and by successive applications of the machinery of abstraction and set description, all the elementary predicate notions of the language can be raised to any level of conceptual intricacy that we desire. At the highest levels are such familiar individuals as virtue and butter. But they are joined, in the Loglan view of things, by such surprising abstract entities as "butterness," "bookness", "enoughth-ness", and "the set of all the burrowing owls." Thus the Loglan world of individuals is a larger world than is commonly accessible to the natural tongues, for it accommodates by vastly exceeding the old. What this may finally mean for the observing eye and the thinking mind can only be guessed. But one thing is certain. For any given size of vocabulary, there will be more in Loglan to think about.

Notes

1 Throughout this chapter I will use the word 'designate' in the approximate sense of 'purport to name, identify, or single out', a sense that does not entirely accord with either philosophic or linguistic usage (cf. Morris 1946, Carnap 1948, Ziff 1960, Quine 1961a). I do this because there is no well-established single word in English that permits one to refer to just this species of linguistic behavior, and I need to. For in the system of semantics I am about to develop, the act of "designation" contrasts with that of "predication," and both are ways of referring to the "external", i.e., non-linguistical, world. In adopting this terminological scheme, I am closest, among logicians, to the analyses if not the usages of Quine. The distinction he draws between "singular" terms and "general" ones, i.e., between that which purports to name X, and that which is true of X (see Quine 1961a:205ff), is very nearly what I take to be the distinction between designating and predicating, though my emphasis is naturally a different one. (For example, I do not think, as Quine does, that the former activity can be eliminated in favor of the latter.) Both acts refer; we would agree on that. But that they do so in entirely different ways is the main point

of this chapter. Morris and Carnap, in contrast, use 'designate' in approximately my sense of 'refer'; Ziff uses 'refer' in approximately my sense of 'designate'; some writers use 'denote' where I use 'designate'; others use 'designate' where I use 'predicate'. Still others call predicates "names." And the names of what? Why, of "properties", of course. In short, semantical terminology is in something of a muddle. There is more on this matter in Chapter 8 of *Loglan 2* (Brown 1969b).

2 The need for **toi toa** and **tio tao** was discovered during Loglan conversations with Prof. John Parks-Clifford, a logician, in December 1977.

3 If Christopher had visited the *King* of Spain, and we had been told that *he* had persuaded *him* that the Earth was round, we would be in a similar quandary.

4 More than suffice, evidently. As mentioned in the text, experience has suggested that any three among the replacing variables, for example, **da de do**, can be assigned and kept track of in this "LIFO" way ("Last In, First Out"), but that assigning more than three in the course of speech is probably too much for the human temporary memory. Usage has added two new conventions since 1975 which supplement the **da de di do du** system. The first is to use an identifying clause on the first use of a fourth or later replacing variable, e.g., **di ji la Pit** = 'Y, who is Pete', a practice which allows one to ignore order of occurrence. The second is to use the letter variables discussed in [Section 4.6](#) as abbreviations, e.g., to use **fei (f)** to replace **le fumna**, whenever the context gets too complicated for the **da de di do du** system to handle. Indeed, the use of letter variables already seems to be so problem-free as to suggest that it may supplant the free variable system entirely. Both systems are still optional. The learner may use either or both. Again we will "let usage decide".

5 As remarked in [Chapter 3, Note 3](#), Loglan has a grammar which is in many respects like those of the natural pidgins and creoles. This augurs well for its possible closeness to the human language biogram; see Bickerton (1981). According to this writer, the similarities between child speech and pidgin are not accidental.

6 A Whorfian from Mars might assume from this fact that England had the least developed class-system among the European nations. How wrong *da* would be! The English class system is probably the most highly developed among those of the European nations. We may be warned by this example of the dangers of over-simplifying Whorf's ideas.

7 The anaphoric use of letter variables was first suggested by Stephen Smith on a visit to The Institute in 1979.

8 The logical theory of descriptions, following Russell (1905), gives a slightly different account of these matters, namely that the description '(i)Fx' purports to name (i.e., designate) the one and only object of which 'F' is true, 'F' being some predicate expression which allows this interpretation, e.g., 'is an author of Waverly' (see, for example, Quine 1961a:222). On this interpretation 'the author of Waverly' (Russell's classic example) is taken to contain the covert claim 'There is an x such that x is an author of Waverly and, for any y, if y is an author of Waverly, then y is identical to x.' But the uniqueness claim is patently false for the majority of

expressions commencing with 'the' in everyday speech, e.g., 'the man', 'the red thing', etc. What *is* common to all such expressions is the intention of the speaker to single out however crudely (e.g. 'the whachamacallit') the unique object, or set of objects, about which da has something to say. That such expressions *use* predicates is apparently misleading, for they do not use them predicatively; any more than names used vocatively actually name. On the view taken in this book, no claim whatever is made by a description. What is signified by the use of one is (among other things) the speaker's readiness to help the listener locate the unique object about which da has something to say. We may say that this *implies* that da believes that such objects exist, but this is a different matter. No one may be accused of claiming everything that da's words imply. There is more on this in *Loglan 2*, Chapter 8 (Brown 1969b, reprinted in *TL2*:31-41).

9 Marking a string of words with a leading asterisk (*) in this way will serve hereafter to notify the reader that the string so marked is not acceptable, either not a correct parse, or not grammatical, or not good usage. This one is grammatical, i.e., the utterance will parse; but it will not parse in this way.

10 This intimate glimpse of the machine's rather fussy parsing behavior is probably nothing that human users of the language need to worry about...unless they aspire to be Loglan grammarians. We frankly doubt that descriptions like that in (8) will have much currency in human Loglan. It is, after all, an exception to the general analogical rule that "Whatever works in one context should work in another." The converse rule "Whatever doesn't work in one context is probably not worth trying in others" is probably also built into human grammar learning behavior. So unless we are *taught* by machines to make sentences like (8) it is unlikely that human users will ever try to make them...knowing, as they surely will, that sentences intended to parse like (7') always fail. Analogical rules like the one defeated here may, in fact, be quite generally invoked in human grammar learning. If they are, they are probably responsible for a great deal of the syntactic ambiguity in natural language. Scott W. Layson is responsible for this particular bit of grammar programming. It was done during the first, 1978-82 assault on the "macgrammatical mountain", the one that resulted in *Notebook 1* (Brown 1982a). Its purpose was to make these unambiguous sentences machine intelligible...whether humans would ever be tempted to use them or not. An interesting scientific question raised by this particular provision of Loglan grammar is whether the analogical rule by which the use of new grammatical structures is extended from one context to another--sometimes leaving a trail of new ambiguities in its wake--is hard-wired in the human central nervous system or not? With Loglan, language scientists should be able to tease answers to such important questions out.

11 This discussion of the mass term owes much to Quine (1960) in which he makes ingenious use of the distinction between mass terms and general terms in discussing certain philosophical difficulties in the way of coming to understand totally unknown languages. In particular, Quine examines the difficulty that will be experienced by a philosophically wary investigator--one who has presented a series of different rabbits, say, to a certain informant--in deciding whether that informant's uniform linguistic response to this series of stimuli means that da's language has a general term for 'rabbit', of which da recognized each new rabbit as an instance, or whether da's language has only a mass term, roughly equivalent to 'Mr. Rabbit', say, of the designatum of which da recognizes in each presentation simply a reappearance. Quine shows that the resolution of this difficulty involves linguistic transformations of a surprisingly high logical order; and that

these, in turn, involve ontological assumptions about the language in question which one would have hoped to be among the findings, rather than the presuppositions, of linguistic inquiry. My own reflections on this matter persuade me that in the mass term/general term distinction we are probably dealing with a fundamental biological feature of the human speech apparatus...differently exploited in learning different languages, to be sure, but always there. For example, my own observations of the speech behavior of very young (pre-English speaking) children suggests that the mass term may be developmentally the earliest semantic mechanism to appear in human speech behavior--far earlier, for example, than the mastery of the detailed use of mass terms as a special class of nouns in English--and that it is, therefore, the meaning of the *general* term that is ontogenetically secondary in the biological development of the human semantic scheme. Goodman (1951) also discusses the "arbitrary" ways in which the primitive predicate may be invested with meaning under a wide variety of ontological schemes. On this view, the basic semantic mechanism of Loglan could have been a Trobriand-style 'X is a manifestation of Mr. Y.' type of predicate relation rather than the, to us, "simpler" semantic relation between designations of particular concrete individuals and some general term ('X is an instance of Y'). The same considerations apply to the difference between "abstract" and "concrete" predicate meanings. Thus we could have invested the unadorned Loglan predicate with the abstract meaning that is in fact its meaning now with **po** and **pu**. The concrete particular meaning we now hold simple would in that case be derived from some grammatically complex operation on the linguistically "simpler" notion of an event or quality. Such hypothetical languages are fascinating to contemplate; but the choice among them may be more than a pragmatic one, and actually turn out to be partly rooted in some intractable streak of Nature that, by evolving us to do so, "insists" that we first regard her from some particular, favored side. For the mechanism of that "insistence" could, of course, only be the evolution of the rewarding apparatus in language-using animals so as to favor just that side. There is more on the **lo** operator and its ontological implications in Brown (1977a).

12 Strong quotation began with J.S. Prothero's (1979) suggestion and was further developed by me in Brown (1979g).

13 The designative use of quotation marks in English should not be confused with their use to serve notice on the reader that certain words or phrases are being used non-literally, i.e., "horror" quotes, as they are sometimes called. Thus, a pair of horror quotes (double-quotes in my idiolect) appears around the word 'horror' in the preceding sentence, while a genuinely designative use of (single) quotes appears around the same word in this one. To perform the notice-serving function of quotation marks in English, there is another operator, namely the metaphorizer **jo**, which has the function of marking figurative expressions, especially on the first occasion of their use in some passage or discourse; for more on **jo** and kin, see *Loglan 6*.

14 Single word quotation with **liu** was proposed by William Mengarini in (1977c). See Brown (1979f) for further development.

15 The appeal of nonsense to logicians is curiously widespread and in some cases monumental (for example, in Lewis Carroll). The affinity is not accidental. It is often nonsense that reveals the logical structure of ideas most nakedly. One test of a logical language, then, is that in it one should be able to speak nonsensically and still be understood. Thus if I want to *say* that John is a

short word I do not wish the blind forces of "common sense" and "usage" to defeat me whichever way I turn this phrase.

16 These French quotation-marks have the advantage over the English ones of being clearly directional. As this is a useful feature in analyzing quotations within quotations, I have adopted them. Note that **li** and **lu**, being distinct words, are also "directional".

17 Or at least they are in all languages of which we know; but see Note 11, above, for considerations which argue the logical possibility of languages in which such abstract mass individuals are the elementary objects of the linguistic scheme, and hence elementary to just such hypothetical "minds" as had been exclusively exposed to such languages. Whether *human* minds would react in this way to such exposure is, of course, a biological question of some interest.

18 Quine (1958) offers an interesting conjecture as to how abstract singular terms might originate by analogy with concrete ones as a solution to one of the ontological problems of the child. Supposing (as seems likely) that children commence their linguistic careers with an ontology, i.e., a view of existence, which sees the world as composed of mass individuals and their reappearances (Mummy, Hunger, Warmth, and the like), and graduate to countable objects and general terms (boys, dogs, glasses of water, and the like); there would then emerge the ontological problem of what kind of individuals "stand behind" those general terms which have spotty, streaky or superficial manifestations, like 'is red'. For a red thing is not red clean through, as a boy is a boy clean through and as every drop of water is wet. Quine suggests, therefore, that on analogy with some word like 'water', which survives ontologically as the mass individual Mr. Water lurking behind the predicate 'is water', a new individual Mr. Red is mistakenly conjured up to be the simple, concrete massification of the predicate 'is red'. Mistakenly, because in fact the mass individual composed of all red things is *not* all red, as water is all water, but mostly white (apples), pink (Injuns), green (plums), and so on; and of course the child knows this. So what the child really means to designate by the mass term 'red', in such sentences as 'Red is my favorite color', is not the same kind of mass individual da alludes to in 'Water is my favorite drink.' Instead, it is the *abstract* mass individual composed of all the red parts, spots, or streaks of red by virtue of which red things are red, the same individual we designate in Loglan with **lopu redro**. Hence attributes arise on the basis of a false analogy; and red becomes as "pure" and "liquid" a thing as water is, though oddly less substantial, by virtue of the shifting ontological scenery in the child's mind.

19 Another clarifying provision is the pause rule that distinguishes the compound operator **lepo** and kin from the corresponding phrases **le po** and kin with which they might sometimes be confused. **Le po** phrases are rare but when they do occur are always distinguished by internal pauses which **lepo** and kin never show. For example, the phrase **le po** in (i) **le po sucmi ditca** = 'the swimming teacher (i.e., a teacher of the activity of swimming)' is always pronounced with a pause between the **le** and the **po**, and, in addition, the **le** is often stressed. Thus /LE.poSUCmiDITca/ is a typical utterance of (i). In contrast, both syllables of the word **lepo** are usually unstressed and there is never a pause between them. The utterance /lepoSUCmiDITca/ therefore uniquely resolves as (ii) **lepo sucmi ditca** = '(the state of) being a swim(mer) teacher, i.e., a teacher of swimmers', which is a much more common way of speaking in Loglan. Expressions like (i) are said to involve *short-scope po*, for in them, the force of abstraction

extends over exactly one predicate, the next predicate word. Expressions like (ii) are said to involve *long-scope -po*, for in them the force of the abstraction runs over the entire sentence serving as the operand of the event description. When short-scope **po** occurs non-initially in a predicate string, as in (iii) **le corta po sucmi ditca** = 'The short swimming-event teacher' (i.e. a teacher of swimming-events of short duration), no pause is required: /leCORtapoSUCmiDITca/. It is only when short-scope **po** follows a descriptor that it needs to be set off from that descriptor by an intervening pause. Other stress patterns than those described here are, of course, quite permissible.

20 This move may have some bearing on the phenomenon that Quine calls "referential opacity" (1961b:139ff). For example, when recast with a Loglan-like event-description the troublesome sentence 'Philip believes that the capital of Honduras is in Nicaragua' (p.141) becomes 'Philip believes that the state of affairs of the capital of Honduras being in Nicaragua obtains.' This second formulation relieves Philip of the responsibility of ever having listened to, or uttered, such a remark, and yet clearly designates the non-existent object in which Philip believes. How different this is from a third formulation: 'Philip believes that the sentence 'The capital of Honduras is in Nicaragua' is true.'! About this third sentence, we should certainly agree with Quine that its deduction from 'Philip believes that the sentence 'Tegucigalpa is in Nicaragua' is true' and the true identity 'Tegucigalpa is the capital of Honduras' is not justified. But contexts within quotation marks are always and everywhere referentially opaque. But are descriptions always similarly opaque? Clearly not. For 'the village ten miles north of Tegucigalpa' and 'the village ten miles north of the capital of Honduras' both succeed, for a person in possession of this identity, in designating the same presumably existent thing. The difficulty that is residual in Philip's believing in the object we have designated 'the state of affairs of the capital of Honduras being in Nicaragua' is that it is non-existent; and how indeed do we locate such objects for the sake of testing the truth of sentences in which their designations occur? This is, of course another and a quite different problem; but certainly it is not incapable of solution. For how *do* we determine whether or not Philip believes in the flatness of the Earth, or in the flights of Pegasus? We ask him; and in doing so we do not have first to locate a flat Earth or a winged horse to present to him; for a picture or a model, or even a carefully constructed sentence delineating this non-existent thing, will clearly do for ascertaining the truth or falsity of any claim that da believes in it.

21 For humans. The **ga**-rule is not awkward for machines. The machine grammar sees **ga** as just another allolex of the PA Lexeme. Machines will observe that human speakers evidently use it when they have no particular time or place or mode in mind but want to mark their predicate expressions anyway. (The motive of the mark-using speaker may remain unknown to the machine.) The machine would not regard the use of **ga** when contextually unnecessary as ungrammatical, or even odd. Thus, ***Da ga mrenu** is a perfectly grammatical expression to the machine. (If you have LIP--the "Loglan Interactive Parser"--try it. It will parse. But I have starred it because it is bad usage...from the point of view of human users of the language.) That in fact human speakers, being sensitive to such matters, do not produce such unnecessarily marked sentences is a distributional matter, a matter of usage, not grammar. Machines may remain context-insensitive, in short, and still parse the productions of context-sensitive human beings. When our machines begin to speak Loglan back to us, we may of course *then* teach them whatever humanoid practices we wish them to observe. When we do that, we will perform be

teaching them a kind of context-sensitivity. For in a certain sense all usages are context-sensitive in that they are selected by the user as appropriate to the contexts in which they are to appear.

22 The noun/verb distinction does this work in English, as in all the Indo-European languages. Thus the distinction made with various English suffixes between the description 'the man singer' and the sentence 'The man sings' is made in Loglan by the presence or absence of the predicate marker **ga**: **Le mrenu gritu** vs. **Le mrenu ga gritu**. From this and similar experiments it emerges that the chief syntactical work of the noun-verb and adjective-verb distinctions in the natural languages may be to distinguish the predicative from the designative parts of sentences. The PA operators and the LE and NI operators do this work in Loglan, and, as in **Da preda**, they may be omitted when no ambiguity can arise.

23 See Brown (1977a) for an informal discussion of the ontology of the **lo**-operator.

24 Technically, we might say that the description 'my book' uses the vague claim that there exists a two-place, or higher order, predicate **P** such that I and my book are apparently related by **P**, in the same non-committal way that it uses the explicit claim that my book is apparently a book. Thus the listener is helped to locate my book by a conjunction of two presumable predicate relations: one vague but with a specified second argument, the other concrete but unspecified.

25 Work on the special designators may be found in Darwin (1978a), Rosenberger (1978) and Brown (1979c,d).

26 One counts in Loglan either by separating the integers by the continuation connective **I** (see [Section 5.1](#)), as **Ne. I to. I te** (/NE.iTO.iTE/) means literally 'One. And two. And three' or by pausing between the quantifiers: **ne, to, te** (/ne.to.te/). So the word **netote** cannot be heard, as English 'one-two-three' might, as a short burst of counting instead of the integer '123'.

27 There is more on the quantification privileges of various kinds of descriptions in Rosenberger (1978) and Brown (1979c).

28 Indefinite description has had a checkered history in Loglan. The first widely published account of the language, the 1960 *Scientific American* article (Brown 1960), included a provision for speaking universals and existentials by indefinite description much as is here described. But six years later this option had already been removed from the language. It had been replaced in Brown (1966), the first book on the language and the 1st Edition of this one, by the requirement that the quantificational machinery of modern logic *always* be used. The latter option had been present in 1960 but was not obligatory. So, as early as 1966, expressions such as **Ra humni ga razdou** had been outlawed and were to be replaced by expressions like **Raba humni, noa razdou** ('Every something x is human only if it reasons'). (The latter sentence is still good Loglan and its construction will be explained in [Section 4.30](#).) Indefinite description reappeared after a 21-year absence in *Notebook 3* (Brown 1987). My reasons for reinstalling it were three-fold: (1) Learners whose native languages include indefinite articles used the corresponding Loglan words (**su** and **ne**) in indefinite descriptions anyway, whether it was "grammatical" for them to do so or not. (2) Translating natural language texts that contained indefinite articles into a style of Loglan that eschewed them often imposed an alien formality on those texts. Without

indefinite description, the translator had to render all instances of existential and universal claims by the heavily logical-ized Loglan forms. For example, *da* would have to replace every genuinely existential 'a' in an English text with a **ba jio**-clause ('something x which is a...') and every 'all' with **raba...noa** ('every something x is...only if...'). Such a requirement, if adhered to, would certainly mar Loglan's performance as a translation instrument. But (3) quite the most important consideration was the fact that Loglan had become, since 1975, a language of optionalities. It is fair to say that Loglan is now not so much a *logical* language as one in which the *option* of "talking logic" elegantly and swiftly is available to the speaker should *da* wish to use it. Moreover, logicity-alogicity is not the only pair of stylistic choices now built into the language. There has always been the optionality of its tense system, for example; and there are now optional case tags. Yet the existence of a system of case-tags (which may be found in [Section 4.31](#)) in no way interferes with the basic caselessness of the unadorned Loglan argument. This, like the equally basic tenselessness of its unadorned predicates, remains as it was before the case option was added. I believe (but cannot of course yet know) that the logicity function will be similarly unimpaired by the side-by-side existence of pre-logical linguistic forms. Besides, each option-pair is, in effect, a provision for running a natural experiment. The existence of the fully logicalized but nevertheless speakable **ba** and **raba** forms alongside the evolutionarily older, and hence more natural, **su** and **ra** forms will provide for just one more such experiment, in this case a vital one for the Whorf hypothesis. Does the use in speech of logicalized verbal forms, like the predicate calculus, facilitate the thinking of the speakers? Or hinder it? Who chooses to use these logical devices? Under what circumstances? We would like to know. With a fully optionalized experimental language such as Loglan now is, it ought to be possible to find out.

29 The use of the syllable /ra/ as the quantifier word meaning 'all' and also as the numerical suffix meaning '-some' or '-ad' may seem to introduce homonyms into the language. But the grammar is so arranged that these two uses of the same syllable will never be confused. For example, the word **ra** can never follow a number word; so if /ra/ is heard after a number word it is not the word **ra** but the suffix **-ra** one is hearing. Semantically, the two uses of /ra/ are related. The cardinal number of a set is found by counting *all* its members.

30 Alternatively this could be said by first making the complex predicate **fergalno** from **fe + r + galno**; whence **Ta fergalno veslo** = 'That's a five-gallon container.' Loglanists have not yet faced such situations frequently enough to have developed distinct preferences for one form over another.

31 Again the quantifier **ri** meaning 'several' and the ordinal suffix **-ri** have non-overlapping distributions, and so will never be confused.

32 This is true of the broad group of languages of which I and my manuscript readers know. But I would be most grateful if a reader who knows of one which uses this order would apprise me.

33 The system of measurement statements described in this section was, in all essentials, proposed by Scott W. Layson in (1979). See also Brown (1980c) for additional development.

34 **Lae** and **sae** were proposed by William Mengarini in (1976) and further discussed by John Parks-Clifford in (1980b:48-50).

35 **Me** was invented in early 1978 during the stay at The Institute of Scott W. Layson. It was he who coined the figure that there had been "a **me**-shaped hole in the language". **Me** was first described in **TL2**:114 in February 1978 and further discussed by Parks-Clifford (1980b:20-21).

36 Note that **Ba pa ditka mi lemi barma** ('Something bit me on my arm') makes the same claim completely as the incomplete form **Mi pa nu ditka** ('I was bitten') makes, and that this last statement contains no reference to the biter at all. But in fact all incomplete forms of multiplace positive predicates implicitly claim the existence of at least one whole set of participants in the predicated relationship even though some of them remain unmentioned. Thus **Mi vedma** ('I sell') is, strictly speaking, an abbreviation of **Mi vedma ba be bo** ('I sell something to someone for something') and may be so expanded when desired. Sentences with *negative* predicates, on the other hand, require universally quantified non-designating variables for their completion; see Note 37 below. Thus **Mi no vedma** becomes **Mi no vedma raba rabe rabo** ('I do not sell anything to anyone at any price'); see [Section 5.25](#) on negative sentences for further discussion of this point.

37 The logician will miss the existential quantifier in these expressions. In the language of logicians (1) would normally be rendered '(Ex)Fxy', in which '(Ex)' is the existential quantifier and may be read 'There is an x such that'; (2) by '(Ex)(Ey)Fxy'; and so on; for example as in the notation of Quine (1961). If we really are to "talk symbolic logic" in speaking Loglan, why not follow this well-established linguistic route? But Loglan is a spoken language, not a notation meant for visual inspection, nor yet a way of reading notational expressions aloud; for surely this is the origin of the logician's version of spoken English. In every spoken language the most frequently used expressions have the briefest forms, and the existential claim is surely one of the most frequently used devices in the natural languages...more frequent, for example, than universals. We should expect this rule to hold in Loglan, too. Therefore we set aside a series of "non-designating" variables to be used exclusively with quantified sentences in Loglan and say that any unquantified instance of such a variable implicitly expresses the existential claim, while any instance of such a variable preceded by the quantifier **ra** ('all') implicitly expresses the universal claim; there is more on the Loglan system of implicit quantification in [Section 5.24](#) on quantified sentences.

38 Logicians, but not other people, are likely to feel that this sentence requires explicit mention of an existential quantifier with sentence-long scope, as in schema (i) '(Ex)(Fx · Gx)', in order to distinguish it from the two short-scope quantifiers of schema (ii) '(Ex)Fx · (Ex)Gx'. For if it were an instance of (ii) as ordinarily interpreted by logicians--say by Quine (1961)--then the discovery that there was something x that was a man and something else x that came would satisfy the claim of (7) in a way that is plainly contrary to our intention. But we construe (7) in such a way that it does not require this embellishment; for recurring instances of any given non-designating variable in the same Loglan sentence are all taken to refer to the same indefinite someone or something. Thus **ba** implicitly recurs in (7), for (7) may be expanded into the connected sentence (7a) **Ba mrenu, ice ba pa kamla** (literally, 'x is a man; and x came') by means of the sentence connective **ice** which we have not come to yet (see [Section 5.23](#) on connected sentences); but the

two instances of **ba** which occur in it may *not* be interpreted as referring to different objects. If we want to make the distinction in Loglan which is imputed to the difference between schemata (i) and (ii) in contemporary logic, we must use different variables: (7b) **Ba mrenu ice be pa kamlā** (literally 'x is a man and y came'). The Loglan convention here is that while **ba** and **be** do not have to be distinct somethings, they may be. Again note that it is the more interesting of the two claims (7a) and (7b) that can be more briefly said in Loglan. We should also note that these arrangements necessitate some changes in the schematization of logical law as applied to Loglan; thus, for Loglan sentences, schemata (i) and (ii) are equivalent, and a third schema (iii) '(Ex)Fx · (Ey)Gy' would have to be introduced to accommodate their former difference. As far as I know, the other adjustments are equally harmless; but the matter has not been studied exhaustively.

39 To see that the word 'man' in 'A man came' does make some kind of claim against the world--and is therefore not a designation--suppose that we found out, by exhaustive search, that only one thing came and that one thing was a woman. Would we not then regard our previous remark 'A man came' as false? This contrasts rather strikingly with the fate of '*The* man came' under the same circumstances; for in that case all we should care about would be whether the woman that came was in fact the person designated by the speaker whether camouflaged or not.

40 The very least that we should require of a designation is that it function, even if temporarily, as a name: that is, that there be exactly one thing or set of things about which the speaker is saying whatever da is saying and of which some portion of da's speech functions as a verifiable label. 'John came' says the speaker. 'Is this John?' we ask, working our way down the list of Johns. Somewhere, sometime the speaker must say yes; for there must be at least a quasi-John which satisfies da's intentions. For if there is not, da is not playing the two-handed game we have here called "designation" according to its rules. Now names, descriptions, and the free, demonstrative and personal variables all satisfy this strict behavioral criterion. Words like 'someone', however, do not. If we make the mistake of thinking that they do and ask of someone who says 'Someone came', 'Is this someone?' we may be told yes or no indiscriminately with every presentation; for everyone we present *is* someone and no one we present will be the intended someone the speaker "has in mind." In short, the speaker has made a zero-order designation: a most peculiar and powerful maneuver which enables da to predicate something of the world without committing daself to locating anything in it. That so fastidious an act should lurk behind every "universal" claim is one of the most curious and far-reaching discoveries of modern logic.

41 This explains why 'someone' and 'something' are among the favorite words of children. 'Someone broke it' gives nothing away. Closely related is the strange intransitive sense of such verbs as '(to) break' in such sentences as 'It broke', which is a kind of suppressed passive: 'It was broken by someone or something (and I'm not saying who or what).'

42 Again we assume that the implicit quantifier has sentence-long scope, i.e., that sentence (11) is an instance of schema (i) $(x)(Fx \rightarrow Gx)$ and not of schema (ii) $(x)Fx \rightarrow (x)Gx$, see Note 38 above. For the system of implicit quantification foreshadowed here, see [Section 5.24](#).

43 In 1975 Loglan the word **raba** was the phrase **ra ba**. In this it was like the phrase **le po**, one of whose senses also ascended to wordhood during this period while another retained the

meaning of a distinct two-word phrase. I do not yet know what causes some phrases to become words while other, even very common phrases do not. One is haunted by the evident histories of such natural words as 'nevertheless' and 'understand'. By what process do these strings of once-separable elements consolidate and become, to speakers of that language, single items in the speechflow? I have no idea what is happening here. But with Loglan, we will probably have a chance to observe this event fairly frequently. It has already occurred more than once.

44 The argument for preserving the logicity-alogicity option in Loglan is summarized in Note 28.

45 Such as **no...a...**, as in **Raba no mrenu, a mitro titci** ('Each something is a non-man or a meat-eater').

46 This is not an accident. Whenever a complete English predicate may be expressed with unmarked arguments, such as 'give' may be in '...gives... ..', we have adopted that order as the dictionary order of the places of the corresponding Loglan predicate. In these cases we have learned our lesson, as it were, about the behavior of unmarked arguments from this one natural language. The operative word, however, is 'complete'. Very few multiplace English predicates *can* be completely expressed without prepositions. So for these far more numerous cases, other considerations have been used to determine the dictionary order of the corresponding Loglan predicates; see Brown (1969b, Ch.9) reprinted in *TLI*:101-9.

47 Linguists will recognize in this tagging system a means of translating the sentences of *any* natural language into Loglan in unaltered order. By tagging them, the elements in the source sentence may be kept in their original order no matter what the order type of the source language is. For example, specimen (15) might translate a sentence from a VSO language ("Verb-Subject-Object"); specimen (13), a sentence from an SOV language; while specimen (10) is in fact a translation from our own SVO language. Loglan-normal word order is SVO as well, of course, because that order is the normal (unmarked) order in the languages spoken by 83% of Loglan's "source population", i.e., 83% of the speakers of the eight most populous languages of the world; see Brown (1969b), Ch.6, The Word-Order Problem, reprinted in *TLI*:54-61. Still, it is important to note that once again Loglan's pervasive optionality makes departure from these statistical norms quite easy. Loglan may be spoken in either of the other two standard word orders, VSO or SOV, if one chooses...in fact, in any of the three abnormal orders OVS, VOS and OSV (in which the object precedes the subject) as well. Again Loglan has made an important, and this time highly variable, feature of the natural languages plainly imitable; and it has done this without departing from our rule of keeping the weight of the disambiguation burden on the Loglan listener at precisely zero.

48 The Loglan case system was developed during the years 1984-87 and announced in Brown (1987). Developmental studies were performed during those years by a visiting Latinist, who wishes to remain anonymous, by my daughter, Jennifer Fuller Brown, and by myself. With optional cases we hope to be able to test Fillmore's (1968) theory on the naturalness of case, as well as to solve certain practical problems of everyday Loglan speech that have arisen since 1975...problems which in a small way tend to confirm Fillmore's theory. But obviously more systematic observations are required.

49 We predict that this will be true in Loglan as well. This is because the negative clause of the **noa**-sentence will have gone past by the time the infix **noa** (**no** + **a**) appears. So the listener must go back over the clause *da* has just heard as a positive one in order to re-understand it as negated. In **anoi**-sentences the clause to be negated still lies ahead when the **no**-bearing connective appears, so no back-parsing is required. This observation is due to John Parks-Clifford (personal communication).

50 I suspect that this is true in English as well. But as English usage alternates rather less decisively between what I am calling "marked" and "unmarked" connected forms, it is difficult to be sure what unmarked strings of English connectives mean.

51 The system of marked connectives described in this and earlier sections differs from the 1975 system in ways proposed by John Parks-Clifford in (1980:59-62).

52 It will probably be clear by this time that I am using the notion of sameness of claim in the logician's sense of having the same truth-values under all imaginable circumstances. Thus any given claim may be expressed in many ways; but however it is expressed, the truth-values of any pair of those ways will remain the same under any given set of circumstances, and this will be true of all of its expressions under all sets of circumstances. So construed, sameness of claim is obviously not the same as sameness of meaning; nor is it a condition that we yet know how to measure empirically. Unfortunately linguists have so far not developed behavioral criteria by which to assess either of these matters. So we are as yet confined to the analytic methods of philosophers if we are to talk about what a sentence claims at all. Most linguists, of course, choose the Draconian horn of this dilemma and banish the topic altogether. There is, however, no escaping the problem of what a sentence "claims" if we are to talk about what happens to meaning under the transformations generally called logical.

53 In fact they must be exported before any implicit quantifiers may be made explicit; see Sections 5.24 and 5.25 on quantified and negative sentences.

54 Sentences with non-designative arguments *may* be converted if and only if all such arguments are of the same type (all universal or all existential) and sign (all positive or all negative).

55 This is a special case of the "rule of reversal" given in [Section 5.25](#). By that rule, if a sentence contains no non-designating arguments, the signs of both the sentence and its predicate may be simultaneously reversed. Thus a positive sentence with a negative predicate may be transformed into a negative sentence with a positive predicate; and this is exportation.

Chapter 5

GRAMMAR 3: UTTERANCES

5.1 Utterances and Speeches

One of the ancient prejudices of grammarians is that grammar has to do with sentences, and that portions of speech that are not sentences are somehow not grammatical. While it may be true that some formal writing is composed entirely of sentences, speech is not. Greetings, questions, answers, commands, requests and replies bulk larger in the flow of actual speech than those neatly formed statements of fact or opinion that are the writer's stock-in-trade. Obviously, if Loglan is to be a spoken language, we must provide for the bits and pieces of ordinary speech as well as the more formal speech-forms with which ordinary grammar deals. Let us call these bits and pieces, whether they are sentences or not, the *utterances* of the language.

But the utterance is not the largest unit of speech. Some passages of speech--like reports, recipes or narrations--consist of strings of utterances each of which could have ended the message had the speaker chosen to stop there.

(1) I saw it there. It was under a tree. Joe was standing right next to it. I don't know what happened to it then.

In this report, there are three points at which the speaker could have stopped but didn't. In a certain sense, the report consists of a string of utterances each of which could have stood alone. Let us call such larger units of continued utterance *speeches*. A speech is not over until the speaker who is making it yields the floor, so to speak. On the other hand, what we are calling speeches might well be taken to correspond to what we mark off as paragraphs in writing. It is whatever occurs between the real starts and stops in either speech or writing.

Loglan is by design an isomorphic language. The forms of speech and writing must correspond to one another in sufficient detail so that the essential features of each can be generated from the other. So the first thing we require in the management of speeches is a sign by which to know where the constituent utterances in them end. We will sometimes need a sign to mark the end of the last (or only) utterance in a speech or paragraph, but usually we will not.

Every language has at least one end-of-utterance sign. English has several. The one it uses to mark the end of declarative sentences is a fall in pitch. The last syllable is also often lengthened or drawn-out, but is not necessarily louder. This pattern of tone and pace change is usually, but not always, followed by a pause before the speaker continues. If you speak speech (1) aloud you are very likely to hear all these signs in the neighborhoods of the words 'there.' 'tree.' 'it.' and 'then.' This is the most common of the English end-of-utterance signs. There are several others.

operator scope--the Loglan logic understander will treat this specimen as a single utterance. But the parser treats it as a pair.

Thus the complete story of the end-of-utterance sign in Loglan is that it is always [. ee] in speech and either ', i-' or '. I-' in text. That is all. No tone or pacing change is required, although any may be used.

There is just one more thing to consider. As hinted above, the '. I' sequence in Loglan text does not translate all English periods, but only those which occur *within* speeches. For example, it translates the first two periods in the English portion of speech (3) but not the third:

(3') Yes. I saw it there. However, it was under a tree.

There is no Loglan word that signals the end of a speech, or the point where a speech might be continued but is not. The speaker simply stops. Certainly the mark for continuation could not be used, and that is what **I** really is. When an utterance is over in spoken Loglan, silence reigns. Or another voice begins. In written Loglan, that silence or the start of that "other voice" is often signalled by a carriage return followed by an indentation, or by a carriage return alone, or by a pair of carriage returns (which amount to a skipped line), or by some other textual convention. When such end-of-speech-or-paragraph cues threaten to be ambiguous, or to take too much space, a cross-hatch (#) may be used. Thus the Loglan of (3) could be shown textually as:

(3") Ia. I mi pa vizka da va. I buo da pa nilca ne triccu#

/IA.imipaVIZkadaVA.iBUodapaNILcaneTRICu/

and the cross-hatch (the standard linguistic sign for silence) could then serve to concatenate speech into even larger units of language, say discourse, just as the period-plus-**I**-word concatenates utterances into speeches.

But notice that the cross-hatch does not stand for any spoken word or other sound in the speech-stream. It stands for silence, a voice-change, the end of a paragraph or message. Whether cross-hatches (or some other graphic sign) will gain currency as end-of-paragraph marks in written Loglan is difficult to predict. The important point is that Loglan speeches, whether composed of more than one utterance or not, are the natural units of both speech and writing, and therefore probably also of thought, and as such, their ends will be naturally known.

Logically, of course, the utterance concatenator **I** that forges utterances into speeches is just another version of the conjunction **e** ('and'). We might call it the *strong conjunction* that occurs between sentences as opposed to the *weak conjunction* that occurs within them. But apart from matters of scope the logical force of **I** is the same as that of **e**. For whoever uses **I** between the two utterances in a speech evidently means to utter both independently; and this, had da thought about it beforehand, is often what da could have said with **e** or **ice** or **ke...ki...** Thus **I** is logically the sign of an afterthought, of an essentially unplanned continuation of speech. One may, of course, change one's mind about the truth of what one has already said. But this is not usually the sense of **I**.

- (3) Ditca Be a teacher!
/DITca/

Both imperatives and sentences may of course be followed by one or more sutori (from Loglan **su + to + ri**) arguments:

- (4) Ditca lo numnsensi [noom-SEN-see] lo Teach mathematics (number-
friki science) to the Africans.
/DITcalonumSENSiloFRiki/
(5) La Djan, ditca lo numnsensi John is a teacher of mathematics
/laDJAN.DITcalonumSENSi/

As suggested, single-argument utterances like (2) are normally the answers to questions. For example, **Hu ditca numnsensi lo friki** = 'Who teaches mathematics to the Africans?' or **Hu merji la Selis** = 'Who is married to Sally?' The answer to either question might be **La Djan** = 'John.' Later in this chapter we will see how to make questions like these. But we already know how to make the answers.

Arguments spoken or written as utterances may also specify the topics of discussion or the titles of books. But notice that the latter are always answers to implied questions. **Hu nu perti levi bukcu** = 'What's this book about?' you ask yourself as you pick it up and look. (Literally, 'What is pertained to by this book?'). Or in better loglandical word-order, **Levi bukcu ga perti hu** = 'This book is about what?' One answer is the one you might see printed on its cover in a loglandian bookstore: **La mela Peloponesos po Dorja** = 'The Peloponnesian War.' Thus titles are almost always constructed as argument forms.

Utterances like (3) and (4), however, which commence with, or are composed only of, predicate expressions, are always imperatives: **Ditca** = 'Be a teacher!'; **Gudbi botci** = 'Be a good boy!'; **Gancu** = 'Be a winner!'...in short, 'Win!' In other words, imperatives in Loglan are nothing but sentences without first arguments. No inflection or other marking is required.

The fourth type of utterance are those treated by the parser as strings of separate utterances but by our logic understander as strings of *connected utterances*. The utterances connected may be sentences or imperatives. The connectives involved may be either keks--which may be used to connect utterances as well as utterances parts--or the weak type of **i**-word in which **i** itself is not capitalized and which is preceded by a comma-pause. For example,

- (6) Ditca da, icanoi tu djano da Teach it if you know it.
/DITcada.icanoituDJAnoda/

is logically a single utterance, a connected one in which the connectands could be separate utterances but aren't. In contrast,

- (7) Ditca da. Ikii [ee-KEE-ee] tu djano da Teach it. Clearly you know it.
/DITcada.iKIituDJAnoda/

In sum, there are four types of Loglan utterances: (1) sentences, (2) answers, (3) imperatives and (4) connected utterances. They are made out of five types of ingredients: (i) predicates, (ii) arguments, (iii) modifiers, (iv) connectors and (v) punctuators. We already know how to construct unmodified sentences, answers and imperatives. The rest of this chapter will be devoted to explaining the three things we do not know: (A) how modifiers are made and used; (B) how and when utterances need to be punctuated; and (C) how utterances may be connected to each other.

We commence with modification.

5.3 Three Kinds of Modification

There are three types of modifiers in Loglan, (a) *free modifiers* like **Ia**, which may be inserted at any point in a sentence, (b) *sentence modifiers* like **Vi** and **Na la Ven**, which may go nearly anywhere but which must be guarded grammatically from absorbing, or being absorbed by, other elements, and (c) *argument modifiers*, which may only follow arguments. To illustrate the difference between these three styles of modification, let us apply them to the same basic sentence:

- | | |
|--|-------------------------------------|
| (1) Ia da godzi la Pari's | Certainly X goes to Paris. |
| | /iadaGODzilapaRIS/ |
| (2) Na lo dotra da godzi la Pari's | In the winter X goes to Paris. |
| | /naloDOTradaGODzilapaRIS/ |
| (3) Da godzi la Pari's, ja sitci go nu cluva | X goes to Paris, which is a city |
| da | beloved by X. |
| | /daGODzilapaRIS.jaSITcigonuCLUvaDA/ |

The sense in which **ia** [yah] 'certainly' is grammatically "free" may be appreciated by noting that **ia** may go anywhere in its sentence--except, in fact, between **la** and **Pari's**, for nothing may come between a name operator and its name without becoming part of that name--without causing parsing difficulties. The word 'certainly' is similarly free to move about in English. On the other hand, as we do this we notice that the meanings of the resulting sentences subtly change: 'X, certainly, goes to Paris (not Y)' 'X goes, certainly, to Paris (doesn't live there)' 'X goes to Paris, certainly (not to Rome).' In short, attaching a free modifier to a particular element of a sentence calls our attention to that element. In a sense it emphasizes it by suggesting a contrast between this sentence and another like it in which just this element has been changed. So non-initial free modifiers highlight particular features of the host sentence. It is apparently only when free modifiers are initial, as in (1), that they modify the host sentence as a whole.

So much for free modification with little words like **ia**. The sentence modification that is going on in sentence (2) is quite different. Here, the whole sentence will be modified no matter where we put the modifying phrase **na lo dotra**. While these kinds of phrases may be placed nearly anywhere in their sentences, their contribution to the meanings of those sentences doesn't seem to change as they move. There seems to be no difference in the three claims that (i) in the winter X goes to Paris, (ii) X goes in the winter to Paris, and (iii) X goes to Paris in the winter. In all

event-descriptions. When they are event-descriptions, then what we are calling a sentence modifier in Loglan will seem in English grammar to be a subordinate clause.

From adverbial **na**, to preposition-like **na** in **na ti**, to conjunction-like **na** in **na lepo la Djan, pa kamla** ('when John came'), the Loglan relative operator seems to be the pillar of this construction. Earlier in this book we encountered two varieties of relative operators, although we didn't call them that then. These were the tense and location operators of Sections 3.6 and 3.7, of which **pa na fa** and **vi va vu** were the elementary instances. But there are many other kinds of relative operators. We call them all "relative" because they relate the main event predicated in a sentence to something else: to the time, place, or other circumstances of speech when the operator is being used as an "inflector" of the predicate, to other designated things or events in the case of modifying phrases or clauses.

To appreciate the semantic range of these sentence-modifying constructions let's consider the following quartet of them: **vi lo resra** = 'in restaurants', **kou tao** [koh-oo-tow] = 'because of that (alluded-to event)', **lia lo cinkau** [sheen-KAU-oo] = 'like a puppy', and **nia lepo da junti** = 'throughout X's youth'. Notice that no grammatical distinction is drawn between relative phrases and relative clauses in Loglan. Both are sentence modifiers formed by joining a relative operator to an argument...no matter how elaborate that argument is. This will lead, as we'll see, to a considerable simplification of the grammar of modification.

Let's now apply this quartet of modifiers to the following unmodified sentence: **Da pa clucea** [shloo-SHEIGH-ah] = 'X fell in love (lover-became).' First, in solo passages:

- | | |
|------------------------------------|--------------------------------------|
| (1) Da pa clucea vi lo resra | X fell in love in restaurants. |
| /dapacluCEaviloRESra/ | |
| (2) Da kou tao pa clucea | X because of that fell in love. |
| /dako,utaopacluCEa/ | |
| (3) Lia lo cinkau da pa clucea | Like a puppy X fell in love. |
| /lialocinKAudapacluCEa/ | |
| (4) Da pa clucea nia lepo da junti | X fell in love throughout X's youth. |
| /dapacluCEanialepadaJUNti/ | |

And then in concert:

- | | |
|---|--|
| (5) Da clucea kou tao vi lo resra, lia lo cinkau, nia lepo da junti | X fell in love because of that, in restaurants, like a puppy, throughout da's youth. |
| /dacluCEako,uTAOviloRESra.lialocinKAu.nialepadaJUNti/ | |

I've put commas between the modifying phrases in the English translation of (5) to indicate that none is to be interpreted as a local modifier. Such punctuating moves are not necessary in Loglan--although I've used two optional phrasing pauses in the long production of (5) to make it easier to read aloud--because the fact that each of these modifiers modifies the sentence as a

whole is unequivocally conveyed by the simple circumstance of their being unmarked. We will see in a later section how, if we want to say that it was a "restaurant like a puppy", we can do so...odd as that claim might be. But we must then mark the modifier **lia lo cinkau** with one of the **ja**-links of [Section 5.17](#) to turn it into a local modifier.² When we say that these modifiers modify "the sentence as a whole" we mean, of course, the sentence as modified by all its other modifiers.

If we were engaged in semantical analysis, we might well argue that speaking the modifiers of a given sentence in a different order would deposit the features of the speaker's image in the listener's mind in a different narrative sequence...much as a story-teller might describe the same scene differently on different occasions by mentioning its elements in a different order. Yet the *logical* claim of sentence (5) is independent of the order of its modifiers. Moreover, that claim, once it is finally made, is identical to the claim made by the conjunction of sentences (1) through (4). For while each of these shorter sentences tells only part of this complex story, they make serially the same set of partial claims as are made collectively in (5).

To see that all the partial claims of sentences (1)-(4) are indeed order-independent, and that they probably do add up to (5), let us arbitrarily rearrange the elements of claims (1)-(4), in particular let us speak them in the inverse order in which they appear in (5):

(6) Nia lepo da junti gu, lia lo cinkau, vi lo resra, kou tao, da pa clucea Throughout X's youth, like a puppy, in restaurants, because of that, X fell in love.

/nialepodaJUNtigu,lialocinKAu.viloRESra.ko,uTAO.dapacluCEa/

Note that, now that the **nia**-clause is no longer final, the punctuator **gu** is required to prevent the sentence inside its **lepo**-clause from acquiring **lia lo cinkau** and **vi lo resra** as *its* sentence modifiers. The three comma-pauses, however, are optional...designed to break up this long sentence into five breathgroups, so as to make it easier for the newcomer to read aloud, and perhaps also for the listener to understand.

Sentence (6) is perhaps a bit more difficult to understand than (5) because one has to wait so long to learn about the main event. But apart from that, it is clear that (6) is merely one of the many possible retellings of the curious story told by (5).

The most compact form of a sentence modifier is simply the relative operator itself. For example, **na**, **vi**, **kou**, **lia** and **nia**, all of which have been used prepositionally above, are also capable of functioning as adverbs...that is, used without their customary arguments. Some English words are also capable of playing this dual role. For example, one may say 'They are flying above the house' but also 'They are flying above.' In English the word 'above' may thus be used as both adverb and preposition. While this is only rarely true in English, it is true of all the Loglan relative operators. These are neither adverbs, prepositions, nor conjunctions but a class of multi-function words that may play without confusion any of these syntactic roles when called upon to do so.

When used alone in this elliptical fashion **na**, for example, means 'at this unmentioned time (usually assumed to be the time of speech)', or simply 'now'. By a similar ellipsis, **vi** alone may be taken to mean 'in this unmentioned place (but usually assumed to be the locality of speech)', or simply 'here'. Analogously, **kou** means 'because of this unmentioned cause (inferably the event just alluded to in speech, or the event of speech itself)', or simply 'consequently'. Similarly interpreted, **lia** means 'like this thing or event (that has just been alluded to in speech)', or simply 'similarly'. Finally, when **nia** is used as an adverb--and **nia** is the sign of the continuous present tense--it means 'throughout this event (usually one alluded to in speech)', or simply 'meanwhile'. And when we consider that some of these relative operators--in principle, as we are about to discover, all of them--may also be used to inflect predicates as well, as, for example, in **Da na sucmi** ('X is now swimming') and **Da vi farfu** ('X is here a father'), it is evident that Loglan gets quite a lot of syntactic mileage out of its relative operators.

In fact, it does. The lexeme to which all these very different kinds of words belong--called the PA Lexeme by the machine grammar--is one of the "portmanteaux" lexemes of Loglan. It contains a huge congeries of semantically unlike elements, yet all have the same grammar. It contains, for example, tense operators, location operators, modal operators, and causal operators, and the meanings of these have little in common except their "relativity". Yet the remarkable fact is that all of them can be handled by the same small set of grammar rules. This is emphatically not true of similar words in natural grammars. So a large simplification of Loglan grammar is achieved by pooling them together. In the end the learner will discover that the same rules handle them all. As a consequence, to learn where **pa** and kin may go in Loglan, is to learn not only where **vi** and kin go, but also where **kou** and **lia** and all their diverse kin go as well. And remarkably enough this will include the so-called "inflecting position" before the predicate.

Let us now take the mystery out of the inflecting role of the relative operator. Consider (i) **Da kou sucmi**. In contemporary Loglan usage, the claim of (i) does not differ substantially from that of (ii) **Da sucmi kou**, any more than **Da na sucmi** claims anything very different from **Da sucmi na**. In (ii) the causal relative **kou** is playing the role of an English adverb...a role which we seem to understand readily enough: 'X swims, consequently.' Hence (i) must mean something very like 'X is consequently a swimmer' in which the effective cause of the swimming--or of X's being a swimmer--is something which both speaker and listener may be assumed to be aware of...something current, perhaps, or recently alluded to, in this communication. Apparently the only, or at least the chief, difference between (i) and (ii) is syntactic and positional. In (i), **kou** is being used early in the sentence as an inflector, perhaps to mark the predicate off from some preceding description, and is therefore inferably forethoughtful. In (ii), **kou** comes along after the main statement of the sentence has been made, and so is being used afterthoughtfully, as it were, which is the very spirit of the adverbial construction. These are differences in meaning, alright, because they signify different things about the speaker and the speech situation. But it is a difference that seems to make no difference in the claim.

In short, the lesson to be learned in this section is that the Loglan relative operators--of which there are apparently four types: the temporal, the spatial, the modal, and the causal--are remarkably free, positionally. They are not quite "free modifiers" in the sense discussed earlier, for these, as we shall see, are even freer positionally than the sentence modifiers are. But the relative operators, as well as the phrases and clauses made with them, may be dropped into a

sentence at almost any point at which an argument may be used. Sentence modifiers are, in truth, quasi-arguments; for they specify those temporal, spatial, modal and causal features of events which may be mentioned in connection with nearly any predicate. That is, whatever happens in nature takes place in time, but also in space, and in some sort of causal nexus with other events as well. And if that happening also happens in the human world--as the events reported in human sentences nearly always do--it will be found to have been accomplished with some instrument, for some purpose, in some mode, and according to some rule.

Thus, each of the many relative operators of Loglan may be used in all three ways: (i) as a preposition to form sentence modifying phrases or clauses; (ii) as an adverb functioning as a free-floating sentence modifier; and (iii) as an inflector of the predicate, in which position it performs the occasionally important syntactic function of marking the main predicate of the sentence to be such. In English we are used to seeing only tense words--the so-called "auxiliary verbs"--in this essentially syntactical, predicate-marking role. In Loglan, spatial words like **vi** are also capable of playing it, as are, we now learn with some surprise, causal and modal words like **kou** and **lia**. As a result of our constant effort toward grammatical simplification, another large increase in the semantical domain of the language has apparently been obtained.

5.5 The Four Varieties of Relative Operators

Two varieties of relative operators are already familiar to us, namely the *tense operators* consisting of **na** and **kin**, which relate events in time, and the *location operators* consisting of **vi** and **kin**, which relate them in space. The two remaining categories of relative operators are the *causal operators*, which relate the event or relationship described by the main predicate to other events according to how the speaker thinks they are causally related, and the *modal operators*, which place the main event in what might be called the human matrix. They allow the speaker to explain how the predicated event is similar to other events, who it is for, how it was brought about, or with what tools, agents, methods or according to what rules. Less systematic than the causal relatives, we'll discuss the modals first.

5.6 Modal Operators **lia** and **Kin**

Like the case tags of [Section 4.31](#), the modal³ operators are all CVV-form words. Like them, too, each one is derived from a primitive predicate which serves as a clue to its meaning. At present there are but twelve of these modal words; they are shown in [Table 5.1](#). We expect that, as the number of native languages of loglanists increases, other modal notions will be added from time to time.

ciu	[shyoo]	(ciktu = equals)	as much as/as little as/to the same degree as...
coi	[shoy]	(tcori = authority)	according to rule/method/ authority...
dii	[dee-ee]	(dilri = represent)	for/on behalf of...
duo	[dwoh]	(durzo = do)	in manner/mode.../by method...

takna leda matma talked to X's mother.
/dapaTAKnadeliaAlepoledaFARfu.paTAKnaledaMATma/

Again, this is a phrasing pause.

It will repay us to take a moment to think about how the modals differ from the case tags of the BEU Lexeme described in [Section 4.31](#), for these are the objects with which they are most likely to be confused. In a certain sense, modal phrases may be used to extend the place-structure of nearly any predicate. So they may be thought of as "itinerant cases", cases which are permitted to visit nearly any predicate on their far-flung rounds. But just because such itinerant features may turn up nearly anywhere, they may never be distinctive features of any predicate. It is for this reason that modal features are never, or rarely, part of the dictionary definition of a predicate...any more than time and place features are. It is for this reason, too, that modal prepositions may never be omitted from their arguments, as a case tag may be thought to have been when the argument it might tag is unmarked and in standard order. This is because a speaker may not rely on even the most knowing listener correctly to infer the modality of an argument from its context, as *da* may rely on that same knowing listener to infer the non-itinerant features of a predicate, namely the roles played by the occupants of its standard arguments. Thus modality must always be explicitly marked by the use of modal prepositions as the cases of arguments need never be.

Loglanists are exploring the uses of modals as inflectors and adverbs. We expect adventurous speakers to make many interesting discoveries in these uncharted waters. With a little thought, almost any of these strange new usages may be sensibly interpreted. For example, what does **Da durzo de hea** mean? In other words, what is the adverbial sense of **hea**? Well; if you think about it, **hea** used non-inflectionally and without an argument must at the very least mean that X did Y with the help of someone else, that is, "helpedly". So **Da durzo de hea** must mean 'X does Y with help'. What about **hea** as an inflector? Reasoning analogically from, let us say, the sense of **pa** itself in these three positions--as a preposition **pa** means 'before (this designated time)', as an adverb 'before some undesignated time (presumably inferable from context)', and as an inflector 'before this particular time, namely the point of speech'--**Da hea durzo de** must mean that X's doing Y was helped by someone or something current, perhaps a person present at the time of speech. Could we translate it as 'X does Y with *your* help', you the listener? Extending the currency principle to another case, what does **Da sea durzo de** mean? As a preposition **sea** means 'instead of'. So I would assume that the specimen means that X did Y instead of someone or something else, someone or something which was in some sense present at the time of speech. Could it mean that X does Y instead of *your* doing Y? But note that the speaker, too, is present at the point of speech...but perhaps less interestingly so, since the speaker is always present. As I say, loglanists are now exploring this vast new domain of meanings that has been opened up by the development of a machine-readable grammar.

5.7 Causal Operators **kou moi rau soa** and **Kin**

There are sixteen causal operators in Loglan, and their full significance will not be appreciated until, in the last sections of this chapter, we study the closely-related causal connectives that have

The number of variations in some of these groups is small. There are only four salutations, for example. Some groups are middle-sized; there are about 20 discursives and 25 attitudinals. But others are essentially unlimited in number. Examples are the vocatives (any name may be one), the parenthetic comments (any utterance may be a parenthetic comment on another), and the utterance ordinals. These last, like any set of numerically-based words, are in principle infinite in number.

As mentioned earlier, a free modifier is always assumed to modify the word it immediately follows or, if initial, the whole utterance which it thus precedes. This will be illustrated in the sections that follow.

5.9 Salutations and Other Expressions of Direct Address

These are among the most primitive utterance forms of any language. With them one calls a listener's attention, singles out the person one wishes to talk to, or expresses the formal sentiments of gratitude, welcome, greeting or farewell. Sometimes these modifiers are collectively called *vocatives*, which is nothing more than Latin for "calls".

There are five special words of direct address in Loglan. These are **Loi** [loy] which means 'Hello'; **Loa** [loh-ah] which means 'Goodbye'; **Sia** [syah] which means 'Thanks'; **Siu** [syoo] which means 'You're welcome'; and the general attention-caller **Hoi** [hoy] which, when used alone, has a sense rather like English 'Hey!' or the nautical shout 'Ahoy!', and, when used to introduce a phrase, turns that phrase into a vocative.

In addition, every name word of the language may be used as a call. Thus **Djan**, **Frans**, **Far** and **Lun** [jahn frahns fahr loon] ('John', 'France', 'Dad' and 'Moon'), when used without the name-operator **la**, serve as simple calls.

Finally, any predicate expression whatever may be preceded by **Hoi**, and this move forms an address of any length whatever...in much the same way that the same kinds of expressions may be capitalized and used with **la** to form formal names. For example, on the pattern of the name **la Ganbra Matma** ('Noble Mother'), one may form the call **Hoi Ganbra Matma** ('O Noble Mother'), which affords a much more formal way of addressing one's female parent than shouting **Mat**. Similarly, **Hoi Ganfua go Redro Nu Herfa** means 'O Lady with the Red Hair' and also has all the requirements of formal address.⁴

Any call may be used alone:

- | | |
|---------------|------------|
| (1) Djan | John! |
| (2) Hoi Brudi | O Brother! |

So may any salutation:

- | | |
|---------|-----------------|
| (3) Loi | Hello! |
| (4) Siu | You're welcome! |

Any call may be used with any salutation, and in either order:

- | | |
|----------------|--------------------|
| (5) Frans, sia | France, thank you! |
| | /frans.SIA/ |
| (6) Loa, Lun | Goodbye, Moon! |
| | /LOa.LUN/ |

Any of these expressions may be used as an embellishment of any utterance in almost any position. Thus an address may be used to preface an imperative, as in

- | | |
|-----------------|--------------|
| (7) Djan, godzi | John, go! |
| | /DJAN.GODzi/ |

or to follow one:

- | | |
|-----------------|--------------|
| (8) Godzi, Djan | Go, John! |
| | /GODzi.DJAN/ |

or to direct different parts of a message to different listeners:

- | | |
|---------------------------------|---------------------------------|
| (9) Plizo ti, Djan, e ta, Meris | Use this, John, and that, Mary. |
| | /PLIzoTI.DJAN.eTA.MERis/ |

or to adorn declarative sentences with definite addresses:

- | | |
|-------------------------------|----------------------|
| (10) Meris, la Djan, pa godzi | Mary, John went. |
| | /MERis.laDJAN.GODzi/ |

and to do this either forethoughtfully, as above, or afterthoughtfully as below:

- | | |
|-------------------------------|------------------------|
| (11) La Djan, pa godzi, Meris | John went, Mary. |
| | /laDJAN.paGODzi.MERis/ |

Only two words in the above utterances were allowed to precede names pauselessly. These were **la** and **Hoi**. In fact these are the only two words with that privilege in Loglan. Any other word must be separated from a following name by a pause. This includes other names. Thus non-final names in a string of names must always be followed by pauses. In other words, /djanpolDJONZ/ will be heard in Loglan as the single name **Djanpoldjo'nz**, and not, as one had hoped, as **Djan Pol Djonz**. One is, in Loglandia, either **Tam Braon** or **Tambrao'n** depending on how one's callers speak one's name.

Suppose, given all these constraints, one wanted to insert a vocatively used name at a point in an utterance where a designatively used one has just occurred. Suppose, for example, one wanted to translate 'Go to Mary, John' literally into Loglan. Naively executed that intention would produce

(1) Ia mi ditca	Certainly I am a teacher. /IAmiDITca/
(2) Mi ia ditca	I, certainly, am a teacher. /MIiaDITca/
(3) Mi ditca ia	I am a <i>teacher</i> certainly., /miDITcaIA/
(4) Mi ia no ditca	I, certainly, am not a teacher. /MIianoDITca/
(5) Mi no ia ditca	I am <i>not</i> , certainly, a teacher (I am certainly not a teacher). /miNOiaDITca/

We have put **ia** through its paces. Now let's look at the other indicators.

The twenty-two attitude indicators of Loglan are grouped into several distinct series. There is (i) the *conviction* series, of which **ia** is the head; (ii) the *intention* series of which **ai** ('I will') is the head; (iii) the *obligation* series, of which **oa** ('must') is the head; (iv) the *request* series of which **ei** ('Is that so?') is the head; and finally what we may call (v) the *emotive* series of which **ua** (expressing satisfaction) is an example. Let us consider these five series one at a time.

Degrees of conviction may be expressed in Loglan with the following series of indicators:

- ia** [yah] Yes/I agree/I agree that...is true.
- io** [yoh] Probably/I think that...is true.
- ii** [yee] Perhaps/Maybe/It is possible that...is true.
- iu** [yoo] Who knows/I don't know/I don't know whether... is true.

Three negative forms are also possible, namely **no ia** ('I disagree'), **no io** [noh-yoh] (I think not) and **no ii** [noh-yee] ('Perhaps not'). Thus seven distinct expressions comprise the conviction scale in Loglan.⁵

Degrees of obligation are similarly expressed:

- oa** [oh-ah] I (or you) must do.../bring...about.
- oe** [oh-eh] I (or you) should do.../bring...about.
- oi** [oy] I (or you) may do.../bring...about.
- ou** [oh-oo] It doesn't matter whether I (or you) do...or not.

Again there are three negatives: **no oa** [noh-OH-ah] ('must not do...'), **no oe** [noh-OH-eh] ('should not do...'), and **no oi** [NOH-oy] ('may fail to do...').

The word **ia**, we have said, means 'Yes.' But there are other kinds of affirmatives in Loglan. For example, the sense of 'Yes, you may' may be translated simply as Loglan **oi**. In addition there are several affirmatives which express willingness or consent. These belong to the intention series.

ai [igh] Yes, I will/I consent or intend to do.../to make...the case.

ao [ow] Yes, I wish to/I want or prefer to do.../that...is the case.

ae [ah-eh] Yes, I hope so/I hope to do.../that...is the case.

au [ah-oo] I don't care whether I do.../whether...is the case.

As usual we have three negatives: **no ai** [NOH-igh] ('I refuse/'I will not'), **no ao** [NOH-ow] ('I don't want to'), and **no ae** [noh-AH-eh] ('I hope not'). (Remember that [igh] is the value of these letters in 'sigh'...which is always the sound of Loglan /ai/.)

Note the formal parallels between the three series. Each has three positives, three negatives and a zero point which takes no negative. Thus zero conviction is ignorance ('Who knows?') and is expressed with **iu**; zero obligation is ethical indifference ('It doesn't matter') and is expressed with **ou**; and zero intention is another kind of indifference ('I don't care if I do or not') and is expressed with **au**. Thus there are, in effect, seven positions on each of these three "attitude scales," and the zero-point on each is marked by final **-u**.

Only one of these scales will present serious difficulties to the speaker of English: the intention scale. This scale proves troublesome to English-speakers because in Loglan, unlike English, any of the seven intentional expressions may be used with sentences which do *not* involve the speaker, as well as (more comfortably for us) those that do. Thus both

(6) No ai mi godzi la Romas I refuse to go to Rome.

/NOaimiGODzilaROmas

(7) No ai tu godzi la Romas I will see to it that you do not go
to Rome.

/NOaituGODzilaROmas/

are meaningful uses of **No ai** in Loglan. English forms like 'I insist that...', 'I refuse to permit you to...', 'I do not want you to...', and so on, are best treated in Loglan as intentional expressions and not as predications at all. They are therefore best translated by attitude indicators, and not by literal equivalents of the English words.

In fact, literal translation into Loglan is seldom the best choice where English expressions of attitude are involved. This applies to other kinds of attitudes as well as those of the intentional kind. For example, the sentence 'I believe the Earth is round' may occur with two quite different meanings in English. One involves an indication of moderate conviction (this is what 'I believe...' usually expresses in English):

(8) Io la Ter, bamfoa [bahm-FOH-ah] Probably the Earth is round (ball-
form).

(14) Ai la Ter, bamfoa

I intend that the Earth shall be round(!).

/AIlA TER.bamFOa/

Through it all, the roundness of the Earth persists. For the Earth's geometry is, of course, independent of all our hopes and fears and of nearly all but the most robust of our intentions. The logician's interest in all these sentences is substantially the same because the evidence that confirms or refutes **La Ter, bamfoa** is in every case the same.⁶ Only after we know what something claims can we make use of whatever information we may have about the speaker's attitude toward that claim. But knowledge of claims and information about attitudes interact in important ways. Thus the startling thing about (14) is not the strength of the speaker's attitude or the geometry of his claim, but the enormity of such a claim when accompanied by such an attitude. For with (14) we suddenly have a vision of a speaker levelling mountains in the interests of geometry, while in (11), (12) and (13) the same approximate truth mixed with other attitudes may be more placidly entertained.

Note that in Loglan these two components of meaning--traditionally called the "cognitive" and the "emotive" components⁷--may be clearly separated. Again, we suppose that this arrangement will perform some service for the thinker.

The next list of indicators forms a series of requests:

ei [ay] Oh?/Is that so?/Is it the case that...?

ea [eigh-ah] Let's/I suggest that we do.../make...the case.

eo [eigh-oh] Please/I request that...be the case.

eu [eigh-oo] Let...be.../Let's suppose/assume that...is the case.

Ei requests information about the truth of some matter:

(15) Ei la Djan, pa kamla

Did John come? (Literally, 'Is it true that John came?')

/eilaDJAN.paKAMla/

(16) Ei tu fa godzi

Are you going? (Is it true that you will go?)

/eitufaGODzi/

Ea requests some cooperative act from the listener:

(17) Ea mu godzi

Let's go.

/eAmuGODzi/

(18) Ea la Ter, bamfoa

Let's make the Earth round.

/eAlaTER.bamFOa/

Eo requests permission, and presupposes that the listener is in a position to give it:

Now, to answer her properly you must give her a replacement of **ha** that fits your case. If you want neither tea nor coffee, you will reply **Noenoi sia**, which is Loglan for 'Neither, thank you.' If you want tea but not coffee, **Enoi sia** ('And-not, thank you') will serve very well. If not tea but coffee, **Noe sia** ('Not-and, thank you' will signal that preference neatly. And if you want both, one or the other or both, one or the other but not both, one or the other or neither but not both, etc., etc., you would answer, **E sia**, **A sia**, **Onoi sia**, **Noenoi sia**, respectively, down the long list of logical possibilities which loglanists will tend to savor more than other people, perhaps.⁹

In sum, loglanists use **ie** when they want to know the identity of the designatum of some inadequate argument (**Ie da** = 'Which X?'), **he** when they want a predicate for an answer (**Da he** = 'X is/does what?' **Tu he** = 'How are you?'), **hu** when they want an argument for an answer (**Hu gritu** = 'Who sings?'), **ho** when they want a number for an answer (**Ho da** = 'How many X's?'), and **ha** when they want a connective for an answer (**Da ha de** = 'X is how connected to Y?').

The result is an utterly novel but very flexible system of interrogation that is capable of translating with great precision all the questions of natural language and a great many more besides. Questions like 'When?' and 'Why?' are still missing from our catalog. These will be supplied in the next section through the good offices of the argument interrogative **hu**.

5.12 Relative Interrogatives with -hu

The next group of words are free modifiers again, but also question-forming words. These are the *relative interrogatives* made by postfixing the suffix **-hu** to any of the relative operators described in [Section 5.5](#). This move produces words like **nahu** [nah-hoo] = **na** + **hu** = 'at' + 'what (time)?' or 'when?', **vihu** [vee-hoo] = **vi** + **hu** = 'in' + 'what (place)?' or 'where?', **kouhu** [koh-OO-hoo] = **kou** + **hu** = 'because of' + 'what (event)?' or 'why?' and all their diverse kin. Speaking one or more of these words in any sentence will turn it into a question. We are beginning to see why we do not use the question mark in Loglan text. Nor do we need, but of course may freely use, the rising tonal contour that is the sign of a question in many natural tongues. Utterances become questions in Loglan when they contain one or more interrogative words. So Loglan questions do not have to be marked by rising pitch in speech, nor by question-marks in text. A spoken word will have told the listener that it is a question da has heard.

The interrogative compounds made with **-hu** are, as mentioned, free modifiers. Unlike the relative operators on which they are based--**na**, **vi** and **kou**, for example--whose intricate grammatical work is strictly controlled by the grammar, the addition of the postfix **-hu** to these words apparently insulates them from all such problems. It makes them positionally free. What this means in practice is that they may be used anywhere in any sentence without fear of producing grammatical ambiguities.

This is an important principle. But what makes it true? Because **na**, for example--one of the many parents of these words--is open-ended to the right. **Na** may or may not take an argument. It may or may not be an inflector of a predicate, or a tense operator. That is to say, **na** may function as the sentence modifier **na**, which means 'now'; or it may function as the head of a modifying phrase like **na la Ven**, when it means 'at', 'during' or 'while'; or it may function as the inflector of a predicate expression, as in **Da na kicmu** = 'X is now a doctor.' Whether it is doing the one

thing or the other in any given case is found out by parsing the utterance in which it occurs. So these are matters which must be strictly controlled by the grammar in order to avoid syntactic ambiguities. Not so with **nahu**. The compound **nahu**--which is really a compacted phrase--is grammatically closed at both ends. That is, it can absorb nothing to its left and nothing to its right. Like English 'certainly' or 'however', it can get into no grammatical trouble. Therefore it is free to be used anywhere.

So all relative interrogatives--and there are in principle hundreds of them in Loglan--have exactly the same grammatical distribution as the Loglan vocatives and attitudinals. In fact, the grammar of these interrogatives is so simple they are all members of the UI Lexeme, a lexeme which takes its name from the happiest of the attitudinals. Like other free modifiers, the **hu**-interrogatives are taken to modify the whole utterance they precede when spoken initially. In this position they turn the utterance into a question that has no special interrogative emphasis on any of its parts:

- | | |
|--|---|
| (1) Nahu tu pa mercea la Pol | When did you get married
(married-become) to Paul? |
| | /NAhutupamerCEalaPOL/ |
| (2) Kouhu tu pa mercea la Pol | Why (from what external cause)
did you marry Paul? |
| | /koUhutupamerCEalaPOL/ |
| (3) Moihu tu pa mercea la Pol | Why (from what motive) did you
marry Paul? |
| | /MOIhutupamerCEalaPOL/ |
| (4) Rauhu [rah-OO-hoo] tu pa mercea la Pol | Why (for what reason) did you
marry Paul? |
| | /raUhutupamerCEalaPOL/ |

Obviously, there can be many varieties of why in Loglan. We will discover why that is so, and what kind of why that 'why' is, in the last sections of this chapter.

Let us now observe what happens when speakers choose to use one of these question-making words in a non-initial position. The result is still a question, but of a rather different kind:

- | | |
|-------------------------------|---|
| (5) Tu rauhu pa mercea la Pol | Why did <i>you</i> marry Paul?
(Literally, You-why married
Paul?) |
| | /TUraUgupamerCEalaPOL/ |

Table 5.3 The 27 Discursive Modifiers

Table 5.3 The 27 Discursive Modifiers			
bea	[beigh-ah]	(bleka = 'look')	For example/For instance (cf. piu)
biu	[byoo]	(blicu = 'possible')	Hence it is possible that
buo	[bwoo]	(bufpo = 'opposite')	However/In contrast/On the contrary
cea	[sheigh-ah]	(cenja = 'change')	That is/In other words

ceu	[sheigh-oo]	(clesi = 'without')	Anyway/In any case
cia	[shyah]	(clika = 'like')	Similarly/Like the foregoing
coa	[shoh-ah]	(corta = 'short')	In short/In sum/By way of summary
dau	[dah-oo]	(dakli = 'probable')	Hence it is probable that
dou	[doh-oo]	(donsu = 'give')	Given/By hypothesis/As assumed
fae	[fah-eh]	(fanve = 'reverse')	And vice versa (reverses the order of terms)
fao	[fow]	(fando = 'end')	Finally/In conclusion
feu	[feigh-oo]	(fekto = 'fact')	In fact/Actually/Indeed
gea	[geigh-ah]	(genza = 'again')	Again/I repeat
kuo	[kwoh]	(kusmo = 'custom')	Usually/Customarily
kuu	[kwoo]	(kumtu = 'common')	Generally/Generalizing from the above
nao	[now]	(Eng. 'Now')	Changing topics/(New paragraph)
nie	[nyeh]	(snire = 'near')	In detail/Looking closely
pae	[pah-eh]	(prase = 'continue')	And so forth/etc.
piu	[pyoo]	(plizo = 'use')	In particular/Applying the above (cf. bea)
rea	[reigh-ah]	(frena = 'in front')	Clearly/Obviously
saa	[SAH-ah]	(sapla = 'simple')	Loosely/Roughly/Simply speaking
sii	[SEE-ee]	(simci = 'seem')	Apparently/Evidently
sui	[swee]	(sumji = 'sum')	Also/Moreover/Besides/Furthermore/Too/In addition
taa	[TAH-ah]	(trana = 'turn')	In turn/In sequence
toe	[TOH-eh]	(to = 'two')	Respectively
vau	[vah-oo]	(valti = 'jump')	Skipping details
zou	[zoh-oo]	(dzoru = 'walk')	By the way/Incidentally

(6) Tu pa mercea rauhu la Pol Why did you *marry* Paul? (You married-why Paul?)

/tupamerCEaraUhulaPOL/

(7) Tu pa mercea la Pol, rauhu Why did you marry *Paul*? (You married Paul-why?)

/tupamerCEalaPOL.raUhu/

Any of the hundreds of relative interrogatives may be used in all these entertaining ways.

5.13 Discursive Modifiers

When a speaker wishes to call the listener's attention to some aspect of the flow of discourse, da uses one or more *discursive* modifiers. These are single Loglan words which function much as phrases like 'For example', 'In short', and 'And so forth' do in English. Generally Loglan speakers

use discursives to call attention to a comparison, contrast, or inference that may be drawn or found between the current sentence--the one in which the modifier resides--and certain foregoing portions of the discourse.

There are presently twenty-seven of these discursive words in Loglan; see [Table 5.3](#). They form an open class which may be added to at any time. All are CVV in form and all the current ones have been derived from primitive predicates selected to suggest their meanings.¹⁰

Like all free modifiers, discursives only modify the utterance as a whole when they are initial in it.

- | | |
|---------------------------|---|
| (1) Bea da ditca | For example, X is a teacher.
/beAdaDITca/ |
| (2) Buo de cirna | In contrast, Y is a student.
/buOdeCIRna/ |
| (3) Sui da turka le botsu | Moreover, X works on the boat.
/SUIdaTURkaleBOTsu/ |

This is their usual position. But non-initial positions in the utterance are also possible.

- | | |
|-----------------------------|---|
| (4) Da ditca bea | X teaches, for example (as an instance of a more general activity mentioned earlier).
/daDITcaBEa/ |
| (5) De buo cirna | Y, in contrast (to some X), is a student.
/deBUoCIRna/ |
| (6) Da turka leda gardi sui | X works on his garden, too (in addition to working on something else).
/daTURkaledaGARdiSUI/ |

But note this. Sentences (1)-(6) must be initial in their speeches else they would be marked with **I**. So from the absence of a resident **I**-word we know that these are either the first or the only utterances in their speeches. But it is the role of a discursive word to comment on foregoing portions of a discourse. Therefore the sutori (from Loglan **su + to + ri**) utterances in speeches are much more frequently adorned with discursives than speech-initiating utterances are. Moreover, when discursives are initial in sutori utterances they are often compounded with the continuation operator **I**:

- | | |
|---|---|
| (7) Ro le frasi ga smina turka. Ibea [ee-
BEIGH-ah] la Pi,e'r, ditca | Many of the French (people) are mental workers. For example, Pierre is a teacher.
/roleFRAsigaSMInaTURka.iBEalapiER.DITca/ |
|---|---|

Sometimes, as in this specimen, the initial letter of the enclosed remark is capitalized. In translating such spoken parentheses into written English, it is often just as appropriate to use a pair of dashes (--):

(1') Sally Jones--I loved her deeply--was a sister of my friend.

The choice between dashes and parentheses tends to be idiolectic in English, so the translator should follow da's own writing customs in this regard.

The parenthetic remark itself may be of any grammatical type whatever, and as simple or complex as the speaker or writer likes:

(2) La Selis Djonz, kie Mi djadou ei tu Sally Jones--I did tell you about
da, kiu pa some lemi fremi her?--was a sister of my friend.
/laSELis.DJONZ.kiemidjaDOu,eituDA.kiupaSORmelemiFREmi/

(3) La Selis Djonz, kie Ueuiua, kiu pa Sally Jones--Wow!--was a sister
some lemi fremi of my friend.
/laSELis.DJONZ.kie,ueUIua.kiupaSORmelemiFREmi/

Indeed any utterance or utterance string whatever may appear between parentheses.

When a parenthetic remark is initial it modifies, as usual, the entire utterance. So such a parenthetic comment at the head of a speech often has the effect of a label. For example, a playwright might choose to identify da's characters in this way:

(4) (La Hamlet) Lepo dzabi, onoi lepo no (Hamlet) To be, or not to be.
dzabi

Read aloud--as, for example, by the prompter--this would be:

(4') Kie La Hamlet, kiu Lepo dzabi, onoi lepo no dzabi
/kielaHAMlet.kiulepoDZAbi.onoilepoNO.DZAbi/

whereas the actor himself might read it:

(4'') Lepo dzabi, onoi lepo no dzabi
/lepoDZAbi.onoilepNO.DZAbi/

In Loglan text the parenthesizing words **kie** and **kiu**, together with any attendant commas, may of course always be replaced by their conventional symbols. Thus the biographer could write:

(5) Da pa morce (lopo tubherkulosi She died (tuberculosis) before her
[toob-hehr-koo-LOH-see]) pa leda twentieth year.
toniri nirne

and the reader would read aloud

/dapaMORce.kielopotubherkuLOsi.kiupaledatoNiriNIRne/

For as always, the written symbols '(' and ')' are pronounced like the words they replace.

5.15 Utterance Sequencers with **-fi**

This simple but, in principle, infinite category of words contains the last of the free modifiers and need not detain us long. Any quantifier, whether numerical or not--or any letter-variable, for that matter--may be postfixed with the suffix **-fi** to generate a compound little word, for example **Nefi** [NEH-fee] 'firstly' or 'primarily'. Such words may be used to remind the listener--or the speaker daself, for that matter-- of the position of some utterance, or some portion of an utterance, in some sequence of such elements in da's speech.

The quantifiers most frequently used as sequencers are, of course, the positive integers: **ne to te**, etc., giving **Nefi Tofi Tefi** [NEH-fee TOH-fee TEH-fee] 'firstly' 'secondly' 'thirdly', etc., as the sequencers. Often these words may be more simply translated as 'first' 'second' 'third', etc., or even as 'one' 'two' 'three'. Decimalized numbers may also be used, **Nepinefi Nepitofi** [neh-pee-NEH-fee neh-pee-TOH-fee], etc., as for the sections of this book. Alphabetic sequencers may also be used. They may be either Latin or Greek, or upper or lower case. For example, **Amafi Baifi Caifi** [AHM-mah-fee BIGH-fee SHIGH-fee], etc., illustrate the use of Latin capitals as utterance sequencers.

A common, but certainly not the only, position for these free modifiers is at the heads of the utterances they sequence. When this is the case the first sequencer is capitalized and the sutori ones are prefixed with the continuation connective **I-**, giving **Itofi Itefi Ifofi** [ee-TOH-fee ee-TEH-fee ee-FOH-fee], etc., as the markers of the sutori utterances in the sequence. This is exactly what happens to the discursives in these same positions ([Section 5.13](#)) and imparts a recipe-like structure to the speech:

- (1) Nefi, kutla le mitro su nera inca pisku First, cut the meat into some (at least one) one-inch pieces.
/NEfi.KUTlaleMITrosuNEraINcaPISku/
- (2) Itofi, jarklu [ZHAR-kloo] le palto And-second, slice (thin-cut) the potatoes.
/iTOfi.JARKlulePALto/
- (3) Itefi, nenbromao [nen-BROH-mough] And-third, break in (in-break-make) three fresh eggs.
/iTEfi.nenBROmaoteFREseNEGda/
- (4) Ifofi, tensea [ten-SEIGH-ah] le krimea, And-fourth, add (increase put) the e le vinjo cream and the wine.
/iFOfi.tenSEaleKRIma.eleVINjo/
- (5) Ifefi, gudbi mismao [MEES-mough] And-fifth, mix (mixture-make)

of Paul, you are identifying him. For you are telling me that the man I can (presumably) locate as the father of Paul is also the person you mean to designate when you say 'John'. But if I know who John is and then ask you *what* he is or what John *does*, and you tell me that John is a teacher, or one of Mary's brothers, *or* that he is the father of Paul, you have told me something both testable and useful *about* John, and this requires that you use a predication sentence if you are speaking Loglan.¹⁴

Now in some cases we can sense this same difference between predication and identity in the English shift from 'the' to 'a', as in the following pair of sentences:

(9) La Djan, bi le brudi je la Selis John is *the* brother of Sally (that is
the one I mean).

/laDJAN.bileBRUdijelaSELis/

(10) La Djan, brudi la Selis John is *a* brother of Sally (she
may have several).

/laDJAN.BRUdilaSELis/

And in these cases, the difference between the English predication sentence and the corresponding identity sentence is unusually clear. But some predicate relations connect individuals uniquely. Paul *can* have only one father, and in English we would therefore never say 'John is *a* father of Paul.' Thus in the case of the following pair of sentences

(11) La Djan, bi le farfu je la Pol John is the father of Paul.

/laDJAN.bileFARfujelaPOL/

(12) La Djan, farfu la Pol John is the father of Paul.

/laDJAN.FARfulaPOL/

there is no perceivable difference between the English sentences. Yet a very clear difference exists in Loglan.

Identity sentences will not be easy for the English speaker to recognize, not even in his own speech. Therefore the Loglan difference between identities and predications--a difference which is fundamental to any logical language--will for a time seem arbitrary and unnecessary. But perhaps the following rule of thumb will help. When you are trying to help your listener locate something which *da* has failed to locate from some earlier designation, then you will probably do so with identity sentences, even in English. But when questions of identity are, at last, cleared up, and your listener knows who Samuel Clemens is, then your subsequent remarks about him--for example, that he informed a certain newspaper that the reports of his death were greatly exaggerated--will almost undoubtedly be delivered in predication sentences. For only these give information about the non-linguistic world.

There is a second identity operator which, in natural language, is used chiefly by mathematicians and logicians. This is the membership operator which means '...is a member of class...'; and in Loglan is **bie**. Membership sentences--for so we can now call them--are formed with **bie** exactly as the more common type of identity sentences are formed with **bi**. Thus:

zhough]. Every argument modifier is marked with one of these six links, and all of them localize the effect of the linked modifier:

- (1) Lemi brudi ji vi levi hasfa, ga ditca lo helna My brother--the one in this house--
teaches Greek.
/lemiBRUdijivileviHASfa.gaDITcaloHELna/

(The pauses in this and the following sentences are all phrasing pauses and would be eliminated in rapid speech.) If we remove the localizing link **ji** from (1), the phrase **vi levi hasfa** becomes of course a sentence modifier:

- (2) Lemi brudi vi levi hasfa, ga ditca lo helna My brother, in this house, teaches
Greek.
/lemiBRUdivileviHASfa.gaDITcaloHELna/

which, as we learned in [Section 5.4](#), makes substantially the same claim as

- (3) Lemi brudi ga ditca lo helna vi levi hasfa My brother teaches Greek in this
house.
/lemiBRUdigaDITcaloHELna.vileviHASfa/

If, now, we link **vi levi hasfa** to the preceding argument in this new position, we get quite a different story:

- (4) Lemi brudi ga ditca lo helna ji vi levi hasfa My brother teaches the Greek
which is (say, spoken) in this
house.
/lemiBRUdigaDITca.loHELnajivileviHASfa/

What my brother teaches is that particular dialect, perhaps, that is spoken in this house. All of the six modifying links localize modification in this way.

But the links have different senses and some take different kinds of operands. **Ji** is the *identity link*. It makes the information added by the modifier play a part in identifying the designatum of the argument to which it is attached. In (1), for example, it says that the one of my brothers I am talking about (presumably I have several) is the one who is in this house. In (4) **ji** narrows down the vast domain of all things (linguistically) Greek to that particular portion of it that is "in this house". **Ji** will link arguments, relative operators, clauses, and even sentences without first arguments to (other) arguments in this same restrictive way:

- (5) Lemi brudi ji le ditca ga gudbi mrenu My brother the teacher is a good
man.
/lemiBRUdijileDITcagaGUDbiMREnu/
(6) Lemi brudi ji ditca lo helna ga gudbi My brother who teaches Greek is

mrenu

a good man.

/lemiBRUdijiDITcaloHELnagaGUDbiMREnu/

Both (5) and (6) add restrictions to the designation given by the argument so-modified, namely **Lemi brudi**. Sentence (5) does so by offering an alternative designation (**le ditca**) in case the first one (**Lemi brudi**) fails; (6) does so by adding a predication but in an identifying way. Perhaps the speaker has several brothers who teach, and this is the one who teaches Greek.

Or perhaps both speaker and listener are in the same room with the speaker's brother. So the speaker may improve da's designation by linking it to the simple locator **va**:

(7) Lemi brudi ji va, ga gudbi mrenu My brother over there is a good man.

/lemiBRUdijiva.gaGUDbiMREnu/

Notice that in all these sentences, a modifier linked with **ji** identifies.

But just as we distinguish in Loglan between identity sentences and predication sentences, so we must now draw the same distinction between modifiers that identify and modifiers that make claims about the world. Thus instead of identifying something or someone, a speaker may wish to use a modifier to make a subsidiary claim about some already identified object in the course of making some larger claim about it:

(8) Lemi brudi ja ditca lo helna, ga gudbi mrenu My brother, who teaches Greek, is a good man.

/lemiBRUdijaDITcaloHELna.gaGUDbiMREnu/

In sentence (8) the predicating link **ja** performs the same grammatical function of attaching the predicate clause **ditca lo helna** to **lemi brudi** that **ji** performs in (6), but with the notably different message that my brother *is*, incidentally, a teacher of Greek. Such subordinate clauses may, of course, be much more elaborate than this. For example:

(9) Lemi brudi, ja ditca lo gleca le friki na lo dotra vi la Ganta Silezias, ga gudbi mrenu My brother, who incidentally teaches English to the Africans in the wintertime in Upper Silesia, is a good man.

/lemiBRUdijaDITcaloGLEcaleFRikinaloDOTravilaGANta.-siLEZias.gaGUDbiMREnu/

And this in turn, can be turned into an identification very simply by replacing the little word **ja** by **ji**:

(10) Lemi brudi ji ditca lo gleca le friki na lo dotra vi la Ganta Silezias, ga gudbi mrenu My brother--the one who teaches English to the Africans in the wintertime in Upper Silesia--is a

good man.

/lemiBRUdijiDITcaloGLEcaleFRIkinaloDOTravilaGANta.-
siLEZias.gaGUDbiMREnu/

One sometimes has to make rather strenuous efforts in the English--using phrases like 'the one', 'incidentally', dashes, and the like--to make such distinctions clearly. But in Loglan, being a logical language, this important distinction is drawn phonemically by the linking words themselves.

Notice that there is no difference in truth-conditions between the claim of (9) above, with its subordinate predicating clause, and the same claim made with the same subject and a connected predicate:

- (11) Lemi brudi ga ditca lo gleca le friki My brother teaches English to the
na lo dotra vi la Ganta Silezias, e Africans in the wintertime in
gudbi mrenu Upper Silesia, and is a good man.

/lemiBRUdigaDITcaloGLEcaleFRIkinaloDOTravilaGANta.-
siLEZias.eGUDbiMREnu/

Sentence (11) is not a legitimate transform of (10); for as we have noted several times, identifying information may be false and still be useful...that woman may *still* be a man. But the function served by predicating modifiers, as distinct from the locating function served by identifying ones, is to permit the speaker to claim less important things in a by-the-way fashion while making more important claims directly. Thus the hearer clearly understands from (9) that it is the fact that the speaker's brother is a good man that is the main burden of the speaker's message, and that the business of where and what the brother teaches is only incidental information. While from

- (12) Lemi brudi, ja gudbi mrenu, ga ditca My brother, who is incidentally a
lo gleca le friki na lo dotra vi la Ganta good man, teaches English to the
Silezias Africans in the wintertime in
Upper Silesia.

/lemiBRUdi.jaGUDbiMREnu.gaDITcaloGLEcaleFRIkinaloDOTra-
vilaGANta.siLEZias/

which is equivalent to (9) by way of (11), the listener would form the opposite impression.¹⁷

Note that both identifications with **ji** and predications with **ja** may be accomplished in the same sentence:

- (13) Lemi brudi ji la Djan, ja ditca ga My brother John, who
gudbi mrenu incidentally teaches, is a good
man.

/lemiBRUdijilaDJAN.jaDITcagaGUDbiMREnu/

/dajaolaDJAN.paDONsuleBOTcida.paNIGroHORMa/

Now, because of **jao**, the Loglan listener will know that the ensuing clause is meant to convey, not an identification, but a subsidiary claim. The phrase 'and by the way' helps to express this intention in English. But while the intent of the Loglan is clear, it is not until we speak the two claims as separate English utterances that we realize fully what the English of (18) is really saying:

(19) Da pa nigro horma. I la Djan, pa X was a black horse. And John
donsu le botci da gave the boy X.
/dapaNIGroHORMa.ilaDJAN.paDONsuleBOTcida/

The way to determine whether an argument modifier in a natural language sentence deserves a predicating link in its Loglan translation is to unwind the two clauses as separate assertions first and then judge whether their joint assertion is the intent of the original sentence. Thus (18) is clearly equivalent to (19) while (16) equally clearly is not.¹⁸

Both identifying and predicating clauses apply to the argument they immediately follow. Thus in

(20) Le brudi je la Djan, ji le ditca pa The brother of John the teacher
gudbi mrenu was a good man.
/leBRUdijelaDJAN.jileDITcapaGUDbiMREnu/

the identification **ji le ditca** applies to John, not his brother. But in case we do wish to make an identification apply to an entire specified description we must first close off that description with the closing comma **gu**, as follows:

(21) Le brudi je la Djan, gu ji le ditca, pa The brother-of-John--who is the
gudbi mrenu teacher--was a good man.
/leBRUdijelaDJAN.gujileDITca.paGUDbiMREnu/

Now it is the brother who is being further identified as the teacher. But, as the translation suggests, it is difficult to make such distinctions in English. There will be more on the uses of punctuators in Sections 5.20-21.

Finally, the pair of modifier links **jie** and **jae** exists to permit class-membership clauses to be used in either an identifying or a predicating way. As usual, the one that contains the phoneme /i/ is identifying:

(22) La Plutos, jie le la Sol, telfoa, ga The Pluto that is one of Sol's
kleda la Ter planets is colder than Earth.
/laPLUtos.jielelaSOL.telFOa.gaKLEdalaTER/

while the one that contains the /a/ is predicating:

(23) La Plutos, jae le la Sol, telfoa, ga
kleda la Ter

Pluto, which is (incidentally one
of Sol's planets, is colder than
Earth.

/laPLUtos.ja,elelaSOL.telFOa.gaKLEdalaTER/

In English it is often difficult to tell whether the speaker means to predicate or to identify with da's subordinate clauses. For example, without reading their parenthetical portions '(The)' and '(incidentally)' aloud, the sense of the English translations of (22) and (23) seem to differ only slightly if at all...despite the presence of commas in the latter and their absence in the former, a feature that is supposed to settle this matter in English text. But in fact, it rarely does. Pauses in speech are equally helpless to make these distinctions unambiguously.

But in Loglan the small phonemic difference in the links themselves makes this subtle difference clearly. We have learned to expect this. For the Loglan speaker *must* be clear about whether da is identifying something or claiming something to be true of it whenever da uses an argument modifier...if only because there is no way da *can* speak Loglan without doing the one thing or the other clearly. In Loglan there is thus no middle ground between predication and identification, as there apparently is in English.^{19,20}

5.18 Punctuation

To punctuate an utterance is to insert a syntactic marker at a point at which, if the marker were removed, the utterance would be perfectly grammatical but would mean something that one does not intend. The syntactic marker may be nothing more than a pause-comma, i.e., a pause in speech and a comma in text. Or it may be a **g**-initial word like **ga** or **gu**. Punctuation, therefore, is the avoidance of unintended meanings through the use of special markers whose entire function is syntactic, that is, which do nothing other than distinguish one structural arrangement of the words of an utterance from some other.

Punctuation is a surprisingly simple topic in Loglan. Apart from the morphological occasions for pausing--which are few enough: (i) the pauses after names, (ii) before those names that are not immediately preceded by **la** or **hoi**, (iii) before all vowel-initial predicate words, (iv) before all eks whether vowel-initial or not, and (v) before predicate words when the just-preceding syllable is stressed--there are relatively few types of Loglan constructions that need punctuating; and very often the punctuation they do need is the simplest of all punctuation, the pause-comma. We will list in the next four sections all the constructions that ever need punctuating in Loglan. But, as we'll see, not even these constructions always require it.

For completeness we begin the next section by reviewing the punctuating move with **ga** that we already know. Then in [Section 5.20](#) we will deal with the major clause punctuator, which is **gu**. In [Section 5.21](#) the uses of two punctuators **ga** and **gi** in effecting abnormal word-orders will be described; and in [Section 5.22](#) the three specific punctuators **gue** **gui** **guo** will be discussed.

5.19 Marking Main Predicates with ga

When the main predicate of a sentence is untensed and otherwise unmarked, and when the last preceding element that is not a free modifier is a predicate word, then **ga** is used just before that main predicate to prevent it from being absorbed into the preceding predicate string. For example,

- (1) Le mrenu ia, ga tsittoa [tsee-TOH-ah] The man, certainly, is a thief (is one who takes criminally).
/leMREnuia.gatsiTOa/

Note that **ia** alone does *not* perform this predicate-protecting function:

- (2) Le mrenu ia tsittoa The man (type), certainly, (of) thief. (The one who is a man? Or steals men?).
/leMREnuiatstiTOa/

Thus (2) is an answer, not a sentence.

Since free modifiers may go anywhere, their appearance at some particular point in an utterance is without grammatical significance. So, as far as the parser is concerned, they might as well not be there.²¹

Notice also that, while free modifiers can't do it, any relative operator *can* perform **ga**'s role.

- (3) Le mrenu kou tsittoa The man is "causedly" a thief.
/leMREnuko,utsiTOa/

In fact, **ga**, like **kou**, is just another member of the PA Lexeme, the lexeme that contains all the relative operators ([Section 5.5](#)). So **ga** is a relative operator, but the one which has no other meaning than the punctuational one.

5.20 Marking Right-Boundaries with **gu**

Gu is the all-purpose comma-like word. It is used to close off a wide variety of constructions that would not end at just that place without it. It is thus a right-boundary marker. In fact **gu** is like an unmatched right-parenthesis. It can remain unmatched because the left-boundaries of these constructions are always known.

An example we have already seen is:

- (1) Mu titci vi gu le supta We eat, here, the soup.
/muTITciviguleSUPta/

(11) Lo nimla ga cnida lopo cluva, lopo clivi Animals need to love living.

/loNIMlagaCNIdalopoCLUva.lopoCLivi/

Pause-commas are quite incapable of closing-off **lepo**-clauses. If a right-boundary mark is to be supplied, it must be either **gu** or the specific **lepo**- clause terminator which we will describe in the next section.

Here's a somewhat different case involving **lepo**-clauses. In the following specimen a clause modifying the main sentence would be engulfed by an earlier **lepo**-clause if the earlier one were not terminated by **gu**:

(12) Da pa djano lepo ti fa crina gu, pa lepo le neri drida fa felda X knew it was going to rain here,
(and X knew this) before the first drops fell.

/dapaDJAnolepotifaCRInagu.palepoleNERiDRIdafaFELda/

(The predicate **crina** means '...is rained on by (cloud)...' So **Ti crina** means 'It rains here', i.e., on this place.) If, in this situation, we omit **gu**, we get a sentence which is almost impossible to think about:

(13) Da pa djano lepo ti fa crina, pa lepo le neri drida fa felda X knew it was going to rain here
before the first drops fell.

/dapaDJAnolepotifaCRInapa.lepoleNERiDRIdafaFELda/

The Loglan of (13) says that X knew that it-was-going-to-rain-before-it-rained. Such claims are nearly impossible to entertain... or, what amounts to the same thing, to believe are being made. But we know that this is the claim of Loglan (13) for in it **pa lepo le neri drida fa felda** ('before the first drops fell') is plainly a modifier of the sentence **ti fa crina** ('it was going to rain here'). Like the kindred notion that someone Y was born before Y was born, such "knowledge" shakes our faith in the universe...or would do if we believed for a moment that anyone possessed it. But what we do with sentences like English (13) is interpret them "sensibly", that is, as if they said (12). In fact, it is almost impossible to speak the English sentences (12) and (13) in ways that even faintly suggest the remarkable difference that will be so plain in the Loglan once we understand it. But our minds want to stay in their comfortable plausibility tracks. So to show what Loglan (13) actually does mean we are obliged to construct another Loglan sentence, one with exactly the same grammatical structure as (13), but this time with a plausible meaning:

(14) Da pa djano lepo ti fa nicyceri X knew it was going to snow here
[NEESH-uh-shree] pa lepo le neri (snow-rain) before the first leaves
clife fa felda fell.

/dapaDJAnolepotifaNICycripalepoleNERiCLIfefaFELda/

/daFUNdiloGRAtO.enorFUNdilaPIT.loGUTraSINma/

In other words, **gu**'s appearance anywhere in the sequel of a set of connected predicates cuts off the argument and modifier sets of all the individual predicates as developed up to that point. Then whatever follows **gu** is taken as augmenting each of those separate developments. For example, by closing (20) with **gu** we may then add a joint modifier:

(21) Da fundi lo grato, e norfundi la Pit, lo X likes cake, and dislikes Pete
gutra sinma, gu vi levi telfoa more than foreign movies, (and
both take place) on this planet.

/daFUNdiloGRAtO.enorFUNdilaPIT.loGUTraSINma.-
guvilevitelFOa/

Without **gu**, each predicate in a connected set of predicates develops its own set of arguments and modifiers independently:

(22) Da fundi lo grato vi leva telfoa, e X likes cake on that planet, and
norfundi la Pit, lo gutra sinma vi *levi* dislikes Pete more than foreign
telfoa movies on *this* planet.

/daFUNdiloGRAtovilevatelFOa.enorFUNdilaPIT.loGUTraSINma-
vileVitelFOa/

So the loglanist does not take for granted that someone who says (16) "really means" (15), as we do so often--and so forgivingly--in English. The price of saying what one means is so small in Loglan--often just the effort to write or speak the little word **gu**--that most of us are willing to pay it. So in general, we loglanists make the extra effort to punctuate even our informal speech precisely. One consequence of this is that when we do misspeak we expect to be misunderstood...or, more precisely, we expect that what we said will be taken to have been meant. For we are speaking a language in which, unlike the natural ones, one can always say what one means. There thus arises among loglanists an obligation to mean what one says.

A final use of **gu**. It may be used to effect the attachment of argument modifiers to larger and more distant units than the nearby small ones to which attachment is automatically made in the absence of **gu**. For example, we saw this sentence in the previous section:

(23) Le brudi je la Djan, gu ji le ditca, ga The brother of John--the brother
gudbi mrenu who's the teacher--is a good man.

/leBRUdijelaDJAN.gujileDITca.gaGUDbiMREnu/

Here, because of **gu**, the identifier **ji** will attach itself to the whole linked argument **Le brudi je la Djan**. Without **gu**, of course, **ji** will link the modifier to the last-mentioned argument, namely **la Djan**.

So (23) is a case of **gu** being used to increase what might be called the "grammatical size" of the modificand to which an argument modifier is being applied. These "backward" references, while

often intended, are difficult to convey with any accuracy in natural language, and so require *ad hoc* interventions...of which the awkwardly constructed English sentence in (23) is an example.

5.21 The Specific Terminators **gue gui guo**

Terminating the scope of clauses by using **gu**'s and/or pause-commas, as described in the preceding section, works perfectly well when the clauses to be terminated are nearby. But when a phrase or clause to be referred to began some time (or text) before--as happens frequently in lecturing, or in the kind of careful writing in which the writer feels obliged to qualify da's remarks at every turn--then a more far-reaching clause terminator is needed. For this purpose we have the *type-specific terminators*.

Three types of clauses sometimes require this kind of closely-targeted termination: **je/jue**-clauses, and these can be terminated by **gue**; **ji/ja** phrases or clauses (and their kin), and these can be terminated by **gui**; and **lepo**-clauses (and their numerous kin), and these can be terminated by **guo**. Any of these punctuators may be used in place of a string of **gu**'s--or in place of a single **gu**, for that matter--to reach back to the last-occurring instance of the type of clause which it is its business to close. In doing so it will ignore all other species of unterminated phrases and clauses, and zero in on its target. The difference between the specific terminators and **gu** is precisely that: **gu** will close the *first* unclosed clause or phrase it comes to in its leftward search for structures to close, regardless of their grammatical type. The translations of Appendix G contain several instances of these specifically targeted terminators at work. One can see how much more efficient they are than **gu** in deeply nested prose.

Good usage calls for using **gu** whenever a single **gu** will do the job. If it will not, you should consider using one of the specific terminators in place of the string of multiple **gu**'s that would otherwise be necessary. The machine could parse the latter just as well as a single specific terminator, of course; but humans find strings of "right parentheses"--and that is what a string of undifferentiated **gu**'s amounts to--tedious to both produce and unravel. Sentences in which clause-specific terminators have been used are apparently much easier for humans to understand.

5.22 Abnormal Word Order with **ga gi goi**

These last three punctuators permit non-standard, i.e., non-SVO ("Subject-Verb-Object(s)"), word orders to be expressed in Loglan. **Ga** [gah] we have seen before; it is the "time-free" predicate marker introduced in [Section 4.4](#). Here it will be used to help express sentences of VSO and VOS ("Verb-Subject-Object" and "Verb-Object-Subject") word-orders...in short, all those abnormal word-orders in which the predicate is spoken first. Another of these abnormalizing punctuators is **gi** [gee]. It might be called the *fronting operator* because it permits sentences to be spoken in the OSV and OVS word-orders, that is, when the sutori argument(s) of a sentence is (are) to be spoken first. **Goi** [goy] is really just a variety of **gi** that is used to mark off "sentence quantifiers". These are a special kind of logical construction which we will study in detail in [Section 5.25](#).

Let us start with the fronting operator **gi**. As suggested, **gi** is normally used to speak one or more of the sutori arguments ("objects") of a predicate first, i.e., to "front" them:

- (1) La Mini,a'polis, la Seint Pol, gi da pa (To) Minneapolis (from) Saint
godzi Paul, X went.

/laminiApolis.laSEINT.POL.gidapaGODzi/

- (2) Lopo clivi gi, la Djan, pa takna la (About) Life, John talked to
Meris Mary.

/lopoCLIvigi.laDJAN.paTAKnalaMERis/

- (3) La Meris, lopo clivi gi, la Djan, pa (To) Mary (about) life, John
takna talked.

/laMERis.lopoCLIvigi.laDJAN.paTAKna/

When **gi** is being used properly, the argument that is in the last place of the standard, or dictionary, place-structure of the main predicate will always be mentioned; for **gi** always follows this argument. Unless the **gi**-sentence is an imperative--in which case the predicate will immediately follow **gi**--the normally first argument, too, will be spoken. So what the **gi**-sentence uniquely allows is leaving out the middle arguments of sutera-order predicates in incomplete utterances:

- (4) La Seint Pol, gi da pa godzi (From) Saint Paul, X went (to
somewhere).

/laSEINT.POL.gidapaGODzi/

- (5) Lopo clivi, gi la Djan, pa takna (About) Life, John talked (to
someone).

/lopoCLIvi.gilaDJAN.paTAKna/

Imperative forms may also be spoken in this **gi**-inverted way:

- (6) Lopo clivi gi, takna (About) Life, talk.

/lopoCLIvigi.TAKna/

In Loglan-normal word-order, it is only the last elements in the argument-string that one is able to omit:

- (7) Da pa godzi la Mini,a'polis X went to Minneapolis (from
somewhere).

/dapaGODzilaminiApolis/

- (8) Takna la Meris Talk to Mary (about something).

/TAKnalaMERis/

So **gi** increases the incompleteness options of the speaker.

among these, many of the question-forms of Loglan are to be found (**Ei da godzi** = 'Does X go?'). Then there are (vii) the specific interrogatives **Ie** and **Hu** and kin and the many questions they create (**Ie da** = 'Which X?' **Hu godzi** = 'Who goes?' **Da he** = 'X is what?' **Ho da** = 'How many X?' **Da ha de** = 'X how connected to Y?'); (viii) the discursive operators (**Kii** = 'Clearly') and the sentences they embellish (**Kii da godzi**); (ix) the utterance sequencers (**Nefi**) and the utterances they order (**Nefi, godzi** = 'First, go'); (x) the parenthetic remarks (**kie uu, kiu** = '(Alas!')') and the sentences they embellish (**Da, kie uu, kiu godzi** = 'X (Alas!) goes'); (xi) the relative modifiers--which include the temporals **Na**, the spatial **Vi**, the modals **Lia**, and the causals **Kou**--and the sentences they embellish (**Da na godzi** = 'X now goes' **Vi, da godzi** = 'Here X goes' **Da godzi lia** = 'X goes similarly'); (xii) the relative interrogatives (**Nahu**) and the sentences they create (**Nahu da godzi** = 'When did X go?'); (xiii) the relative phrases (**Na de** = 'At Y') and the sentences they embellish (**Da godzi na de** = 'X goes at Y'; and finally (xiv) the relative clauses (**Na lepo de godzi** = 'When Y goes') and the sentences they embellish (**Da godzi na lepo de godzi** = 'X goes when Y goes'). Finally, we have just seen how (xv) potential ambiguities may be resolved by punctuation (**Na lepo de godzi gu, da godzi** = 'When Y goes, X goes') and how (xvi) certain unusual word-orders may also be obtained (**Ga godzi de, ga da** = 'Goes to Y, does X', **Di gi, da godzi** = 'From Z, X goes'). Standing apart from all these ways of forming, modifying, and punctuating utterances is (xvii) the mechanism by which utterances of any kind may be linked together in sustained discourse with the continuation connective **I** and its many kin (**Ibuo**) as in **Ia. Ibuo da pa godzi** = 'Yes. However, X went.'

In the rest of this chapter, we shall consider how sentences and imperatives may be linked together in two further ways: (a) logically and (b) causally, and finally how they may be (c) negated and (d) quantified with the logical quantifiers with which symbolic logic deals. With this last, and most formidable topic of Loglan grammar, we will complete our account of the grammatical structure of the language.

5.24 Logically Connected Sentences with *ica* and Kin

We saw in Chapters 3 and 4 how logical connections could be made between arguments and predicates in several ways. The simplest of these ways was with the unmarked series of connectives **a**, **e**, **o** and **u** and their elaborations (see Sections 3.14 and 4.22). We remarked then that connections made with these words were evidently "afterthoughts" in the sense that they do not have to be planned in advance, although, of course, they may be. The "forethought" method of making connections involved the use of the **k**-marked series of prefixed (or "Polish") connectives **ka**, **ke**, **ko**, **ku** and their elaborations, and these were used with the infixes **ki** or **kinoi**. Because they lead the pair of elements they connect, such connections *do* have to be planned in advance (Section 4.23). Finally, there was also a third series of connectives, namely **ca**, **ce**, **co**, **cu** and their elaborations, and these were used only to form connections among predicate words in a string of such words (Section 3.16). So we already have three series of 14 connectives each, and we shall now add a fourth. It is clear that the apparatus for making logical connections is rather elaborate in Loglan. But this is the price we pay for the machinery we need to make a language logical.

Before adding our final series of connectives, let us first note that the series of marked connectives, with their prefixes **ka**, **ke**, **ko**, **ku**, etc., and infixes **ki** and **kinoi**, may be used for

distinctive pattern of stress, intonation and pause for each of the two interpretations. In written English we use punctuation to distinguish the sentence connective. But in Loglan, punctuation is spoken. Let us see, then, what we can do to mark one or the other of the two dubious connectives **e** or **a** phonemically so as to make one of them an afterthought sentence connective that will be plainly identifiable as such in either speech or writing.

We already have the continuation operator **I**, the mark of a parsable utterance. So **I** might be used as well to mark afterthought sentence connectives. Sentences to be connected in this way are not quite finished; but they are in principle parsable, as they would have been finished had the speaker not thought of this connection. Moreover, **I** is always accompanied by a substantial pause; and, in a sense, continuation is itself an afterthought mode of connection: one pauses, one thinks of something else, then one continues. Usually the logical import of the **I**-connection is the conjunction of some new assertion with all the old ones one has already spoken. But we need to be able to make implications, alternations, equivalences and independencies, too, in this same pause-before-continuing style of utterance connection.

But if we were simply to speak **I** before one of the unmarked **a**, **e**, **o**, **u**-words, we would soon be unwittingly speaking one of the attitude indicators of [Section 5.5](#) whenever we did so. Thus **I + a** would soon become **ia**; **I + e** would become **ie**; **I + o** would become **io**, and so on. So, to prevent the production of unintended diphthongs, we put a consonant between the two vowels. There are several consonants that would perform this function adequately, but the one we use is **c**, a sound which is already associated with logical connection through its employment in the **ca**-series. So the last series of connectives we require, namely those which are used to connect sentences in the afterthought mode, is, in effect, formed by prefixing lower case **i**- to any member of the **ca**-series. Thus **ica**, **ice**, **ico**, **icu**, **inoca**, **icano**i, [ee-shah, ee-sheh, ee-shoh, ee-shoo, ee-no-shah, ee-shah-noy] etc., are the marked connectives we require.²⁴ Using **ice** and **ica** to express the two interpretations which we noted for (3) above, we can now produce two distinct sentences, each with a clear meaning:

(4) Da corta de, ice di, a do faltaa X is shorter than Y; and Z or W is
a liar.

/daCORtaDE.iceDI.adofalTAa/

(5) Da corta de, e di, ica do faltaa X is shorter than Y and Z; or W is
a liar.

/daCORtade.eDI.icadofalTAa/

Thus, by choosing to adorn exactly one of the two connectives in (3) with **ic**-, we can speak one or the other of its two possible meanings quite unambiguously. We will sometimes refer to this new, and final, series of connectives as "eesheks".

What, then, is the difference in meaning between the sentence marked with **ice** ('and') and the same sentence marked with the utterance continuer **I**? Let's replace **ice** with **I** in (4) and see what happens:

(6) Da corta de. I di, a do faltaa X is shorter than Y. Z or W is a

liar.

/daCORtaDE.idi.adofalTAa/

In both languages the sense of (6) is that these are two sentences separated by a full stop. The speech could have ended before the **I** but didn't. This contrasts with (4) in which, although there is a pause before **ice**, it is probably a very brief one because the speaker is obviously rushing on to give more information. Like **I**, the logical sense of **ice** is to express conjunction: the assertion of both claims. But **ice** does not launch the parse as **I** and its kin, the speech-continuing discursives like **Ibuo**, do. This is because an eeshek-connected string of utterances sometimes requires that later utterances in the string be understood before the sense of earlier ones can be fully taken in. This is particularly true when the eeshek is one that involves negation:

(7) Mi fa stolo, icanoi da kamla I will stay if X comes.

/mifaSTOlo.icanoidaKAMla/

Notice that in English we do not punctuate the 'if'-clause. This is probably because the two clauses are so nearly a single idea. Thus even though **Mi fa stolo** is potentially a finished utterance, it would be a mistake to parse it too quickly. In this sentence, as the upcoming **icanoi** quickly shows, **Mi fa stolo** is not being asserted by the speaker but being made contingent on a condition which may or may not be realized.

In Loglan we must pause before the eeshek, as we do before all connections in this logical language; but we do not mark the eeshek-preceding pause with a period followed by a capital letter in text. Eesheks may, on occasion, initiate the first or even the only utterance in a speech. For example, **Icanoi da kamla** may be an answer to a question like **Ei tu fa stolo** = 'Will you be staying?' In such cases the initial **i** of the eeshek is always capitalized.

We might wish to make some logical use of the distinction between the **I**-words composed of **I** and its true semantic kin, the **I**-initial discursives, and the eesheks, saying for example, that the appearance of an **I**-word in a speech terminates the scopes of all preceding "sentence quantifiers" while an eeshek does not. (Sentence quantifiers are the topic of the following section.) But this is a matter of logic, not grammar, and is in any case still under study.

Afterthought sentence connections may, of course, be combined with forethought sentence connections in the same utterance. The afterthought may occur within the first term of a **k**-connected pair:

(8) Kanoi da fa kamla, ica de fa godzi, ki If (X comes...or Y goes), then I
mi fa stolo will stay.

/kanoidafaKAMla.icadefaGODzi.kimifaSTOlo/

(I've used parentheses in the English to show the grouping, and triple dots to mark the point at which the afterthought occurs.) Or the afterthought may follow the **kek** pair, in which case the original thought must be grammatically complete before the afterthought clause is spoken:

(9) Ka da fa kamla ki de fa godzi, inoca (Either X comes or Y goes)...only
mi fa stolo if I stay.

/kadafaKAMlakidefaGODzi.inocamifaSTolo/

Actually, sentences (8) and (9) make, in the end, the same claim...although they suggest that their speakers were in very different cognitive states as they were spoken. But as the parentheses show, both are left-associative; and the fact that the hesitations occur in different places does not alter their logical structure at all. In fact, the claim made with *two* hesitations, that is, with two afterthought connections,

(10) Da fa kamla, ica de fa godzi, inoca mi (X will come...or Y will
fa stolo go)...only if I stay.

/dafaKAMla.ica defaGODzi.inocamifaSTolo/

also makes the claim of (8) and (9).

So, like all afterthought connectives, the eesheks are left-associative. This means that it is the entire preceding portion of the utterance that is the antecedent term of the implication made with **inoca** in both sentences (9) and (10). These are thus equivalent to the same claim made forethoughtfully with **kanoi...ki** in (8).

The right-associated connection among these same three elements makes, of course, a different claim. The new claim may be expressed in Loglan only by kekking the last two elements:

(11) Da fa kamla, ica kanoi de fa godzi ki X will come...or, if Y goes, then I
mi fa stolo will stay.

/dafaKAMla.icaKAnoidefaGODzikimifaSTolo/

Of course this same right-associated claim may also be made with two forethought connections as follows:

(12) Ka da fa kamla ki, kanoi de fa godzi Either X will come or, if Y goes,
ki mi fa stolo then I will stay.

/kadafaKAMlaki.kanoidefaGODzikimifaSTolo/

The first kek used in (12), namely **ka...ki**, is of course redundant in the sense that a simpler eeshek could do the same connecting work...as it actually does in (11). Yet, because (12) is completely pauseless, it can probably be more rapidly spoken than (11). This may cause its redundancy to be tolerated and the form itself to be preferred when no genuine afterthought is involved.

Finally, in anticipation of the matters to be dealt with in the next two sections, we must mention that kekked sentences, unlike eeshekked ones, carry the scope of any outside negative or "sentence quantifier" over the entire **ki**-connected structure. Thus,

(13) No, kanoi da fa kamla ki mi fa stolo It is not the case that if X comes
then I will stay.

/NO.kanoidafaKAMlakimifaSTOlo/

is the contradiction of the whole connected sentence-pair made with **kanoi...ki**; whereas the negative in

(14) No, da fa kamla, inoca mi fa stolo It is not the case that X will
come...only if I'll stay.

/NO.dafaKAMla.inocamifaSTOlo/

applies only to the first of the two connected sentences. This follows, of course, from our decision to regard any sentence that precedes an eeshek as at least grammatically complete. Sentences (13) and (14) make, therefore, very different claims. In (13), the speaker Y is denying that Y's staying is conditional on X's coming. It turns out that this is equivalent to asserting unconditionally both that X will come and that the speaker Y will not stay.²⁵ How different this is from the claim of (14), in which the speaker de is saying that de's staying *is* conditional, but on X's *not* coming! Matters of scope are, therefore, essential to the interpretation of such sentence-long operations as quantification and negation, which are the subjects of the two following sections. In part such questions are settled in Loglan by the speaker's choosing between the forethought and the afterthought modes of making connections among his ideas.

In summary, we have now defined four distinct series of logical connectives. They are: (i) the basic unmarked series **a, e, o, u, anoi**, etc., (called eks), which are used to connect arguments, predicates or sentence modifiers; (ii) the **ca, ce, co, cu, canoi**-series (called sheks), which are used to connect only the elements of predicate strings; (iii) the **ka, ke, ko, ku, kanoi**-series (called keks), which are used with the infixes **ki** or **kinoi** and may be used to connect arguments, predicates, modifiers, sentences, or the terms of metaphors--in short, to connect any sort of sentence element that may be connected--and finally (iv) the **ica, ice, ico, icu, icanoi**-series (called eesheks) which are used to connect only sentences or other utterances. The reader will probably be relieved to learn that these are all the connective words there are in Loglan. All told there are 56 of them.²⁶ It is clear that the gain in logical explicitness over the natural languages is purchased at the expense of a very considerable increase in the number of logical words in the lexicon. On the other hand, much of this increase is because of features of these connective words that are equivalent to punctuation, and this, therefore, is compensated by economies realized in that department elsewhere in the language. Moreover, learning 56 connective words may be simpler than it sounds. Ten consistently used morphemic elements are sufficient to construct them all.²⁷ Using all these words correctly may, however, prove more difficult than we expect. Or the system may surprise us in the other direction and prove easier to master than the natural connectives are; for the latter seem to have grown like Topsy from rude beginnings. In any case, it will be interesting to see just how troublesome--or trouble-free--a consistent and unambiguous system of connectives is for the logically untrained mind.

5.25 Quantified Sentences

Notice that the variables in the string of sentence quantifiers have been written in the same order as the order of their appearance as arguments of the original sentence. This is mandatory. We shall examine some of the consequences of this rule in a moment.

What about sentences which make universal claims? We learned in [Section 4.21](#) that these are formed by quantifying a non-designating variable with **ra** ('all'). For example, the universally quantified argument **Raba** appears in:

- (11) Raba cluva la Espanias, anoi la Sol Every someone x loves Spain if
the Sun. (All who love the Sun,
love Spain.)
/rabaCLUvala.esPANias.anoilaSOL/

Here, too, a sentence quantifier is implicitly invoked, this time the universal quantifier **Raba goi**, which, like the existential **Ba goi**, we may also write or speak explicitly at the head of the sentence. When we do so we strip the original argument of its quantifier **ra**, for it is now redundant:

- (12) Raba goi, ba cluva la Espanias, anoi For every x, x loves Spain if (x
la Sol loves) the Sun.
/RAbagoi.baCLUvala.esPANias.anoilaSOL/

The phrase 'For every x' is the usual reading of the universal quantifier in logician's English; but it is usually written in text as the expression '(x)'. The Loglan verbal expression **Raba goi** is not quite so compact. But note that logicians use the unmarked form '(x)' for the universal and the longer marked form '(\exists x)' for the existential while in Loglan we evidently prefer to let the existential be the unmarked form: **ba** as opposed to **raba**. This is because, in speech, existential quantification occurs far more frequently than universal quantification. The former appears implicitly in English, for example, in nearly every use of the indefinite article 'a' outside of predicates. But in the claims that traditionally interest logicians, universals may be the more common form.

Let us now mix these two types of quantifiers in the same sentences. We will do so first implicitly and in two different orders:

- (13) Raba nu cluva be Every someone x is loved by
someone y. (Everyone has a
lover.)
/rabanuCLUvabe/
(14) Be cluva raba Someone y loves every someone
x. (Everyone has the same lover.)
/beCLUvaraba/

And then explicitly in the same two orders:

are both confined to the first of the two implicitly connected clauses that could be made explicit by expanding these last two utterances into connected sentences. For example, (20) could be expanded into **Raba cluva be, inoca raba cluva la Espanias**. It is clear, once (20) is expanded, that the scope of the implicit existential quantifier **be** is, by this convention, confined to the clause **Raba cluva be**, while the scope of **Raba** extends over both clauses. We may convey this difference in scope even in the compact form of the sentence (in which only the second arguments are connected) by using *two goi*'s in the explicit quantifier string:

(22) Raba goi, be goi, ba cluva be, noa la Espanias *For every x such that there is a y such that x loves y only if (x loves) Spain.

For every x, if there is a y such that x loves y, then (x loves) Spain.

/RAbagoi.BEgoi.baCLUvabe.no,ala.esPANias/

(23) Raba goi, rabe goi, ba cluva be, noa la Espanias *For every x such that for every y such that x loves y, only if (x loves) Spain.

For every x, if, for every y, x loves y, then (x loves) Spain.

/RAbagoi.RAbegoi.baCLUvabe.no,ala.esPANias/

(I cannot produce a grammatical English sentence using the English afterthought form 'only if' as translations of (22) and (23); so I've starred them, and included parenthetically other English sentences which *are* grammatical, and which make the same claims as the Loglan ones, but in which the English connective is the forethought form 'if...then'.) To make sense out of these over-compact Loglan remarks, let us expand the connected arguments of these sentences into clauses. To do so we will use the marked connective **kanoi... ki...**--which is equivalent to **...noa...**--in order to carry the scope of **Raba** over both clauses:

(24) Raba kanoi be goi, ba cluva be ki ba cluva la Espanias For every x, if there is a y such that x loves y, then x loves Spain.

/RAbakanoi be goi.baCLUvabe ki ba cluva la Espanias/

(25) Raba kanoi rabe goi, ba cluva be ki ba cluva la Espanias For every x, if, for every y, x loves y, then x loves Spain.

/RAbakanoi rabe goi.baCLUvabe ki ba cluva la Espanias/

These formulations make very clear that the scopes of the two inside quantifiers, **be goi** and **rabe goi**, are confined to the clauses they immediately precede, as our convention for interpreting implicit quantifiers requires. But now let us say with explicit quantifiers what cannot be said with implicit ones in Loglan. Let us move the inner quantifiers of sentences (24) and (25) ahead of the kekking prefix **kanoi** so that the quantifiers **be** and **rabe** will then have sentence-long scope explicitly despite the fact that their variables do *not* appear in the second clauses:

(26) Raba be kanoi ba cluva be ki ba cluva la Espanias For every x there is a y such that, if x loves y, then x loves Spain.

/RAbabe kanoi ba cluva be ki ba cluva la Espanias/

useful technique when we want to see what a connected pair of English sentences is really claiming):

- (34) Re le mrenu ga merji, icanoi re le mrenu ga farfu Most of the men are married if most of the men are fathers.
/releMREnugaMERji.icanoireleMREnugaFARfu/

By replacing the second instance of **le mrenu** with either **da** or **mei**, this may of course be shortened to:

- (35) Re le mrenu ga merji, icanoi re da farfu Most of the men are married if most of them are fathers.
/releMREnugaMERji.icanoiredaFARfu/

Sentences (34) and (35) have clear interpretations in both languages. We now see that (33)-(35) can be false under circumstances under which (31) and (32) are plainly true. An example of such circumstances would be when the designated group of men is composed of a married father, an unmarried father, and a childless bachelor. In that case (33)-(35) are false (most are fathers, but most are unmarried), while the implication 'If X is a father then X is married' is true of the childless bachelor (by denial of the antecedent) and of the married father (by affirmation of the consequent) although it is false for the unmarried father. Whence sentences (31) and (32), which claim that the implication holds for more than half of them, are both true.

Again, it is a matter of scope. The scope of the explicit quantifier in sentences (31) and (32) runs over the entire sentence it precedes even when expanded into a pair of clauses. But the scope of each of the quantified arguments of sentences (34) and (35) is, of course, confined to the constituent sentence in which it appears. This will always be true of sentences with designative arguments; whence we are denied the economies of implicit quantification in their case.

The same argument could, of course, be applied to sentences with non-designative arguments. We could, for example, have chosen to say that

- (36) Raba merji, anoi farfu Every something x is married if a father.
/rabaMERji.anoiFARfu/

may be properly expanded into the surprising claim that

- (37) Raba merji, icanoi raba farfu Every something x is married if every some thing x is a father.
/rabaMERji.icanoirabaFARfu/

But sentences of this form would, if our logical usages allowed them, nearly always be trivially true. Since for any property P it will nearly always be false that everything is a P, the conditional that *if* every something x is a P (but not all somethings are) then something else is the case (but

every someone y if that someone
x is the father of someone z
through that someone y.

/rabaMERjiraBE.icanoibaFARfuboBE/

And the quantifiers of this new sentence may now be stated explicitly as follows:

(44) Raba rabe goi, ba merji be, icanoi bo For every x and every y, x is
goi, ba farfu bo be married to y if there is a z such
that x is the father of z through y.

/RABarabegoi.baMERjibe.icanoibogoi.baFARfubobe/

If we were in doubt about the adequacy of (43) as an accurate expression of our intent, (44) will dispel it. Sentence (44) says what we mean, and so, apparently, does (43). What it says, suitably moralized, is still a fairly broad rule since it permits polygamy; but it does rule out children whose fathers are not married to their mothers. This is, perhaps, the intent, at least, of that version of the human marriage law that is most common on this planet.

So we see that completing a sentence not only has the formal advantage of guaranteeing that any subsequent transformation of its quantifiers will also be complete, but the informal one of forcing us to deal with the exact nature of its claim. Thus (38) says exactly, if incompletely, what (41) and (42) say completely. So the speaker of (38) who thought da was saying something that was an abbreviated equivalent of (43) learns that da was not. Once this awareness is in hand, da may then go on, by adjusting da's quantifiers, to say exactly what da did mean.

We have in this section dealt with what is perhaps the most difficult set of linguistic usages engendered by our project to "make symbolic logic speakable". Yet we have barely scratched the surface. We will leave it to the logically-minded reader to carry the apparatus of implicit and explicit quantification further. Yet other readers will have glimpsed, perhaps, that in these elegant Loglan forms--all of which are far shorter and apparently far plainer than their horrendously intricate English equivalents--we may be on the road, at least, to making some kind of logic speakable. We do not yet know that even this little has been accomplished, of course. For it may be that we have simply compacted the intricacy of these quantificational ideas into denser forms which are even less understandable than their more attenuated English originals. Only experimental tests with authentic speakers of Loglan will settle this interesting question of whether we have, in fact, made logic speakable...or made it even more unspeakable than it was.

5.26 Negative Sentences

We saw in [Section 4.24](#) on negative arguments that the negative operator **no** could be exported from any internal designative argument to a position at the head of the sentence where it is marked by a pause-comma. In this position and so-marked, **no** has the sense of the sentence-negating English phrase 'It is not the case that...' We also saw that, before non-designating arguments formed with **ba**, **be** or **bo**, such internal negatives could *not* be exported. We said that all such negatives are, in a sense, "stuck to" their arguments. Finally, we also noted that **no**

Romas, ba

such that John went to Rome from
x.

/NObagoi.laDJAN.paGODzilaROmas.BA/

Notice that the pause-comma marking **No** in (3) may be dropped when, as in (5), **No** precedes an explicit quantifier. In a sense **No** becomes part of the quantifier string and shares its final punctuator.

The rule, then, for making the implicit quantifiers of negative sentences explicit is to insert the explicit form between the negative and the sentence it negates; and this incorporates the negative operator into the quantifier string.

Now suppose we had attempted to make the quantifier in (2) explicit before exporting the negative:

(6) Ba goi, la Djan, pa godzi no la
Romas, ba

There is an x such that John went
not to Rome from x.

/BAgoi.laDJAN.paGODzinolaROmas.BA/

But there is always such an x! Even if John is drawn so magnetically back to Rome that he goes there from Paris, London, Tokyo and DesMoines, Iowa, there will still be an x somewhere--in Antarctica, say--from which John doesn't go to Rome. Sentence (6) is, in fact, equivalent to

(7) Ba goi, la Djan, no pa godzi la
Romas, ba

There is an x such that John didn't
go to Rome from x.

/BAgoi.laDJAN.nopaGODzilaROmas.BA/

With predicates like **godzi** such sentences as (6) and (7) will always be true. ³²

So, to avoid counter-intuitive transformation products like (6) we adopt the rule that the exportation of internal sentence negatives, like the completion of incomplete sentences discussed in [Section 5.17](#), *must* be accomplished before rendering any implicit quantifier explicit. As always, one must be able to state trivial truths like that of sentence (6) clearly, of course, but in Loglan they must be stated with negative predicates, as in (7), the implicit version of which is:

(8) La Djan, no pa godzi la Romas, ba John didn't go to Rome from
somewhere x.

/laDJAN.nopaGODzilaROmas.BA/

Or, perhaps more clearly, with a universal quantifier and a negative argument as in:

(9) La Djan, pa godzi no la Romas, raba John went not to Rome from
everywhere x.

/laDJAN.paGODzinolaROmas.RAba/

From the latter, after exporting the negative, we get:

(10) No, la Djan, pa godzi la Romas, raba It is not the case that John went to
Rome from everywhere x.
/NO.laDJAN.paGODzilaROmas.RAba/

And this, once the quantifier has been made explicit, becomes:

(11) No raba goi, la Djan, pa godzi la It is not the case that, for every x,
Romas, ba John went to Rome from x.
/NOrabagoi.laDJAN.paGODzilaROmas.BA/

It happens that sentence (11) is transformationally equivalent to (7) by a logical rule called "reversal", which is useful for handling negative quantifiers and which we will discuss more fully toward the end of this section.

So the first rule for handling negative sentences is to recognize that a sentence with an odd number of negative designative arguments is a negative sentence, and should be so expressed before rendering any implicit quantifiers explicit. The second rule is that the explicit quantifiers of negative sentences must be inserted between the negative and its sentence.

But now let us consider the handling of negatives which are bound to non-designative arguments. Take the sentence

(12) Ba corta no be Something x is shorter than no
something y. (There is a longest
something.)
/baCORtanobe/

Such negatives may not be exported. Clearly sentence (12) is not equivalent to:

(13) No, ba corta be It is not the case that something x
is shorter than something y.
(Everything is the same length.)
/NO.baCORtabe/

which we would have obtained by incorrectly exporting the negative of (12). But to make the implicit quantifiers of sentences like (12) properly explicit, we move a copy of the entire argument, negative included, into the quantifier string leaving only a copy of the variable itself in the body of the sentence which is thus quantified:

(14) Ba no be goi, ba corta be There is an x (such that) there is
no y such that x is shorter than y.
/baNObegoi.baCORtabe/

The English version of sentence (16) is almost impossible to understand no matter how carefully we try to phrase it...and so, probably, is the Loglan. It is not until the quantifiers in the English sentence have been rendered explicit, as in (17), that we begin to glimpse its claim. But again it is our hypothesis that Loglan speakers will be able to make these and other transformations directly on the speech-flow without going through the intermediate step of explicit quantification. After all, the string of sutori (second and subsequent) arguments in sentence (16) is identical to the string of explicit quantifiers in sentence (17); and, in each of them, any element surrounded by negatives is immediately replaceable by an element of opposite type. We surmise that this will be as easy to hear in Loglan as the double negative ('He didn't not come') is easy to hear--and eliminate--in English.

On the other hand, the rule that permits us to eliminate any pair of **no**'s which surround explicit quantifiers does not apply to implicitly quantified negative first arguments if any subsequent arguments are non-designating. Thus in

(20) No raba no farfu be rabo	Not everyone x is a non-father of someone y by everyone z.
/noRAbanoFARfubeRAbo/	

the expression **No raba no** may not be replaced by **Ba**. The reason is that in the corresponding string of explicit quantifiers, **raba** is not surrounded by **no**'s:

(21) No raba be rabo goi, ba no farfu be bo	Not for everyone x is there a y such that, for every z, x is a non- father of y by z.
/noRAbabeRAbogoi.banoFARfubeBO/	

The reader will perhaps agree that this gem is even more opaque than the one we considered previously; and this time rendering the quantifiers explicit seems only to deepen the opacity. Fortunately there is a quite general transformation that allows us to eliminate the negatives from negative sentences that happen to have negative predicates, as this one does; and this operation applies to both implicitly and explicitly quantified forms.

That transformation is called *reversal*, and the *reverse* of a sentence with either explicit or implicit quantifiers is formed by changing (i) the signs of both the sentence and its predicate, and (ii) the type of each quantifier. Under reversal, all designative arguments and the signs of all internal quantifiers--in implicit forms, the signs of all arguments--remain unchanged. Applying the reversal rule to sentence (21) gives us:

(22) Ba rabe bo goi, ba farfu be bo	There is an x (such that), for every y, there is a z such that x is the father of y through z.
/baRAbebogoi.baFARfubebo/	

they are, their position guarantees that no quantification can occur inside them; such a negation will, therefore, always be the last operation to be performed after all the operations specified by the quantifier string have been performed. They permit us to use, in short, that elegant equivalence whereby we may say either 'It is not the case that all x are P' or 'It is the case that some x are not-P' without change or loss of meaning. And now, of course, we also see that if there *is* no quantifier string for the negative to stand inside of, as there will not be if the sentence has no non-designating variables, it makes no difference whatever if we speak our sentence negatives at the head of our sentences or in a way that makes them appear to be predicate modifiers. Stylistically, in a logical language, the sentence-head position is to be preferred. But there is no difference whatever between the claims of a negative sentence and that of the same sentence with a negative predicate *provided* that sentence is complete and no non-designating variables appear in it.

These reflections also clarify what may have seemed arbitrary, or even puzzling at first, about our methods of filling the holes in incomplete sentences. Why, for example, must we complete sentences that have negative predicates with universals, and sentences with positive predicates with existentials...even though the latter sentences may themselves be negative? The reason is now plain. If the sentence to be completed has a negative predicate, then all its quantifiers, when explicit, will stand *outside* this final negative. If it has a positive predicate and is negative, then all its quantifiers, when explicit, will stand *inside* this initial negative. But we have learned that to say 'It is not the case that some x are...' is simply another way of saying 'It is the case that all x are not...' So this method of completing incomplete sentences simply guarantees the equivalence of the two ways of making the same negative claim: one, with an inside negative; the other, with its negative moved outside:

(28) La Djan, no pa godzi la Romas John didn't go to Rome.
 /laDJAN.nopaGODzilaROmas/

(29) No, la Djan, pa godzi la Romas It is not the case that John went to
 Rome.
 /NO.laDJAN.paGODzilaROmas/

The first, with its inside negative, we complete with a universal:

(30) La Djan, no pa godzi la Romas, raba John didn't go to Rome from
 every someplace x (i.e., from
 anyplace).
 /laDJAN.nopaGODzilaROmas.RAba/

The second, with its outside negative, we complete with an existential.

(31) No, la Djan, pa godzi la Romas, ba It is not the case that John went to
 Rome from someplace x.
 /NO.laDJAN.paGODzilaROmas.BA/

That the two sentences still make exactly the same claim may be seen by making the two quantifiers we have just supplied explicit:

- | | |
|---|--|
| (32) Raba goi, la Djan, no pa godzi la
Romas, ba | For every x, John didn't go to
Rome from x. |
| /RAbagoi.laDJAN.nopaGODzilaROmas.BA/ | |
| (33) No ba goi, la Djan, pa godzi la
Romas, ba | There is no x such that John went
to Rome from x. |
| /NObagoi.laDJAN.paGODzilaROmas.BA/ | |

For now, quite obviously, sentences (32) and (33) are simply reversals of one another; as are indeed, though perhaps less obviously, sentences (30) and (31).

5.27 Causally Connected Sentences with *ikou*

A class of sentence connectives which is of special interest to Indo-European learners are those formed by preceding the causal words **kou moi rau soa** and their compounds (see [Section 5.7](#)) with the prefix **i-**. This move generates the *afterthought causal connectives* of Loglan, words like 'because' and 'therefore' that figure so importantly in Indo-European thought. In Loglan these words are grammatically among the *eesheks*, but semantically they are more complex than the afterthought logical connectives that are their lexemic kin. Here are several sentences connected by **ikou**-type connectives:

- | | |
|---|---|
| (1) Da pa rodja, <i>ikou</i> tu pa cuidru
[SHWEE-dru] da | It grew <i>because</i> you watered
(water-did) it. |
| /dapaRODja.iKOutupaCUIdruda/ | |
| (2) Tu pa cuidru da, <i>inukou</i> da pa rodja | You watered it; <i>therefore</i> it grew. |
| /tupaCUIdruda.iNUko,udapaRODja/ | |
| (3) Da pa rodja, <i>inokou</i> tu <i>no</i> pa cuidru da | It grew <i>although</i> you <i>didn't</i> water
it. |
| /dapaRODja.iNOko,utuNOpaCUIdruda/ | |
| (4) Tu <i>no</i> pa cuidru da, <i>inunokou</i> da pa
rodja | You <i>didn't</i> water it; <i>nevertheless</i> it
grew. |
| /tuNOpaCUIdruda.inuNOko,udapaRODja/ | |

Evidently the Loglan words **ikou**, **inukou**, **inokou** and **inunokou** [ee-koh-oo ee-noo-koh-oo ee-noh-koh-oo (and) ee-noo-noh-koh-oo] mean (approximately) what the words 'because', 'therefore', 'although' and 'nevertheless' mean in English. What kinds of claims do they express?

From an examination of the Loglan forms we can guess several things immediately. The prefix **i-** strongly suggests that these are afterthought forms to be used without prefixed markers, and that strings made with them are therefore probably left-associative. Both are true. Stripped of **i-** the remaining (prepositional) forms **kou**, **nukou**, **nokou** and **nunokou** seem related to one another in two ways. For one thing, **nukou** is apparently the converse of **kou**; and this seems reasonable

from the meanings of the English words 'because' and 'therefore' to which **ikou** and **inukou** apparently correspond. The second relationship that may be surmised is that **nokou** and **nunokou** ('although' and 'nevertheless') are in some sense the "negatives" of **kou** and **nukou** ('therefore' and 'because'); but the reason for this is not so plain. Finally, we might hesitantly infer that **nunokou** ('nevertheless') is the "converse" of **nokou** ('although'); and this is suggested not only by their forms but by the sense of the English words. Let us first examine the two converse pairs and return for the more elusive negative relationships later.

If we restore the prefix **i-** to these forms and re-examine the English sentences of (1) and (2), we see that they do in fact make the same claim and differ only in the order of their clauses. Thus **E ikou C**--where **C** and **E** stand for sentences asserting some "cause" and some "effect," respectively--is evidently equivalent in meaning to **C inukou E**. It is in this sense that **inukou** is indeed the converse of **ikou**. From sentences (3) and (4) we may draw a parallel conclusion. They too make the same claim with the same clauses in different orders. Apparently **inokou** and **inunokou** are also converse connectives in Loglan, just as 'nevertheless' and 'although' are in English. This much is plain, even in English.

But what about the negative relationships that we suspect exist between **ikou** and **inokou** in sentences (1) and (3), and between **inukou** and **inunokou** in (2) and (4)? We may note that sentences (3) and (4) do indeed involve a negative event, namely that you didn't water it, and that this is related somehow to the "negative feeling" of 'nevertheless' and 'although' in English. In particular, the forms of these two negative sentences are **no C inunokou E** ('not C nevertheless E') and **E inokou no C** ('E although not C'). In these expressions **E** is still some looked-for effect, namely its growth, but **no C** is now the absence (or negation) of some presumed cause **C**, namely your watering it. This suggests, but does not yet quite explain, the reason for the infix -**no-** in these two negative connectives.

We proceed now to examine the simplest and probably most basic claim made in these four sentences, namely the one made with Loglan **inukou** and English 'therefore':

- (2) Tu pa cuidru da, inukou da pa rodja You watered it; therefore it grew.
 /tupaCUIdruda.inuko,udapaRODja/

But what does this sentence claim? Clearly it claims more than a similar sentence with the logical connection of implication claimed to hold between these same two clauses:

- (5) *Kanoi* tu fa cuidru da, *ki* da fa rodja *If* you water it, *then* it will grow.
 /KAnoitufaCUIdruda.KIdafaRODja/

For apart from the obvious difference in tense, the claim of (5) does *not* require that each of its constituent sentences be true. Thus it need not grow and you need not water it, and the claim of (5) that *if* you water it, *then* it will grow, may still be true. Not so with the causal claim in (2). Its growing and your watering it have, according to (2), actually taken place. For if you can show that either of these events has not taken place, you have refuted sentence (2). But is that all? Is (2) just an obscure form of logical conjunction? Is (2), in short, equivalent to (6) below?

for a moment how indispensable the English writer regards his 'because's, 'although's and 'therefore's, how densely they are scattered throughout any carefully reasoned piece of prose--the present text, for example--and how much, we have learned, such words secretly contain. It is clear we *cannot* ignore the problem of translating such telegraphic words into Loglan. The best we can do is provide similar encapsulations of these intricate causal relations but in verbal forms that make their logical freight a little easier to bear, and their transformations therefore a little easier to perform. This, then, is the limited objective of the apparatus of causal connection in Loglan, to the description of which we may now, rather more somberly, return.

Let us now consider the problem of the two negative causal connectives. If **ikou** and **inukou** ('because' and 'therefore') implicitly claim a causal relationship between events, their negatives, **inokou** and **inunokou** ('although' and 'nevertheless'), implicitly deny one. Let us see how. Consider the difference between the following sentences, one of which we have seen before:

- (3) Da pa rodja, *inokou* tu no pa cuidru da It grew *although* you didn't water it.
- (8) Da pa rodja, *ikou* tu no pa cuidru da It grew *because* you didn't water it.

/dapaRODja.iKOutunopaCUIdruda/

Sentence (3) has the form **E inokou no C** in which a presumed causal agent **C** (the watering) does *not* occur. Sentence (8) has the form **E ikou no C** in which the fact that some event **C** does not occur is taken to be a cause of **E**. Obviously these sentences make vastly different claims about the world.

But both sentences make the same pair of explicit claims, namely that it grew and that you didn't water it. But in addition (8) claims implicitly that your not watering it *caused* it to grow, an extraordinary claim but a clear one. Sentence (3), in contrast, apparently denies this causal connection between your not having watered it and its growth, for according to (3) it grew *despite* the fact that you didn't water it. Evidently the speaker of (3) believes that its growth was caused by something else besides your not having watered it. In (3) da expresses surprise but stubborn surprise. What da has observed (namely that it grew) was counter-expected precisely because you didn't water it. But da is apparently unwilling to give up the causal principle that watering usually causes growth. Da therefore opens the search for other causes of this strange effect by *denying* that your not watering it caused its growth.

The speaker of (8), in contrast, takes a very different view of the same two events. De refuses to be surprised, or to look for another cause. De simply says 'Oh well, it must be the kind of plant for which not watering is a cause of growth.' Thus (8) and (3) contradict each other; they cannot both be correct explanations of this corner of the world. Since they agree in their explicit claims, their disagreement must lie in what they claim implicitly. We have seen that the connective **ikou** represents a positive claim with the predicate **ckozu**; its denial will therefore involve the negative predicate **no ckozu**. And it is from this relation that we derive the Loglan word for 'although', namely from **i + no + kou = inokou**.

Once we have seen this, it is an easy matter to derive **inunokou** from **inokou**; for it is nothing but the converse of the latter:

- (3) Da pa rodja, *inokou* tu no pa cuidru da It grew *although* you didn't water it.
 (4) Tu no pa cuidru da, *inunokou* da pa rodja You didn't water it; *nevertheless* it grew.

And even in English it is clear that (3) and (4) make the same negative claim in converse ways; whence **i + nu + nokou = inunokou** for 'nevertheless'.

So much for the meanings and derivations of the four most commonly-used causal connectives, those built on the causal preposition **kou**, which is, in turn, derived from the predicate **ckozu**. As we have already surmised from the uniform appearance of the prefix **i-**, they are all members of the unmarked, afterthought forms of the sentence connective system, the eesheks. Strings of causal connections made with **i**-marked forms are indeed left-associative:

- (9) Tu pa danza lepo da rodja, inukou tu pa cuidru da, *inukou* da pa rodja You wanted it to grow, therefore you watered it; *therefore* it grew.
 /tupaDANzalepodaRODja.inuko,utupaCUIdruda.-
 iNUko,udapaRODja/

Like all afterthoughtfully connected sequences, the first two of these three connected clauses are evidently to be joined together before the third is added. So we may infer that the speaker is claiming, first, that your wanting it to grow caused you to water it; and second, that this sequence of causally connected events was itself a cause of a further event, namely its growth.

So much can be achieved by afterthought connections. But if we now want to assert the right-associated claim that the first event, namely your wanting it to grow, was the cause of the sequence of events composed of your watering it *and* its consequent growth, we can easily say that, too. We need only make a forethought form of the connective **inukou**. To do this we remove the leading **i-** and add **-ki** as a trailing mark, getting **nukouki** [noo-koh-OO-kee]. Then, because this prefixed connective will now precede the cause ('you watered it') rather than the effect ('it grew'), as its analog **inukou** did in the afterthought mode, we deconvert it, ending up with **kouki** [koh-OO-kee] (read 'because') as the prefix element of the forethought connective. Finally, we will use this new kek with the usual infix **ki** or **kinoi** as appropriate to join two connectands causally as well as logically. Using **kouki...ki...** ('because..., ...') between the last two clauses of (9) gives the right-grouping required:

- (10) Tu pa danza lepo da rodja, ikou *kouki* tu pa cuidru da, *ki* da pa rodja You wanted it to grow; therefore *because* you watered it, it grew.
 /tupaDANzalepodaRODja.iko,ukoUkitupaCUIdruda.-
 KIIdapaRODja/

On the other hand, a grammatical expression of this same sentiment is certainly possible in English by using the prepositional form 'because of':

(14) I love Mary because of (loving) John. Mi cluva la Meris, kou la Djan
/miCLUvalaMERis.koUlaDJAN/

And this, as we see, goes into Loglan quite directly as the modifying phrase **kou la Djan** and not as a connection between arguments at all. In fact, the Loglan causal form in (14) is more flexible than that in (13) with its kekked connection. For, as a sentence modifier, **kou la Djan** may appear (nearly) anywhere in this sentence. For example:

(15) Mi cluva kou la Djan, la Meris I love, because of John, Mary.
/miCLUvakoUlaDJAN.laMERis/

(16) Kou la Djan, mi cluva la Meris Because of John, I love Mary.
/koUlaDJAN.miCLUvalaMERis.

And if this be thought too vague, then the argument of this phrase may be turned into a **lepo**-clause in which more detail can be supplied:

(17) Kou lepo mi cluva la Djan, gu mi Because I love John, I love Mary.
 cluva la Meris
 /ko,ulepomiCLUvalaDJAN.gumiCLUvalaMERis/

This makes exactly the same claim as (13). Again, the loglanist has many options, and da may choose the one that seems most natural to da, given the customs of da's native language.

The reader may have noticed that, in designing a system of causal connectives for Loglan, we have followed the structural pathways already laid down for the logical connections of the language. Thus to learn about the one is to learn a great deal about the other.

5.28 The Connectives imoi irau isoa

All the connections formed in the preceding section were based on the implicit use of a single predicate, the predicate **ckozu**. But there are other causal predicates, e.g., **modvi** and **raznu**, with which one may claim other varieties of causal relations between events. **Modvi**, for example, relates the motivation of some actor to da's action, and **raznu** relates the reasons given by some actor for his act. It is certainly true that the relation posited by **ckozu** ('...is a cause of...under conditions...') is the most general causal predicate in the language in the sense that all others will be found to be species of its genus. But analysis of the many near-synonyms of 'because', 'therefore', 'although' and 'nevertheless' in English suggests that these other, weaker--or more sharply focused--varieties of causal claims are frequently the ones intended by the speaker who uses these words in English. For example, the word 'because' seems to have at least four distinct meanings in English, as the following sentences show:

(1) It grew because you watered it.

- (2) I took it because I wanted it.
- (3) He got first prize because he won the race.
- (4) X is not divisible by 2 because it is an odd number.

Sentence (1) involves 'because' in the broad physical sense of causation with which we have been dealing so far. Therefore we will continue to use **ikou** to translate it. Sentence (2), however, seems to speak of that special kind of cause that is a human motive. Of course the speaker might wish to speak of even this causal relation in its most general sense, and hence use **ikou**. But let us give da a choice. The predicate **modvi** means '...is a motive of...to do... under circumstances...' Let us derive a new causal operator **imoi** from this predicate just as we derived **ikou** from **ckozu**. With this new connective we can then express the special motivational sense of English 'because'. And it is with **imoi** that most speakers will probably choose to translate the sense of 'because' which occurs in (2) above. ('My wanting it motivated my taking it; and both events occurred.')

Sentence (3) expresses still a third sense of causation, namely the kind we call justification. The act of giving a criminal a prison sentence or a winner a prize is justified (so we say), by the event of their having "earned" it, that is, by the one having fairly and truly won some contest and the other having been fairly and truly convicted of some crime. The winning and crime-doing are also *causes* of the prize- and sentence-giving, of course, and curiously enough, they are also motivations for it, but motivations of a special kind: namely the kind we feel righteous about. For these are the special kind of human motives by the mention of which we defend our actions to other humans. 'Why did you give him that sentence (or that prize)?' we ask the judge 'Because he earned it' says the judge piously. Impiously da might have said 'Because I wanted to.' Obviously these are different senses of 'because'. We will use the predicate **raznu** ('...is a reason for...to do...under circumstances...') to form the justificational sense of 'because', namely **irau**. And this is the sense of 'because' most probably intended in sentence (3). ('His winning the race was a reason for the judges giving him the prize; and both events happened.')

But note this. The Loglan speaker of a sentence meaning (3) now has three choices before da. If da wants to point to the broadest causal sense in which the winning of some contest led to the getting of some prize, da may still use **ikou**...because the race took place in the physical as well as in the social world. If da wants to point to the somewhat narrower sense in which the causal relation involved a human motive, for example the judge's desire to please the crowd or even to be fair, da may still use **imoi**. But if, as is most likely, da wishes to point to that very special and important kind of motive which we are willing to defend publicly, namely the judge's *reason* for judging justly, da will use **irau**. Again, we give options to the speaker of Loglan that are implicit, but very deeply buried, in the semantic structures of at least some natural languages.

The fourth variety of causation is more difficult to see. Sentence (4) clearly shows that we also use words like 'because' and 'therefore' in contexts in which no ordinary sense of causation is intended, and in the formal sciences like logic and mathematics we do so incessantly. At least our customary view of arithmetic truth, for instance, convinces us that there is no *physical* sense in which an "event" of something's being an odd number *causes* the impossibility of some other "event," namely dividing it by two. But this conviction may be mistaken. Words and numbers are tokens in the symbolic games we play, and among other things they are physical tokens. These

games have rules: psychosocial, and hence biological, and hence, ultimately, physical rules. When we "obey" these social rules--for example, by *not* performing the physical act (one which physics allows us to do) of dividing a certain odd number by two and getting an integer for an answer--our behavior is in part caused by our having learned just those rules and not some others. Moreover, it is caused by them in a certain way, namely we are motivated by them. As we sometimes say, we are motivated by our "desire" to obey those rules. (Certainly no *purely* physical law prevents me from writing ' $3/2 = 1$ ', for I have just done so. But my usual desire *not* to do so is itself a physical, that is, neuro-chemical, thing and a physically powerful restraint; but it is a thing, though I assume it is somewhere in my brain, which I cannot otherwise locate for you.)

But the existence of a social rule concerning the manipulation of symbols is not only part of my motive for obeying it, it is also one of my *reasons* for obeying it, that is, it is a motive for which I can expect to be rewarded when it is publicly displayed. Thus if I am formally correct in saying that *because* 3 is an odd number I may not divide it integrally by 2, teachers, mathematicians and other critical readers will applaud both my reasons and my reasoning. (If I am incorrect, it means I have disobeyed some other rule, which they may be quick to show me.) But these are not ordinary reasons, for the rules of logic and arithmetic are not ordinary rules. With other reasons, we brook disagreement; with these, we do not. They seem to be built into the symbolic game itself. Of course, if we stepped into another culture, with another set of symbols and other logics by which to conduct our verbal play, we might be surprised to find some very puzzling departures from our own rules lurking there. But in general we do not make this disconcerting step.³³ We accept, as we say, the "logical necessity" of certain conclusions given their premises. It is this relationship we covertly predicate when we say 'because' in this fourth and final way.

This fourth sense of 'because' is derived from the Loglan word **snola** which means '...entails...by rules/logic...' or, incompletely, '...is one of the premises of...' The derived sense of 'because' that means entailment is therefore **isoa**, and the corresponding sense of 'therefore' is therefore **inusoa**. This completes the set of causal connectives which Loglan provides: (i) the most general sense of causation with **ikou**, (ii) the motivational sense with **imoi**, (iii) the justificational sense with **irau**, and (iv) that special kind of justification called entailment with **isoa**. And just as there are three additional causal connectives built on the base **-kou**, namely **inukou**, **inokou** and **inunokou**, so there are nine more connectives built on the kernel elements **-moi**, **-rau** and **-soa**, and each of these has a forethought version made with **-ki** and used with infixes **ki** or **kinoi**. Their uses are straightforward extensions of the principles considered in [Section 5.27](#).

5.29 Causal Questions and Answers

Just as we can use modal operators or tense or location operators to form relative interrogatives with **hu** (**Nahu** = 'When?'; **Vihu** = 'Where?'; **Douhu** [doh-OO-hoo] = 'How?' in the sense of 'By what method?'), so we can use causal operators to form the various question-asking words which translate as English 'Why?':

- | | |
|------------------------|-------------------------|
| (1) Kouhu [koh-OO-hoo] | Why? (For what cause?) |
| (2) Moihu [MOY-hoo] | Why? (For what motive?) |

Fifth, a relative clause may be supplied using the same operator:

(13) Kou lepo le banhane pa nu setfa ba ta Because the banana was put by
someone there.

/KOulepolebanHANepanuSETfabaTA/

Sixth, a partial sentence, a clause introduced by the corresponding causal connective, may be given as an answer:

(14) Ikou la Djan, pa setfa le banhane ta Because John put the banana
there.

/iKOulaDJAN.paSETfalebanHANeta/

And this, of course, is only part of, seventh, the complete allegation:

(15) Mi pa felda, ikou moiki la Djan, pa I fell because (physical sense)
vizka mi ja kamla, ki da pa setfa le because (motivational sense) John
banhane ta saw me coming, he (was
motivated to) put the banana
there.

/mipaFELda.iKOumoikilaDJAN.paVIZkamijaKAMla.-
kidapaSETfalebanHaneTA/

Now it should be noted that nothing prevents the loglanist from asking da's causal questions the other way round, that is, with effects rather than causes as the objects of inquiry. In doing so, there will usually be no simple English parallels. So English translations of such questions are often circumlocutory:

(16) Nukouhu tu pa felda Your falling had what effect?
(Literally, Therefore-what you
fell?)

/nukoUhutupaFELda/

(17) Nusoahu tu fadpeo toi What follows from your
concluding that? (Literally,
Therefore-what you conclude
that?)

/nusoAhutufadPEoTOI/

But curiously enough, there is one fairly common English interrogatory remark--albeit a fairly impertinent one--that does run the causal inquiry in this direction, and that is 'So what?' This expression translates very neatly into Loglan as:

(18) Nusoahu What follows?

/nusoAhu/

And in a logical language it may not be impertinent to inquire into the consequences of one's interlocutor's remarks.

It may also be observed that to put a question to someone *ba* with **kou** or **nukou** does not preclude *ba*'s answering at some more specific level of causal inquiry. Thus, to question (5) above, about the general cause of your falling, answers made with **moi** or even **rau** are surely permissible.

(19) *Imoi mi pa danza lepo tcaku tu* Because I wanted to startle you.
/iMOImipaDANzalepoTCAkutu/

throws an entirely new light on this apparently externally-caused event by confessing that there was an inner motivation for it, while

(20) *Irau raba pia felda* Because everyone was falling.
/iRAurabapiaFELda/

goes even further and suggests that, in addition to being motivated, your falling had a justification...a reason you would defend. It is difficult to think, however, of how an answer made with **soa** could be made to such a question (what *entails* a falling?). A question put at one of the finer levels of causal analysis is not, however, very adequately answered at a grosser level. To answer question (8), for example, about what entails a certain conclusion you have drawn--let us say, in writing--the reply:

(21) *Ikou lemi pinsi pa clidu* Because my pencil slid.
/iKOulemiPINSipaCLIdu/

might well be regarded as irreverent. An explanation, possibly; but not an answer to a question about entailment.

In closing this discussion of the causal utterance forms of Loglan, it may be useful to remind the reader that the entire causal apparatus we have just described reflects the usages and grammatical provisions of one family of languages most particularly. This is the Indo-European language family, albeit a wide and important one as we have noted. But in this feature of its grammar Loglan is not truly cross-cultural. For the luxuriance of Loglan's 'because's, 'although's and 'therefore's will strike no welcoming chord in many non-Indo-European human breasts. In this, as in several other matters, Loglan accommodates the linguistic exuberance of certain important languages whose speakers have things to say which simply cannot be said (neatly) in any other way. The cost of doing so may be great. For the causal predicates which underlie these grammatical provisions are probably less necessary for human thought than most of us who speak European languages are accustomed to assume, and, as we have noted, they may even obscure thoughtful speech in some important ways. It is noteworthy that scientists use the causal mode of explanation less frequently these days, often preferring functional expressions relating one variable to another in which neither is labelled as the "cause". For nothing has proved more elusive, scientifically, than the very idea of causation, historically important for the early

development of science though this concept may have been. It may therefore be a mistake to follow the European languages down this slippery but historic pathway. But if it is, it is a mistake that we have found unavoidable; and for the reasons we have given.

Even so, these are reasons that may be set aside one day. A more international generation of loglanists may eventually decide to simplify its language by replacing its Indo-European-derived causal apparatus with....

Only they will be able to tell us what.

Notes

1 In preparing text to be submitted to the Loglan parser, the user should know that both periods (.) and cross-hatches (#) are currently being treated by The Institute's parsing program as end-of-utterance signs. Thus the computer currently collapses the distinction between utterances and speeches which we have just developed. This is because, at the time of writing [1988], the Loglan parsing program is not designed to act on instructions in Loglan--for this to be possible, an understanding of the structure of its interlocutor's speeches will no doubt be essential--but simply to exhibit to the human learner how and whether the machine has been able to parse some utterance, thus informing its author what da actually conveyed to the machine by it. The specimen sentences parsed in this way will either have been submitted to the parser one at a time or they will have been extracted by the program from a submitted text and parsed in sequence. For such didactic purposes, then, we have found that it is best to limit the machine's parses to reasonably short units, such as single utterances.

2 In 1975 Loglan it was the local modifiers that were unmarked and the global ones that were marked. Nine years later James F. Carter pointed out (personal communication) that the latter were much more numerous in natural language than the former, citing the decisive evidence he had gathered by counting the incidence of the two types of modifying phrases in a large corpus of English sentences. Carter proposed that the unmarked Loglan status be reassigned to the commoner form. That unmarked forms have higher use-frequencies than marked ones is a general linguistic law, and one which we had applied repeatedly in engineering Loglan. So of course Carter's finding was accepted by The Institute and unmarked modifiers officially became sentence modifiers in 1984. The Carter finding had sweeping formal consequences, however, and it was not fully incorporated into the machine grammar until 1986 and 1987. The first published account of the new arrangements appeared in Brown (1987).

3 We here use the word 'modal' in a sense that differs from its usual meaning in logic.

4 This move was first suggested by James F. Carter (1981) and, for a time, these structures were called "Carter Vocatives".

5 Note that ***iu no**, or "negative ignorance," is undefined. This is because **iu** is, in effect, the zero-point on the conviction scale and is therefore neither positive nor negative.

6 Thus the reader may observe that the attitude indicators are not operators in the logical sense at all; in particular, they are not modal operators. I have taken Quine's strictures on modal logics (1961a, p. 156) to be sufficient to discourage any effort to incorporate one into Loglan.

7 Traditionally, that is, since Ogden and Richard's groundbreaking work (1938).

8 Already some further suggestions have been made. Reader Perry Smith, for example, suggests **oueu** = 'It doesn't matter' + 'we suppose that', or, as in mathematics, 'Without loss of generality we may suppose that ...'

9 The discovery that Loglan needed a connective interrogative was of course made by Prof. John Parks-Clifford, The Institute's logician at the time (personal communication, 1977).

10 Each word on this list except **toe** (from **to**) and **nao** (from English 'Now') is derived from a primitive predicate: **coa** from **corta** ('short'), **dou** from **donsu** ('give'), and so on. Such derivations are strictly mnemonic, however; for the functions of the discursive operators (attention-calling, etc.) are very different from the meanings of predicates (claiming, etc.). See **Loglan 2**, Chapter 8, The Theory of Loglan Semantics, for further discussion of this point.

11 There is something unsatisfactory to me about this indefinitely long and formless list of inference-shaping words. I suspect that they belong to a region of language behavior to which insufficient logical and semantical analysis has yet been applied. Zellig Harris's "discourse analysis" (1952), for example, only scratches its crusty surface; and certainly I do not claim to have broken through. But I also suspect that a proper analysis of the discourse-shaping transformations of speech would not only be difficult to perform on the natural languages, but that once performed could only lead, if Whorf is right, to a set of operators and a transformation schema that would be far more sophisticated than minds originally trained in the natural languages would know how to use. Perhaps such sophisticated developments are best left for Loglan₂; for the leap from Loglan₁ to such hyperlogical manipulations of the flow of discourse may, when it happens, not be so great as the one from English, say, to this only faintly-envisioned realm. All this suggests, of course, that any given logical language will prove to be only a temporary blessing. From its heights new logics will almost certainly be glimpsed; but we cannot hope that these transcendental modes of thought will be optimally facilitated in the language from whose rude platform they have first been barely seen. And from the point of view of thinkers attempting these new transcendental operations, what was once a "logical" language will then seem "illogical" indeed. This is the dynamic corollary of Whorf's hypothesis, of course: the "boot-strapping" operation to which I alluded in [Section 1.2](#). It is also the historical loop-hole, in his essentially static conception of the constraints on language growth, through which the Western languages, anyway, with their proliferation of symbolic calculi, seem already to have in part escaped.

12 My treatment of identity throughout this section, and despite its linguistical air, owes much to the logical writings of Quine; especially his (1961) and (1961a).

13 We may express what sentence (7) *is* about by rewriting it as a predication sentence:

(7a) Li, Semiul Klemenž, lu, e li, Mark Twain, lu namci ba	'Samuel Clemens' and 'Mark Twain' are (both) names of (the same) something.
---	---

If one can agree that (7) and (7a) have the same truth-conditions, one must then agree that sentence (7) is not about Mark Twain. In fact, the expression **la Semiul Klemenž** in (7) does not designate anything at all. Instead, it is a specimen designation being exhibited--much as quoting it would do--to the eye (or ear) of the beholder as an example of something that is capable, on suitable occasions, of designating the same thing as some other specimen designation, namely **la Mark Tuein**, is capable of designating on perhaps quite different occasions. The Morning Star is, to be sure, the Evening Star, and both are the planet Venus; but when this object is in the evening sky it would make no sense to call it by the first of these three names.

14 The point here is that any (sensible) conversation requires that all parties agree (more or less) on who or what they are talking about. Once this is established--by effective new designations or by identities which call up old ones--the speakers can then proceed to make predications with some confidence that all parties know where to find, if necessary, the objects to which they apply. This is the sense in which every designation is contextual. For the effectiveness of a designation can only be judged in the context in which its production is intended to bring about this essential cognitive rapport between interlocutors.

15 Eventually a "partitive" operator may be required in Loglan with the sense of '...is a part of individual...' If this happens, sentences formed with this operator will be of the same grammatical class as the identity and membership sentences discussed here. Such an operator will be particularly useful in case scientific words should be formed as names; see **Loglan 2**, Chapter 12, Some Alternative Ways of Making Scientific Words.

16 Much of the mystery that surrounds numbers probably derives from the unclarity of our talk about them. Are they names? Or are they things? If things, where are they? And if names, of what things? On the view taken in this book numbers are, like Alice in Wonderland, imaginary things. The names of numbers, are of course, not imaginary, just as 'Alice' is not imaginary, but Alice, the girl in Wonderland, surely is. Still, we can ask sensible questions about Alice: Was she tall? Or was she fat? How old was she? By consulting the works of Lewis Carroll one can find out. Similarly, one may ask sensible questions about numbers: Is the number two odd? Or is it even? By consulting the designation-rules of mathematics--that is, the mathematical identities--one can find out. For in mathematics one settles such questions not by examining Two--for like Alice, Two cannot be examined--but by examining its other names.

17 If logical considerations were our only concern we would certainly dispense with these subordinate predicate constructions in designing Loglan; for surely (10) and (12) are transformationally more obscure than (11). But we must also accommodate the natural languages; and, in the Indo-European languages at least, constructions which exhibit the author's views on the relative importance of his predications are essential to "good writing." Clearly we must provide translations which conserve these forms and exhibit these intentions. At the same time it is possible that forms like (11) will find uses in the language in contexts where transformational concerns are paramount.

18 (16) is not, because the identifying clause in (16) need not be true for the sentence as a whole to be true. X may not be a gift but stolen property and still be a black horse.

19 To **ji ja, jie jae, jio jao** we would have to add another pair of links for partitive modifiers if a partitive sentence operator were added to the language; see Note 15.

20 The identification-predication distinction is not quite strong enough to handle all such problems on its own. Take the charmingly ambiguous English sentence (a) 'He wants to marry a Norwegian.' The pair of translations (i) **Da danza lepo mercea ba ji norgi** ('He wants to marry someone Norwegian') and (ii) **Da danza lepo mercea ba ja norgi** ('He wants to marry someone, and that someone is, incidentally, a Norwegian') doesn't quite capture these two English meanings; for in (ii), the linked predication **ja norgi**, 'who is, incidentally, a Norwegian', falls within the scope of the Loglan **lepo**-clause. Thus a fastidious back translation of (ii) into English would produce (ii') 'He wants the event of (his) marrying someone x, who turns out (surprise!) to be a Norwegian, to take place.' This is, to be sure, a possible third interpretation of (a). But it is a quaint and unlikely one, given the structure of English. The real second horn of this dilemma in English cannot be accurately expressed until we have moved the **ja**-claim *outside* the **lepo**-clause, which can be done as in (iii) **Da danza lepo mercea ba, ice ba norgi** ('X desires the event of marrying someone x, and x is a Norwegian'). The new connective **ice**, which functions here as 'and' between two coordinate clauses, will be found with its numerous kin in [section 5.24](#). I am indebted to Winograd (1984) for this delicious example.

21 The machine grammar treats free modifiers that are single words--that is, all free modifiers except the vocatives and parentheses, which may have internal grammatical development--as "grammatical noise". Thus a part of the parsing program called the "preparser" removes all such "noisy elements" from the specimen before passing it on to the parser. This and several similar strategies make it possible for an LR1 parser ("Left-generating, Right-reducing, 1-lookahead") to parse a human language which is clearly not LR1. There is more on the machine grammar strategy in **Loglan 6** and Brown (1982a).

22 According to Greenberg (1966), three of the six possibilities, VSO, SVO and SOV, are the three dominant world word-orders, in that the three major divisions of human languages may be characterized by their use of them. The other three permutations--which may be generated by exchanging the positions of S and O in the dominant ones, thus VOS, OVS and OSV--occur only as infrequent variants of one of the three major types...much as VOS occurs as a literary variant of SVO in English. Apparently none of these minor forms is the preferred form in any language, however. Of the three dominant word-orders, SVO is much the most common, both in the number of speakers of the languages that employ it, and in the number of those languages. Chinese, English, Finnish, Greek, Russian and all the Romance and Germanic languages are SVO (Greenberg's Type II languages). SOV (Greenberg's Type III) is a close second as far as the number of languages is concerned, but gives no contest at all in number of speakers. Languages such as Hindi, Japanese, Basque and Turkish are SOV. VSO, which is the logician's preferred notation (and Greenberg's Type I), is a distant third in numbers of both speakers and languages. Languages such as Hebrew, Maori, Masai and Welsh are of this least common word-order type. Loglan can handle all six of these word-orders, including their imperatives as defined by the absence of a subject. In the declarative mood, the three dominant forms are handled by the

punctuation schemata **gaVgaSO**, SVO and SOV--note that two forms, the most widespread two, are completely unmarked in Loglan--while **gaVOgaS**, **OgiVgaS** and **OgiSV** handle the three subdominant orders. The imperative forms are simpler. Two subject-less forms suffice for the six: the forms VO, VO and **OgiV** serve the three dominant patterns, and the forms **VOgi**, **OgiV** and **OgiV** again serve the subdominant ones.

23 It is for this reason that the Polish Notation, of which the marked series of Loglan connectives is a variation, is called "parenthesis-free." Of course it is not wholly parenthesis-free, since the leading marker functions as a left-parenthesis.

24 The phrases ***i ca**, ***i ce**, etc., with which these new words might be confused, do not occur grammatically in Loglan.

25 By the sequence of transformations $-(p \rightarrow q) \leftrightarrow -(p \vee q) \leftrightarrow (p \cdot q) \leftrightarrow (p \cdot \neg q)$, the middle and crucial one being one form of DeMorgan's Law.

26 This exceeds the number of connective words in English by a factor of about 4. The 14 English connective words are 'and', 'both', 'but', 'either', 'if', 'neither', 'nor', 'not', 'only', 'or', 'possibly', 'then', 'unless' and 'whether'. They are used to construct longer expressions such as 'if and only if', 'whether or not', and 'and possibly both', as well as figuring alone and in pairs ('if...then...'). Needless to say the method of constructing these phrases is far from regular; neither is it transformationally transparent. There are, for example, speakers of English who do not know what the transforms of 'unless' and 'only' are. Thus 'Only the brave deserve the fair' is still a stumper in Freshman logic. Why such expressions should be so obscure in natural language is difficult to say. But there are no such uncrackable verbal nuts in Loglan.

27 These are the four kernel elements **a**, **e**, **o** and **u**, the three syntactic affixes **c-**, **k-**, and **i-**, and the three semantic affixes **nu**, **no** and **noi**. But these last three do not have to be learned afresh as they have similar meanings elsewhere. Knowing these ten elements, then, the hearer or reader will be able immediately to recognize every new connective as a variation of alternation, conjunction, equivalence or independence on the basis of its kernel vowel; the transformational character of the variation can then be gleaned from the affixes **nu**, **no** or **noi**, if any are attached; and finally the scope of the connection can then be determined by inspection of the affixes **c-**, **k-**, or **i-**, if any of these is used. Thus the Loglan system of connectives may actually be simpler to learn than the English one, despite its greater contextual explicitness.

28 Loglan is indebted to Prof. Herschel Elliott of the Department of Philosophy of the University of Florida at Gainesville for the system of implicit quantification described in this section. Prof. Elliott's objective in devising this system was to make symbolic logic teachable; mine in adapting it for Loglan, to make it speakable. The objectives are similar but do not everywhere dictate the same procedures. So I take complete responsibility for any errors of interpretation or of logic which I may have made in adapting Elliott's system to the purposes of speech.

29 Conversely, to express any explicitly quantified claim involving a multi-place predicate implicitly one must first find a converse operation, or a set of such operations, which orders the non-designative arguments of the predicate in question in the same order as their variables

appear in the explicit quantifier string. In Loglan there will always be such a set of operations for every possible order of the arguments of multi-place predicates, although some permutations of the arguments of higher-order predicates require as many as four or five operations to express, and the compound conversion operator that results is probably unintelligible. If it were ever desired to actually *manipulate* such intricate claims implicitly, a set of auxiliary conversion operators capable of exchanging places among sutori arguments would have to be added to the language.

30 The existence of a *complete* set of such rules is as yet a conjecture; and as I have been, since 1975, occupied with matters of linguistic engineering, I have not had time to investigate the matter myself. However, it is known that algorithms exist for expressing the implicit quantifiers of any simple sentence explicitly, and for transforming any explicitly quantified simple sentence into a form in which its quantifiers may be implicitly expressed no matter what the length of its polyadic predicate or the order of its quantifiers; see Note 29 above. Moreover, the scope-problem for any two-clause connected sentence can probably also be solved; see Note 31 below. But the analysis of quantifier scope in third- and higher-order connected sentences has not yet been undertaken.

31 The following equivalences, in which 'p' is any sentence not containing 'x',

$$\begin{aligned} (x)(Fx \rightarrow p) &\leftrightarrow (\exists x)Fx \rightarrow p \\ (\exists x)(Fx \rightarrow p) &\leftrightarrow (x)Fx \rightarrow p \\ (x)(p \rightarrow Fx) &\leftrightarrow p \rightarrow (x)Fx \\ (\exists x)(p \rightarrow Fx) &\leftrightarrow p \rightarrow (\exists x)Fx \end{aligned}$$

or, in Loglan,

$$\begin{aligned} \text{Raba kanoi ba F ki p} &\leftrightarrow \text{Ba F, inoca p} \\ \text{Ba kanoi ba F ki p} &\leftrightarrow \text{Raba F, inoca p} \\ \text{Raba kanoi p ki ba F} &\leftrightarrow \text{p, inoca raba F} \\ \text{Ba kanoi p ki ba F} &\leftrightarrow \text{p, inoca ba F} \end{aligned}$$

suffice for shortening the scope of any quantifier of any implication in which the variable of the quantifier does not appear in exactly one of its clauses. The scopes of quantifiers of two-clause connected sentences made with other connectives, and in which an x-free clause p appears, may be similarly shortened. The general rule is that if either of the two negative affixes, **no-** or **-noi** appears in the Loglan connective word on the same side of that connective as the clause 'Fx' appears, then the short-scope quantifier will be of the type opposite to that of the long-scope quantifier; in all other cases it will be of the same type. This rule depends on nothing more mysterious than the equivalence of ' $\neg(x)$ ' and ' $(\exists x)\neg$ ', and of ' $(x)\neg$ ' and ' $\neg(\exists x)$ '.

32 Notice that were we to encounter an explicitly quantified sentence, like (6), with a negative internal designative argument, the negative would have to be "exported" to predicate-negative position, as in (7). This is an awkward move. But if the logical usages here proposed for Loglan

are followed, such sentences will not be encountered. They are not ungrammatical, however; they are merely invalid transformations of sentences like (2) on the conventions here proposed. One cannot, of course, legislate grammatically against bad logic any more than against bad arithmetic. Thus **Te le to mrenu pa gotso** = 'Three of the two men went' are grammatical but false sentences in both languages. Sentence (6) is not false, but it is an invalid transform of (2).

33 This is, of course, the step Whorf asks us to take.

Chapter 6

WORDS AND GROWTH

6.1 Language and Growth

Languages behave in many ways as if they were alive. For one thing, all languages grow. For another, each language seems to grow in its own way, as if it had its own unique pattern of openness and resistance which causes it to change quite readily in some directions but not at all in others. For example, one of the ways in which English seems to grow is by swallowing the words of other languages whole. As Otto Jespersen, the late 19th, early 20th century Danish linguist, once put it, English eats other languages alive. Not so with French, for example, which prefers to redefine old words to meet new needs or coin new metaphors from old roots. Chinese also shies away from foreign loan-words and grafts new ideas onto ancient stock. Japanese, on the other hand, is more like English, adopting and repronouncing foreign words with gay abandon. Changes in the pronunciation of words over time seem also to follow special patterns which are unique to individual languages, or to small groups of closely related tongues. And it is a major, but so-far untested, hypothesis of linguistic theory that each language tends to develop its own metaphysical outlook on the world. All this has suggested to nearly all students of language that languages are rather idiosyncratic creatures, disorderly in externals but internally autonomous, and in any case very much alive.

Now if you plant something that you thought was a tree and it doesn't grow, then you were mistaken. What you planted was a stick: a poor wooden thing, stiff and unyielding, and without the essential expansiveness, that ability to stretch and swell and fill its niche, that is the very stuff of life. So with languages; if they are alive, they grow. Some partisans of the international language movement have argued that one of the advantages of a constructed language over a natural one, as a universal second tongue, would be that the constructed language wouldn't change. They may be right; but certainly it is a mistake to hope so. For just to the extent that such hopes are fulfilled, they fail. An unchanging language would be a useless corpse, suitable for ritual incantations, perhaps, but quite incapable of serving the changing needs of humans. Latin is said to be a "dead language"; and so it may be. But not because it isn't spoken. For it is obediently intoned in churches and schoolrooms even yet. If it is dead, it is because it has stopped growing. Nobody lives in the house of Latin anymore. Its vast, still rooms no longer echo to the sounds of scuffling life.

Now if Loglan is a language, one of the ways that we will know it, will be that it will grow. The ways in which Loglan has been built to grow are a very carefully considered part of its structure. We have realized from the outset that if the language is to be easily learned, its initial vocabulary must be very small. But even though small, that initial vocabulary must be capable of very rapid growth...growth both in the mind of the learner, as it encompasses the language, and in the community of speakers as they continually expand its corpus to match their expanding need. The

machinery we have provided for rapid, spontaneous and yet orderly growth is the main topic of this chapter.

But first a warning. Natural languages grow rather slowly. The proportion of people who now speak English who will contribute a living word to it during their lifetimes is rather small. A few scholars will do it; a journalist now and then; a poet to implement a new perception; an inventor gazing fondly at the new thing *da* has made; or an occasional gifted urchin who, searching for a word *de* doesn't know, coins one in desperation that happens to stick among *de*'s fellows and then lives on as slang. But the frequency of these events reckoned over the populations who speak these modern languages is very small. Most of us live with our native languages as we find them. To make new words ("neologisms," as they are called by pedants) is not approved in college classrooms. Word-building is a game we are taught *not* to play.

Not so with Loglan. If Loglan lives, it will be in part because its very structure stimulates the poetic impulse in a substantial proportion of its speakers. Or because the word-making game in Loglan turns out to be easy and fun to play. In most of this chapter we will be describing the rules of that word-making game. But first let us review the resources with which we start the play.

6.2 Seven Kinds of Lexical Growth

Let us take stock of what we have. At the present time (1989) the vocabulary of Loglan stands at around 9,000 words. Of these, about 300 are simple little words, the 1-, 2- and 3-letter structure words such as **a**, **ia**, **ta** and **tai** with which we have been mainly concerned in describing the grammar of Loglan; another 500 or 600 are compound little words, the less commonly used, longer structure words, such as **pana** and **anoi**, with which we have had less to do in this book; another few hundred are illustrative names such as **Djan** and **Frans** (the number of names in any language is of course unlimited; the set provided in the current Loglan lexicon simply illustrates the naming process); and the remaining 8,000, or more than 90% of the present vocabulary, are predicate words of various kinds.

Among the little words are the hard-worked common words, like **le**, **la**, **da**, **pa** and **ba**, some of which occur in nearly every utterance. Such words lay out the grammatical and logical structure of ideas. But if grammar and logic, through their little words, provide the bones of a language, predicates provide its infinitely varied flesh. Grammars, and the little words that impart grammatical structure, are necessarily finite affairs; the vocabulary of predicates, in contrast, is in principle infinite in size. This is true in any language. In theory, and perhaps also in practice, there may be many learned persons who know the whole grammar of English. No one knows the whole predicate vocabulary of English, and now that it has passed the half-million mark, no one ever will. Obviously, if we are concerned with how Loglan might grow, it is with the mechanisms for augmenting its predicate vocabulary that we will be primarily concerned.

Of the 8,000 predicate words that are currently defined in Loglan, approximately 1,500 are borrowings--most of those from the vocabulary of science--and another 1,300 are "primitive" in the sense that they are not derived from any other word or words in the language. The largest subset of the primitive predicates are the basic semantic building-blocks of the language, the 860

"composite" words like **mrenu** and **fumna**. Recall that these have been derived as broadly as possible from eight natural languages. But the 5,200 current Loglan predicates which are neither borrowed nor primitive, and which we accordingly call "complex," is by far the largest category of words in the language. These have nearly all been derived from two or more of the composite primitives...with an occasional assist from a little word like **ne**, **no** or **nu**. In English, 'ease' is a primitive predicate: 'easy' and 'uneasy' are complex. More obviously, 'black' and 'berry' are primitive; 'blackberry' is complex.

With relatively few exceptions, the predicates used in the specimen sentences in this volume have been composite primitives. Indeed, only about a hundred of the 860 composites have been used to write the specimens used in this book. These are the words like **kamla** and **godzi**, **matma** and **farfu**, **ditca** and **kicmu**, which we have encountered over and over again. Occasionally a complex predicate has been used to illustrate a grammatical point; but these have been introduced metaphorically as we went along. For example, **faltaa** [fahl-TAH-ah] ('liar') was introduced as 'false-talker'. The word is a complex formed of parts of the two primitive predicates **falji** ('false') and **takna** ('talk'), from which we learn that 'false-talker' is the basic metaphor underlying the Loglan conception of a liar. Similarly, **mormao** [MAWR-mough] ('kill') is made from **mor-** and **-mao**; and these parts come from the primitives **morto** ('dead') and **madzo** ('make'). So to kill something is to "make it dead" in Loglan. By a similar metaphor, a scientist is a "science-maker", someone who contributes to the growth of science; so the Loglan word for 'scientist' is **sesmao**. The word is made from the **ses-** of **sensi** ('science') plus **-mao** again. There are numerous **-mao** words in Loglan. For example, **rojmao** comes from **rodja madzo** or 'grow-make' and so means 'cultivate'. Agronomy can then be conceived as "cultivation-science"; and this metaphor can be rendered by the three-term complex **rojmaosensi**. Loglan for 'agronomist' then unfolds as the four-term word **rojmaosesmao** ("grow-make-science-maker"). In this way the pool of predicates can be indefinitely extended by the metaphorical elaboration of the fundamental ideas of the language. It is clear that the elaboration of new complex predicates by the invention of new metaphors will be the major source of future word growth in the language.

But it is not the only source. Our studies of these matters over the years have suggested that there are at least six further ways in which the vocabulary of Loglan will continue to grow. In addition to new complexes, there is a small pool of what might be called "international" words--words like 'telephone', 'football' and 'beer'--which has been only partly incorporated into Loglan. Most of these now-international words originally spread across the planet in the wake of commerce or conquest during the centuries of European expansion; so they are nearly all European words. But despite their local origins, they are now universally recognized. They are therefore ready to be added gratuitously, as it were, to the vocabulary of Loglan. Usually they are incorporated as primitive-form words: **futbo**, **telfo**, **paspo**. Others come in as longer borrowings: **tcokolate**. About a hundred of these words have already been brought in. Perhaps a few hundred more remain.

A morphological aside. When a Loglan word is primitive in form--i.e., when it looks and sounds like a primitive, as **telfo** and **futbo** do--but is derived as these words are from only one or a few languages, it is called a *one-source primitive* in order to distinguish it from the *composite primitives*, like **sensi**, **morto** and **madzo**, which are derived from as many languages as possible.

Complex predicates like **mormao** and **sesmao** are largely made, of course, from composite primitives; for it is these that have been provided with the short affixes, like **ses-**, **mor-** and **-mao**, that are the principal building blocks of the language. But, morphologically, locally-derived primitives like **futbo** are also primitive...even if they are not semantically so. Words that are neither primitive nor complex, but are still predicates, are called *borrowings*. These are words like **trombona**, **iglu** and **proteini** which are obviously predicates (they have all the necessary features) but are neither primitive nor complex in form. Armed with these few principles, let us continue our survey of the possible sources of future word-growth in Loglan.

In addition to the international words--which come into Loglan either as one-source primitives or borrowings--there is a second, even larger pool of "native" words which, when their meanings are required by Loglan scholars and story-tellers, will probably also be adopted. These are the local words for languages, peoples, artifacts, articles of food and dress, or even local plants and animals. Such things are often unique to the places where they originated--or at least, like kayaks and parkas, they were originally--and so they should obviously be predicated in Loglan by words which resemble the local words for them as closely as possible. Most of these words, like Inuit 'igloo', are primitive notions to the original users. So they should probably not be built as complexes even though they could be. Thus **nichaa** [neesh-HAH-ah] ('snow-house') is really not an adequate translation of Inuit 'igloo'. As it happens, the Loglan borrowing can be an exact imitation of the original Inuit word, namely **iglu**.

By a similar route Swahili **simba** for 'lion' also entered our international language intact. Like **parka**, the natural word 'simba' already has the shape of a Loglan primitive. Since the once-widespread lion is now virtually confined to Africa, it seems only fair to use the most widely-used African word for the beast. The Inuit word 'kayak' also names a unique category of objects on this planet, and so also deserves to be preserved and not metaphorized. But as the word /KAiak/ is vowel-rich and consonant-final, it is more difficult to import into Loglan than **iglu**, **parka** and **simba** were. We will learn how to borrow it in [Section 6.5](#).

Another source of locally-derived words are the language-nationality-culture triplets which we find in Loglan: words like **spana**, **spani** and **spano**. As we have already noted, all three of these were derived from Spanish 'Espan(i)ol' and mean in some sense 'Spanish'. Such words are brought into Loglan either as one-source primitives, as these three were, or as borrowings. So these, too, form a large pool of importable natural words only a small portion of which has yet been imported. In addition to the "Spanish" triplet above--**spana** for 'is an instance of the Spanish language', **spani** for 'is a Spaniard/Spanish person', and **spano** for 'is a Spanish custom/instance of Spanish culture'--we also have, with parallel meanings, **dotca/-i/-o** from German 'Deutsch' and 'deutsche', **hinda/-i/-o** from Hindi 'Hindi' and 'Hindu', **ponja/-i/-o** from Japanese 'Nippon' and 'nippon-ji', and **junga/-i/-o** from Chinese 'Zhung' and 'Zhungwo'. There are perhaps a dozen more of these primitive-form triplets in the current lexicon. But this just scratches the surface. There are at least 5,000 nameable languages on this planet; and a distinct people and culture--or at least a sub-culture--can usually be associated with each language.

There is still a fourth body of internationally-used concepts waiting to be incorporated into Loglan, and it is the largest yet. This is the international vocabulary of science. Of these, by a conservative estimate, there are now upwards of a quarter of a million terms. Science words were

mainly derived from Latin or Greek by European scholars during the few centuries since the European Renaissance, and they are found similarly-spelled, or spelled with only minor and often quite regular variations, in nearly all European languages. Indeed, when suitably transliterated into other writing schemes, they are to be found in all the other world languages whose speakers now "do science".¹ In incorporating these and other scholarly words into Loglan, we regularly use not the sound but the *appearance* of the scientific word as our model. We do this because, while scientific words are often pronounced very differently in different languages, their appearance on the printed page is usually quite uniform over many languages. The uniformity is often faithfully preserved even when the original Graeco-Latin word has been transliterated into some other alphabet, for example, into Cyrillic, the alphabet of Russian. So it is the scientific *reader*, not the listener, we must keep in mind when we are borrowing a scientific word for Loglan.

In making a scientific borrowing we try to retain those portions of the international word that are most consistently retained in other languages. This means avoiding the special endings that are often imposed by certain languages as well as language-specific spellings. At the same time, the resulting word must be a *Loglan* predicate, made with *Loglan* phonemes, and so display at least one consonant-pair as well as being vowel-final. It must also be regularly pronounceable as a Loglan word however it is spelled. **Proteini** [proh-TAY-nee] is an example of a word which meets all these requirements handsomely. It not only captures the look of what amounts to the "same word" in all European languages, but its final vowel is the standard /-i/ given to all Loglan scientific borrowings. So to a Loglan reader it has the unmistakable look--and sound, when da pronounces it--of a scientific borrowing. As many science words in Loglan do, it sounds a bit Italian. But that's fair; the scientific Renaissance commenced in Italy.

Not all ISV words ("International Scientific Vocabulary") fare so well. Take the word that is spelled 'atom' in English. Adding the conventional ending **-i** to the English word (which happens also to be the invariant international stem) gives **?atomi**. (A leading question-mark, recall, is the mark of a trial word.) But heard in a Loglan utterance this trial word would break up as the little word phrase **a to mi** = 'Or two of me'. Thus **?atomi** lacks the essential consonant-pair that is the distinctive feature of the Loglan predicate. But this lack is easily supplied. We insert a "gluing consonant"--conventionally the phoneme /h/--between the /t/ and /o/ of **?atomi**, and this gives the word the required consonant-pair: **?athomi**. Moreover, it puts the consonant-pair in a position that will prevent the trial-word from breaking up. The result is **athomi** [aht-HOH-mee], a word that now passes all tests. While not so immediately recognizable as **proteini** is, the Loglan word for 'atom' is still recognizable on second glance... especially by loglanists who know the gluing art and understand the vital need for it.²

Probably the International Scientific Vocabulary is the largest single population of words that will ever be incorporated into Loglan. Now approaching uniformity in all the languages whose speakers follow science, the terminology of science has become a truly planetary linguistic phenomenon, its numbers probably now growing more swiftly than that of any other body of words on the planet. In a sense it is *already* an international language, one waiting only for its grammar. Loglan may supply that international grammar. Sections 6.5-9 will be devoted to the art of ushering this flood of international words into Loglan.

So far we have mentioned making complex predicates and borrowing three kinds of concepts: international but once-local words in common use, language-nationality-and-culture words, and the vocabulary of science. We have treated these as four sources of potential growth for Loglan. A fifth but much smaller source of future growth is that we may yet find that the present set of semantically basic predicates, the composite primitives, is not yet complete...that is, not yet entirely adequate to the growth needs of the language. It is these semantically basic words, of course, that are employed in building complex predicates. They represent concepts that are nearly universal in human experience, and are represented by primitive predicates in nearly every human language. We will know that the Loglan set of them is incomplete when we find that words that we wish to build as complexes in Loglan may not be built without certain constituent notions that are not yet in our language.

As I mentioned, there are at present about 860 of these composite primitives in Loglan. It is pleasant to report that their number has grown only very slowly over the years. They have been tested three times for constructive adequacy against lists of the most frequently-used concepts in four major European languages (English, Spanish, French and German). So far they have passed these tests with flying colors. That is to say, they have proved collectively capable, with a negligible addition-rate, of supplying metaphors for all the complex notions we have so far encountered in these languages.³ But they have not been tested against languages which are representative of other language-families than the Indo-European one. It will therefore not be surprising, on Whorf's hypothesis, to discover that in embracing the concepts of the non-European languages, as we are now on the verge of doing, a handful of new "fundamental notions" may yet be required. If so, a new handful of composite primitives will have to be added. These will then be used to express the complex notions of still other major branches of human thought.

As their name implies, composite primitives are constructed compositely from words drawn from many languages. This procedure is described in [Section 6.5](#) below.

A sixth source of word-growth is obviously inherent in the privilege every loglanist has of adding new names to the language. These may be either imitations of natural names, or entirely new coinages. There is in principle no limit to the number of names that may be added to the language. The making of names is discussed in [Section 6.13](#).

Seventh and finally, there are certain "open" classes of CVV-form little words to which new members may be added from time to time. Chief among these are the modal operators, such as **lia** = 'like', and the discourse operators, such as **sui** = 'also', which may be indefinitely augmented. In addition, compound attitude indicators, like **aiui** = 'Yes, gladly', may also be added at will. Changes in, or additions to, other classes of little words will be more difficult to accomplish; but it is probable that needs for new punctuation words will be discovered, and it is even conceivable that whole new systems of little words will have to be incorporated to accommodate grammatical features of natural tongues which have so far been overlooked in our analyses. The unused CVV-form words listed in Paradigm L of *Loglan 4 & 5* are available for making these additions. The V, VV and CV word-spaces have long ago been exhausted.

In sum, there are seven sources of future word-growth for Loglan: (1) the addition of new complex predicates (like **djasolsensi** for 'sociology of knowledge'); (2) the incorporation of international words (like **futbo**) and (3) local food, tool, plant and animal words (like **gorgonzole** and **atlatlu**), (4) the coining of language, nationality and culture triplets (like **inhuita/-i/-o** = 'Innu'it' or 'Eskimo'), (5) taking in yet more of the international vocabulary of science (like **deoksiribonukli**), (6) bringing in new person and place names (like **Betcua'naland**), and finally (7) inventing new compound little words (like **pacenoinacefacenoifazu** = 'once-and-future-but-not-now-and-not-for-long', an *ad hoc* invention for the present paragraph) and the assignment of meanings to little word forms presently unassigned. In the remainder of this chapter we will consider how these seven elastic chambers of the language may be utilized by the speaker who wishes to contribute to its growth.

6.3 Making Composite Primitives

The composite primitives of Loglan are the semantically universal predicates of human experience. Such words have all been made in Loglan by deriving them from the eight source languages in such a way that the probability of recognizing them, as measured over the population who speak one or more of these eight languages, has been maximized. In general this has been done by ensuring that each phoneme in the constructed word appears in as many natural words of similar or related meaning as possible. The result is that these Loglan primitives have been made of overlapping pieces of natural words. It is in this sense that they are composite words.

The decision to add a new composite primitive to the language is a major one. Not only is the work involved many times greater than that required to make a complex, a borrowing, or a local primitive, but the presupposition that the machinery for making complex predicates either cannot or should not be applied to making a new predicate word for the needed notion, or that the notion is not already conveyed by a word that has spread internationally, which would justify our borrowing it, or by one that is of only local origin or significance--in which case, for a different reason, we would also be justified in borrowing it--is, by this time, likely to be a questionable one. To fail to find a suitable metaphor does not mean one cannot be found; and the discovery of a new, truly basic primitive is, by this time, an exceedingly rare event.

One late arrival in the set of primitives will illustrate this. It was the word **setci** = 'set'. The word **klesi** for 'class' or 'category' had been around for a long time. But there are many collectivities which are not classes, in that their members do not share any taxonomically useful characteristic--as mammals do, for example, and divorced American mothers also do--and which are, therefore, only sets. For example, the 37 objects bigger than dust-speck that are currently on my desk constitute a set, as do every tenth word in this book. The distinction between sets and classes is semantically fundamental...in a logical language. Moreover, there are certain complex notions--like 'genotype', 'character', 'kin', and so on--that can hardly be defined, or even thought about, without using the notion of a set. **Klesi**, to be sure, could have been made from the idea of a set; but not the other way round. **Klesi** was already deeply embedded in the semantic structure of the language; and anyway, *until* their differences from sets have been analyzed, classes and categories are more likely to be objects of direct perception than sets are. One sees the cardinals flitting through the woods as representative of their larger, unseen class: the species *Pyrrhuloxia*

cardinalis. But one does not see the scattered objects on one's desk as members of *any* collectivity...until, that is, one begins to think metalinguistically about just such phrases as 'the objects scattered on my desk'. It is from such historically late thoughts about meaning that the concept of sets arises. But late or not it is fundamental to our hypermodern language. For all these far-flung reasons, then, **setci** was reluctantly added to the primitive notions of Loglan, and **klesi** was retained.

Still, the occasion will again arise--though one would hope, infrequently--when a concept of truly general human significance will be found to have no good translation into Loglan and for which the existing set of primitives provides no ready route by which to express it metaphorically. As mentioned in the previous section, just this occasion may arise when and if the productive adequacy of the existing primitive set is tested against the complex concepts of some non-Indo-European language, say Chinese; for when this is done it may turn out that a supplementary set of "fundamental notions" will have to be added to our international language. It is well, then, to record here the methods by which composite primitives have already been built, and by which new ones may still be added to the language.

In order to achieve a kind of cultural neutrality for Loglan, its primitive predicates were formed as composites of words of similar meaning in the natural languages. As I indicated while discussing Loglan design principles in Chapter 1, this should make cross-cultural experimentation with Loglan not only possible but fair.⁴ To this end, it became our technical objective to make at least this one very important category of Loglan words--arguably the most important, for among them are the elementary semantic notions of any language--maximally recognizable over the largest possible population base...or at least one large enough to afford a variety of both linguistic and cultural contrasts around which to design cross-cultural experiments of a Whorfian cast. This objective was easier to meet than it now sounds. The first eight languages with which we tried to meet it turned out to be entirely adequate--perhaps more than adequate--to the task. For the total amount of recognizability it was possible to build into Loglan words from a consideration of just these languages was surprisingly large.

The languages chosen were, in the order of the combined totals of their primary and secondary speakers in 1955: English, Mandarin Chinese, Hindi, Russian, Spanish, Japanese, French and German. These are the eight most widely spoken human tongues. The trial addition of the ninth language, Arabic, while it would have appreciably increased the size of the population base, as well as the linguistic and cultural variety of future experimental designs, turned out to make no significant contribution to the average recognizability of our composite words; so Arabic was not retained. Tests in the other direction--that is, of the effects of dropping German, French, Japanese, etc., in reverse order from our list--were not carried out. We were satisfied with what may well be the over-achievement of our aim.

Linguistically considered, this set of what we may now call the "source languages" of Loglan contains representatives of three language-families: Sino-Tibetan (Chinese); Japanese, which is *sui generis*; and Indo-European (all the rest of the source languages). Looked at geographically, the source set contains the three most important Asiatic languages--Chinese, Hindi and Japanese--as well as the five most important European ones. Among the source European languages, there is a Slavic language (Russian); two Germanic languages (German and English); and two

Romance languages (French and Spanish). Some of the most interesting structural differences among human languages, from the Whorfian point of view, are spanned within this group of eight. As to culture, differences large enough to satisfy the most eager Whorfian also exist among the peoples represented in this group. The Chinese-Western difference, the Chinese-Japanese difference, the Indian-Western difference, the Romance-Germanic one--differences which express themselves in some of the widest philosophical, aesthetic, religious, political, metaphysical and ideological contrasts now partitioning the planet--all exist within the domain of Loglan's carefully contrived neutrality to be experimentally explored.

The population from which subjects for these experiments might be enlisted, and about which, therefore, conclusions might be drawn, is also satisfactorily large. The number of human beings who spoke one or more of the eight source languages as a native tongue, or, if none of them, then one or more of them as a second language, was, on the statistics available in 1955, roughly three-quarters of the population of the Earth.⁵ The average recognizability score of a Loglan composite word over this immense source population is 45%. This figure means that a person selected at random from this population would have the mathematical expectation of finding that about 45% of the sounds of some word of related meaning which da knows, appear in the same order in each new Loglan word with which da might be presented. Given the linguistic diversity of the source languages, this figure is surprisingly high. One would not have thought there would be so much commonality in the sounds of such historically diverse languages. But in part this high figure derives from the generosity of the Loglan five-letter form. For very often two very short natural words can be accommodated, as it were, side by side. This often happens for example, with Chinese and English, the two dominant languages on the list, both of which abound in short words. Thus Loglan **forli** ('strong') contains three-fourths' of English 'fort' followed by all of Chinese 'li'.

For the immense number of primary and secondary speakers of English--now reckoned at well over 30% of the world's five billion people--the probability of finding recognizable phonemes in a Loglan composite primitive is substantially more than .45; in fact it is about .70. English speakers are not only marginally more numerous than the second largest group, namely speakers of the Beijing dialect of Chinese, but unlike Chinese, English has lexical affinities with three other languages on the list. It shares some of its vocabulary with both Romance languages in the source set as well as other words with the other Germanic tongue. In other words, English has more linguistic allies in the source set than any other language in it. This, too, contributes substantially to the high average amount of English to be found in the typical composite word. Japanese, being *sui generis*, and so with the fewest allies, is also among the less widely spoken languages on the list. So it makes the smallest contribution to the Loglan composite word, with an average containment of Japanese phonemes of only 12%. The wide spread between these two figures is a consequence of our method of making--or, more accurately, discovering--high-scoring composite sequences, which is the method we will now describe.⁶

To maximize the probability of recognition of a given word over the source population, it was only necessary to weight the contributions made by each language to each trial word by a number which represented the proportion of the total source population who were speakers of that language.⁷ Then the trial word that demonstrably had the highest weighted-score was taken

to be the best Loglan word available for the concept. The proportions, or scoring weights, which were used in this work are given below:

English .28	Spanish .09
Chinese .25	French .06
Hindi .11	Japanese .06
Russian .10	German .05

Let us now consider some examples of how these weights were used.

For the concept 'week' the trial word which received the highest R-score ("recognition score") was **likta**; and **likta** contains:

2/3 of English 'week'	/u ik / yielding	2/3 X .28 =	.19
3/5 Chinese 'li bai'	/li bai /	3/5 X .25 =	.15
3/7 Japanese 'isshukan'	/is cu kan/	3/7 X .06 =	.03
2/5 Hindi 'saptah'	/sap ta /	2/5 X .11 =	.04
3/9 Russian 'niedielia'	/niedie lia /	3/9 X .10 =	<u>.03</u>
Total R-Score:			.44

The phonemes in the natural word which were counted as matching phonemes in the Loglan word are given in boldface.

Likta is a typical word in more ways than one. Not only is its score very near the average, but the fact that the only substantial contributions to its recognizability are made by English and Chinese is also typical of a very large group of composite primitives.

Here is the derivation of a fairly high-scoring word, **djano** = 'know', to which three languages made substantial contributions; for **djano** contains:

2/2 English 'know'	/no /	2/2 X .28 =	.28
4/4 Hindi 'jan-na'	/d jan /	4/4 X .11 =	.11
4/5 Chinese 'j dao'	/d jd ao/	4/5 X .25 =	<u>.20</u>
Total R-Score:			.59

Note that the suffix '-na' is omitted in the phonemic transcription of the Hindi word 'jan-na' and that English 'know' is not transcribed as /nou/, as it would be if we were concerned with the exact phonetics of this word. This is because English speakers hear this diphthong as /o/.

As a third example, consider the derivation of a low-scoring word, **dzoru** = 'walk', which happens to be exclusively derived from the two Far Eastern languages; for **dzoru** contains:

$$\begin{aligned}
&4/4 \text{ Chinese 'dzou'} \quad /dzou/ \quad 4/4 \times .25 = \quad .25 \\
&2/3 \text{ Japanese 'aru-ku'} \quad /aru/ \quad 2/3 \times .06 = \quad .04 \\
&\hspace{15em} \text{Total R-Score: } .29
\end{aligned}$$

Again, a suffix, '-ku', is ignored in the calculation.

Here is another moderately high-scoring word, **morto** = 'dead'. This one comes exclusively from the six Indo-European languages; and it contains:

$$\begin{aligned}
&3/3 \text{ Spanish 'mor-ir'} \quad /mor/ \quad 3/3 \times .09 = \quad .09 \\
&3/3 \text{ French 'mort'} \quad /mor/ \quad 3/3 \times .06 = \quad .06 \\
&4/5 \text{ English 'mortal'} \quad /mortl/ \quad 4/5 \times .28 = \quad .22 \\
&3/4 \text{ Hindi 'mrit'} \quad /mrit/ \quad 3/4 \times .11 = \quad .08 \\
&2/3 \text{ German 'tot'} \quad /tot/ \quad 2/3 \times .05 = \quad .03 \\
&3/5 \text{ Russian 'smert'} \quad /smert/ \quad 3/5 \times .10 = \quad .06 \\
&\hspace{15em} \text{Total R-Score: } .54
\end{aligned}$$

Each word adopted was, of course, the survivor of a competition among as many as a dozen trial words. In nearly all cases the accepted word was demonstrably the best word that *could* be made from the lexical materials considered for each language. The exceptional cases were those in which the best word conflicted with an existing word, and so a slightly lower-scoring word had to be adopted.

As the above derivations show, a natural word was held to make a non-negligible contribution to a trial word only under fairly rigid circumstances. Any sequence said to be a "matching" one had, in fact, to meet the following three conditions:

1. At least two phonemes in the natural word had to match phonemes in the trial Loglan word.
2. If exactly two phonemes matched, then they had to occur in the same order in both words and be either (a) adjacent in both words, or (b) separated by exactly one consonant in both or by exactly one vowel in both.
3. If three or more matching phonemes occurred, they had only to occur in the same order in both words to be counted. That is, no match between the phonemic neighborhoods was required.

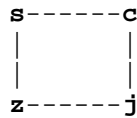
In other words, we found that if only two phonemes were involved in a given match, they had to be reasonably close together and found in the same consonant-vowel pattern in both words. Thus the /aCo/ pattern in **?flako** was said to match the /aCo/ pattern in 'tabol', but this sequence was not taken as matching either the /aVo/ in 'saio' nor the /aCCo/ in 'tabro'. On the other hand, we found that if as many as three phonemes were matchable between the trial and the source word, then the similarity between them was evidently more robust. For it apparently didn't matter whether the contexts matched or not. We found that the order of even three phonemes continued to matter, however.

What sounds of what source languages were taken to "match" what Loglan phonemes was a fairly complex problem in local phonemics which was settled differently for each source language. In Spanish, for example, any 'a' is said to match Loglan /a/; in English, only the 'a' of 'father', the 'o' of 'not', and the 'a'-sound occurring in diphthongs like 'aye' and 'ow' were said to match Loglan /a/. But because it "sounds like" 'o' to English speakers, the English final diphthong /ou/, as in /nou/ = 'know', was said to match Loglan /o/. In French, nasal 'a' and 'o' were taken to match Loglan /a/ and /o/ respectively *provided* they were followed by /n/ or /m/ in the Loglan words, for then it seems so to French ears. In Chinese, the sounds represented by 'hs' and 's' in the Wade system of transcription were both taken to match Loglan /s/; the sound written 'j' in Wade but with 'r' in the Yale system and in Pinyin is matched with Loglan /r/ even though this sound is not recognizably 'r' to any European ear; and the Chinese sound written 'ssu' in Wade, 'sz' in Yale, and 'si' in Pinyin is unmatchable with Loglan because the sequence /sz/, which is its approximate phonemic value, is proscribed in Loglan predicates. Of course all eight source languages have sounds that do not match any Loglan phonemes at all. But the above remarks will give some idea of the problems encountered in comparing the sounds of Loglan trial words to the words of several phonologically quite different languages simultaneously, and some of the ways in which these problems have been solved. In general, our ruling principle has been to set up such identities between Loglan and each source language as would fairly predict which sound-pairs would seem "recognizably identical" to a listener from that language, and which would not.

The recommended procedure for contributing a new composite primitive to the language is as follows: First, make a list for each of the eight source languages of all possible words in that language which might serve as mnemonic cues to the concept to be defined. They do not have to be synonyms.⁸ Eight good pronouncing dictionaries will be required. Second, transcribe each such potential cue-word into Loglan phonemics. Use such matching principles for each language as you can devise, or which you can induce from the derivations given in the Loglan-English dictionary. Use asterisks (or some other non-phonemic character) to record non-Loglan sounds in these transcriptions; for although they can make no contribution to a trial word, they must be counted as contributing to the overall length of each cue-word.⁹ Third, make trial words. Each word must, of course, be of either CV'CCV-form or CCV'CV-form, and any initial or medial consonant-pairs must appear in Tables [2.1](#) and [2.2](#), respectively, of Chapter 2; that is, they must be permissible. In making trial-words, you may be guided by four hypotheses, given here in the diminishing order of their likelihood: H₁: The best word will maximize the joint contribution of Chinese and English. H₂: The best word will maximize the contribution of English. H₃: The best word will maximize the contribution of Chinese. H₄: The best word will not maximize either Chinese or English, or Chinese and English jointly, but will capitalize on some adventitious commonality among cue-words of other languages. H₄-words are exceedingly rare. There may be, of course, several trial-words to be tested under each hypothesis, and words produced under H₁, H₂ and H₃ may be identical. Fourth, prove that the highest-scoring trial word or words is in fact the best possible word on the lexical materials you have assembled. Fifth, ascertain whether the best word conflicts with some existing word, and if it does, adopt the best of the words that do not conflict.

A trial-word is said to conflict with an existing word if (a) they are phonemically identical (no homonyms are allowed), (b) they differ only in their final vowels (**likta** and **?likti** would

conflict, for example), or (c) their only difference is a pair of consonants that occupy adjacent vertices on the "square of sibilants":



What this third kind of conflict means is that a pair of primitive-form words that differ only in the /s c/ difference, for example--as **cimra** and ?**simra** ([SHEEM-rah vs. SEEM-rah] would--are very likely to be confused in conditions of moderate noise; so this may not be the only difference between them. (**Cimra**?**simro** would have an acceptably larger difference between them, for instance.) /c j/, /j z/ and /z s/ as only differences would also lead to word-pairs that are likely to be confused. However, the "diagonal differences" /s j/ and /c z/ in the square of sibilants are quite acceptable. For example, **monca** = 'mountain' and **monza** = 'morning' function side-by-side in the language with no evident problems. This is probably because *two* phonetic features discriminate the diagonal pairs--specifically the presence or absence of voice and the front-back position of the tongue--whereas only one feature discriminates the pairs on the sides of the square. Our research has shown us that differences in two features are always sufficient to distinguish word-pairs like **monca/monza** and **jurna/surna** even in conditions of moderate noise. Notice, also, that words differing only in their *stressed* vowels, like **kerti/kurti**, are quite distinct; whereas the same phoneme-difference in an unstressed syllable, as in **larte**?**lartu**, would have generated conflict had we allowed such phonologically close pairs to exist in the language.¹⁰

Members of **spana/-i/-o**-type triplets do, of course, conflict with one another by this last criterion. But this is allowed. In fact, it is a deliberate feature of these semantically closely-related sets of local primitives. The fact that they are similar in all but their final vowels signals the close semantic relationships between the members of these language-nationality-culture triplets.

When you have made your new composite primitive, and assured yourself that it generates no conflicts in the existing lexicon, you may send your new word with its definition and derivation--arranged more or less as the dictionary entries for composite primitives are arranged in *Loglan 4 & 5*--to the address of The Institute given on the title page of this volume. Accompany it with a brief argument as to why you think we need it. For example, lists of useful complexes which might be made with your primitive would be germane. If, in the judgement of the Word-Makers Council, your word and the concept which it expresses are useful additions to the Loglan composite primitives, it will ultimately appear in the next edition of our dictionary, and, in the meantime, notice will be given of its acceptance, along with other current new words, in the various bulletins to that effect that appear from time to time in The Institute's other publications.

6.4 Making Complex Predicates

To add a new complex predicate to the language one must first coin a metaphor or metaphors capable of suggesting the meaning of the new predicate to future learners of the language.

Remember that for the foreseeable future Loglan will be learned as a second language by adults, only later by children. It is in this adult context that the importance of good metaphors will be seen. For example, the metaphor "sign-know" is very likely to suggest to a newcomer to Loglan the meaning of a predicate that is well-translated by English 'understand', especially if it is to be used in the sense of knowing the meaning of some sign or message. Surely it will do so a little better than 'under' plus 'stand' have ever succeeded in doing for adult learners of English!

Second, after one has made a metaphor, one must make sure that this metaphor or these metaphors are in fact expressible in Loglan primitives or borrowings. The metaphor "sign-know" is so-expressible; for both **sanpa** ('sign') and **djano** ('know') are elemental words...in Loglan as well as English.

Third, one must make a trial word or words from the Loglan version of each metaphor, making sure that it or they are in morphologically permissible form. For example, **sanpa** has two short affixes, **san-** and **-saa**, while **djano** has but one: **dja**. So the only possible 6-letter renderings of this complex notion are ?**sandja** and ?**saadja**. The morphology tells us ([Table 2.3](#)) that the */n+dj/-joint is not permissible. In fact it is unintelligible. The /d/ becomes inaudible in this context; so the string that is intended to be */ndj/ will be heard as /nj/. Hence ?**sandja** will be heard as **sanja**, which is primitive in form and thus misinforming. So if we want to use **san** + **dja**, we must buffer the */n+dj/-joint with the hyphen /y/. The result is **sanydja** [SAHN-nuh-jah], a 7-letter word. The hyphen looks awkward for so common a word. So we decide we prefer the one surviving 6-letter form **saadja** [sah-AH-jah].¹¹

Finally fourth, one must discover which, if any, of the trial-words is in fact still available in the sense of falling within the remaining "free word-space" of the language. At the time it was made, the **saadja**-slot was still free, so **saadja** was adopted as the word for 'understand'. The metaphor was adopted in 1962, and the word itself was remade with the new morphology in 1982.

Let us take up these points one at a time from the perspective of the maker of a new complex.

Behind every complex predicate, old or new, stands a metaphor. One's insight into the meaning of that metaphor may be as sudden as a hammer-blow, like the immediate understanding that **morto madzo** ('dead-make') can mean nothing else than 'kill', or, like the French phrase 'savoir faire' ('to know to do'), one's understanding of its meaning may sink in only slowly over the first half dozen occasions of its use. (The same metaphor in Loglan, by the way, is **durzo djano** = 'do-know'; this is the thought that lies behind the Loglan complex predicate **duodja** [doo-OH-jah] = 'know how to do'.)

Sometimes one's understanding of a metaphor depends on the contrasts it makes with other, similarly constructed ideas. For example, the difference between the active kind of knowing conveyed by **duodja** and the more passive sort conveyed by **saadja** is a larger difference than the one between **saadja** and **siodja** [SYOHD-jah], which also means 'understand' but this time in the very different sense of comprehending the workings of some individual or system. **Siodja**, happily enough, is derived from the metaphor **sisto djano**, or 'system-know', which is an idea that seems very satisfactorily to convey the subtle difference between these two basic kinds of understanding ('I understand him' vs. 'I understand what he is saying').

A good metaphor must also avoid the emptiness of one term's being included in the sense of the other. If the meaning of one term in a metaphor is already implicitly contained in the meaning of any of its companions, then including it does not add much. Thus ?**bersakli** = **berti sakli** ('carry-sack') does not express the idea of a suitcase very effectively because (nearly) any sack or bag can be carried. ?**Berbao** = **berti bakso** ('carry-box') is an improvement since perhaps not all boxes can be; but ?**berbao** does not quite yet make the point about luggage. **Racysakli** [rahshuh-SAHK-lee] made from **traci sakli** ('travel-sack') is a better metaphor since travelling is at least a surprising thing for a sack to do; but the word itself is awkwardly long. Note that the proscribed sequence */cs/ in ?**racsakli** required hyphenation. Moreover, there is no 3-letter affix for **sakli**. So **racysakli** is perhaps longer than we'd like the word for 'luggage' to be. So the metaphor we first chose to convey the idea of a piece of luggage in Loglan was **traci bakso** ('travel-box' or 'traveller's-box'). This yielded the complex **racbao**. We decided that this word was best for 'suitcase' because (i) all pieces of luggage travel, (ii) not all boxes travel, and (iii) nearly all luggage these days is rectilinear or boxlike in shape. Indeed, those that are not--like the duffle bags that sailors still use--could well be called **racysakli** ('travel-sack') in Loglan, a word with plain affinities to **racbao**. But having a pair of words for different kinds of luggage then suggested that the general term for luggage ought to be not **racbao** but **racveo** [rahsh-VEIGH-oh], the second part of this new complex being derived from **veslo**, a word which means 'vessel' and is the generic word for 'container' in Loglan. Thus **racveo** could mean 'travel-container'. So after a number of false starts it appeared that we had at last arrived at our destination. The lesson to be learned from this story is not to fall in love with one's early metaphors. Let them lie around unloved for awhile. If you do, better ones are very likely to come along.

Some metaphors require a fairly close analysis of the concept to be expressed. The English metaphor to be 'on the verge of', in the sense of being about to do something, is an example of an idea that defied successful metaphoric capture for some time. We tried **moidru** from **modvi durzo** ('intend-do') and **durmoi** from **durzo modvi** ('do-intend'); but intention is not the essential feature of an actor on the verge of something. Da may have been intending da's action for some time. It is the fact that da is on the edge of acting *now* that distinguishes a person about to do something from one who only placidly intends. Once this is seen, a happy metaphor is immediately forthcoming; and the Loglan word for 'be about to do' became **durbiesni** [door-BYESS-nee], a contraction of the phrase **durzo bidje snire**, a phrase which in turn translates literally and happily as 'do-edge-near'. So in the end we went back to the figure lurking behind the English metaphor. A person who is "on the verge of" something is indeed "near its doing-edge".

One might conclude from these examples that metaphor-making is essentially a poetic act. This would not mean, however, that only poets can do it...or if it did, that would not be much of a restriction. For there is probably a poet lurking inside every human head.¹²

Occasionally one makes two or more related complexes at once. Thus **groracbao** meaning 'trunk', made from **groda racbao** ('big-suitcase')--actually, from **groda traci bakso** ('big-travel-box'); for the terms of metaphors within metaphors must also be meaningful when unravelled--was made at the same time as **racbao** was, and suggests that the essential difference between a suitcase and a trunk is size. And so it is; for both are boxlike and both are luggage. And both contrast in shape with **racysakli**, the duffle-bags. On the other hand, all are **racveo**, the travel-

vessels. Thus by contriving this quartet of words all at once, we permit **racveo** to be used generically, whereby **Kambei lomi racveo eo** ('Bring my luggage, please') may be expected (in Loglandia) to fetch all one's luggage however varied.

Suppose, now, we have a satisfactory metaphor or set of metaphors for some new predicate idea we wish to express, and that we have been able to write these metaphors in Loglan using only the existing set of primitives. How then do we build trial words? The complex-making procedure is algorithmic; which means that a computer program can do it for you.¹³ This is how that program works:

Step 1. It assembles all possible affixes for each position in the metaphor. Thus for **sanpa djano** it assembles:

1st Term	2nd Term
san	dja
saa	djano
sanpy	

Note that a CVC-form affix need only be considered for non-final positions. CCV- and CVV-form affixes may be used in any position, but, as we'll see in Step 3, if one of the latter is initial in a 3-term or longer complex, it must be hyphenated to the body of the word to keep it from "falling off".

Step 2. It then generates all possible trial-words. In this case, there are six of them:

?sandja	?sandjano
?saadja	?saadjano
?sanpydja	?sanpydjano

Step 3. The algorithm then examines the "joints" in these trial-words to discover whether any need hyphenating, using Tables [2.2-3](#) to do so. Three joints do. **?sandja** and **?sandjano** require hyphen /y/ because of the unintelligible */n+dj/, and **?saadjano** requires hyphen /r/ because, without it, /saa/ would fall off.

So hyphenated, the new set of trial words is:

?sanydja	?sanydjano
?saadja	?saardjano
?sanpydja	?sanpydjano

Step 3 reminds us that there are two kinds of intraverbal hyphens in Loglan as was mentioned in Chapter 2. One is hyphen /y/, which is used to buffer otherwise unpronounceable or unintelligible consonant sequences and to attach 4-letter affixes like **sanp-** to their neighbors; the other is hyphen /r/ (with its allomorph /n/) which is used to join two CVV-form affixes together

in two-term complexes and to prevent initial CVV-form affixes from falling off three- or higher-term complexes.

Step 4. The algorithm then looks for and eliminates trial-words that break either of two rules: (a) No word is allowed to have adjacent identical vowels unless one of them is stressed. (b) The trial-word must not resolve into a CV-word followed by some unintended complex.

Part (a) of Step 4 eliminates ?**saardjano** but allows ?**saadjja** because the second /a/ in the shorter word is stressed: /saADja/. Part (b) is called the "Tosmabru Rule" because the trial-word ?**tosmabru** has this property. The trial word ?**tosmabru** was once intended to be heard as **tos+mabru**; but instead it resolved as the phrase **to sma+bru**. None of our trial-words fails the Tosmabru Test.

Five trial-words survive Step 4:

?sanydja ?sanydjano ?saadjja ?sanpydja ?sanpydjano

Step 5. Determine the best word among the survivors.

To do this, the algorithm scores them all. Unless the concept is one with a low expected frequency of use, in which case a longer word may be desirable, the shortest words score highest. So on the grounds of length alone the computer will pick **saadjja** from this set. Among words of the same length, however, words with more vowels score higher than those with fewer vowels. This is because Institute policy at present is to keep the vowel-consonant ratio in complex words as high as possible. This not only makes them easier to pronounce--judged on a world-wide basis--but increasing vowel-ratio also reduces the amount of consonant-buffering required in the buffered dialects; and this will reduce the average length of buffered words.

Human word-makers short-circuit the complex-making algorithm at many points. In fact, the human worker who looks up, or already knows, the short affixes of **sanpa** and **djano** (as found in Appendix C) will recognize immediately, on seeing **san saa** and **dja**, that ?**saadjja** is the best of the two words that can be made from this metaphor with short affixes. For one thing, ?**saadjja** will be seen to be richer in vowels than ?**sandja** is even before the possible difficulties of the sequence ?/n+dj/ are noticed and investigated. Therefore these difficulties do not need to be investigated. The best word is clearly **saadjja** and that's the end of it.

With a little practice such decisions can be made in a few seconds. All one needs is a list of primitives and their affixes (such as Appendix B or C) and access to a few short rules (such as those embodied in Tables [2.2-3](#)).

Technical words may be as long as the maker feels is necessary to get da's point across. Let's look at the word for 'agronomy' again. Its deriving metaphor is **rodja madzo sensi** = 'grow-make-science', or the science of cultivation. The algorithm makes **rojmaosensi** [rohzh-mough-SEN-see] from this metaphor, the long affix, **-sensi**, for the 'science'-term having been dictated by the fact that **sensi** has no V-final short affix. In fact, its only short affix is **ses-**. Building on **rojmaosensi**, the algorithm will then make the word for 'agronomist' by exploiting the one short

affix that **sensi** does have. Indeed, **ses-** is involved in the general word for 'scientist', which is **sesmao**. Thus, as we observed earlier, the scientist, in Loglan, is seen as a "science-maker". So replacing **-sensi** in **rojmad**sensi**** with **-sesmao** we get 'agronomist' = **rojmaosesmao** [rohzh-mough-SESS-mough], the "cultivation-science maker". The fact that **-mao** is used in two quite different senses in this word, one figurative, the other literal--or both figurative, but to different degrees--is part of its poetry...the sort of thing that a poet but not a logician might be expected to do.

Most Loglan complexes are made up, as **rojmaosesmao** and **saadja** are, of 3-letter segments. As you may already have discovered, the separateness of these triplets virtually leaps off the page. Like the codons of the genetic code, their intelligibility derives from their regularity. Some irregularities do exist, of course...those caused by hyphenation and the occasional long affix, such as the long final segment in **rojmaosensi**, for example. But, as we'll see in a moment, even irregular segment boundaries are easily spotted by the resolver. Moreover, once resolved, each segment may always be assigned to exactly one primitive predicate. As a result, each Loglan complex will always be uniquely decipherable. So when it is new to a learner, it will be heard as a string of elemental meanings, the whole string to be understood as a metaphor. What is remarkable is that the decipherment and subsequent understanding of such metaphors can be done so easily by persons who have never seen or heard the word before.

To guess the intended sense of a new metaphor from a string of elemental meanings is of course an inductive leap, full of insight and daring. It is one of the most amazing performances of the human mind. Yet that we should be able to make this leap with the near-infallibility with which we do make it is perhaps only the other half of the poetic gift, the gift by which we understand the poetry of others.¹⁴ In fact, in what will often be their instant understanding of the metaphors behind the new complex predicates they encounter, human users of Loglan will be enjoying one of the few advantages they will ever have over their computers. The latter will, of course, have to look each word up: old or new, simple, borrowed or complex. (Fortunately computers can perform these incessant dictionary lookups at great speed.) In contrast, human users of Loglan will seldom have need for dictionaries. Once they have mastered the basic kit of Loglan primitives and their affixes, human auditors and readers will seldom have to look up even new words. When they do, it will usually be to confirm and extend an insight they will already have gained from the metaphorical combination of easily deciphered parts.

In making this kind of dictionary-free learning possible, Loglan is by no means unique. Germans, too, seldom use dictionaries. It is said that by the age of eight, each German-speaking child has mastered the basic building blocks of the entire adult German vocabulary...with the result that, from that point on, and except for foreign loan-words, almost nothing ever has to be looked up. We have tried to engineer this same desirable property into Loglan.¹⁵

One apparent irregularity in the segmentation of Loglan complexes is that occasionally they are hyphenated. But this is only apparent. As the hyphens--whether /y/ or /r n/--always occur at the boundaries between segments, they may hardly be regarded as hindering segmentation. In fact, except for two irregular element words, **ytrio** and **yterbio** ('yttrium' [Y] and 'ytterbium' [Yb]), which are obliged to be spelled with the irregular phoneme /y/ because of the 'Y' in their international symbols, /y/ never occurs anywhere else in Loglan predicates except at segment-

boundaries. So if an instance of /y/ is found in a predicate word, and the word is not **ytrio** or **yterbio**, that /y/ is marking some segment boundary; and the predicate itself, of course, can immediately be known to be complex. So the presence of hyphens helps rather than hinders both the segmentation process and the swift classification of words to which it leads.

The /r n/-hyphen is of course more difficult to see than the /y/ one. The reason is plain. The sound /y/ has few functions in non-names. Except for the two /y/-bearing element words, the phoneme /y/ occurs only in its letter-words and in predicates. In the latter it occurs only as a hyphen or, in the buffered dialects, as a consonant buffer. So the appearance of a /y/ in a V-final, CC-bearing word in a non-buffered dialect is an instant signal to both eye and ear that the /y/-bearing word is a complex predicate.

Not so for the /r n/-hyphen. Both /r/ and /n/ occur in many words that are not complex, and in places even in complexes which are not the joints between its segments. Still, the /r n/-hyphen--/r/ being its primary or preferred allomorph, /n/ being used only when the next phoneme is /r/--is easy enough to spot. It is used for just two, easily recognized purposes, both of them quite rare. One is to fasten two CVV-form segments together to make a single two-term word, as **ba** and **mao** are joined in **baormao** [BOUGH-rr-mough] to make 'box-maker'; and the other, even rarer use is to tack a CVV-form segment onto the front of a 3-syllable, or longer, complex. Suppose one wanted a single short word that meant 'market-science'. 'Market' is **marte**; and looking it up in Appendix C we would find that it has exactly one short affix, **mae**. Since **mae** is CVV in form, if it is to be used at the beginning of a 3-syllable or longer word--and all **-sensi** words have at least three syllables--it must be /r n/-hyphenated. The result is **maersensi** [mah-ehr-SEN-see]. **Maersensi** is a pretty word; but perhaps a little obscure...as, in fact, /r n/-hyphenated words tend to be. So probably a better choice would be to settle, in this case, for the long affix **marty-**, with its incorporated /y/-hyphen, and build **martysensi** [mahr-tuh-SEN-see]. This new option, though certainly less mellifluous (at least to this word-maker's ear) than **maersensi**, is transparently the word for "market-science"; and so it is arguably a better word for so technical a concept.¹⁶

Even /y/-type hyphens are fairly rare in Loglan complexes. They occur most frequently in words like **mekykiu** ('eye-doctor' or 'ophthalmologist') in which hyphenation is unavoidable. The deriving metaphor for this word is **menki kicmu**, and each of its two words has exactly one short affix that will serve in these positions: **mek-** and **-kiu**. (**Kicmu** has another short affix, **kic-**; but **kic-** may not be word-final.) ***Mekkiu** and ***mekkiemu** are illegitimate constructions, threatening to be reduced in speech to the phrases **me kiu** and **me kicmu** immediately. So the four legitimate options are ?**mekykiu**, ?**menkykiu**, ?**mekykicmu** and ?**menkykicmu**. We see that hyphenation is literally unavoidable. Unless the concept of an eye-doctor is deemed to be infrequently enough used to deserve a longer form--like 'ophthalmologist'?--the algorithm will again pick the short word, **mekykiu**.

Long affixes are another source of harmless irregularity in the segmentation process. Five-letter affixes like **-sensi**--which are nothing more than the primitive itself treated as an affix--appear as final segments whenever (i) the final term in the metaphor has no V-final short affix, as is the case with **sensi**, or (ii) a long suffix is deemed to be deserved by a more formal word. **Mresurva** [mreh-SOOR-vah] and **fumsurva** [foom-SOOR-vah] for 'manservant'/'valet' and 'womanservant'/'maid', respectively, are instances of the first case. The long affix is required

because **surva** has only one short affix, namely **suv-**, and it is not V-final. All science-words are also built on this pattern in that they all have **-sensi** as their final segment: **fidsensi** ('physics') from **fizdi** = 'physical', **livosensi** ('biology') from **clivi** = 'alive', **tarsensi** ('astronomy') from **tarci** = 'star', **numсени** ('mathematics') from **numcu** = 'number', **tetsensi** ('meteorology') from **tetri** = 'weather', and so on.

Another kind of long affix is the one used in non-final positions, such as **marty-** in **martysensi**. Counting only their meaning-bearing portions, these affixes are really just four letters long; but they are extended to five by the necessity of being joined to the rest of the word with a hyphen. All these long non-final affixes are formed by replacing the final vowel of the chosen primitive with /y/, as **marte** ('market') is so-modified to produce **marty-**. As all Loglan primitives are open to this affix-making move, and as all pairs of them except those that happen to be members of the same language-nationality-culture triplets differ in more than their final vowels, such long affixes are always uniquely assignable to exactly one primitive or primitive-triplet. The vagueness of being derived from a triplet rather than a singlet, as is the case of the language-nationality-culture words, may seem a defect of the system. But when one considers that what is common to the meanings of the individual words in a triplet like **spana/spani/spano** is a very large and robust thing indeed--in this case, the very soul of "Spanishness"--it becomes apparent that it is precisely that large, robust, common thing--that very Spanishness--that is signified in a deriving metaphor by the long affix **spany-**.

Finally, there is the kind of complex predicate in which one or more of the terms in the deriving metaphor is not a primitive but a borrowing. **Athomynukle** [aht-hoh-muh-NOOK-leh] is such a complex; the deriving metaphor is **athomi nukle** ('atomic-nucleus') and the borrowed term, of course, is **athomi**. We will look at how such borrowings are made in the next section. At the moment all we wish to point out is that, by convention, whenever any term in the deriving metaphor of a complex predicate is a borrowing, then *all* the joints between the segments of that complex must be hyphenated. (The ambiguity that is cut off at the pass by this rule will be identified in a moment.) The hyphen that is always used to attach such borrowed segments to the rest of the word is /y/. Thus **iglymao** [EEG-luh-mough] means 'igloo-maker' and is derived from the metaphor **iglu madzo**, of which the first term is obviously a borrowing. To make a non-final affix from the loan-word, its final vowel (or vowel group, if it had one) has been replaced by /y/.

Take the complex predicate **bakteryrodhopsini** [bahk-tehr-ruh-rohd-hohp-SEE-nee]. We know it is a complex *and* a predicate by its internal /y/. The single hyphen breaks this long word into just two parts, **baktery-** and **-rodhopsini**. Each part is derived from a borrowing. **Baktery-** comes from **bakteri** for 'bacterium/-ia', and **-rodhopsini** for 'rhodopsin', being final, represents itself. So the deriving metaphor behind this word was evidently **bakteri rodhopsini** or 'bacterial rhodopsin'. Thus its proper translation (into English) is 'bacteriorhodopsin', a single scientific word which actually means 'bacterial rhodopsin'. That, at least, is the inside story of **bakteryrodhopsini** as known to its builder.

But what about the outside story? How can such a word be known by the reader or listener to be a 2-term complex made from just two borrowings? Why don't **bak** and **ter** also count as segments of this word, representing, as they normally do, **bakto** ('bucket') and **te/teri/tera** ('three/'third/'triad'), respectively? The answer is that because we know that one of the terms in

the deriving metaphor was a borrowing, we may infer that both of them are. Which one do we know to be a borrowing, and how do we know it? We know that **rodhopsini** is a borrowing because it does not break into segments as a complex and therefore can be nothing else. We also know the rule just stated that if any term in a complex is a borrowing, then all of its joints must be hyphenated. Only one joint in this borrowing-containing complex is hyphenated. Therefore, if the word-maker was obeying this rule--and we must assume da was; that is what rules are for...to ensure the safety of just such assumptions--no other apparent joint, such as the one between **bak** and **ter**, is a real one. Therefore, **bakter-** is a single segment and must come from **bakteri**, and not from **bakto tera**, for example. If in fact the word-maker had wanted to make a word for 'bucket-triad-rhodopsin', then da would have hyphenated the **bak+ter** joint thusly: **bakteryrodhopsini**. In so doing, da would be following the rule that requires us to hyphenate all joints of loan-bearing complexes.

It is of course quite possible to create text in which all these hyphenated words have actual hyphens instead of 'y's. In this textual style '**bakter-rodhopsini**' would contrast even more visibly with the unintended '**bak-ter-rodhopsini**'.

It is now time for a phonological observation. It is permissible to pause after any of the /y/s in one of these long loan-bearing complexes, and even to stress the /y/-preceding syllable, without spoiling its resolution as a single word. Thus the pronunciation [bahk-TEHR-ruh . roh-dohp-SEE-nee] of the word **bakteryrodhopsini** is just as acceptable as its somewhat swifter delivery as [bahk-tehr-ruh-roh-dohp-SEE-nee]. The production with the pause will sound superficially like a two-word phrase but will turn out not to be one. It is the anomalousness of the [uh .] sequence that tells us that it isn't. The [uh] is a hyphen; and as a word may not end with a hyphen, the pause [-] that follows it must be inconsequential, that is, ignorable by the resolver. The resolver is, in a sense, advised by the appearance of each hyphen that it is still in the midst of a predicate word. Knowing this it can, in effect, start its resolution over again. So the resolution of this string as a single predicate word is not in the least troubled by the practice of pausing after /y/s.

Close relatives of scientific complexes made with borrowings are the complexes which have letter-words or number-words among their parts. Usually, these non-predicate elements in the metaphor appear in its early portions; they are in any case never final. Little words, too, are joined to the predicate stem with hyphens. Thus **Xaiykre** [KHIGH-uh-kreh] is 'X-ray', the **Xai** being the letter-word for upper-case Latin 'X', and the **kre** being from **kreni** = 'is a ray from source...' **Xaiykre** may be variously written, e.g., as '**X-kre**', '**Xykre**', '**Xai-kre**' or, indeed, as '**Xaiykre**'. But all such expressions are read aloud as [KHIGH-uh-kreh]. The sound [kh], the reader may recall, is the guttural "k" or "rough breath" of Russian or Greek, and an irregular sound in Loglan. The contrasting word **Kaiykre** [KIGH-uh-kreh], by the way, would be 'K-ray'; so one must, in this case, be careful of one's pronunciation...cultivating, for the purpose of talking about X-rays, one's Russian [kh].

Incidentally, the above example reveals how another potential ambiguity is avoided. **Kaiykre**, meaning 'K-ray', is hyphenated with /y/...as it should be. Suppose we mistakenly used the /r/-hyphen, writing **kairkre** and saying [KIGH-rr-kreh]. Unintentionally we would have invoked an entirely different predicate, one that means 'property-of-a-ray' or perhaps 'having-a-ray'; for in

this word **kai** is not the letter-word for upper-case '**K**' but the short affix of **katli** ('has property/quality/feature..'). The difference in meaning between the two words **Kaiykre** and **kairkre** is entirely conveyed in speech by the two hyphens. The rule is that letter- and number-word segments are always hyphenated to a predicate stem with /y/; while normal CVV-form affixes, when initial segments of their complexes, are always hyphenated with /r n/. Remember **baormao**, the "box maker".

Let us close this section on building new complexes by observing that if a Loglan speaker finds a complex predicate in the Loglan dictionary whose deriving metaphor strikes him as less effective, less beautiful, or less apt than one that has occurred to da, let da construct a new one. By submitting da's alternative word to The Loglan Institute da will ensure that it will be considered for inclusion in the next edition of our dictionary. If the Loglan Council of Word-Makers does consider it worthy of inclusion, da's coinage will, for a time, live side by side with the old one...whence, in competing for the attention of other users of the language, only one, perhaps, will survive.¹⁷

6.5 Borrowing Predicates

Borrowings are not so much made as seen. Once one has mastered the borrowing art, new borrowings may be written into Loglan almost as fast as one can write them down. So the most troublesome question is not how to borrow a given concept but whether to borrow it.

The borrowing process itself is virtually algorithmic. This is especially true when the word in question has a widely-borrowed root that appears in slightly different forms in many different languages already, as is true of nearly all science words. So recasting such a word one more time, this time in a form acceptable to *Loglan* morphology, is usually a trivial matter that will add only seconds to the borrowing process. Thus, 'protein', 'hormone' and 'interferon' come into Loglan as **proteini**, **hormoni** and **interferoni** almost as fast as you can type them; and writing 'atom' as **athomi**--once the borrowing rules are known--requires only a few more centiseconds. So typically the most difficult part of adding a new borrowed word to Loglan is making the decision to borrow it in the first place.

The temptation to borrow a word usually arises because its concept is a necessary one for some literary, scholarly or scientific enterprise, and one suspects that it should not be made as a Loglan complex. The other possibility, namely making it as a composite primitive, is seldom even considered. By this time it is an extremely rare event that a new concept is best rendered as a composite primitive. But choosing between borrowing an existing international word for a useful concept and making it as a Loglan complex sometimes requires some thought, and sometimes even preparatory work. Institute policy, while increasingly clear in the case of science words, may not yet provide guidelines that cover the case you are considering. So the most workable policy for individual word-makers is a tentative but optimistic one. Study this chapter; borrow the words you think we need; then let your fellows on the Loglan Word-Makers Council review your borrowings. They will decide whether your new words should be permanent features of the language or not. By considering everybody's work from their community-wide perspective, the Council is likely to develop the same kind of "nearly algorithmic" borrowing policies in other areas as have already emerged for science.

Borrowing policy as it affects science words may be simply stated. If a word has already been borrowed with minor local adjustments in the majority of European languages--in a sense, Europeans were the founding members of the now intercontinental community of science and still deserve to be consulted--and its concept is an exclusively scientific one, then borrow it once more for Loglan. Borrowing it will be to follow a path well-trodden.

But how does one know that the scientific word one is looking at is one of those much-borrowed words that is already part of what the Merriam-Webster people call "ISV", the "International Scientific Vocabulary"? Without consulting a stack of foreign language dictionaries? The easiest answer is to shift the inquiry to another, more easily answered question: Are its roots Graeco-Latin? Did the maker of the prototype--the neologism that is the ultimate source of all this borrowing--go back to those classic languages of European antiquity to get the semantic elements with which to coin it? Well, if you know the most commonly used Greek and Latin roots that appear as "combining forms" (affixes) in these modern scientific coinages, you will probably recognize immediately that 'protein', 'carbohydrate', 'rhododendron', 'horizon' and 'oxygen', but not 'light-year', show indubitable signs of having been made of just such roots. 'Light-year', in contrast, though equally "scientific", has been made of good old English roots and is therefore almost certainly not ISV. (Neither 'light' nor 'year' is either Greek or Latin.) An even simpler test, and probably equally decisive, is to look up the word or words in question in a good-sized dictionary of some Romance language. Any Romance language will do...for example, French, Spanish or Italian. They all have almost identical borrowing habits as far as science is concerned. If a scientific word is substantially the same word--or at least similar enough to attest to having been borrowed from some common source--in both one Germanic language (English) and any one of these Romance tongues, then it is almost certainly ISV and should probably be borrowed.

Applying this test to English 'protein', 'carbohydrate', 'rhododendron', 'oxygen', 'horizon' and 'light-year' we would get 'proteina', 'idrato di carbonio', 'rododendro', 'ossigeno', 'orizzonte' and 'anno luce' if our test language were Italian; 'proteina', 'carbohidrato', 'rododendro', 'oxigeno', 'horizonte' and 'año de luz' if our test language were Spanish; and 'proteine', 'hydrate de carbone', 'rhododendron', 'oxygene', 'horizon' and to 'anneé-lumière' if it were French. Clearly all of these words but the 'light-year' set are ISV. The point is that consulting any of the three Romance languages would have been sufficient to find that out.

Indeed, going back to our earlier point about the origins of these particular words, simply knowing their etymology (i.e., the history of their derivation, as given in almost any large dictionary) would have been sufficient to find out that all but 'light-year' are ISV. For under etymological inspection, 'light-year', being composed of two Germanic words (the German for it is 'Lichtjahr') stands out like a sore thumb. Even with a good etymological dictionary, however, other cases will not be so clear. All things considered, the Romance language test is probably more reliable.

So let us return to that test and its implications for our examples. Since English departs from the Romance languages in using 'light-year' for that important astronomical measure (instead of some anglicized Latin compound, say, like *'annolumen'), we may conclude that neither the Germanic nor the Romance rendering of it should be borrowed for Loglan. Instead the Loglan

term for 'light-year' should be made as a Loglan complex...as it easily can be. In fact, in making our complex predicate we might as well use the same metaphor as the one that both the Germanic and the Romance languages use: "light-year" or "year of light", it amounts to the same thing. Thus the Loglan word for this concept was built as **litnirne** [leet-NEER-neh]. It comes from **litla nirne**, which is of course nothing more than the literal translation of the English phrase 'light year' into Loglan. Note that we use the Germanic word-order, not the Romance one. Loglan, too, is an Adjective-Noun language as neither Latin nor any of its descendants is.

For a very different reason, the concept of "horizon" should probably also not be borrowed. While the word is apparently ISV in all the European languages, the concept itself is part of everyday human experience. Every pair of human eyes has seen horizons. Unlike protons, oxygen and carbohydrates, horizons are directly perceived by human sense organs and noted--and probably named--in all human cultures. Therefore the Loglan word for 'horizon' should be reduced by metaphor to the common ingredients of human experience, which is what we do when we make it as a Loglan complex predicate. Following this decision, 'horizon' was easily made as **telbie** [TEL-byeh] from the metaphor 'Earth-edge'. An horizon, I reasoned, marks the edge of the planet...as everyone who has sailed, or flown, or stood in high places, knows. The Loglan metaphor that conveys this high-flying image is **terla bidje**.

All the other words on our test list may be safely borrowed...and from either the Romance or the English version of the word; the borrowing procedure has been contrived in such a way that it won't matter greatly. I personally prefer using the Spanish version as the source word. I use the Spanish language in my "Romance language test". So while I'm about it, I keep the Spanish word I've just looked up to see if it is like the English, and use it as the source word for the borrowing I will make only if it is. For example, Spanish 'sicopatico' is more useful as a starting point for a Loglan borrowing than English 'psychopathic' is. Both are "local versions" of exactly the same international scientific word; but in the Spanish language most of the necessary rewriting has already been done. The Spanish dictionary one uses to perform this test must be a fairly large one, of course, or specialized in the scientific direction. For it must in any case contain a usable large proportion of the ISV.¹⁸

Once the decision to borrow a scientific word has been made, then transforming, let us say, the Spanish version of it into a predicate-form Loglan word is accomplished in four steps, two of them tests which most words pass immediately. In the rest of this section I shall describe the four steps in a summary fashion in order to give the reader an overview of the borrowing procedure as a whole. Then, in Sections 6.6-9, the full range of moves under each step will be discussed in greater detail.

Before leaving our example, let me report that the four words we have been talking about, all of which we found to be safely ISV, were borrowed as **proteini**, **carbohidrati**, **rodhodendroni** and **okso**. The latter could have been borrowed as **oksigeni**, but as it is a very commonly used element word, the shorter **okso** seemed justified.

Now let us walk through the steps of the borrowing process. Suppose we want to import the word 'insulin' into Loglan. The Spanish word is 'insulina'; so we are assured that it is ISV.

Clearly insulin is not, like horizons and blue-birds, directly perceived in human experience. Hence it is borrowable.

These preliminary questions out of the way, the first step is to rewrite the source word in Loglan phonemes if it needs to be. 'Insulina' is already in Loglan phonemes. So no respelling is necessary. Our first trial-word is therefore ?**insulina** itself.

The second step is to equip it with an appropriate ending. As you may have noticed, /-i/ is the ending conventionally assigned to Loglan science words. So we replace the final /-a/ of ?**insulina** with /i/. Again it is no surprise that ?**insulini** sounds Italian. Most Loglan science words do.

The third step is to test our trial-word for breakup. ?**insulini** doesn't break up into a phrase the way ?**atomi** did (**a to mi**). The initial /i/ is stuck fast to /ns/ because /ns/ is an impermissible initial sequence. After that, nothing breaks.

The fourth step is to inspect our trial-word for segmentation problems. (a) Does ?**insulini** segment like a complex? Clearly it doesn't. (b) Does it commence with a consonant-pair? It doesn't; but if it did, we would have to ask, Does the sequel to its first consonant segment as a complex? ?**insulini** is not CC-initial, so the second question doesn't apply. So ?**insulini** passes all tests. **Insulini** may now be used in the language as a predicate meaning 'is insulin/a quantity of insulin from animal/source...'

Reviewing what we have done,

Step We rewrite the source word in Loglan phonemes if necessary. (It wasn't necessary.)

1.

Step We supply it with an appropriate ending. (As insulin is a scientific concept, we replace the single-V ending of the Spanish source word with /i/.)

2.

Step If it breaks, we glue it. (It didn't break. We didn't have to glue it.)

3.

Step If it, or the sequel of an initial consonant, segments like a complex, we spoil the

4. segmentation pattern. (We didn't have to.)

'Insulin' is a fairly typical word. About a tenth of the science words we've borrowed have been like it in being consonant-final and requiring no gluing: 'interferon', 'protein', 'proton', 'interleukin', etc., are all of this pattern. They've all gone into Loglan with (a) little or no respelling, and (b) the addition of final /i/ to the English form of the word. This usually amounts to the replacement with /i/ of the single final vowel of the Spanish source word. The results are words like **insulini**, **interferoni**, **proteini**, **protoni** and **interleukini** that sound like Italian plurals and yet are distinctly loglandical. Because they neither break as phrases nor segment as complexes, they have the properties of a simple (i.e., non-complex) Loglan predicate quite naturally. Such words can be borrowed almost as fast as they can be written. The source of the borrowing is always plain.

Now let's look at several additional difficult-to-borrow words. This time we'll consider a word that does require some respelling: 'cercopithecine'. It's based on a Linnaean genus word, so we'll probably fail to find it even in a large Spanish-English dictionary; but looking it up in an unabridged English one we find that it is derived from '*Cercopithecus*', the name of a genus of long-tailed African monkeys that includes the guenons. Our convention is to use a Linnaean word as the source of a borrowing whenever one is available. The reason we do this is that endings like '-cine' tend to be language-specific; and so it would be a mistake to imitate any one of them in Loglan. In contrast, the Linnaean terminology is universal. So as we want our word to be as international in flavor as possible, we use '*Cercopithecus*' as our source for the Loglan translation of the English word 'cercopithecine'.

In Step 1 we ask, Does '*Cercopithecus*' require respelling? The answer is yes. Two of the 'c's in this word precede "strong vowels" (/a o u/) and so are turned into /k/s. Thus ?**cerk**opit**hekus**. Note that the first 'c', which precedes a "weak vowel" (/e i y/), is unchanged. This follows a general custom in the Romance languages...and many others. However, instead of pronouncing this unaltered 'c' as /s/, as it is the Romance custom to do, we will of course continue to pronounce it as Loglan /c/, i.e., as [sh]. What about the 'th'? Our rule here is to rewrite this digraph as /t/ whenever it does not precede a stressed, i.e. penultimate, vowel. When it does precede such a vowel--as it does, for example in ?**ethili**--we keep the /h/ and pronounce it: for example, [et-HEE-lee]. The 'e' in '-thecus' is also going to be stressed. So we keep this /h/ and pronounce it: [shehr-koh-peat-HEH-koos]. Thus our trial-word is still ?**cerk**opit**hekus**.

Step 2 asks us to fit a new ending if our trial-word requires one. ?**cerk**opit**hekus** does. It is not only a science word but its source is Linnaean. So special rules apply. One of those rules requires that we replace the /us/ on words derived from Linnaean sources with /ui/; we'll see why this special treatment is required in [Section 6.6](#). So ?**cerk**opit**hekui** (pronounced [shehr-koh-peat-HEK-wee]) is the new shape of the trial-word as it emerges from Step 2.

Step 3 asks us to test our trial-word for breakup. Does it break up as a Loglan phrase? No; again the initial /ce-/ is prevented from being heard as a CV-word by the fact that the /rk/ that follows it in ?**cerk**opit**hekui** is impermissible at the head of a word. So we pass on.

Step 4 asks us to look for segmentation problems. Can ?**cerk**opit**hekui** be heard as a Loglan complex? We can start to segment it as **cer+kop**+..., but then the sequence +**ithekui** comes along and we cannot continue. If a word cannot be completely segmented, it is not a complex. Finally, ?**cerk**opit**hekui** is not CC-initial so the second segmentation test does not apply. Apparently there are no segmentation problems; so there is nothing to be done in Step 4. **Cerkopithekui** is evidently the Loglan word for 'is a cercopithecine, a member of the genus *Cercopithecus*'.

Let's now borrow a word that illustrates why Spanish makes a better source language than English does. Let's borrow the medical term 'psychopathic'. The words 'psychopath' and 'psychopathy' will of course come along with it. The corresponding Spanish cluster is 'sicopatico/-ta/-tia'...attesting to the ISV-ness of the psychopathy concept. In Step 1 we rewrite the two 'c's as /k/s; for both precede strong vowels. In Step 2 we replace the ending /-iko/ with /i/ getting ?**sikopati**. (It wouldn't have mattered which member of the source cluster we had used, because /-a/ and /-ia/ are also replaced with /i/.) In Step 3 we find that ?**sikopati** breaks up as **si**

ko pa ti; so we glue it together by inserting /h/ after the consonant (or consonant group) that follows the first word-break, in this case, the one between **si** and **ko**. This gives us ?**sikhopati**. In Step 4 we discover that there are no segmentation problems. So **sikhopati** is evidently the Loglan predicate for 'is psychopathic/a psychopath, someone suffering from psychopathia'. Psychopathia itself, of course, will be designated by **lopu sikhopati**, the mass of psychopathic properties, or psychopathies. The mass of psychopathic states can then be designated by **lopo sikhopati**.

Let's borrow one more medical word and then go on to consider the four borrowing steps one at a time. Let's take another illness word, this time 'tubercular' in the sense of 'suffering from tuberculosis'. In Loglan, we usually use the disease noun, the '-osis' or '-pathy' word, as the source of these medical borrowings. In Step 1 we rewrite 'c' as /k/ because /u/ is a strong vowel. In Step 2 we drop the 's' from '-osis' getting /osi/. In Step 3 ?**tuberkulosi** breaks up into the phrase **Tu berkulosi** ('You are "bercular", whatever that means'); so we have to glue it. We insert /h/ after the consonant that follows the word-break; and this gives ?**tubherkulosi**. In Step 4 we notice that the sequence /-kulosi/ cannot end a Loglan complex unless it is part of a borrowed segment. There are no hyphens; so this settles the matter without further testing. The Loglan word is **tubherkulosi** and it means 'suffers from tuberculosis/is tubercular'. Again, the disease itself will be designated by **lopu tubherkulosi**, and the mass of all disease states, by **lopo tubherkulosi**. (If you want to develop some skill in pronouncing these long words, practice saying [loh-poh-toob-hehr-koo-LOH-see] a few times. You might alternate it with the distinctly easier production [loh-poh-seeek-hoh-PAH-tee]. Soon you will be talking like a loglandian physician.)

Borrowing will never be completely algorithmic, of course. Every now and then a first-cut borrowing will imitate a complex, and when it does, a repair appropriate to the local circumstances of the problem will have to be devised. [Section 6.9](#) describes the several strategies that have been devised to deal with this non-algorithmic side of the borrowing problem.

In the above examples we have concentrated on problems. So let me conclude this section by showing the reader how swiftly the borrowing procedure works with non-problematic source words. Here is a group of Italian musical words, also widely borrowed internationally and so borrowable in Loglan as well. The procedure works like an algorithm here; it brings all six words through Step 4 without appealing to human judgement:

Italian	Step 1	Step 2	Step 3	Step 4
viola	-	-	violha	-
violino	-	violina	violhina	-
violone	-	violona	violhona	-
violoncello	violoncelo	violoncela	violhoncela	-
tromba	-	-	-	-
trombone	-	trombona	-	-

This is a typical set of borrowed words. As they are Italian, we see that almost no rewriting is necessary in Step 1. In fact, only the double 'll' of 'violoncello' gets rewritten as 'l'. In Step 2,

however, four of the six trial-words exchange their Italian '-o' and '-e' endings for the Loglan music-word ending '-a'. (The other conventional word-endings are given in [Section 6.7](#).) In Step 3, another four require /h/-insertion to prevent break-up (into the phrases **vio la**, **vio li na**, **vio lo na**, and **vio loncela**). In Step 4, none of the six words prove to have segmentation problems. Finally, we may note that **honcela** [hohn-SHEH-lah] will make a nice abbreviation of Loglan's new **violhoncela**, the also overlong name for the mellow instrument whose name we abbreviate as 'cello' in English.

In the next four sections we consider the four steps of the borrowing procedure in more detail.

6.6 Rules for Rewriting Source Words

Once a word is chosen to be the source of a borrowing, one should rewrite whatever characters in it match the left halves of the following rules. Rewriting rules will not be very different for the various types of borrowings--for music as opposed to food words, for example--but certain problems arise in borrowing science words that require special rules. [Table 6.1](#) includes the solutions to all known instances of such problems for all categories of borrowings. The trial-words given as examples in the table are the products only of rewriting; no other borrowing steps have yet been performed on them.

Table 6.1 Rules for Rewriting Source Words	
aa	aa => a. 'aardvark' => ?ardvark.
ae	ai-or-ae- => e. 'Aegytopithecus' => ?egiptopithecus.
c	c before C/a/o/u => k; c followed by e/i/y, or matched in the symbol of an element word, unchanged. 'canid' => ?kanid; but 'violoncello' => ?violoncelo and 'californium' = ?californium.
cc	cc followed by e/i/y => kc; otherwise cc => k. 'succinta' => ?sukcinta; but 'Echinococcus' => ?ekinokokus.
CC	Any double instance of a C not c is replaced by a single instance of that C. 'Bettongia' => ?betongia.
ch	ch => k. 'Escherichia' => ?eskerikia.
ee	ee => i. 'sakeen' => ?sakin.
eigh	eigh => ei. 'leightonii' => ?leitoni.
ew	ew => u. 'Andrewsarchus' => ?andrusarkus.
h	h in VhC => VCh to make it pronounceable. 'ahli' => ?alhi.
ie	-ie => i; non-final ie unchanged. 'calorie' => ?calori.
igh	igh => ai. 'lightfooti' => ?laitfuti.
ii	-ii => i; non-final ii unchanged. 'livingstonii' => ?livinstoni.
lh	lh- => elh; non-initial lhC => lC; non-initial lhV unchanged. 'lhoesti' => ?elhoesti.
ng	ngC => nC; ngV unchanged. 'livingstonii' => ?livinstoni, but 'Bettongia' => ?betongia. If ngC => nC is later found to cause segmenting, then repair with nC => ngiC. E.g.,

	?livinstoni breaks as 'li vinstoni' and /h/-insertion then gives ?livhinstoni which segments as liv+hin+stoni. This triggers the rule nC => ngiC which inserts /gi/ into the trial word, giving ?livhingistoni, which no longer segments.
oo	oo => u; except in 'zoo-' and other disyllables in which oo remains unchanged. 'lightfooti' => ?laitfuti, but 'Zoothera' => ?zoothera.
ou	ou => u when within a natural form: 'youngi' => ?iungi; when split between two forms, unchanged: 'thiourea' = 'thio-' + '-urea' => ?tiourea.
ow	ow => ao. 'owstoni' => ?aostoni.
ph	ph => f; ph- => eph in very short words; non-initial ph unchanged when it will glue an otherwise breaking word. 'phenyl' => ?fenil; but 'phyla' => ?ephila; and 'ophiocomina' => ?ophiokomina.
pt	pt- => ept; non-initial pt remains unchanged. 'Pterocera' => ?epterocera.
pn	pn- => n; non-initial pn remains unchanged. 'pneumonia' => ?neumonia.
q	q => k. 'antiquitas' => ?antikuitas.
qu	in Sp. source words quV => kV; but in a Linnaean, quV => kuV. 'braquiopodo' => ?brakiopodo; but 'Madoqua' => ?madokua.
rh	rh- => r; rhC => rC; non-initial rhV unchanged. 'rhodopsin' => ?rodopsin.
sc	sc => sk. 'sclerosis' => ?sklerosis.
th	when not followed by a stressed V, th => t; when followed by V', h is retained. Also, if the th-containing word is related to one in which h precedes V', keep the h. Thus 'ethylene' ?ethileni [et-hee-LEH-nee] is related to 'ethyl' ?ethili [et-HEE-lee] and so keeps its h.
y	y => i. 'Amphyosemian' => ?amfiosemian.
yn	yn => un whenever the n is the last C in the word. 'butenyne' => ?butenune; but 'dynamo' => ?dinamo.
x	x- => z unless matched in the symbol of an element word, when unchanged; when non-initial, => ks. 'xenyl' => ?zenil; but 'Atilax' => ?atilaks; 'xenon' unchanged.
w	w => u unless matched in the symbol of an element word, e.g., ?lawrencium.

Note that 'j' is not rewritten; it is retained and pronounced as Loglan [zh].

Perhaps the most awkward rewriting problems are presented by the Linnaean vocabulary of biology. This is true principally because species and genus names often incorporate the name of their discoverer. This brings into science a riotous variety of names and spelling styles: 'Escher' in '*Escherichia*', 'Livingston' in '*livingstonii*', 'Lightfoot' in '*lightfooti*', and so on. Many rewriting rules are necessary just to make such words pronounceable in Loglan phonemes. In general our goal has been to develop words from these Linnaean sources that will be regularly pronounced in Loglan much as Spanish or Italian scholars would pronounce the originals.

6.7 Rules for Adjusting the Endings of Loan Words

By convention, certain characteristic vowels are used for ending loan words of given types when they are six letters long or longer. Shorter words, like **iglu**, may keep their natural endings. In fact, the endings of 4-letter loans and single-source primitives, like **simba**, should follow the natural sources as closely as possible without regard to these conventions except that all element words, short or long, should end in /o/.

These are the five characteristic vowel endings:

- a for musical forms and instruments.
- e for local foods, dishes, plants, and animals.
- i for scientific, technological and medical words.
- o and -io for element words.
- u for all the rest, e.g., tools, clothing, dwellings.

Most of the rules for adjusting the ending of a borrowing are obvious. For example, if after being rewritten, a trial loan word already ends in its characteristic vowel, e.g., **?livinstoni** from the Linnaean 'livingstonii' and **?tromba** from Italian 'tromba' ('trumpet'), then we of course leave the ending unchanged. If it ends in a single V which is not characteristic of its type, then we change it to the proper one. E.g., the science word **?amfidela** becomes **?amfideli**, and the musical word **?trombone** becomes **?trombona**. There is one exception to these obvious rules: the Spanish endings '-ico/-ica', which will have been rewritten as /-iko -ika/ during Step 1, are entirely replaced by whatever vowel is appropriate. Thus, as we have already seen, the medical term **?sikopatiko** is reduced to **?sikopati**.

Genuine problems arise only with trial words which end in vowel-groups or consonants. Then the following rules apply. Remember that adjusting the end of a trial-word takes place after it has been rewritten, if necessary, in Loglan phonemes:

1. All word-final vowel-groups are reduced to the characteristic vowel except the endings /-ae -ea -oa -ua/ on Linnaean-derived science words. In the case of /-ae/, the whole ending is replaced by /ei/ if the source is Linnaean. In the case of the /-Va/ endings, the vowel /i/ is added. Thus the Linnaean-derived trial-words **?kimera** (from 'chimaera') **?sturio** and **?artemia** are changed or reduced to **?kimeri** **?sturi** and **?artemi**, respectively, but the rewritten Linnaeans **?kimerae** (from 'chimaerae') **?cinerea** and **?madokua** are changed or expanded to **?kimerei** **?cinereai** and **?madokuai**. This is to preserve distinctions which are finer-grained among Linnaeans than among other categories of possible source words.

2. The characteristic vowel is added to all consonant-final trial words except those which end with /-(i)es -is -(i)us -(i)um -ik/. In these exceptional cases, the word-maker should replace the entire ending with the characteristic vowel unless it is an

/-(i)um/ ending on a Linnaean, in which case add /i/ to it, or an

/-(i)us/ ending on a Linnaean, in which case replace it with /ui/. Thus the trial scientific words **?andrias**, **?acipenser** and **?dalton** issuing from Step 1 become **?andriasi**, **?acipenseri** and

?**daltoni**, while ?**intestinalis**, ?**humerus** and ?**organic** become ?**intestinali**, ?**humeri**, and ?**organi** after end-adjustment. But the Linnaean '*Bittium*' keeps its ending by becoming ?**bitiumi**, and the /-us/ ending of the Linnaean '*Gymnorhinus*' is changed to /ui/ in order to preserve its distinction from '*Gymnorhina*'. Thus ?**gimnorhinui** and ?**gimnorhini** are the ending-adjusted words, and the gender difference is preserved.

Thus as far as possible the special requirements of each body of words to be borrowed--for example, the occasional importance of a gender distinction among the biological Linnaeans--are taken into account.

There is more about the importation of Linnaean words in [Section 6.14](#).

6.8 "Gluing" Trial Words

That a trial-word should break into a phrase of two or more shorter words--as ?**atomi** breaks into **a to mi**--is perhaps the most common problem that the Loglan word-borrower will encounter. The frequency of the problem is understandable. Science words, especially, are mainly derived from Greek or Latin roots, and in these languages, simple consonant-vowel alternation is a very common word pattern. This is a common pattern in Loglan, too, of course. But in Loglan consonant-vowel alternation means that one is listening to a string of compound or simple little words. So if we were to borrow words like 'leukemia', 'modularis' and 'molecule' intact, they too would be heard, after end-adjustment, as strings of Loglan little words: **leu ke mi**, **mo du la ri**, **mo le ku li**, and so on.

Even when there is a consonant-pair in a Greek or Latin source word, it often comes too late to hold the whole Loglan trial-word together. Thus after end-adjustment 'rhododendron' and 'kilocycle' will be heard as **ro do dendroni** and **ki lo cikli**. Besides, not all consonant-pairs save trial-words from breakage. In ?**isopropili**, for example, the /pr/ pair is itself a permissible initial. So despite its having a consonant-pair, the trial-word breaks up into the quite reasonable phrase **I so propili** = 'And six propyls'. Similarly, 'retrovirus/-ri', after end-adjustment, comes out ?**retroviri**; and this also breaks up, in this case as the phrase **re troviri**. Obviously, such fragile words may not be permitted in Loglan, where speech and writing are isomorphic. After all, we speak a language in which one can infallibly set down in writing what one hears...*provided* the word-borrowers do their job right.

Despite the frequency of the breakage problem, however, there is always a simple algorithmic solution to it once identified. There are two principal gluing moves, each called for by its own particular set of circumstances. Inserting "gluing /h/" after the first word-break is, as we have seen, by far the most common of these repair moves. It fixes all the breakages except the last one, **re troviri**, that were listed in the last paragraph. In all other cases the phoneme /h/ is simply inserted after the first consonant or consonant-group that comes after the first word-break: after the /k/ in **leu ke mi**, the /d/ in **mo du la ri**, and so on. This gives us **leukhemi** [leigh-ook-HEH-mee] for 'leukemia', **modhulari** [mohd-hoo-LAH-ree] for the Linnaean species name 'modularis', **molhekuli** [mohl-heh-KOO-lee] for 'molecule', and **rodhodendroni** [roh-d-hoh-den-DROH-nee], **kilhocikli** [keel-hoh-SHEEK-lee], and **ishopropili** [ees-hoh-proh-PEE-lee] for 'rhododendron', 'kilocycle' and 'isopropyl'. Once /h/s have been installed, these are all perfectly good words

which have no segmentation problems. (**Kilhocikli** will, however, have to compete with the complex **kilcikli** ('thousand-cycles') for our vote as the best word for this concept; and it will probably lose.) It is not until we get to the breakup of ?**retroviri** as **re troviri** that the second, and far less common gluing move, is called into play.

We will call the second repair move "continuant doubling". It is applied only when one of the four continuants /r l m n/ is the last consonant in a group of two or more consonants that immediately follows the first word-break in a pseudo-phrase. This is the case in the phrase **re troviri**, for example. The cure is to double the continuant /r/. This produces the new trial word ?**retroviri** [reh-trr-oh-VEE-ree], which does not break up.

But how does continuant-doubling arise? In particular, how is it related to /h/-insertion? Well, if we followed the more common practice in the above case and tried to insert an /h/ after the consonant-group in **re troviri**-- not noticing, perhaps, that the last element in the group was the continuant /r/--we would get ?**retrhoviri** as our new trial-word. Certainly this *looks* more difficult to pronounce; and if we do try to pronounce it in a Loglan way, we are very likely to produce a vocalic rendering of the continuant anyway: [reh-trr-hoh-VEE-ree]. Indeed, this is probably the only way one *could* pronounce the medial consonant sequence /trh/ in Loglan, that is, by vocalizing the /r/ in this inter-consonantal context. So, since vocalicization is an all but inevitable consequence of /h/-insertion in such contexts, and the vocalicized consonant is in many ways simpler to both produce and hear than the inserted /h/, we decided to simplify matters and not insert the /h/ at all in these cases, but just double the continuant. Thus **retroviri** is now the recommended respelling of 'retrovirus/-ri' as imported into Loglan. Note that its pronunciation is surprisingly easy: [reh-trr-oh-VEE-ree]. Indeed, for most people, this will be an easier word to pronounce than words that have been fixed by normal /h/-insertion. '**Retroviri**' is also visually simpler than '**retrhoviri**', as well as closer to their common source in 'retroviri'. So except for the necessity for introducing an *ad hoc* resolution rule that will keep such words from being heard as phrases, continuant doubling is a simplification of the /h/-insertion move in a context in which the latter encounters phonological difficulties.

The required *ad hoc* rule is, of course, that doubled continuants be confined to loan words and to the borrowed parts of complexes, and that even in these contexts they not be allowed in word-initial syllables. It is this rule, of course, that makes the sequence /trr/ an impermissible one initially, and so saves /retroViri/ from being heard as the two-word phrase **re *trroviri**.

Both /h/-insertion and continuant-doubling require a certain care in pronunciation. All such repaired words are meant to contrast successfully with the phrases into which they were *not* allowed to break: thus **leukhemi** [leigh-ook-HEH-mee] should contrast intelligibly with **leu kemi** [leigh-oo-KEH-mee], and **retroviri** [reh-trr-oh-VEE-ree] must successfully contrast with **re troviri** [reh-troh-VEE-ree], which is the phrase it was not allowed to be. Notice that the second contrast is far easier to produce and hear than the first one. The vocalicized continuant is in fact quite audible and gets an extra syllable of its own. Indeed, even syllable count is different in the word compared to the phrase (5 syllables vs. 4). In producing **leukhemi** intelligibly, however, one must deliberately separate the [k] from the vowel [eh] with a strongly aspirated [h]. A little practice listening to one's /h/s makes one reasonably good at this. However, you needn't be concerned about perfecting this skill. It is mainly your computer that will care if you fail to

"emphasize your /h/s" in a way that can always be heard. Your human interlocutors will probably understand you even if you mumble them.

It is true that after all the breakups have been repaired--and about half your scientific borrowings will require gluing repairs--a Loglan text that is largely made up of such borrowings--a scientific article, say--will at first fairly bristle with its 'h's. But experience has shown that the 'h's soon drop into the visual background in such documents. They become virtually invisible, in fact. What the English-trained eye comes to see in **athomi**, **molhekuli**, **ishopropili**, **rodhodendroni** and **leukhemi** are strings of letters in which the 'h's and 'i's have been blanked out: 'at-om-', 'mol-ekul-', 'is-opropil-', 'rod-odendron-' and 'leuk-em-'. A possible cause of this phenomenon is that the 'h's bear almost no semantic burden. They seldom occur in such positions in the original Greek and Latin constructions. 'Methane', 'atherosclerosis' and 'ethyl' and kin are the chief counter-examples I've run into. Besides, in such words the "real" 'h's have a way of coming back to life: **methani**, **atherosklerosi**, **ethili**, **ethileni**, and so on. As for the inserted 'h's, all they have to say to the reader is 'This is probably a Loglan borrowing' The often-added final /i/s bear a similarly slender metalinguistic message: 'This is probably a Loglan *scientific* borrowing.'

So in the end what the reading eye does is look past the gluing 'h's and the characteristic vowels to the phonemes that actually identify each borrowing...in a sense the load-bearing ones. Among these the reader will almost always find the main ingredients of an often-borrowed international word laid out in seemly order. Beyond **atlatlu** is the Nahuatl word 'atlatl'; beyond **ionhi** is the Greek word 'ion'.

6.9 Curing Segmentation Problems

Loglanists, we have seen, expect to be able to spot and decipher new complexes as they read and listen. So a loan-word that ends up looking and sounding like a complex is no good to us. It throws the attentive reader/listener off the track. And loglanists are likely to be fairly attentive readers and listeners. In fact, we are likely to be constantly on the lookout for segmentation patterns like **mek+y+kiu**, **roj+mao+ses+mao**, **num+sensi** and **marty+sensi** in what we see and hear. These are the hallmarks of the Loglan complex predicate. Complexes are far more important in our language than borrowings are. So any borrowing that can be seen or heard as a complex probably will be.

In a world of well-constructed borrowings, attention to segmentation patterns will be amply repaid in Loglan. For one thing, new complexes are likely to be much easier to understand than novel scientific words are. The reason is that all *regular complexes*, i.e., those made of non-borrowed parts, are combinations of about 600 plainly derived affixes as well as the 860 Loglan primitives themselves. In Loglan, these basic semantic ingredients will be routinely learned by everyone. Once they are learned, *any* new complex--no matter how strange or long--can be easily deciphered. So deciphering a strange new complex is likely to be a much easier task for the ordinary loglanist than fathoming an unfamiliar scientific borrowing...like **albocinerei**, for example.

The word I've chosen to make this point is obviously a Loglan borrowing; its form is not primitive and it doesn't segment. But what it borrows is a natural complex, originally made from

several parts. Its source was 'alboconereous', an English ISV word that was once derived from Latin 'albus' = 'white', 'cinis' = 'ashes' and '-eus' = 'composed of'. So 'alboconereous' is a technical word meaning 'composed of white and grey material'. It is used mainly by anatomists.

To know this one has to know a lot about how Greek and Latin roots have been used in making scientific words. At least one must know how to use the etymological information given about them in large dictionaries. All scientists must learn at least a portion of this immense body of Western scholarship; but usually they master only enough of it to understand the derivations of the words used in their own and related disciplines. It will probably not be different for the Loglan-reading scientist. So da will probably be unwilling to give up the clarity of the words da can easily decipher--the regular Loglan complexes--just to make the borrowing of the natural complexes a little more automatic.

For it is the automaticity of the borrowing process--and very little else--it turns out, that is at stake here. That is what we give up when we require that every word-borrower check da's products for segmentation, and then correct them before da publishes them. For, unlike breakage, there is no automatic way of curing a segmentation problem once one has been found. Suppose we have made ?**palheozoi** from the English source word 'Paleozoic' (Spanish 'Paleozoico' gives the same result). If we fail to notice that our trial word could be segmented as **pal+heo+zoi**, then at least some of our unfortunate readers would be sent on a wild goose chase when they encounter our new word. The most attentive of them would attempt to decipher **pal+heo+zoi** [pahl-heigh-OH-zoy] as a three-term complex. If they do, they will soon be frustrated. To be sure, **pal-** has an assigned meaning as an affix of **spali** = 'side'; but both **-heo** and **-zoi** are still unassigned. That doesn't mean that they *couldn't* have meanings, however, or that the day will not come when they do. Were such a day to come, borrowings like ?**palheozoi**, if we permitted them, would be un-untiable knots in the fabric of the language. They would be words that could only be legitimately interpreted as complexes but which context demanded be seen as loans.

So we avoid such words with their mixed messages. We carefully examine each loan-word we make for the two ways in which it might imitate a complex: (1) all by itself, as ?**palheozoi** imitates **pal+heo+zoi**; and (2) as part of a CV-word initiated phrase, as ?**spektri** in the phrase **tospektri** imitates **tos+pek+tri**. For this reason words like ?**spektri** are also disallowed.¹⁹

The tests themselves are easy to conduct. Test 1 is simply to attempt to resolve one's trial-word as a complex. If one succeeds, as one does in the case of ?**palheozoi**, the word must be repaired; its segmentation pattern must be spoiled. Test 2 applies only to CC-initial words. Of these one asks, Will the sequel of the initial consonant segment as a complex? If it does--if ?**spektri** segments as **s+pek+tri**--it is a Spektri-type word; and it, too, has a segmentation pattern that must be spoiled. The tests require no human judgement. So performing them could well be part of a borrowing algorithm. It is the *repair* of a segmentation problem once identified that cannot yet be done algorithmically.

As mentioned earlier, the direct imitation of a complex, as ?**palheozoi** imitates **pal+heo+zoi**, produces by far the most common type of segmentation problem: it affects about 5% of the scientific borrowings. But the second, **s+pek+tri**-type problem, while much rarer--occurring as it does in less than 1% of the scientific borrowings--may be repaired by exactly the same set of

maneuvers. So from the standpoint of the word-maker, we may consider both sets of problems to be one.

The task in either case is to spoil the segmentation pattern of the pseudo-complex. Once spoiled in any particular, the pattern will disappear. Thus there is no such thing as a word which is "half complex and half borrowed" in Loglan. If *any* part of a word fails to segment as a complex, and it is not a primitive, then the whole word is a borrowing. So to spoil a segmentation pattern at any point in it is to solve the segmentation problem.

Here are some of the most commonly used "pattern-spoiling" maneuvers:

1. Restore an old VV, VC or VCV ending, preferably one that was replaced in Step 1 or 2, and add the characteristic vowel if necessary.

The failed word ?**palheozoi** affords a good example of the usefulness of this kind of repair. In Step 2, the /-iko/ of ?**paleozoiko** was replaced by /i/; we now restore it and change the /o/ to the characteristic vowel /i/. This produces ?**palheozoiki** [pahl-heigh-oh-ZOY-kee], and, miraculously, the segmentation pattern disappears. Segmenting from left to right, we get as far as **pal+heo+...** before the "indigestible" residue +**zoiki** appears. No sequence of the shape -CVVCV can be the final segment of a regular Loglan complex because no string of that shape can be decomposed into regular Loglan affixes. Therefore any word that ends with such a segment must be either wholly or partially a borrowing.

So **palheozoiki** is now a satisfactory Loglan form of the international word that is in English 'paleozoic' and in Spanish 'paleozoico'; and while, to the knowing scientist, all three of these words are natural complexes, composed as they all are of variations on the two Greek roots 'paleo-' and 'zoi-' (meaning 'old' and 'life' respectively), there is now no temptation to interpret it as a *Loglan* complex. Its parts are in this case Greek, not Loglan.

There is a simple feature of a regular Loglan complex which may be used to detect the goodness of a Step 4 trial borrowing at a glance. This is that the last six letters of a regular complex must either (a) be -CVVCVV in form or (b) contain at least one CC. Several final patterns occur very commonly among borrowings that show neither of these characteristics. Such words may be known immediately to be borrowings...or to contain them. This is true no matter what their front ends look like...provided, of course, that all breakup problems have been solved. For example, if a predicate shows the final pattern -VCVCV, then it can only be a borrowing. This is also true of other final patterns: -CVVCV (as we have just seen) and -CVVVV and -VCVCVV. Predicates with such final sequences cannot be regular. Therefore if a predicate does end in any of these ways, it is either a borrowing or a complex in which at least its final segment has been borrowed.

Returning to our main task, which is the repair of segmentation problems, here is another pattern-spoiling move:

2. Insert a vowel between the members of any consonant-pair other than the first one.

This assumes that there are at least two CC-pairs, as there are, for example, in both ?**spektri**, which fails because of **s+pek+tri**, and ?**galhaksi**, which segments as **gal+haksi**, the latter being the trial-word which emerged from the gluing of ?**galaksi (ga laksi)**. Usually the inserted vowel is /i/, and if there are more than two CC-pairs available, usually the earlier the pair that is chosen as the site for this surgery, the better the result. But in the case of ?**s+pek+tri**, choosing the third C-pair, namely /tr/ as the site for vowel-insertion gives the best result; and the best vowel, this time, seems to be /e/. Thus, **spekteri** is the word we chose, but **spektiri** would have spoiled segmentation just as well. Applying the same move to ?**galhaksi** produced **galhakisi**; but this is a resolvable word we didn't accept. Instead, we looked to other spoiling moves to produce possibly better results for this important notion.

Another trial word that segments is ?**plasm** = **p+lasmi** (from 'plasma'). This time there is only one possible site for vowel-insertion, and that is /sm/. This time /i/ does seem to be the best vowel even though /a/ was tempting. The word we finally settled on was **plasimi**. Notice that 'plasmid' follows the same route: ?**plasmidi** segments as **pla+smidi** and repairing it by vowel-insertion gives **plasimidi**. So the two borrowings **plasimi** and **plasimidi** exhibit the same degree of affinity as their sources do.

Here's a final spoiling move:

3. Eliminate one of the two consonants in any consonant-pair other than the first one.

For example, **gal+haksi**, which is what happens to ?**galhaksi**, which is in turn the glued form of ?**galaksi** from 'galaxie', imitates a complex. Spoiling Move 1, which restores the original ending and then extends it, produces the resolvable word **galhaksiei** [gahl-hahk-SEE-ay]. Move 2, which inserts a vowel in the second CC, produces the equally resolvable **galhakisi**. Both moves cure the problem, but neither result seems as attractive (to this word-maker, at least) as one of the results of spoiling it by Move 3. Move 3 can give either **galhaki** or **galhasi**. Something about the simplicity of **galhasi** [gahl-HAH-see], for the notion of an "island universe", appeals to me.

Notice that while Move 3 works here, it would have given unattractive repairs of both of the problem-words we chose to cure with Move 2. That is, it gives **speki**, **speti** or **speri** for 'spectra', and all these are, in my opinion, less suggestive of the source than **spekteri** is; and it gives **plasa** and **plama** for 'plasma', and these are less successful words than **plasimi** is...or at least it seems so to these ears. But the reader has observed that the words that emerge from segmentation repair are nearly always less handsome than other borrowings. Fortunately, only about 5% percent of borrowed science words require such repairs; see [Section 6.11](#) for the proportions in other categories.

There are other ways to repair segmentation problems; but these three are the main ones. It is obvious that human esthetic choices are involved at nearly every point in the repair process, and would be no matter how we chose to do it. It is thus the segmentation problem--the occasional word that looks like a complex and requires spoiling--that makes the borrowing procedure non-algorithmic.

6.10 Some Non-Scientific Borrowings

While the largest number of borrowed words in current Loglan are science words, local food, plant and tool words are also eminently borrowable. Here is a list of food and drink words, for example, for which the characteristic ending is /-e/. We start with cheeses:

gorgonzole	glaosetere	gaodhe
rokfore	dansiko blanu	gruiere
limburgere	tcedare	munsitere
brihe	kambere	provolone
montereidjeke	stiltone	edhame

Dansiko is from the **dansika/i/o**-triplet for Danish, Danes and Danish culture, which includes the art by which they make their cheese. Note that, for the most part, we follow sounds rather than spellings in making these borrowings. One talks and listens to talk about food; much less frequently does one write about it. So the principal habitat of the culinary vocabulary is speech.

We continue with some fruit and vegetable words:

aspharage	abrrikote	gumbo ('okra')
articoke	fighe	kolhe ('cabbage')
tcokolate	melhone	brokhole
mustharde	selhere	kolhyflora ('cauliflower')
banhane	mango	pampelmuse ('grapefruit')
kranbere	zukhine	persa ('pear')

Kolhyflora is of course a complex made from **kolhe flora** ('cabbage-flower'), a practically universal metaphor for this vegetable.

We finish with some words for wines and other potables:

bordo	vermute	rainvaine
bojhole	uiski	sakhi
mozhele	konhiake	absinte
porto	madhiere	campeine
herhese (cerhi)	marsale	muskatele
cabli	sotherne	klarete

One observes that words originating in the Romance languages--especially from Spanish and Italian--suffer less distortion in being imported into Loglan than words from other languages. Compare Italian-derived **gorgonzole** with German **munsitere**. This is, of course, a natural consequence of the deep phonological affinity between Loglan and other instances of what might be called "five vowel" languages.

6.11 The Borrowing Pathways and Their Products

Before we leave the topic of borrowing it will repay us to look at the outcome of all these arrangements. What borrowing pathways are most common? What do the words produced on these pathways look like?

We have a sample of about 1,000 scientific borrowings to look at. In the period 1985-88 The Institute added about 1,600 scientific words to the lexicon during its studies of how best to translate scientific prose into Loglan; and about 1,000 of these were added as borrowings. The rest were single-source primitives, complexes, and scientific names. The added words covered a wide variety of scientific topics, ranging from archeology to biochemistry and cosmology.

The largest group of borrowed words that were outcomes of a single borrowing pathway--neglecting rewriting differences--were words like **hormoni**. These are words that are made by replacing a single final vowel with /i/. They neither broke nor segmented; so they needed no repairs. Let us call them Group 1. They amounted to about 15% of the 1,000 borrowings. Three examples are **kartilagi**, **intestini** and **gimnorhini** (for 'cartilage', 'intestine' and 'Gimnorhina').

The next most productive pathway was single final-V replacement combined with /h/-insertion. No words with segmentation problems are included in this group. Call these Group 2. These were a little fewer than 15% of the sample. Three examples are **anhilini**, **kimheri** and **cithosini** (for 'aniline', 'chimaera' and 'cytosine').

The next biggest group were words that came from naturally C-final sources--C-final in English, anyway--but broke, and so had to be fitted with a final /i/ as well as glued with /h/. Call these Group 3. They were a little more than 10% of the sample. Three examples are **hemhoglobini**, **neurhoni** and **achipenseri** (for 'hemoglobin', 'neuron' and 'Acipenser').

The fourth group came from naturally C-final sources that didn't break but had to be fitted with final /i/. These required no gluing and were a little less than 10% of the sample. Next to Group 8, which required no alteration beyond rewriting, these are perhaps the most recognizable of the Loglan science borrowings. Three examples are **antigeni**, **kanceri** and **etheri** (for 'antigen', 'cancer' and 'ether').

Then we come to six smaller groups, each with about 5% of the sample. In order of size, they are Group 5, which were made by replacing a VC-ending, usually /-is/, with /i/ and gluing with /h/. Examples are **anhalgesi**, **kathalisi** and **filhariasasi** (for 'analgesic', 'catalysis' and 'filariasis').

Next were those with VC-endings that required replacement with /i/ but no gluing. Examples are **brakeocefali**, **sklerosi** and **karpoidi** (for 'bracheocephalic', 'sclerosis' and 'Carpoides').

Then there were the Linnaeans that didn't break but were /-us/-final. These, recall, had to be made /ui/-final so that they would contrast with the occasional feminine form of the same words. Examples are **amfibolurui**, **granulatui** and **gimnorhinui** (for 'Amphibolurus', 'granulatus' and 'Gymnorhinus'; compare the latter with 'Gimnorhina' => **gimnorhini** in Group 1.)

Then there are the naturally Loglan-form words, perhaps as rewritten. Examples are **arteri**, **singami** and **prosimi** (for 'artery', 'syngamy' and 'prosimii'). These were also about 5% of the sample.

Another "five-percent group" were those with natural /i/-endings--again, perhaps as rewritten--but requiring gluing with /h/. Examples are **ephoksi**, **ephitaksi** and **helhioterapi** (for 'epoxy', 'epitaxy' and 'heliotherapy').

The last of the six "five-percent groups" were the Linnaeans with /us/- endings that were required to be replaced by /ui/, but which also needed gluing with /h/. Examples are **pomharinui**, **orhiolui** and **methopidui** (for 'pomarinus', 'oriolus' and 'Metopidius').

With the ten groups described so far, we have accounted for about 80% of the borrowed science words. Four more groups had about 5% each; but these were not products of single production pathways as the first ten groups were. For example, in the order of size, Group 11 was composed of all those words that had had segmentation problems, no matter what their other characteristics. About half of these were glued with /h/ and the rest required no gluing. Many different solutions to their segmentation problems were represented. Here are three examples: **bronkikui**, **bronkia** and **krisitali** (for 'bronchus', 'bronkia' and 'crystal').

Fewer than 5% of the borrowings required doubled continuants as their solution to the breakup problem. Examples are **neutrroni**, **membrrani** and **apllasi** (for 'neutron', 'membrane' and 'aplasia').

A still smaller group had VV-endings which were replaced by /i/. Again about half were /h/-glued and half unglued: **malhari**, **anhemi** and **albuminuri** (for 'malaria', 'anemia' and 'albuminuria').

The last group were characterized by VV- and VC-endings that were augmented by /i/, and these, too, were about half /h/-glued and half unglued. Nearly all of this final group were Linnaeans: **antropoideai**, **aurheai** and **cinhereai** (for 'Anthropoidea', 'aurea' and 'cinerea').

To see some of these words in action, you may wish to examine Appendix G, where the first few paragraphs of a number of scientific articles are translated into Loglan.

6.12 Making Single-Source Primitives

Adding a local (**parka**), scientific (**carbo**), or other international primitive (**futbo**) to the language is probably the least demanding of the several word-making arts. There are only two primitive forms, the **fumna**- and the **mrenu**-one; and only a few of the words one wishes to borrow will fit neatly into either of them. But those that do usually do so quite easily, either exactly (**simba**), with some padding (**genhe**), or by abbreviation when some shortening is justified by use-frequency (**telfo**). Some very short words (e.g., 'beer') require several bits of padding to fill out the primitive form (**birju**). But unlike other borrowings, single-source primitives do not require elaborate tests.

Here are some primitive-form words that were derived from a single source either because they are words for once-local things that have since spread, like parkas, or because they are words like 'passport' that have long been part of the international scene. All of these words could have been made as longer borrowings; but either their form or their use-frequency seemed to justify the primitive form:

sinma	sofha	tulpi	telfo
telvi	kabre	birju	resra
konsu	paspo	kapta	banko

Note that characteristic final vowels play little or no role in either making or recognizing these primitive-form words.

In making single-source primitives, the word-maker's task is to preserve as much that is phonemically prominent in the natural word in similarly prominent positions in the new one. Thus 'beer' could have been equally padded out as ***jbiru**, but this would have put the sequence -**bir**- in the middle of the word where it is surely less recognizable than in **birju**. The sound /j/, as we shall see presently, comes from Chinese.

Sometimes /h/ makes the best "filler consonant" (as in **genhe** and **sofha**) when one is required. Since /h/ is nothing more than an unvoiced version of the following vowel, it is naturally a sort of "minimum consonant". Also, although /h/ is widely distributed among the source languages, it is a fairly infrequent sound in all of them. Therefore it makes an excellent filler sound, ideal for use here as well as to mend broken borrowings. Knowing that word-makers are observing this convention helps one decipher **sofha**, **brihe**, **sakhi** and **fighe** as the words for sofas, brie, saki and figs, respectively.

Occasionally one is helped in making these primitive-form words by examining what happened to the international word when it arrived as a loan-word in other languages. Thus, when the Japanese borrowed 'beer' it became 'biiru', while the Chinese version of this foreign word--one of the few non-scientific imitative borrowings in Chinese, by the way--became 'bijiu'; so from these two Oriental renderings of the original Germanic word we may draw the final vowel /u/. We can also use /j/ as the filler consonant, taking it from Chinese. The result is **birju**. So in this case **birju** makes a more recognizable word than the more conventional **birhu** to the billions who know this word as 'beer', 'bir', 'Bier', 'biere', 'bir(r)a', 'birah', 'bere', 'biiru' or 'bijiu'.

Sometimes a truly universal but vowel-rich word like 'radio' cannot be built into Loglan by conventional methods in any way that seems adequately to preserve its flavor. ?**Radio** itself breaks of course into the phrase **ra dio**. Inserting /h/ to cure the breakage produces **rad+hio**, which segments like a complex. Dropping the /i/ gives the workable primitive-form ?**radho**...but it just doesn't seem to make it. To bring this one back into the realm of the recognizable, I remembered a substitution for the [y] allophone of /i/ that I had observed in northern Spain. In the province of Asturias one often hears the sound [zh] being substituted for [y] in such words as 'Yo' ('I'), as in [zhoh-VOY] for 'Yo voy' ('I go'). I wondered whether the same substitution might make ?**radjo** more recognizable as a variant of 'radio' to an international bag of loglanists. After

living with it for some months--a necessary test of any morphological innovation--I came to believe it would. And so I rendered the European word 'radio' as Loglan **radjo**.

6.13 Making Names

Adding new predicates to a language is an occasional, even rather solemn affair in which the word-maker must persuade daself--and others--that da's proposed addition is a good one. But adding names to a language is a continuous and possibly even a frivolous activity. No dictionary, for example, even tries to keep track of all the names the speakers of its language coin and use.²⁰ So it will be in Loglan. And just because name-making is an easy and casual activity, we must now treat the name-making game more fully. Everyone who speaks Loglan will have many occasions to build names.

As we learned in [Section 2.11](#), the morphology of Loglan names is exceedingly simple. All that is required of a Loglan name is that it be any sequence of two or more Loglan phonemes of which the last is a consonant. We also learned that if a natural name does not end in a consonant, the consonant /s/ is conventionally supplied. Thus 'Italia' becomes **Italias**; 'Roma' becomes **Romas**; 'Mary' (/MEri/), **Meris**; and so on. Moreover, since we follow the stress of the natural name in pronouncing the Loglan one, if that natural stress is not penultimate, we mark the vowel that is stressed with an apostrophe ('). Thus 'Paris' is **Pari's** [pah-REES] and 'Washington' is **Ua'cintyn** [WAH-sheen-tuhn]. Similarly, if the syllabification of a natural name does not follow the standard Loglan pattern, close-commas may be used to mark the special syllable breaks required: in **Lo,is** [LOH-ees], for example, but not in **Djois** [joyss]. Thus virtually any natural name whose sounds can be at least approximated in Loglan phonemes may easily be rendered as a Loglan name.

One is free to use the three irregular phonemes /x q w/ ([kh th ue]) in importing natural names, or not to use them as one chooses. Thus, 'Bach' may be written **Bax** or **Bak** depending on whether it is the goodness of the imitation that one wishes to maximize, or the number of people on the planet who will be able to pronounce what one has written. Some word-makers pursue one objective; some, another. Similarly, Russian 'Krushev' may be either **Xructcyf** or **Kructcyf**, and Theodore the Englishman may write and speak his Loglan name as either **Qi'ador** or **Tiador** again depending on whether it is verisimilitude he is after or easy reproduction. It is often possible, of course, to get good approximations without recourse to the irregulars. (The only natural name I have yet encountered which cannot be well-approximated in Loglan sounds--even including the irregulars--is the Malaysian single-phoneme name which in English transcription is spelled 'Ng'.²¹

Before we leave the matter of natural names, there is one set of them that one would think would be proscribed in Loglan but are not. These are the names--very common in France--that commence with the sequence /la-/, a pair of sounds that happen to invoke our name-operator exactly. One would think that importing the name of Laplace, the 19th Century French astronomer and mathematician, exactly as it is pronounced, namely as **Lapla's**, would be to invite confusion with some Dutchman called 'Plass'. Would not the call **Lapla's** be indistinguishable in speech from the designation **la Plas**? The productions seem identical: [lah-PLAHSS] and [lah-PLAHSS]. Indeed the two utterances *would* be identical if persons with /la/-

initial names were ever to be called by their names alone. But they're not. Loglanists, being alert to such difficulties, insist that all such names be preceded by either **Hoi** or **la** whenever they are used: **Hoi** when used as vocatives, **la** when used as designations. Thus **Hoi Lapla's** and **la Lapla's** contrast unmistakably with **Hoi Plas** and **la Plas**, while Plass has the extra privilege of being callable to dinner by his unadorned name **Plas**. But LaPlace can't be. If we ever call such a person, it will be by shouting [HOY.lah-PLAHSS]. For his name alone is indistinguishable from a potential designation of someone else.²²

Let us now review the several ways in which new name-words may be coined in Loglan. In [Section 2.11](#) we observed that the CVC-form was preferred for internally-derived Loglan names, and **Sol** ('Sun'), **Ter** ('Earth') and **Lun** ('Moon') were given as examples. Many other name-words can and have been made in this form, or in elaborations of it. For example, the standard way to make a numerical name is simply to add /n/ to the numerical quantifier. Thus, the number One is **Nen**, Two is **Ton**, Three is **Ten**, Thirteen is **Neten**, and so on. And these numbers may also be used for the names of the local hours: 'nine (o'clock)', 'ten (o'clock)' and 'eleven (o'clock)' being most economically referred to as **Ven**, **Nenin** and **Nenen**.

To provide names for local days of the week--as are provided in many languages, English included (thus 'He came on Tuesday' seems to be the preferred form in English over all the more exact alternatives: 'He came on tuesdays/a tuesday/the fourth tuesday, etc')--one may easily follow the precedent of these compact numerical expressions and generate the Loglan series **Neden** = 'Monday' (from **ne** + **den** from **denli** = 'day'), **Toden** = 'Tuesday', **Teden** = 'Wednesday', **Foden** = 'Thursday', and so on. To use them for every purpose for which day-names are used in natural language would probably not be good Loglan, however. In a language in which one can easily build predicates for these same classes of temporal objects, why not do so? Thus **nerdei** might be derived from **neri denli** = 'first-day' and mean 'is a monday of week/month...'--note my use of lower-case initial letters in both languages--and the series then continued as **tordei**, **terdei**, **fordei**, **ferdei**, **sordei** and **serdei**; and this is *lower-* case sunday this time.²³ These predicate words are, in any case, the words that one would require, in a logical language, to translate such logically more fastidious remarks as 'He came on a tuesday' = **Da pa kamla na ne tordei**. Similarly, 'He came on tuesdays' finds satisfyingly precise expression as **Da pa kamla na lo tordei**.

Once such predicates are in hand, another kind of Loglan name-usage can be developed by pursuing the following route:

- | | |
|------------------------------|-----------------------|
| (1) Da pa kamla na ne tordei | He came on a tuesday. |
| (2) Da pa kamla na lo tordei | He came on tuesdays. |
| (3) Da pa kamla na la Tordei | He came on Tuesday. |

In the last step we are using the predicate as a name. We first encountered this usage with such relational words as **matma** and **farfu**, as in **La Farfu pa fadkaa na lepo natli** = 'Father arrived last night'. And this example reminds us of the informal alternatives to these rather formal predicate names, such as **La Far** in **La Far, pa kamla na lepo natli** = 'Dad arrived last night' **Far**, of course, is an actual consonant-final Loglan name-word, not just a predicate word being

used as a name. Could it be that **Toden** will come to bear the same relationship to **Tordei** as **Far** bears to **Farfu**? That one will be a familiar version of the other? A nickname? If this development is foreseeable, we may then add the following step to our series:

(4) Da pa kamla na la Toden He came on Toozie.

And what is 'Toozie' but the just-invented English nickname for 'Tuesday' which we apparently now require to translate Loglan **Toden**.

Of course the tuesdays the loglanists would bother to name in this familiar way are just those special, local tuesdays which were singled out by them as deserving a local name, just as dads are singled out for nicknaming in such local groups as our own particular families. It's hard to think of a non-fanciful use for a nickname sense of 'Tuesday', I admit. But that's the use for which Loglan **Toden** is apparently headed. For most other uses, the predicate **tordei** will usually be a better choice.

Assuming that loglanists will have some use for temporal name-words--and surely they will, if only to translate natural language texts with fidelity--the names of the months are built on a similar pattern to that of day-names, this time using **-men** from **mensa** ='month'. Thus, **Nemen** = 'January'; **Tomen** = 'February'; **Temen** = 'March'; and so on up to **Netomen** for 'December'. Again, the corresponding predicates could be built as a series of complexes, this time using **-mea** from **mensa**. Thus **nermea** ('is the january of year..'), **tormea**, **termea**, up to **nertormea** for lower-case 'december' this time. It will be interesting to observe whether or how readily loglanists will take to using predicate words (common nouns) for objects which in their native tongues are uniformly (but logically, incorrectly) treated as deserving local names (proper nouns).

As mentioned earlier, any predicate may not only be used as a name, it may also yield a name-word. Thus, just as **Far** may be drawn from **farfu** to mean informal 'Dad', so **Fum** may be used as the informal call 'Woman!' In contrast, **Hoi Fumna** would be the more formal address 'O Woman!'. The latter form might, indeed, approximate the respectfulness of English 'Lady' or 'Madame'. Similarly, **mrenu** yields the familiar call **Mren** = 'Man!', while **Hoi Mrenu** is the formal 'O Man!' which might even be used to translate 'Sir'. Adding **-n** to a little word also produces a name and hence a potential call. Thus **Tun** is 'You!', and **Min** is the proper familiar vocative for people who talk to themselves.

By an odd turn in the analysis this takes us to a point from which we can speculate on how the mechanism of insult might run in Loglan. To call a man a fool or a liar, for example, is an insultingly familiar act in most cultures, one tolerated only between the closest relatives or the fastest friends. Outside these privileged circles, the use of such words is a provocation...indeed, among simple peoples, it is often a clear invitation to combat. To say such dangerous things in Loglan is, therefore, to say **Bun}** not **Hoi Bunbo** ('O Fool'), **Faltak}**, not **Hoi Faltaa** ('O Liar'), **Tsitok}** not **Hoi Tsittoa** ('O Thief'). On the other hand, we now notice that these other, more formal forms are still available, and that they will have a very clear if different sense in Loglan, a sense which may (miraculously) allow them to be used. Thus there may be circumstances in which to say **Hoi Tsittoa** in this formal way may be to remove the familiarity component from

the insult, and thus to withdraw its sting. Is it possible that loglanists will be able to engage in straight talk with one another without offense, using these delightfully formal, and so not very insulting, verbal forms? Cannot one imagine a loglandian play, for example, in which the characters courteously addressed one another as **Hoi Faltaa** and **Hoi Tsitoo**? How dramatically this might contrast with **Faltak}** and **Tsitok}** when at last the chips went down.

6.14 Importing the Linnaean Names of Biology

A special category of imported names in any language whose speakers practice science is the Linnaean nomenclature of biology. '*Homo sapiens*' and '*Escherichia coli*' are examples of our respectful treatment of these words in English. By international convention, no writer may alter the original spelling of these biological names no matter what language da is writing in. Even scientists writing in languages that do not use the Latin alphabet--Chinese, Japanese, Hindi and Russian, among our source languages--are obliged to reproduce such expressions as '*Australopithecus afarensis*' in their scientific texts exactly as they are spelled in Latin letters. Scholars who write in Loglan will certainly feel obliged to follow this same convention. But in that case we must have a way of indicating to our readers that our usual phonemic spelling rules are being temporarily set aside whenever they and we encounter a Linnaean name. We introduce the special Linnaean name operator **lao** [lough] to do this work. Apart from its role as a designator, the meaning of **lao** is that the text we produce within its scope is not to be interpreted phonemically.

Lao is an obvious kin of **la**, the standard name operator. Unlike **la**, however, **lao** is always separated from the name that follows it by a pause. Like the pause between names, this pause is occult; that is, it is not indicated by a comma in text. Thus,

- (1) Lao *Escherichia coli*, intestini bakterii *Escherichia coli* is an intestinal bacterium.

Like all serial names, each of the Linnaean names in a string of names is followed by a pause. But only the final pause appears as a comma in text.

Another problem that inevitably arises with Linnaean names is that, without a special signal, the listener can't know beforehand how many separate words each **lao**-construction will contain. Sometimes there is only one word, as in **lao Mammalia** or **lao Primates**. Such solitary Linnaean words are usually class, family, or order names as these two are. But most often there are two elements in the Linnaean name, usually a genus-species pair as in **lao Homo erectus** or **lao Pan troglodytes**. Sometimes three Linnaean words are strung together, as in **lao Homo sapiens neanderthalensis**, which is the current scientific name for Neanderthal Man. The third name-word is usually the name of the subspecies or variety if these have been named.

There is no uncertainty about the scope of **lao** in text, of course. But in speech, while one can hear the **lao**, and know that at least the first part of the ensuing string will be Linnaean, one cannot know its scope beforehand. Most Linnaean names end with vowels, and so may imitate Loglan words that are not names. True; Linnaean names are separated by pauses. But how many pauses should one listen for before deciding that the Linnaean name is over?

To answer this question, a special signal for the listener is required, one that will determine the scope of the spoken **lao**-operator absolutely. We use what is normally our intraverbal hyphen /y/ to link strings of two or more Linnaean names together into what are always grammatically simple structures. Thus all sutori (second and subsequent) terms in Linnaean strings are preceded by the sound but not the sight of /y/. If the term to be attached to the string is consonant-initial, the obligatory pause precedes that spoken [uh]: [lough . ess-kehr-REEK-yah . uh-KOH-lee]. If it is vowel-initial, the pause follows the spoken hyphen: [lough . HOH-moh-uh . ehr-EK-toos]. The Linnaean sequence ends, notice, only when a pause arrives that is not accompanied by an [uh]. This stratagem links each spoken Linnaean string into a unified name, and the scope of each **lao** is that name.

Of course the Linnaean-linking hyphens are not shown in text...neither as letters nor as hyphens. To reveal them in writing would be to break the international convention concerning the invariant *appearance* of the Linnaean name. So the hyphens we embed in our Linnaeans exist only as sounds for us. They are the little grace notes we play on otherwise unruly tunes to conserve the audiovisual isomorphism of our language.

One other feature of the textual appearance of Linnaeans should be mentioned. It is the international convention to italicize, underline or put in boldface all the Linnaean terms in any scholarly text. Any writer is of course free to choose among the enhancements that are available to da. In this book, we underline Linnaeans in English and in the freestanding Loglan specimens, and we boldface them in running text. Unfortunately, this does not distinguish them from ordinary Loglan words in running text, for these are already bolded.

So much for the appearance of the Linnaeans. But how to pronounce them when they do appear? How to *speak* them, in fact, when we wish to talk science with other loglanists?

Each natural language community in which biology is practiced has its own standard way of pronouncing, or mispronouncing, the Linnaean vocabulary. When devising our own Loglan way of speaking Linnaeans, we will be well-advised to follow the customs of scholars who speak a phonologically kindred language, say Spanish or Italian. Happily enough, we already have a full set of guides for doing precisely that. This is the set of rewriting rules given in [Section 6.6](#). We need only pronounce our Linnaeans *exactly* as we would do if we had rewritten them for borrowing. In other words, all we have to do to pronounce any Linnaean word "correctly"--that is, by our own loglandical standards--is to mentally perform Step 1 of the borrowing procedure on it, and then "read" that word aloud as we have mentally rewritten it. We don't put a special ending on it; we don't look for breakup or segmentation problems. We are not borrowing it. We are just rewriting it in our minds as if we were preparing it for borrowing; and we then speak it aloud as we have mentally rewritten it. We do this in order to standardize our pronunciation of the Linnaeans: to make us intelligible to one another.

This is easier to do than it sounds. Thus, **coli** comes out [KOH-lee] and not [SHOH-lee] or [KOH-ligh]; and **Escherichia** comes out [ess-kehr-REEK-yah] and not [esh-rr-EEK-ee-ah] as American and German scientists typically pronounce it.

If we all follow this loglanizing convention, we will have a clear, easily understood, *Latinize* way of pronouncing our Linnaeans. It will be a way that will not only be consistent with the rest of Loglan phonology, but also very similar to the ways Spanish and Italian biologists pronounce their Linnaeans.

Try reading the following expressions aloud as if you had first rewritten the Linnaean words for borrowing. Hyphenate the serial terms together orally even though the text shows no signs of hyphenation:

lao <i>Escherichia coli</i>	lough . ess-kehr-REEK-yah . uh-KOH-lee
lao <i>Mammalia</i>	lough . mah-MAL-yah
lao <i>Primates</i>	lough . pree-MAH-tess
lao <i>Homo sapiens</i>	lough . HOH-moh . uh-SAHP-yens
lao <i>Homo erectus</i>	lough . HOH-moh-uh . ehr-REK-toos
lao <i>Pan troglodytes</i>	lough . PAN . uh-trohng-loh-DEE-tess
lao <i>Homo sapiens neanderthalensis</i>	lough . HOH-moh . uh-SAHP-yens . uh-neigh-ahn-dehr-tahl-LEN-seess
lao <i>Cercopithecus lhoesti</i>	lough . shehr-koh-peat-HEH-koos-uh . ell-hoh-ESS-tee
lao <i>Australopithecus afarensis</i>	lough . ah-oos-trah-loh-peat-HEH-koos-uh . ah-fahr-REN-seess

There are some words here that are difficult to pronounce in any language. What Loglan pronunciation does is draw out such words in a Romance way, giving each syllable its due: [ah-oos-trah-loh-peat-HEH-koos]. Such a practice makes these long words even longer; but there is a very real sense in which it makes them easier as well. In English we adopt the opposite tack: we rush through such long, difficult-appearing words as 'Australopithecus' at breakneck speed, grunting the sounds out as we go, almost as if we didn't know how to pronounce them properly: [awss-truh-luh-PIHTH-uh-kuhss]. The trouble is that so much information is lost by such a pronunciation that unless one has heard it before, it is almost impossible to produce it from the spelling...and of course quite impossible to spell it from the pronunciation! The Loglan Spanish-type pronunciation will lead to far more creditable performances on both counts.

Except for our distinctively loglandic pronunciation of 'c' before weak vowels as [sh], rather than [s], our fastidiousness about pronouncing /h/s before stressed vowels, and our quite extraordinary use of linking [uh]s between pairs of Linnaean words, this is approximately the way a Spanish or Italian biologist would pronounce these scientific names.

Before we leave the subject of Linnaean names, let us remind ourselves that Linnaeans may also be borrowed as predicates as well. Thus, Loglan **mamla** ('is a mammal') comes ultimately from the Linnaean name '*Mammalia*' just as **primati** ('is a primate') comes from '*Primates*'. The alternative to using **Ta mamla** to say 'That's a mammal' would be to "predify" the Linnaean name with **me** and say **Ta melao Mammalia** = 'That's a member of (the Class) *Mammalia*.'. One can speak in this stiff Linnaean way in Loglan just as one can in English. But it's a bit more precise than one usually needs to be. **Ta mamla** is ordinarily quite sufficient.

However, if we do wish to say precisely that a given zoo specimen, say, is a "common chimpanzee", we might wish to eschew **cimpa** and **cimpanizi** altogether, which both mean 'chimpanzee' in the widest sense, and either use the exact Linnaean phrase,

(2) Da melao *Pan troglodytes* It's a (member of the species) *Pan troglodytes*.

which employs the **me**-operator to convert the Linnaean name into a predicate, or make two loan-words out of it. Thus, we could borrow '*Pan*' as the predicate **panhi** and '*Troglodytes*' as **trogloditi**, using the borrowing methods described earlier in this chapter; and then either use these predicates in the reverse order (since Loglan, unlike Latin, is an Adjective-Noun language).

(3) Da trogloditi panhi It's a "trogloditic pan" (i.e., a member of species *troglogytes* of genus *Pan*).

Or, in deference to the original Linnaean, we might use the Loglan *go*- operator to put the matter in its original Latin word-order:

(4) Da panhi go trogloditi It's a "pan of trogloditic type" (i.e., a member of genus *Pan* and species *troglogytes*).

Note that **panhi** and **trogloditi** are now genuine Loglan predicates. They do not have to be predified and they are both written and pronounced in Loglan phonemes; so they require no special handling. So these predicate derivatives of the Linnaeans have certain stylistic advantages for the loglanist over the original Linnaean names.

In doing science we will often want to borrow predicate words which are the equivalents of '-cine' and '-oid' words in scientific English. We can always do this by borrowing Loglan predicates from Linnaean genus names, whether we have a precedent in the natural languages or not. For example,

(5) Da australopitekui It's an australopithecine.
(6) Da panhi It's a "panoid" (i.e., a chimpanzee of either the dwarf or common species).

Note again that these expressions are both easier to pronounce and grammatically more elegant than the Linnaean predications which they replace.

I will not hazard the prediction that the *entire* Linnaean vocabulary is about to be absorbed by borrowing into Loglan. There are, after all, over a million of these words, many of them the names of rare, precious, and now vanishing things. Some of them are known only to a handful of specialists. The main thing is that we are ready to borrow them. We are ready to welcome them

properties, was in the past characterized by a certain property or quality, or by a relationship with other individuals or sets which is here expressed incompletely. As a whole, therefore, the frame alone expresses a kind of claim; moreover, the kind of claim it makes is a predicating claim, not an identifying one. So much can be told without any content whatsoever, that is, without looking at any names or predicates.

Now it is true that words like **le** in Loglan and 'the' in English *can* be replaced by certain other little words without significantly changing the structure of the remark. For example, the grammatical frame below:

(3) Levi.....na.....

This.....is now a.....

does not differ significantly from that in (2). In fact, for most purposes, the grammar of these two frames may be regarded as identical. For in Loglan, at least, the two words **le** and **levi**, as well as the pair of tense operators **na** and **pa**, may replace each other wherever they occur without ever turning a grammatical sentence into an ungrammatical one, or *vice versa*. Thus, **le** and **levi**, like any two predicates, are also grammatically interchangeable. But the important thing is that the group of interchangeable words to which **le** and **levi** belong, unlike the group of predicates, is a very small one.

Now what happens if you change, withdraw, or add members to, a *small* class of structure words? Some idea of the effect can be obtained by considering the following playful changes in English. Suppose you try replacing the word 'the' by the new word 'foo' in a few sentences. You may find it nearly impossible even to begin. But now try replacing the word 'book' by the similarly nonsensical word 'thoo' in a few remarks. This is not only possible, but it can even be done with a certain heedless glee.²⁵ The point is that structure words are too intimately associated with our fundamental linguistic habits for us to suffer their changes gladly. Content words, however, can be added to, redefined, even wholly replaced, without causing much pain to the human mind. A student in a first-year course in almost any university subject spends half da's time learning new content words; and some of them will be perfectly ordinary old words which da must now learn to understand in a new way. But it is apparently quite easy to do this. Similarly, any apprentice to a new craft must learn dozens of new content words a month; and again some of the words will have old meanings de must now reject. But no craft and no scholarly discipline can dispense with words like 'the' or 'and' or 'but' and very few dare to change or redefine them. None but the most impudent of sciences, mathematics and logic, dare to change them. Logic abandons the structure words of ordinary language almost completely...and therefore, perhaps, provokes the greatest linguistic bewilderment in its students.

If we look at the grammatical types of the words that occur as slang, we see the same fundamental difference. There are plenty of slang nouns, verbs, adjectives and adverbs in English; but there are very few slang articles or prepositions and no slang connectives that I know of. The reason is clear. Structure words change very slowly. They may be added to from time to time; but even this is historically resisted in most languages. For example, the forms 'ain't' and 'this-here' have been around for a long time and are still not quite accepted as "good English." In contrast, note how short a time it has taken the word 'astronaut' to install itself in the very lap of the language.

Now what this means for Loglan is that the arrangement of structure words with which its life commences will (i) almost undoubtedly have to be changed or added to, but (ii) those changes, at least, will be mightily resisted. The second point is now obvious; but what about the first?

Let us first make the categorical prediction that such changes *will* be necessary. For while the laboratory testing of the grammar--in a certain sense, its engineering--has long been completed, the actual construction of a human grammar inside human minds is a continuous, never-finished process; and we will almost certainly find that there are unsolved structural problems still. Mistakes will be found; ambiguities will arise; important natural functions will turn out to be inadequately served.²⁶ A human grammar is an immense affair, a mansion of many rooms, and we cannot claim to have examined every nook and cranny of the structure we have designed. Not only that, but some questions--and some of which we are now aware--can only be settled by use. For example, I am interested to see how loglanists will handle their potentially "preposition-free" language. Will they use case-tags? Or ignore them? If they use them, under what circumstances will they do so? On another level, I sometimes fear that the connective system I have designed may prove too intricate for human minds to handle in the "real time" world of speech; and so on. If so, parts of that vast structure will remain unused by the majority of speakers. Adjustments may have to be made.

As questions of this kind are gradually being answered by experience or experiment, some speakers of the language will want to change it to bring its structure into harmony with those answers as they emerge. If such changes involve its most deeply embedded structure words, there is some question in my mind whether they can actually be executed without exciting open rebellion among those who have learned these "erroneous" structures.²⁷

Some changes, of course, will be relatively easy to accomplish. Additions to the list of modal operators--**tie, lia, sea**, and the like--should be nearly as easily accomplished as the addition of a predicate. The list of discursive operators--**bea, pou, sui**, and so on--should also prove easy to augment. But additional case tags will, I predict, be more difficult to introduce. Compound indicators may also be added with great freedom. And the less frequently used tense and location operators may prove relatively easy to augment or change. Perhaps even the rarer "punctuation marks" may yield to pressure. But the connective system, or the tense system, or the system of descriptive operators, will probably prove more stubborn. Let us hope that these more fundamental structures of the grammar will now prove to be well-engineered, and that such changes as take place in them will be augmentative rather than corrective.

In the end some change in the fundamental structure of the language will almost certainly be necessary. This may seem unfortunate; but the alternative policy of freezing its early forms could well mean its early death. For only by accommodating productive change is the language likely to struggle through its own early traditions and come alive and grow.

Notes

1 For example, I was surprised to find that in a recent Chinese-English dictionary (Wu Jingrong 1983) some 15% of the science entries were phonemic borrowings from the Greco-Latin, or rather from European adaptations of it. E.g., English 'amoeba' is Chinese 'amiba'; 'aniline' is

'anilin'; 'aspirin' is 'asipilin'; 'atropine' is 'atuopin'; and so on. My distinct impression is that this is a larger proportion of imitative loans than one found in Chinese dictionaries published forty years ago, and it suggests to me that there may be a long-range trend at work in even this most reluctant of languages that is causing Chinese scholars to turn away from metaphor-building, their classic way of incorporating foreign notions, toward simple phonemic imitation...at least for the international vocabulary of science. That would make sense. Although formerly a European province, science is now an international enterprise and needs a uniform vocabulary in which to conduct its business. Reclothing the verbal tokens of this enterprise in a body of local metaphors would be to reprovincialize it, to impede the swift conduct of this most international of human activities.

2 During the work on the borrowing algorithm one worker suggested that glued words like **athomi** could be written as 'at:omi', a textual style in which close-colons would replace all gluing consonants. This move would certainly enhance visual recognizability; but it has a minor disadvantage. It slightly disturbs the audio-visual isomorphism of the language by requiring "local knowledge" on the part of a stenographer--human or machine--who is given the task of transcribing a heard speech in this "punctuated" way, i.e., to write close-colons for all the gluing /h/s in it but normal 'h's for all the ones that are non-gluing. It would be impossible for such a stenographer to perform this task unless he were first given some independent means of distinguishing gluing from non-gluing /h/s in positions in which the latter could be gluing. For example, the genuine /h/ in **ethili** ('ethyl') is in such a position. But how to distinguish it from the one in **ekhinodermati** ('echinoderm') which is gluing? Apart from supplying our stenographer with a list of all the loan-words in the language in which /h/s had been used in gluing positions non-gluingly, that might be difficult to do.

3 The first test was conducted in 1961 prior to, and in preparation for, the compilation of the first (1963) edition of the dictionaries. Working through Eaton's (1940) list of the most frequently used concepts in four European languages, English, French, German and Spanish, we undertook to make new complexes when we could from the 784 composite primitives then in hand, to add new primitives when we could not, and to call the test concluded when the rate of adding primitives went to zero. This occurred earlier than expected: between frequency ranks 1,500 and 2,000. Before rank 1,500 we had added 43 new primitives but at a decreasing rate, bringing the total number of composite primitives to 817 by rank 1,500. Between ranks 1,500 and 2,000 none were added. We built a total of 1,262 new complex predicates during this early test, having started with 689, bringing the total in this category to 1,951. We then allowed ourselves the prediction that very few new composite primitives would ever have to be added to the language, that the current set would be found sufficient to make indefinite numbers of new complex predicates for the concepts of at least these four major languages, whatever the degree of conceptual intricacy of the concepts.

That prediction was substantially upheld during a second test of the constructive adequacy of the set of primitives during 1972-74. This time the test was made during the first revision and augmentation of the dictionaries. In performing this essentially editorial task we discovered that very few new composite primitives were required to be made. During that revision, 311 new complexes were added, most of them to build a dense translation interface between Loglan and English below frequency rank 2,000, but some to meet certain lexicographical considerations

(resolution of English homophony, for example). During this same period 11 new composite primitives were added, bringing the total in the primitive set to 838. But fully nine of these new words were *not* occasioned by the work of making complex predicates; instead they were the words for nine body parts and functions, normally regarded as indelicate, which had apparently been deliberately "overlooked" during the 1961-63 dictionary work. So the constructive adequacy of the 1961 set of primitives for at least one of these four languages is attested by the fact that only two substantial additions had to be made to its set of primitives in order to add more than 300 new complexes to the language ten years later.

A third test of the adequacy of the composite primitives took place during the 1983-87 period of dictionary work. This most recent work was aimed at extending the solid portion of the interface between the Loglan lexicon and the Eaton four-language list through frequency rank 5,000 (through Eaton page 171). This was done by making over 2,500 new complexes but only eight new composite primitives. But again, only a very small number of these composites--three of the eight, in fact--were actually required for complex-building. These semantically crucial additions were, interestingly enough, the words for 'parent', 'offspring' and 'sibling', none of which is an English primitive and all of which had been originally made in Loglan, too, as complexes (as it happens, with the Chinese-type metaphors "mother-father", "daughter-son" and "sister-brother"). But certain types of kinship relations (grandparent, cousin, for example) cannot be economically expressed without these gender-free notions. So the earlier complexes have been replaced by the added primitives **penre**, **tciha** and **sibli**, the first two compositely built, the third, a single-source borrowing.

4 We may not have done this, since, as will be pointed out in Note 6, the "largest" languages have the largest representations in the word-stock of Loglan. But this is, at least, a variety of "fairness." Observe what would have happened, for example, had we "unfairly" taken the entire fundamental word-stock of Loglan from English. Or from Russian or Chinese. Or even from what Whorf called 'Standard Average European'...which is the source, very largely, of the word-stock of Esperanto. *No* cross-cultural experiments could have been conducted with such a language, much less ones designed to elicit subtle Whorfian effects. For the very process of importing the words of a language into any grammatical frame whatever can be expected also to import the cultural values and conceptual biases associated with those words in their natural frames. Take the word which is to have the denotation of the word 'copulate'. If English is to furnish our word-stock, are we to use 'fuck'? It is the word, perhaps, which is most widely-known. Or the word 'copulate' itself? Or either of the metaphors 'make love to' or 'go to bed with', for use in our "experimental" language? It makes a difference which we choose. For the connotative values of these expressions differ hugely in English...as the reader has no doubt been reminded by encountering them here. Moreover, their connotations differ in ways in which denotatively corresponding words and phrases do *not* differ, for example, in Chinese...a language which is rather less suitable for the expression of either obscenity or Victorian obscurantism than English is, one gathers. Yet their denotations are the same. Are we, then, in our experiments, to reckon with *English* cultural values every time an English subject uses such a word? Or with Russian, if our words are Russian? Or with Chinese, if Chinese? Clearly *no* experimental elucidation of the Whorfian phenomenon could be expected with such "instruments" as these. The compositely-built Loglan word **kitsa**, in contrast, which shares the denotation of these diversely-laden natural words, is itself nearly neutral in connotation ("nearly" because those who

know Latin may come to associate 'coitus' with the phonemes it shares with **kitsa**, and so **kitsa** itself may come to bear a burden of connotations for them...but, we think, a small one). So in the main we may say that whatever connotations **kitsa** will acquire it has not acquired yet. And it will acquire these connotations, as will every other composite word in Loglan, under conditions which are at least in principle subject to scientific observation and experimental control.

Now none of this means that it would not be interesting, and perhaps useful, to plug English words into Loglan grammar. Or Russian words. Or Chinese words. It has more than once occurred to me, as it has to other loglanists who work with computers, that such "hermaphroditic languages"--possessed of the grammatical and logical faculties of Loglan, but with predicate vocabularies which were utterly familiar to those who were going to use them--would make excellent computer languages: that is, languages capable of penetrating the machine/man interface the toughness of which is perhaps the central problem in computer technology now. But such a language would not be a scientific instrument for finding out how the structure of language mediates human thought. It would be a practical tool of strictly limited applicability: a logician's Pidgin English--or Pidgin French, or Pidgin Chinese--for talking with machines.

5 The building of the Loglan composite primitives was largely accomplished during the interval 1955-59. The latest year for which language statistics were available when the work began was 1950. In 1950 there were 1,108 million native speakers of the 8 source languages, and 778 million more who spoke at least one of them as a second language, according to statistics made available by the United Nations in 1955. The best estimate then available of the 1950 world population was 2,438 million, of which these primary and secondary speakers of our source languages constituted 78%.

6 This method is clearly biased in favor of the larger language groups. Thus the "larger" languages make the largest average contributions to Loglan composite words, the "smaller" languages, the smallest. From one point of view, this is unfortunate; for it means that speakers of linguistically very interesting but less widely spoken languages like Japanese will not be simply pairable, in experimental designs, with speakers of dominant languages like Chinese or English. For it may well take them longer to learn the to-them less recognizable primitive vocabulary of the experimental language than subjects who are native speakers of the favored languages. On the other hand, differences like this can be explored experimentally, and then adjusted by providing longer learning intervals for the groups that will find less in Loglan to recognize. The *average* level of recognizability is maximized by our procedure, so that experimental learning rates should in general be far higher than if we had used a procedure which equalized the contribution of each language. Speed of learning is certainly an advantage to the experimenter, at least in da's earliest experiments; and da may be confined, therefore, in these experiments, to subjects drawn from the favored language groups. At the same time, the cultural neutrality of the experimental language is, I think, not seriously marred by the unevenness of the distribution of recognizability over the several source language groups. Thus, the fact that English 'go' appears wholly in Loglan **godzi** does not deprive that word of its interesting exoticness; for the mysterious (Chinese) sounds **-dz-** also occur in it. **Godzi** is not likely, therefore, to import the connotations of English 'go' unmixed into the language. Thus, the fact that the incorporation of short native words within longer Loglan ones occurs more frequently for dominant languages

like Chinese and English should not, I think, impair the over-all neutrality of the design...even for these favored speakers.

7 In calculating the sum of speakers of a language, we counted all native speakers of it plus half of those who had acquired it as a second language provided they did not speak any of the other source languages as a native tongue. Thus, half of all native Swahili speakers who speak English were counted as English-speakers, while all native Hindi speakers are counted in the Hindi column whether they also spoke English or not. If some group spoke both English and Hindi as second languages, say, and none of the source languages as a native tongue--this is true of many native Tamil-speakers, for example--then half their number was divided equally between the English and the Hindi columns.

8 That good cue-words to the foreign words that one is learning as an adult do not need to have the same, or even similar, denotations, is demonstrated by the way in which English 'vaccine' serves as an excellent reminder of the meaning of Spanish 'vaca' ('cow') to one who knows the history of the English word. Similarly, English 'tempo' serves as a cue to Loglan **ckemo** ('time interval'), 'reverie' to Loglan **revri** ('to dream') and 'polity' to Loglan **poldi** ('nation'); although none of these pairs of English words can be regarded as good synonyms.

9 The supra-segmental Chinese phonemes known as "tones" were not counted as part of the "phonetic length" of Chinese words. This is an error. Its not unpleasant consequence is that Chinese is slightly over-represented in Loglan.

10 As they were allowed, indeed, in 1975...a circumstance which led to the discovery of this flaw in the language and to the engineering research that finally "unpacked" the primitive set. Speaking technically, the 1975 language was not redundant enough to function well even in moderate noise. More important, learning was seriously impaired by having to master sets of what seemed only trivially different words. For example, the pair **clivi/clivu** and the **kanta/kante/kanti/kanto/kantu** set. No such "primitive-packing" exists now in the language.

11 Vowel-rich short forms like **saadja** are currently preferred by the Institute over hyphenated forms like **sanydja**, but the Loglan speaker should be able to recognize the alternative forms, which can be used in repetition of a sentence to aid its comprehension, or where desirable for poetic meter or rhyme.

12 William Greenhood and I have argued elsewhere (Brown and Greenhood, in press) that the earliest adaptive event in at least one scenario for the evolution of human language was the deliberate misuse of genetically-coded signs, an act that might be called proto-metaphor. If this conjecture turns out to be correct, then metaphor-making is not only an essential part of the human language performance, it is phylogenetically its earliest part. If so, it is extremely likely to be fixed in the human gene pool, that is, to be a hum-drum human skill, and therefore part of the basic language kit of everyone.

13 A program embodying this algorithm is available from The Institute.

14 Greenhood and I have argued (Brown and Greenhood, in press) that this skill is at bottom what has been called the "role-taking" skill: seeing the world from the perspective of others, an adaptation that seems to have been in some ways shared with the other *Hominoidea*. Role-taking was posited by the American philosopher-psychologist George Herbert Mead (1937) to have been the basic cognitive skill required for the evolution of language. Much recent data about language seem now to support this older view.

15 A computer program supplied by The Institute allows the learner to teach daself the 860 composite primitives and their 600 affixes in a few weeks. This is all the knowledge da will ever require to decipher any regular Loglan complex da might ever encounter. Irregular ones--i.e., complexes like **iglymao** ('igloo-maker') that are derived at least in part from borrowings--are a different matter. No teaching program is capable of supplying the learner with advance information about all the borrowings da might ever encounter. This is one of the deepest and most far-reaching advantages of regular complexes over borrowings, and the reason why loglanists make complexes instead of borrowing whenever that is both appropriate and possible.

16 At the moment the evaluation routine employed by the complex-making algorithm scores /r n/-hyphenated words so much lower than /y/-hyphenated ones that it picks **marty sensi** over **maer sensi** even though the latter is both shorter (a plus value, according to the algorithm) and higher in its V/C ratio (and currently, this is an even greater plus value). So the human word-maker who prefers a word like **maer sensi**--and in certain categories of complexes such forms might be definitely preferable to their /y/-hyphenated alternatives--will have to flag its dictionary entry as "a handmade word". This move will prevent the complex-making algorithm from remaking it as **marty sensi** on its periodic "update passes" through the dictionary. The policies that control the choices of the algorithm on these update passes are of course subject to revision and refinement as we come to understand more about the aesthetics of our language.

17 Two complexes meaning substantially the same thing offer no problem to a language, since they represent different ways of approaching the same, perhaps elusive, idea by what is at first an essentially poetic act, the coining of a metaphor. Two primitives meaning the same thing would be awkward, however, since every primitive notion of a language predicates whatever it does predicate, say blueness, by fiat, that is, by convention only. Thus **blanu** is not the "best" word for blue, it *is* the word for blue; there is no other. But that two rival coinages, say **racbao** ('travel-box') and **racysakli** ('travel-sack'), might both be used to predicate pieces of a traveller's luggage, and live a long time side by side in the language, is surely possible...and the two words might each acquire distinct nuances of "betterness" in complementary contexts...as indeed these two already have.

18 The Institute's choice for this work is the Simon and Schuster *International Dictionary: English/Spanish, Spanish/English*, (1973), a work of some 200,000 entries, and therefore very likely to contain all but the most esoteric portion of the ISV. It is weak on Linnaeans, but has good representation of nearly everything else.

19 If we allowed words like ***spektri** in the language, then words like **tospektri** would have to be disallowed; and *vice versa*. It is because complexes are so much more important than borrowings in the structure of the language that we tip the design-scales in favor of the former.

Besides, the domain of possible complexes of any given length is much smaller than the domain of possible borrowings of that length; for unlike borrowings, complexes are a morphologically restricted class. So by disallowing ***spektri**-type words in Loglan, we withdraw from a large, sparsely-populated domain (the domain of borrowings) a certain word-space that can then be unambiguously allocated to a smaller, more densely-populated domain (the domain of complexes). On both grounds, it is a justified trade-off.

20 Names, to be sure, play a special role in any language; and there are philosophers who insist that names are not part of individual languages at all (e.g., Ziff 1960). This view cannot be supported linguistically, however, since all languages have definite rules for forming or incorporating names. Loglan is no exception.

21 Since [ng] is a Loglan phone but not a Loglan phoneme--it is the allophone of /n/ used before /k g/--there is no way of spelling it in Loglan as a single sound. Either Loglan **Nng** or **Nnk** would serve, I suppose, but both would render the name as a rather difficult two-sound monosyllable: [ng+g] or [ng+k], the former being the middle part of English '(ti)ng(le)', the latter, the last part of '(i)nk'.

22 I am indebted to Robert A. McIvor for suggesting this 'Laplace'-saving convention.

23 Sunday used to be the first day of the week--in the Judeo-Christian world, anyway--and on most Western calendars it still is. But the five-day work-week seems to have displaced it in the industrial countries with Monday, which has always been, apparently, the first day in the Western work-week. But now that Sunday has been joined to Saturday in a week-*end*, these are pretty clearly the sixth and seventh days of some new conception of the week, one in which Sunday is last, not first. The results of a small sample survey (N=30) showed that this perception is probably widely shared in the U.S. population at least, 75% of our respondents reporting that Monday is the first day of their week. We are told that the first workday is also taken to be the first day of the Chinese week as well.

24 In the technical argot of Loglan workers, classes of words whose members are grammatically interchangeable with one another are called *lexemes*, and members of any one such class are called its *allolexes*. So the question in hand may be rephrased as, What happens to the grammar if you add or delete an allolex from some lexeme? The answer: If there is still one allolex left, nothing.

25 'This is a good thoo. I like these two thoos. This thoo is bigger than that thoo' comes easily enough. But not 'Foo man gave foo book to foo girl'. One can hardly get one's tongue around the latter sequence, let alone one's mind! The difficulty experienced in making such "allolexic" replacements--as measured by overall time, hesitation, and the errors committed in making them--might well be used as an experimental measure of the size of the lexemes (see Note 22 above) in a natural language, i.e., the number of their "allolexes." Loglan, having lexemes of known size, offers an opportunity to test this notion.

26 These predictions--originally made in 1975--have already been once fulfilled. But the "important natural function" that was not well-served by the 1975 language turned out not to be

grammatical but morphological: the 1975-style complex predicates were not regularly decipherable, and so had to be learned as quasi-primitives. This defect had wide-ranging consequences, the most critical of which was that it slowed down the acquisition of this portion of the vocabulary. There were others. The discovery of this raft of morphological problems during the 1977-78 learning trials led to what was called the "Great Morphological Revision", a program to build and test the best possible set of "decipherable affixes", an engineering program that was to last through 1982. The unsolved problem in the grammar, in contrast, was well-known in 1975: Loglan grammar was not formally, but only heuristically, unambiguous. Discovering a formal proof of its freedom from ambiguity, and disambiguating it where it was not, was a task that had been necessarily left undone for want of powerful enough tools. This lack was filled in 1975--the very year of Loglan's second public debut--by Aho, Ullman and Johnson (1975). With the "automatic parser generators" that issued from their work, Loglan grammar was made, and demonstrated to be, unambiguous in 1982, and has remained so ever since.

27 In fact, something like this actually happened in the course of the reengineering of Loglan morphology during the years 1978-85, a project called the "Great Morphological Revision" or GMR. A rebellion did occur--or did very nearly--in response to the publication of *Notebook 2*, a report on the early findings of the GMR research. Some loglanists did not welcome such fundamental changes in the morphological structure of their language. See Brown (1983c) for some reflections on why resistance of this kind might be more likely to occur when changes in morphology are proposed than when the changes proposed affect only grammar. I argue in that paper that this observed difference in resistance to change, if it turns out to be a real one, could very well reflect the very different evolutionary histories of these two compartments of the human language-handling apparatus, the early Pleistocene one, which was arguably evolved to handle the mimetic acquisition of morphology and a proto-lexicon, as opposed to the late (geologically) Recent one, evolved to handle the inductive acquisition of grammar. I argue that mimesis and induction involve very different kinds of mental programming, the first (in several senses) being essentially conservative and change-resisting, the second, essentially exploratory and change-welcoming.

Chapter 7

TESTING THE SAPIR-WHORF HYPOTHESIS

7.1 The Paradoxical Nature of Scientific Truth

Many readers of earlier editions of this book have been charmed by the notion that the Sapir-Whorf hypothesis may actually turn out to be true, and that their own personal commitment to learning Loglan may contribute to that outcome. Most of the discussion of the Whorfian prospect in the loglandical literature takes for granted the truth of the central Whorfian thesis, namely that the structure of individual languages does in some way shape the thought of monolingual speakers of those languages. The potential role of Loglan in mobilizing such effects is also seldom doubted. For such discussions immediately move on to what is evidently the more interesting question: how Loglan may best be used to exploit the "Whorfian effect". What is clearly presupposed by all such discussions is that there is a pool of such effects, and that some or all of them are salubrious.

These are cheerful opinions and they lead to cheerful prospects. They may even be the stuff of which human commitment is made...for example, to the not inconsiderable investment one has to make to learn a sutori language. But while I welcome this action-supporting optimism, I would also like in this final chapter to take a more sober, scientific view of the Whorfian prospect.

In doing this, I will consider several possible hypotheses--all Whorfian in one sense or another--that might be tested by future work with Loglan. I will try to explain exactly what these hypotheses claim, and what we can expect to observe--either in nature or in the laboratory--if their claims are true. More importantly, I would like to show how we can expect to *know*--not merely to conjecture--that those hypotheses are false should they turn out to be so.

There is an apparent paradox here. The scientific enterprise appears to proceed most vigorously through efforts to falsify ideas rather than to prove them. This is apparently because of both the local and the selective nature of all organismic knowledge. Our sensory apparatus, like that of any other organism, does not allow us to observe nature either completely or directly. So we can never know that any given explanatory model we contrive is true of it. The paradox is that we can, and often do, make the opposite discovery: that some theory that we hold is false. The history of science is replete with instances of a well-established theory turning out to be in some unexamined corner false just as we were getting used to it.

The methods of science are based on this curiously asymmetric relationship of human understanding to objective truth and falsity. We have learned in the last five or six centuries that we and nature are apparently constructed in such ways that we can discover the vices but not the

virtues of our theories about her. If hypothesis H is true, we reason, then observation O will surely follow. So we run an experiment, or we go half way round the world to make an observation, having prepared ourselves very carefully beforehand to measure O or to record it should it occur. If we fail to observe outcome O after having invested so much care and attention on its possibility, then we can say clearly and flatly that H is false...and turn back to the drawing-board to repair our model. We have found a defect, a "vice" of our theory; and this is useful, for we then have useful work to do. And it is by such work that scientific models grow and prosper. But if O is observed, if our prediction that it would come about is upheld by the facts, then, paradoxically, we have nothing to do. We can rejoice, of course, and often do. But no intellectual progress has really been made. Confirmation is the absence of something, the failure to find out something definite, namely that our model is false to nature in some concrete respect.

Confirmation is, of course, reinforcing in the psychological sense; it is fun and therefore makes us work to achieve it. But the actual event of confirmation makes very little addition to the fund of knowledge. ¹ A confirmed model is an unchanged model, and so all we can be is happy. Confirmedness, moreover, is a temporary condition of nearly every model. We know as scientists that we must not be confident that what even the most abundantly confirmed model says about the universe is true. We have, for example, virtually abandoned the word 'theory' in modern science; for it tempts us to believe. So we use the word 'model'. It is obvious that it is we, not nature, who make our models. It is equally obvious that nothing so simple-minded as a humanly-constructed model will ever provide a permanently true picture of the majestically unfolding universe. We know even after the most resounding series of successes that we could run a new experiment tomorrow and find that some new O which it also predicts, but which we didn't think to look at, *doesn't* happen, thus learning that our model, though historically confirmed, is now not true to nature after all.

What this curious until-further-notice character of our scientific explanations seems to lead to in the working scientist is, one, skepticism about even the most well-supported theories and models, two, a readiness to overhaul one's own beliefs when new facts emerge, and three, a methodological resolve to try as earnestly as one can to disprove even one's own theories--that is, to find their defects--rather than try to prove them. The modern scientist, unlike those of earlier centuries, apparently harbors a suspicion that attempting to find "proofs" of any natural principle is, increasingly, a foolish enterprise. Proofs deal with certainty; and, as the late British philosopher Bertrand Russell once put it, we only know with certainty what is not about nature, and what we know about nature is never certain. So demonstration, while it may be a useful tool to a teacher or a civil servant, has an increasingly small role to play in science.

Such a Spartan resolve is difficult to live with. Moreover, it is more than just a touch inhuman. It counsels us to feel happy only when we fail to disprove our most cherished beliefs. In fact, one could argue, the happiness that one deserves to feel about any successfully predicted observation is in strict proportion to the earnestness and the cunning that one had invested in the effort to make it *not* appear. If, after so much effort to defeat it, the predicted outcome emerges anyway, then we are entitled to a little jubilation. And therein lies the paradox. Science is an enterprise whose logic demands that we try to fail, and then be happy when *that* effort fails.

Let's apply this curiously inhuman logic--no wonder science was such a late emergent in human cultural evolution!--to the Sapir-Whorf hypothesis, or rather, to the cluster of hypotheses that can be deduced from the several existing models of how those "Whorfian effects"--if they exist--are generated.

7.2 The Whorfian Phenomenon

Sapir and Whorf thought they had seen a pattern of relationships between the cultures of certain peoples and the structures of the individual languages with which those cultures were associated. That repeated pattern seemed to be containment. It was, they thought, as if human cultures were contained in their own languages, that each language set limits on the minds of its monolingual speakers so that each culture was constrained in its development by the very structures of the language in which it was expressed. Thus individual human cultures seemed not to develop in certain directions but to develop quite freely, even luxuriantly, in others. The observations on which Sapir and Whorf based these conclusions were originally confined to a small set of exotic peoples and languages; but Whorf later applied this containment model by analogy to several European languages and peoples.

Let us suppose that what Sapir and Whorf thought they had observed in nature actually exists. For brevity, let us call it the "Whorfian phenomenon". What other data do we have that might help us to understand the Whorfian phenomenon? There are two other fairly impressive bodies of data that relate human cultural enterprises to linguistic structures. One is provided by the history of mathematics; the other, by the everyday experience of travelers who learn foreign languages.

The history of mathematical progress over the last six centuries is a curiously repeated story. From time to time, the invention of a new notation--plus, of course, the system of calculation that quickly develops to explore its boundaries--ushers in a flood of new results and problems. These seem always to have been results and problems that had not been foreseen--indeed, were scarcely expressible--in the epoch before the new notation appeared on the scene. From its earliest beginnings the story of mathematics seems to have been segmented by notational innovations of this kind: the invention of zero and, what is more, its expression as a manipulable digit; the invention of negative numbers and their expression; of irrational numbers and theirs; of imaginary numbers; complex numbers; modular numbers; groups; matrices; lattices; transfinite numbers...each new conceptual advance having been accompanied by its separate, new notation.

One explanation of these historical phenomena is that it was, in each case, the new notation itself that allowed successively wider domains of mathematical phenomena to be explored. Indeed, this seems to be so obvious a feature of the history of their discipline that few mathematical workers seem to have any doubt that some kind of Whorfian mechanism has control of their intellectual lives. The power of notation is such a banal truth among them that it seems hardly worth mentioning. Computer scientists seem also to be of this opinion. Again it is the power of notation--often, in their case, as expressed in a new programming language--that seems to set limits on the elegance and power, in the end the productivity, of the programmer's work. Again it is by expanding those limits by inventing new notations that progress in this field, too, seems at least in part to be occasioned.

We might well surmise that in all those fields of human creativity in which inventions are expressed in written symbolisms--mathematics, computer science, logic, poetry, among many others--it is the resources of the language or notation in which the worker is working that seems to free da's mind. Thus long before Sapir and Whorf wrote of the possible linguistic constraints on thought, mathematicians were aware that it was the elegance of their notations that was "liberating minds". Before imaginaries, for example, the mental domains of mathematicians had been in some sense "restricted by" the absence of a "suitable notation". In effect, and except as they were then invested with a prior existence by retrospection, imaginaries did not exist. But those same minds were in some sense "liberated" by that "suitable notation" when it at last appeared. (Historians of mathematics tend to have a curiously impatient view of these matters...as though notations, like continents, were waiting to be discovered.) Thus the domain of what is thinkable mathematically has grown explosively over the last six centuries; and it seems obvious that it has done so by a series of definite, discrete pulsations, each one associated with a new mathematical idea, and a notation in which to express it.

But there's the rub. Is each domain-augmenting "pulsation" a result of the notation? Or of the invented idea itself? We cannot be certain. As in other Whorfian phenomena, there is no disentangling the substance of these new mathematical ideas from their form. At least there seems to be no chance yet of separating the electrochemical traces in the brain of the mathematician that represent the new mathematical concept about which da is thinking, from the effects of the new "squiggling rules" that guide da's hand on paper and so reveal new relationships to da's eye. So, obvious or not, we must put the histories of mathematical invention and notation in the same category of unexplained phenomena as the culture-language phenomena observed by Sapir and Whorf. But this is the question we must somehow answer about both: Is it the human *mind*, independent of the languages and symbolic notations in which it expresses itself, that is evolving in these culturally distinct or historically pulsating ways? That is, are all such developments implicit in the mind-stuff itself, whatever that may be? Or do the linguistic/notational garments in which the mind dresses its thoughts, and in which it appears to do much of its work, at first somehow "constrain" those minds, and then, when new costumes of previously undreamed-of symbolic cut are invented, they somehow "liberate" the mind from just those earlier "constraints"?

This, then, is the puzzling problem that faces all serious investigators of Whorfian phenomena: in nature, at least, there seems to be no way of disentangling the form of the thought from the thought itself. Only experiment gives any hope of separating linguistic form from either cultural or intellectual content...unless, of course, nature obligingly runs some disentangling experiment for us.

But what about the third pool of phenomena which we thought might possibly be Whorfian? The experience of foreign-language speaking travelers? Again the data are banal. Again they seem to lead to conclusions that are "indubitable" to the travelers and expatriots who experience them but distinctly doubtful to the scholar. One seems to "know", as a traveler, that when one is speaking Spanish with a Spaniard, or French with a Frenchman, or Arabic with an Arab, that one is in direct, immediate contact with a mind of strikingly "different flavor" from the minds one left at home. The differences one senses are (for want of a better word) "philosophical"...not more substantial than that. Yet the more widely one has traveled, and the more intimately one has

known the minds of foreigners while traveling--minds that were forged originally by other languages, one senses--the more deeply one is convinced of the existence of powerful linguistic (or only cultural? or are they gene-pool?) forces that must be cunningly at work everywhere on the planet to give shape and flavor to the human soul. One "knows" this, as a traveler, as certainly as one knows the differences between the overt styles of cuisine, work, friendship, art, religion, architecture, romance, manners and decor that decorate the countries one is moving through.

Most anthropologists would disagree with this travelers' intuition. Most would brand it as superficial, confusing the messenger with the message, the language with the culture it expresses. For the bulk of things one notices when one travels, this must surely be true. It must, we feel, be the culture, not the language, that is responsible for most of the cleavages we notice in the human fabric when we travel. Some anthropologists would say that it is the internal dynamics of cultures in reaction to their habitats that creates those deep discontinuities in beliefs and customs in the first place. But most would confess they don't know what creates the gullies in the human landscape, but there they are.

But isn't this the same problem of form vs. content that we encountered earlier? Indeed, how can we disentangle the culture from the language in which it is expressed? Isn't this, too, a case of disentangling--at first conceptually, and later experimentally--two forces that are in nature tightly wrapped? As soon as we begin to consider these travelers' data, and the facile explanation all travelers seem to invent for them, *again* it is clear that we are conjuring up forms as possible causes of mental and social behavior that are in fact disentangleable from the substance of that behavior itself. Like the ethnologist, we are led to ask, Is it the cultural dynamo itself we are sensing when we speak with foreigners in their own tongue? That is, is it something quite independent of the linguistic garments in which we find it (fascinatingly) garbed? Or is it the very garments, their cut and style, that have shaped (as we seem always to believe they have) the myriad forms of human philosophy which we encounter when we travel?

Sapir and Whorf are not the only scholars who have believed that they'd found convincing evidence that the shape of language shapes the culture and the mind. The American philosopher F. S. C. Northrop, in his (1946) book **The Meeting of East and West**, examines the cultural gulf that lies between the Chinese civilization and the cultures of the West, and offers us a wide variety of historical, geopolitical, and cultural explanations. But prominent among them are the linguistic differences between Chinese and the Indo-European languages, according to Northrop. Indeed, he adduces the deeply esthetic orientation of the Chinese civilization directly to the metaphor-richness of this remarkably long-lived and grammatically permissive language...a possibly important feature of the grammar of Chinese which we have had occasion to note more than once in this book.

Northrop's hypothesis is yet another Whorfian hypothesis, this time a facilitory one. Indeed, so is the most obvious explanation of the apparent effect of notational advances on the development of mathematics; for whatever else they are, notations that replace other notations are facilitory. This is a very different matter from talking about grammatical obligations and their restrictiveness. Restriction takes place in present time. But no one can seriously argue that the absence of a "suitable notation" was restrictive before it was adopted. How can it have had any effect before

the event? An absent thing can have *no* effects, neither restrictive nor facilitory.² Yet the travelers' data seem not to be better explained by either kind of explanation, neither the facilitory nor the restrictive one.

Whorf's containment model for culture-language phenomena is definitely restrictive, however...at least that is most frequently the thrust of his arguments. Whorf uses the restrictive argument especially effectively with respect to obligatory grammatical rules: the fact that all Indo-European sentences, for instance, must bear some mark of tense. Also, he observes that I-E predicates are sorted into unmixable "metaphysical" categories: nouns for things and substances, verbs for actions and processes, adjectives for qualities, and so on. All these structural features of languages are seen by Whorf as limiting the domain of the possible for minds shaped by them. Yet Northrop speaks of the facilitation of poetry by the grammar of the Chinese language, which, with its virtually limitless interplay of verbal categories, is a lot like Loglan in its freedom to combine predicates. And certainly there is no historian of mathematics who would balk at the word 'facilitation' to describe what has happened linguistically in mathematics...if, indeed, anything linguistic has. On the other hand, 'enablement' might be a better word to describe what has happened in mathematics.

So let us distinguish between two quite distinct kinds of Whorfian hypotheses: those that offer containment by domain-restriction as their explanation of all or some of the Whorfian phenomena, and those that offer facilitation or enablement. The obligatory grammatical arrangements of the natural languages are instances of the kind of cause to which restrictive hypotheses attribute Whorfian phenomena, while the invitation to pour old wine into new notational bottles--to rethink old problems in new formulations--is an instance of the kind of cause to which enabling hypotheses attribute some or all of the same phenomena.

What kind of hypothesis is Loglan good for testing? Well; both kinds. Loglan is both enabling and domain-enhancing. At certain points the design of Loglan incorporates restrictive hypotheses by removing many of the domain restrictions which Whorf described, or at least by pushing them outward in domain-augmenting directions. The loglanist will know what these are; I hardly need to mention them. But chief among them are the absence of *any* obligatory inflections on the Loglan predicate, and of any grammatically significant distinctions among them. At the same time, in the same design-for-a-language, enabling hypotheses are also served. For example, the intricate but instantly decipherable connective apparatus of Loglan is plainly meant to facilitate the logical transformations. And the fact that Loglan predicates, much like Chinese ones, may be freely combined in literally any order is meant not only to remove domain restrictions of a metaphysical kind on metaphor-making, but also, and not altogether incidentally, to facilitate the poetic richness of metaphor in the language as well.

The question is, Will Loglan do any of these things? Will it do all of them? Will the "removal" (in the sense of not requiring any) of obligatory grammatical arrangements (like tense inflections) actually increase the domain of the sayable, and hence of what is thinkable in Loglan? Obviously we don't know yet. But these are formal features of the language, not substantial or cognitive ones; so they can be invoked by both kinds of Whorfian hypotheses. Some matters of substance are expressed in the design of Loglan, too, of course, but these, like its accommodation of the vocabulary of science, are robustly international in bias and provincial

only in the planetary sense of belonging to the human "global village". In fact except for science, Loglan as it stands is almost entirely a set of content-free linguistic forms.

7.3 Containment vs. Differential-Enablement Hypotheses

Let me first make clear that the containment vs. the differential-enablement interpretations of the Whorf hypothesis are not rival hypotheses in the usual scientific sense of that phrase. That is, the two models of the origin of Whorfian phenomena are not incompatible with one another in the sense that they may not both be true at once. As applied to cultural differentiation, for example, as this is sensed by the traveler and described by the ethnologist, the restrictive interpretation of the Whorfian hypothesis (Whorf's own interpretation, in the main, although enablement is a recurrent minor theme of his analyses) generates an hypothesis that language A of culture A' is sufficiently different in some structural feature--say its tense system--from language B of culture B', that the domains of the grammatically permissible in the two languages A and B differ in both size and extension, and in ways that explain at least some of the content differences--that is, differences in beliefs, techniques and values--that characterize the two cultures A' and B'. In other words, the containment hypothesis argues that the observed A'-B' cultural differences are at least partly due to the differences in the "shapes" of the two linguistic bottles, A and B, in which the two cultures have been--and still are--contained. But it must be emphasized that there is nothing in such a containment-oriented explanation of the observed phenomena that is logically inconsistent with, or dependent on there not being, language-related facilitations also at work in the mental lives of speakers of A that are not at work in those of B, and *vice versa* and that these also explain some of the differences between A' and B'.

So it is a question of mix. We may eventually know what the mix of causal mechanisms in any given A-B/A'-B' language/culture comparison is. But for the present, we have no idea how the ball will bounce between the two kinds of hypotheses. Both kinds interest us. And both kinds of models generate detailed predictions of experimental outcomes. It becomes the task of the early experimenter, then, to measure a broad enough range of outcomes to include the predicted products of both kinds of mechanisms. For example, enhanced facility with metaphor might be an expected (Whorfian) outcome of Loglan's undifferentiated predicate-structure, should Loglan be the A in some A-B comparison, while enhanced awareness of the varieties of possible existences might also be an expected consequence of the lifting of metaphysical restrictions as this might be attributable to the same undifferentiated lexical arrangement on the containment model.

So at the same time that certain enablement effects were being generated by what we might think of as the "logical" parts of a language, certain "liberation effects", such as measurable increases in speakers' senses of the possible, might be simultaneously attributable to a restructuring of its "metaphysical" parts, for example, to a reduction in scope of the obligatory arrangements of the same language. The point is that both kinds of effects could be exhibited historically by the same population during the same period--presumably one in which such linguistic changes were occurring naturally--as well as by the same subjects in the same experiment. To put the experimental point more concretely, there is nothing (that we know of) that would make it psychologically impossible--or even awkward--for a subject to become both more aware of existential possibilities and more adept at coining metaphors; and for both events to happen

during the same experimental treatment. So we do not have to choose between the containment and the differential-enablement models in the early experiments. In fact, our best bet is to provide for the measurement of *both* kinds of effects in the earliest experiments. It is all but inevitable, of course, that in later experiments, more sophisticated models will be developed, and that these will predict a different mix of outcomes for different language-pairings, and so require a different battery of instruments to record them.

7.4 Whorfian Effects

By a "Whorfian effect" I will mean in this chapter that subset of Whorfian phenomena that can be regularly released in experimental settings. Of course we don't know what these effects are yet, or even whether any can be released. But in order to measure any Whorfian effect whatever, we must obviously be able to predict it, or at least to predict phenomena which are very similar to it, in order to prepare the instruments that will measure or record that effect...in a word, that will be capable of "catching" it. We must, in short, have some clear ideas as experimenters about the kinds of effects we are likely to release in our language-learning experiments in order to be able to capture them as observations when we run those experiments.

Loglan was designed to release Whorfian effects in subjects who learn it as a second language under conditions of laboratory control. It was meant to do this in two ways: (1) by increasing the domain of the grammatically possible over the formal size of that domain in the subjects' primary languages, we expect some of the subjects to occasionally show signs of using or having used the larger domain in their thinking...that is, of having been "liberated" from the smaller one "imposed by" da's native tongue; and (2) by providing the subject with notational facilitation of certain language-mediated performances, such as logical and causal inference, we again expect at least some subjects to show signs of increased competence in just those areas of da's mental life as involve those kinds of performances. Let us call the first type *liberation effects*--those that, according to the containment model, arise from the removal of constraints--and the second type *enablement effects* those that arise from supplying the subject with what amount to notational improvements, in the mathematical or computational sense, over corresponding structures in the subject's native tongue. In short, we hesitatingly predict that there will be signs--perhaps faint signs at first, but definite signs, and observable in the most receptive subjects if not in all--of both domain transcendence, as permitted by the lifting of constraints, and enhanced mental performance, as enabled by what may then be seen as Loglan's notational advances over the state of these same matters in the subjects' primary tongues...and I trust I need not add 'if Whorf is right.'

Of course we would expect the enablement effects--if they exist at all and if any given exposure to Loglan lasts long enough for them to develop--to include various kinds of long-range historical effects, such as enhanced rates of discovery and innovation, in the Loglan-speaking portions of some affected population; for this result, too, is predictable on the Whorf hypothesis given linguistic enablement over long intervals in large populations. In fact, there are those who will say that the "real" confirmation of the Whorf hypothesis will not take place until and unless such historically visible results do emerge. This may well be; but such historical outcomes obviously cannot happen until Loglan has been adopted as a sutori language by a considerable number of people for some years. Nothing is more likely to lead to widespread adoption than

clear experimental results that its use is likely to be both individually and socially salubrious. So with this acknowledgement of the importance of long-term effects--but as qualified by their probable dependence on some useful short-term ones--let us return to our experiment and its necessarily short-term focus.

We must now address the matter of the time it takes to develop a response, which is so crucial for a real-time experiment. Cutting across the field of liberating and enabling effects, is the question of the interval required for generating a measurable expression of some effect. We can expect (a) short-range *creativity effects* or those verbal expressions of both domain-transcendence and enablement which might be emitted early in the second-language learning experience; but we may also expect (b) long-range *performance effects*, or those relatively permanent alterations in the subject's verbal/mental competence which may not appear in measurable magnitudes until deep familiarity with an enabling and/or domain-expanding second-language has been achieved. Obviously only the first of these are suitable for assessment by a short-term experiment, say a Summer Workshop. But the second are more interesting, and certainly more germane to the ultimate assessment of Loglan as a second language. So we must keep in mind the design of longitudinal studies to track the slower-developing performance effects of the Loglan-using experience, as well as the design of instruments to trap the short-range and perhaps even ephemeral creativity effects we will with luck observe even in the earliest experiments.

Let us now consider these several kinds of possible Whorfian effects in some detail, concentrating first on the creativity effects we must be prepared to measure in short-term experiments, and looking later and more briefly at the longer-range performance effects we might want to track in longitudinal studies of our once-experimental subjects after we release them.

7.5 Creativity Effects

Linguists and other travelers have long been aware that certain playful, and often utterly novel, uses of one's native language often accompany sutori-language learning. Indeed, they accompany many non-linguistical varieties of formal learning as well, professional logicians, computer programmers, and masters of other essentially formal disciplines often exhibiting the same sort of verbal playfulness (Lewis Carroll having been, perhaps, the most conspicuous example of a linguistically playful scholar). I have noticed that these effects are particularly salient in students of Loglan.

Creative novelty in the use of one's own language is, of course, explicable on either version of the Whorf hypothesis, but especially on Whorf's own version of it, the containment model. We should expect such creative play to occur whenever a new and language-transcending symbolism is being acquired, whether that symbolism is strictly linguistical or not. For what one learns through the manipulation of a new and powerful symbolism--like symbolic logic, for example--is precisely that one's native speechways are both imprecise and unnecessarily constraining, that they are both convention-bound and logically incomplete; and it is this cluster of discoveries that invite the extension of those speechways by "illegal" means into new domains of meaning or existence. The interesting possibility is that these random excursions beyond the conventional

usage-boundaries of one's native tongue may be precursors to genuine, long-range performance changes in the minds so touched.

I suggest that those who conduct the first Whorfian experiments measure the emission rates of these presumable early effects of second-language learning by counting their instances in recorded verbal protocols obtained in response to a set of standard stimuli administered in interview situations. Each stimulus must be usable in both "pretest" and "post-test" measurement sessions, that is, both before and after the experimental "treatment" has been applied, a treatment which in this case is the learning of a second language. On the other hand, no stimulus should be reused on the same subject. One way to do this is to divide the set of stimuli into two demonstrably equivalent sets. Then a random half of the subjects who receive the pretest will receive the two stimulus sets in one order while the other half will receive the other. The Whorfian prediction is, of course, that the "Loglan experimentals"--the subjects who learn Loglan--will exhibit the largest net increase in verbal creativity as so measured.

It is essential that the creativity-evoking stimuli be found to release high rates of such behavior in the subject population; and this can best be done by reducing the variance in verbal responsiveness between subjects. A type of stimulus that is known to have such properties is the "how-many-uses" question. Here is one: 'Suppose you were dropped by parachute into the middle of an Amazon rain-forest. How many uses could you make of this brick?' '.... this newspaper?' '.... this tennis shoe?' Procedures such as this are well-known in creativity research; see Parnes (1962).

As to the specific content to be abstracted from such open-ended protocols, and counted as instances of creativity in them, thirty years of work with Loglan has put me in touch with numerous categories of creative verbal behavior in the friends, co-workers and learners who have been exposed to Loglan at various stages of its development. It is possible that none of this behavior was actually evoked by exposure to Loglan but, given the circumstances in which I observed it, all of it could have been. For the benefit of other future experimenters let me record here the several types of this behavior that I have observed: (1) richness and oddity of metaphor; (2) unusually frequent designation of previously "unheard of", or unthought about, individuals and phenomena; (3) increased awareness of ambiguity as evidenced by jokes or other usages that call attention to it; (4) a taste for neologisms or for bizarre or over-literal usages; (5) the invention of inflected (or de-inflected) forms that do not exist in ordinary usage in the speaker's native language but are in principle possible in it (e.g., 'coolth' 'idiosyncrat', 'ert', 'qualityedly', 'therapped grouply', 'encomiast', to list a recent sample); and finally (6) a heightened sense of fun with one's own and other people's English, e.g., with the often comic contrast between what people actually say and what they think they are saying...or have said.

Admittedly, none of these effects need have been genuine consequences of either learning or working with Loglan. It is true that they are often thought to be "Whorfian effects" by the people who experience them, but that won't do as science. They may be verbal/mental behaviors that develop quite spontaneously in the life-histories of whatever special kinds of persons are attracted to learning or working with Loglan...or, indeed, with its inventor. Even so, familiarity with these quasi-Whorfian effects among the aficionados of the language has probably given us at The Institute a number of concrete insights into how to measure the incidence of at least one

species of "verbal creativity", one, moreover, that may be argued to be a direct expression of the expansion of the speaker's "ontological domain"...by which I mean the domain of possibly existent entities as da perceives them. I have shared these insights with my readers in the hope that among them will be the next generation of Loglan scholars, on whose shoulders the responsibility for designing and running the Whorfian experiments may eventually come to rest.

Such creativity measurements, however tentative, will allow the early experimenters to raise the question--both by additional experiments and by longitudinal studies later--of whether these playful verbal effects are persistently related to any more substantial kind of creativity. In our present corps of loglanists, they seem to be. But at present, this observation provides us with no more than a preliminary hypothesis. For the causal influence may very well run in the other direction. Thus it may be that *only* productively creative people have managed to learn, or even desire to learn, Loglan through their own boot-strapping efforts. This reminds us of the sobering fact that the experimenter must *not* draw his subjects from the population of persons who are *spontaneously* attracted to Loglan, as da might be inclined to do, but instead from some other, more broadly defined pool of available subjects, say university students, in which the association between willingness to participate in linguistic research and personal creativity is not likely to be so strong, and hence so troublesome. This is a matter we will take up in the section after next, the one on experimental design.

7.6 Long-Term Performance Effects

At its most precise, the assessment of the long-range effects of learning Loglan requires that performance measures be made at an early stage in each subject's acquisition of Loglan, and again at the stage of da's full linguistic competence. As a diverse set of controls on such longitudinal studies, it would be desirable to track both the growth of linguistic competence and the performance effects that might be associated with it not only among (1) the Loglan-learning experimentals from some short-term experiment (see next section), long since over, who had continued their studies of their own volition, and had eventually achieved full competence (measured at some realistic level after some substantial interval, say five years), but also among the following three additional kinds of subjects: (2) the Loglan experimentals who had not achieved competence by that time; (3) the other experimentals, that is, those who had learned other second-languages as part of the same experiment; and (4) at least some members of the control group; see the upcoming section on experimental design for the source of these four kinds of experimental subjects, some of whom might also be longitudinally tracked in long-term studies.

A problem with all longitudinal studies, of course, is the high loss rate of subjects over time. People move away, lose interest, fail to respond to inquiries. I will assume that this problem can be solved, that a reasonably high proportion of the original pool of subjects can be tracked and kept interested in what is happening to themselves and others linguistically. A further assumption of such a study design is that some substantial number of the Loglan experimentals, as well as the experimentals who were exposed to other second-languages, will continue their language studies voluntarily and ultimately achieve respectable competence in their respective second-languages. Only then will we be in a position to compare the performances of the several groups of experimentals with each other, and with the controls.

There is a second, even more troublesome problem with longitudinal studies of this kind. There may be--indeed, there probably will be--what statisticians call a strong first-order interaction between whatever causes a subject voluntarily to pursue da's studies to competence and the particular language in which competence is being achieved. Thus, subjects of one type may persevere in French to competence, while quite a different type of person may win through to full speaking competence in Loglan. If such an interaction exists, and it is strong, then any difference between the mental performances of the two linguistically competent groups could be as reasonably attributed to the differences between, let us say, their genomes or their personalities as to the formal differences between the two second-languages they had happened to learn. There are, fortunately, ways of solving such problems of longitudinal studies statistically; but it would take us too far afield to discuss them here.

I shall now list a number of specific verbal and/or mental skills whose enhancement might be arguably related to the specific structure of Loglan vis-a-vis English, and on which we might expect, therefore, the performances of competent Loglan speakers to be higher than, say, those of the subjects who had learned French on the same measures: (1) the understanding and the use of metaphor, as in the appreciation or composition of poetry, or in the acquisition of new vocabulary; (2) competence in achieving clarity in communication, as in the stylistic avoidance, or the editorial detection and repair, of both syntactical and lexical sources of ambiguity; (3) logical competence, as revealed by (a) the correct use and/or understanding of quantifiers, explicit and implicit ones; (b) drawing correct inferences from stated premises and/or detecting and correcting incorrect ones; (c) supplying the missing premises of incomplete arguments; and (d) the correct use and/or understanding of the logical modalities (actuality vs. potentiality, etc.). Finally, metaphysical awareness may also be argued to increase while acquiring competence in Loglan, and this might be measured by (4) the ability to understand and/or appreciate non-Western cultural assumptions about reality, or by (5) the subject's ability to reexamine da's own assumptions. Inductive and abductive competence may also be expected to increase, as expressed in (6) the frequency and originality of new insights and hypotheses.

The selection of standard psychometric measures of such human performances, where they exist, or the construction of new ones where they do not, would indeed be a challenging task. Nevertheless, if post-experimental studies of a subject-tracking, longitudinal type are ever to be performed, their initial conditions must be met in the earliest experimental designs. One possibility would be to include such a performance battery in the pretest of the original experiment. This strategy, however, might so increase the magnitude of the pretest/post-test interactions of that experiment as to mar its sensitivity to short-term, creativity effects. Fortunately, such destructive interactions can be investigated beforehand. But another, safer course would be to administer the performance battery along with the experimental post-test, where it would have no chance to influence the outcome of the experiment itself. This second strategy assumes that no very substantial changes in these performances will have taken place in, say, a two- to six-months' exposure to a second language, or that, if substantial, they will appear as clearly identifiable performance differences between each of the several groups of experimentals and the controls. Another design consideration is that, since the Loglan experimentals will be the crucial subjects in all future longitudinal studies, and since the number who will eventually achieve linguistic competence will inevitably be less than all, their original number should, accordingly, be larger than the other groups in the original experimental design.

7.7 An Experimental Design

Probably the most fruitful field in which to investigate the constraining effects of monolinguality, as predicted by the containment model of the Whorf hypothesis, is second-language learning. According to this model, *some* expression of the Whorfian phenomenon takes place whenever anybody learns a second-language. This is because of the predictable widening of grammatical constraints that must, if Whorf is right, take place during any instance of second-language learning. No two languages have identical structural constraints under a Whorfian analysis. Therefore the logical sum of grammatical/ontological/semantical possibilities in the mind of a person who has learned *any* second language will always be larger than the set of those same kinds of structurally determined permissibilities when *da.* was monolingual. The effect will be large and noticeable when, other things being equal, the second language has a domain of grammatical, or lexical, or designational possibilities that is far larger than, or differently grained than, that of the subject's first language; it will be small and unnoticeable when the two languages are so closely-related historically that there are only small differences between their grammatical, lexical and ontological domains. On this same hypothesis, the reason we have not noticed these effects before as scientists is that, until the development of Loglan, we had not found a way of bringing the experiences of the mind-teased traveler and the notation-enabled mathematician into the laboratory.

But suppose we do bring natural sutori-language learning into the laboratory, let's say on a Summer Workshop basis for a "total immersion" language-learning experience. Suppose we use before-and-after measuring of relevant behavior with a view to capturing Whorfian effects. If Whorf is right, they'd be there. But we would probably find that the magnitude of such changes in behavior after that brief experience--especially with any of the languages commonly learned as second-languages by the English-speaking university students (whom I expect to be our first subject population)--would turn out to be so small that we would not be able to detect any changes at all with our "first-generation" instruments...by which I mean the instruments we had prepared for these earliest experiments. For those early instruments would necessarily be crude ones compared to later generations of the same devices. Not only that, but even if we were lucky enough to capture--even in our first experiments--effects large enough to consider Whorfian, we would not be entitled to attribute them exclusively to linguistic structures. For whether we plan it or not, whole cultures would have gotten involved in those totally-immersing Summer Workshops.

Suppose French had been the language taught in one of these workshops, and German in another. Suppose further that our subjects had all been (previously) monolingual English-speaking North American university students, and that the teaching and measuring had been performed in both workshops under substantially similar conditions. Would we be entitled to say that the French and German *languages* were responsible for whatever "Whorfian effects" we thought we had found? Certainly not; one cannot teach French by immersion methods without bringing in the French, nor German without bringing in German life, and culture. So even if we did find (as is unlikely) that solid and persistent changes had taken place in the mental lives of both experimental groups, and also that equally solid differences separated the sets of measurements made in the two workshops, even then we would not be entitled to attribute those changes and those differences to linguistic structures as any test of the Whorf hypothesis would require us to

do. French and German cultures would also have been involved. There is no practical way to keep them out.

It is at this point in our thinking that the strategy that led to Loglan arises. I discussed in [Chapter 1](#) how using an invented and therefore culture-free language like Loglan might help us "disentangle" the linguistic from the purely cultural effects of second-language learning. But this is only part of the experimental strategy, and, in fact, the smaller part. A more important reason for using a small, (relatively) culture-free language like Loglan is that such a language can be designed to turn on Whorfian effects in large amounts. Loglan--if it works--will be a kind of large-bore linguistic tap for turning on Whorfian effects. The hope is that we will be able to release them in such magnitudes that our necessarily gross first-generation instruments will have no difficulty in measuring them. Later, when we learn more about Whorfian phenomena in all their subtlety--and there *will* be subtle ones if there are any at all--and have had the experience of observing the full range of the effects that we have learned to produce experimentally, then we will become more skillful in measuring them. Scales will be developed. We may eventually become capable of detecting even minute amounts. When that happens, then the differences between the Whorfian effects of learning even two closely-related natural languages may well be studied...even though even the first-order effects may be unmeasurable now.

So the centerpiece of our design is the predictably large effect of learning Loglan. Still, a good experimental design to test the Whorf hypothesis should provide a comparison between at least two sets of linguistically-produced results. One advantage of having two sets that were presumably linguistically-produced would be that they could be examined for signs that they were. For example, if the effects of learning French on English-speaking subjects were qualitatively similar to those of learning Loglan, and all or most of them showed movement in the same direction as the Loglan-associated effects, then we could argue that they were at least the same kind of effects even if strikingly different in magnitude. If there were no qualitative similarities, then that would warn us of some problem with our method. So it is not enough, methodologically, to measure only the presumed Whorfian effect of learning Loglan on, say, English-speaking minds. Even if that effect were large, we could doubt that it was a genuinely *linguistic* effect we were observing.

Let me be concrete here. Let us say that a "significant Whorfian effect", as we will now use this phrase, is a statistically significant difference between a pair of before-and-after measures on some Whorfian parameter, say the creativity effect discussed in [Section 7.5](#). What is important, if our experiment is to submit our model to a searching test, is that we have at least two such Whorfian effects to examine at the end of the experiment: one that we predict will be small, possibly even insignificantly different from zero, and attributable to French, say (and to France!), and another that we predict will be much larger, significantly non-zero, and attributable to Loglan (and to a not yet existent Loglandia). The point is that if the French-on-English effect is significantly different from zero as well, then it must be qualitatively similar to the Loglan-on-English effect if the results are to be regarded as supporting the Whorf hypothesis.

But a tendency established by two points is much less meaningful than one established by three. In fact, we can practically double the amount of information we get from our experiment if we provide for a third set of Whorfian effects, from a third second-language. To be most

informative, the language we choose as our third experimental language should have a predictable Whorfian effect that is intermediate in magnitude between the predictably large Loglan-on-English effect and the small one we expect to get from French-on-English. With what sorts of languages would we expect to observe such intermediate effects? Well; obviously not one that is in the Indo-European family, as both French and English are. It would also be desirable for the intermediate language to be more Loglan-like than French is. Chinese is a suitable candidate for the third language on both counts. It is completely unrelated to English; and, from a Whorfian point of view, it has a grammar that is marvelously different from English. It is also similar to Loglan in several interesting respects. It is not as "marvelously different" from English as Loglan is, of course, but it is in that direction.

With three such second-languages in the experimental design, we will be able to make even more exact predictions. We will now be able to say that the Chinese-on-English effect will be smaller than the Loglan-on-English one but substantially larger than the French-on-English one...if Whorf is right. So with a three-experimental-group design there are twice as many ways in which the Whorfian predictions can be wrong; and that is precisely the kind of improvement that we seek.

We are now envisioning a classic three-group, trend-assessing experiment in which all three kinds of experimental subjects--i.e., all those who were going to receive an experimental treatment of some kind, either with French, Chinese or Loglan--would learn in a Summer Workshop setting the particular second language to which they had been randomly assigned. It is obviously important that the assignment process be a completely random one. This would minimize--indeed, it could well eliminate--the effects of differential attraction between given subjects and the second-languages they were assigned to learn. If such effects were allowed to exist, they would align themselves with language selection where they would then exert large, unknown influences on the experimental outcome. In order to avoid them by using a random assignment procedure, however, we must evidently appeal to the kind of subject who would agree beforehand to accept the luck of a random draw. Such individuals might be fairly rare--rarer, surely, than those who could be tempted to volunteer to learn some specific one of our three languages--and to encourage them might require other, even monetary, incentives. If this turns out to be the case, financial incentives will have to be supplied; but these would probably add only a modest amount to the already considerable cost of such an experiment. Please note that it would spoil our experiment beyond salvation if we were to allow only those who were strongly drawn to Loglan to learn Loglan, only those passionately drawn to Chinese culture to learn Chinese, and only those with a secret desire to read French poetry in the original to learn French. Yielding to such powerfully differentiating forces among human beings would immediately reduce our study to a study of three, possibly sharply different pools of human tastes and temperaments; and none of the outcome differences among them could possibly be regarded as having been linguistically caused.

Let us now consider the all-important question of statistical controls. One would think that all of the experimental subjects would have to be exposed to a pretest on the Whorfian measures so as to establish their current, pre-experimental levels of creative behavior. It is true that some subjects will have to be so-measured in order to provide good estimates of the levels of creative behavior with which the experiment begins; but it would be a mistake to expose all our subjects

to such pretesting. It turns out that pretests interact strongly with experimental treatments of this kind, and the unavoidable effects of that interaction must, therefore, be estimated and, in that way, statistically controlled. To control such interactions--that is, to take them into account statistically while evaluating our results--we must measure the final levels of the outcome variables both when the pretest was present and again when it was not. The difference between the two measurements will then give us our estimate of the strength of the pretest effect, an effect that can then be withdrawn mathematically from the main effects of the experiment.

The most efficient way to get an accurate estimate of the pretest effect is to divide each experimental group into random halves. To one half of each group the pretest is then given; to the other half, it is not. As the two halves of each group will then be mixed back together again in the workshop, there to live and work together while learning their particular second-language socially, it is essential that the people who have experienced the pretest--and who will thus have data from which any alert observer will be able to infer at least some of the reasons for the measurements they had undergone (it is of just such inferences and their usually cooperative effects on subjects' performances that the pretest effect is in fact composed)--be warned *not* to discuss their pretest experience with anyone else...especially-not with those who did not experience it and who are being kept, to that extent, in the dark about the Whorfian measurements that will be made on everybody at the end of the experiment. Experience has shown that it is not difficult to get the cooperation of the pretested subjects on this vital matter...precisely because their cooperation *is* so vital to the outcome of any before-and-after experiment. In general, subjects wish their efforts to be unwasted.

A final kind of disturbance which a wise experimenter will make an effort to control is what might be called the "ongoing world effect". Controlling it requires that an estimate be made of "what would have happened to our subjects had the experiment not been run". Every human experiment takes place at a particular time of year, at a particular historical moment, in a particular culture, in a particular matrix of surrounding events, and during a particular developmental season in the lives of the people from whom its subjects have been drawn. To measure what is happening to a group of persons who did *not* receive any experimental treatment, therefore, but who are similar in every other way to the experimentals, is just as crucial to a treatment-assessing experiment of this kind as to measure what happened to those who did. To control for this ongoing-world effect is, in fact, very simple. All we need is a fourth group, called the "controls", in addition to the three we have already planned. In size the control group need be no greater than any one of the experimental groups, but no smaller either; for a random half of the control-group, too, will be administered the pretest.

We have already explained why the partition of the total group of subjects into the four quadrants of this design should also be done at random. But the actual allocation of the four random quarters of the subjects to their four experimental destinies should not, in fact, be done until after pretesting has been concluded. This will prevent other potentially disturbing interactions from forming. It is quite conceivable, for example, that subjects who knew before the pretest that they were going to be controls would not perform as well on it as they would have done had they known that they were to be experimentals. Similarly, subjects assigned to the Loglan group might also do less well on a subsequently-administered pretest, but for a different reason. To eliminate all such possible influences, then, of the subjects' prior knowledge about their allotted

roles in the experiment--influences caused, in the main, by the subjects' genial intention to "cooperate" with what they infer to be the "desires" of the experimenter--the pretest should be administered to a random half of all subjects before any of them are allocated to the various cells of the design.

What will the controls be doing while the experimentals are in their Summer Workshops? Anything except studying languages, or, for that matter, such other disciplines as philosophy, anthropology, or logic which might be thought to have quasi-Whorfian effects. Extra-cultural summer traveling, too, should probably be excluded as too likely to leave its own pattern of Whorfian traces. As for the rest, the controls could be free to spend their summers as they chose, reporting back at summer's end for their share of post-testing along with the experimentals.

Certain motivational problems are likely to be created by a design of this kind...for the controls, perhaps especially. Also, perhaps, but in weaker measure, for the non-Loglan experimentals. Inaction toward some valued end, or reduced levels of action toward it--such as the non-Loglan experimentals might well imagine they were being required to deliver--are intrinsically unpleasant for the human organism. How shall we compensate our subjects for this unpleasant cost of scientific rigor? (For that is precisely what it buys us.) There is one answer that seems to hold some promise of restoring a sense of fairness to the proceedings; and that is to make available to both controls and non-Loglan experimentals the *same* experience that the Loglan experimentals had--complete with curiosity-satisfying measurements--but during the *following* summer.³

Willy-nilly Loglan and the Whorf hypothesis will have become the public focus of this scientific enterprise. One would hope that publicity would be minimized until the results were in hand; but it could not be kept at zero. Speculation about its purposes would spread; and no one involved in it could be blamed for hoping for a positive outcome...never mind the inhuman logic that will be telling the investigators that *they* shouldn't do so...or rather, that they shouldn't let their doing so stack the cards in favor of that outcome.

7.8 The Experimental Treatment

Little space in this work need be devoted to describing how modern intensive language-teaching works. The "live-it, eat-it, sleep-it", total-immersion method of learning a modern language is well-known. We hear of the preparation of spies and diplomats through it, and of its use in the training of business and military people for overseas assignments. By the time the Whorfian experiments come along, immersion-teaching will almost certainly have been applied to teaching Loglan, too. We need only discuss here the scientific problems that may be generated by the effort to apply such a method concurrently to three such different languages as, say, Chinese, French and Loglan. The very largeness of the differences among these three languages is, of course, what makes them attractive as concurrent treatments in a Whorfian experiment. But the character of those differences may lead to some knotty problems, too, for the experimenter.

For example, a serious problem for the experimenter would be created by any large difficulty-differences among the three languages for any particular nationality of subjects. For example, for three groups of English-speaking learners to reach substantially the same level of competence in

Chinese, French and Loglan, the three languages may well require substantially different learning times. Very likely a group of monolingual Americans undertaking to learn Chinese will require more time than a similar group learning French will; and while we do not yet have quantitative comparisons between these two natural languages and Loglan, we do know that Loglan learning rates are very high, so the Loglan group is likely to require even less time to reach any given level of competence than the French one will. Suppose the intervals required are in the ratios of 4-2-1. How do we conduct concurrent Summer Workshops on that basis?

Two solutions present themselves. One, we introduce calculated amounts of "idle time" into the Loglan and the French group's workshop experiences, and run the Chinese workshop flat out. Two, we start the Chinese group's workshop first, then the French group's, then the Loglan group's; and, having obtained good estimates of the total times required beforehand, we arrange for them all to reach approximately the same competence level at approximately the same time. In other words, we handicap the three groups as if we were running a fair footrace among runners of very different talents.

The "idle time" idea seems flawed to begin with. No time is really idle, and if the Loglan group's fascination with their new language reaches the same pitch we have observed in other Loglan learners, there will be no practical way of keeping their minds really idle about Loglan once they have been exposed to it. The different-starting-times proposal seems to be the only practical way of running a fair learning-race.

How much total time do we have? The typical language workshop lasts about two months...let us say 8 weeks. If, at the ratios given, the Chinese group were to use all of those weeks, then the French workshop would have to start at the beginning of Week 5, and the Loglan group at the beginning of Week 7. But this is absurd. Two weeks is not long enough to get comfortable with any language, not even with a charmer like Loglan. We will have disabled our fountain of Whorfian effects before we even connect the plumbing to it.

Clearly, it is better that we think in months. If 4-2-1 really are the expected multipliers, let's let the Chinese workshop run 8 months, the French one 4, and the Loglan one 2. But, if we did this, we would, in a certain sense, be penalizing the Loglan group by making the total time it spends with Loglan inversely proportional to the swiftness with which it can be learned! This sounds unfair. Definitely uncompetitive, and in the market-place, we wouldn't allow it. But isn't that stifled competition just what we want in science? Isn't it the learner's *competence* in da's second language that both Whorfian models predict will produce Whorfian effects? And not the time da takes to reach it? Besides, with such a schedule for the administration of our three treatments, we are stacking the cards against Loglan, not for it. That's not quite true, of course. We are actually handicapping the three languages as fairly as we can. So if, even after handicapping, the Whorfian effects of learning Loglan are *still* greater than those of learning Chinese, and the Chinese ones are in turn greater than the French effects, and if the magnitudes of these effects are *not* correlated with the duration of the respective exposure intervals--as this particular set of multipliers would have arranged for them not to be--then there must be some *other* explanation. It could be Whorf's.

So again there is every scientific advantage in making it tough for our hypothesis to emerge unscathed. To put the matter more precisely, we wish to arrange matters so that a chance, or inadvertent, confirmation of our model when it is in fact not true is as unlikely as it can be. A scientific "truth", i.e., a confirmed hypothesis, is apparently valuable in proportion to the unlikelihood of its having been confirmed by chance.

I do not for a moment believe that the learning intervals required for English-speaking subjects to reach speaking competence in Chinese, French and Loglan will be as disparate as the sample multipliers 4-2-1 suggest. But if they are, we should live with it. Provided they are solidly based on preliminary studies of learning times, such multipliers will provide fair handicaps. To do the opposite, to allow the three groups to race without handicaps through equal learning times, would almost certainly be to settle for lower levels of terminal competence from the French- and Chinese-learners than the Loglan-learners had achieved. This would stack the cards in favor of an outcome that favored Whorf and Loglan, and so doom our experiment to triviality.

7.9 Measuring the Host Culture Effect

Even an experiment as carefully controlled as the one just described could not be regarded as being decisive...not, that is, if its outcome was corroborative. It could of course refute the Whorf hypothesis, and would do so if no discernible Whorfian effects emerged, or did not arrange themselves in the predicted pattern: largest among the Loglan experimentals, second largest among the Chinese-learning subjects, and smallest among the French-learning subjects. In this (happy) event, we could still not regard the Whorfian thesis as having been established...even temporarily. For a very large and potentially powerful factor would remain unexamined; and that is what might be called the "host effect": the causal influence of the host language and culture on the effects we had succeeded in capturing. In our case, of course, that would be the North American English one, assuming that only monolingual English-speaking American and Canadian subjects had been enlisted for the first experiment.

The truth is that there is a large unmeasured main-effect in such nature-embedded experimental designs, as well as unknown interactions with other factors. Who knows how North American English-speaking life prepared, biased, or even seduced our subjects into displaying pseudo-Whorfian effects under just such circumstances? What complex pattern of so-called "Hawthorne effects" might we have created?

But we need not speculate about these mysteries. The next step in any series of experiments meant to be decisive is, scientifically, a standard one: we replicate. We repeat our experiment in "another laboratory", or we get others to do so; that is, we repeat our four-group experiment in a setting in which such transient, uncontrollable causes as might have produced false positive results in North America are bound to be different ones. We will get the most information from our replications if we repeat our experiment in China and France.

Then, if we observe the same corroborating pattern--the same prominence of the Loglan-induced effects over the two natural-language ones, and the same rank order of effects in France as we observed in North America (replacing French, of course, with its cousin, English, to make the prediction), and a predictably different pattern of results in China (and much, much more that

can be predicted for what would then become a *twelve*-group design) then we may, perhaps, claim to have run a decisive experiment.⁴

7.10 Some Possible Consequences of the Several Outcomes

Suppose that despite all such vigorous experimental efforts to refute it, the Sapir-Whorf hypothesis survives. Suppose an explanatory model emerges from these efforts that does successfully relate Whorfian linguistic causes to Whorfian psychological effects, that is, to a measurable expansion of the mind. Suppose as well that the effects we discover are as wholly salubrious as the predicted ones were: mind-expanding, thought-facilitating, and yet completely harmless to the persons who experience them. Such a pattern of scientifically induced effects could only be seen as augmenting human life. Probably all who learned about them would want to feel and see them happening in their own and others' lives. Suppose, further, that Loglan were the instrument of this extraordinary discovery, that it actually *was* the instrument that the experimenters used to turn on Whorfian effects. Wouldn't learning Loglan in the living-room promise to produce approximately the same effects? Wouldn't the entire experimental program, in fact, now be seen as a successful assessment of a proposed new educational experience, one that was available to everyone? It might even be seen as a treatment of a disease we didn't know we had! LLL, the disease of "local language limitation", or UNM of "unnecessarily narrowed minds". A disease, moreover, that had been pandemic on the planet until the studies of Sapir and Whorf began, nearly fifty years ago, to sniff it out? And wouldn't Loglan itself then be seen as the gentle new cure for that ancient human malady? An antidote for the antique provincialism of the human spirit? For what the late American psychiatrist-anthropologist Erik Erikson tellingly called our extraordinary tendency to "pseudo-speciate"? To behave like different species toward one another even though we're not? An antidote for the bigotry with which even "civilized people" tend to view their neighbors in the global village?

A fancy? Not entirely. This is what is very likely to happen given what the journalists will call a "positive" outcome of our Whorfian experiment, that is, a failure to refute this powerful notion. The Whorfian thesis *is* a powerful one, and it will be seen as powerfully salubrious if it is found to be "correct", that is, if it resists falsification by a well-designed experiment. It is for this positive outcome, perhaps, that we are allowed quietly to hope. As experimentalists, we are not, of course, allowed to be partisan, to unfairly help the fragile truth emerge, or even to try to demonstrate it. But as humans who see the practice of science as a service in the cause of life we are certainly allowed to hope for useful outcomes. This one surely would be.

Given that useful outcome, Loglan, and perhaps other engineered languages, could have a bright future in human affairs...even a utilitarian one. Backed up by such a result, Loglan would probably be seen as ideal in the role of that international auxiliary, for example: the first language to be taught to the world's school children, the one slated to become everybody's second tongue. The international language movement itself, now a century old, would receive a tremendous boost from a successful outcome of a Whorfian experiment. The choice of the best language for use in the international arena would be seen as an important choice again. At the same time, first-languages would continue to be seen as they are today: rich in nuance, history, literature, poetry, ambiguity, and humor; and dying first-languages would perhaps be strengthened everywhere by the appearance of an ally, the international auxiliary.⁵ But our

engineered new second-language would be seen as the mind-expander, the instrument of thought, reason, invention, and exposition...and perhaps also as the medium of intercultural mediation, a culture-spanning bridge to a more tolerant and peaceful world. Loglan, which started life as Whorf's instrument, might well be seen as something very like a suspension bridge, ready to be flung over cultural gorges, its linguistic antecedents (the natural languages) having been the mossy logs on which humans had been crossing local streams for millenia....the instruments of local traffic, surely, but of human provincialism as well.

We would continue to use those stream-crossing logs in the cosy provincial corners of our minds, of course, and love them. Their massiveness, their intricacy, their almost organic wholeness and wanton "over-design", would continue to charm and mystify. But where wide distances were to be spanned, where both accuracy and efficiency in communication were required, we would turn to our new linguistic implements: the engineered languages. Perhaps language and the language arts would begin to be seen in an entirely new light: like symphonies, space-ships and computers, we would see them, finally, as they had always been: the products of human invention if not exactly of human design. We would begin to realize what had apparently been true all along, namely that human languages *were* artifacts...evolved artifacts, to be sure, but, like culture itself, artifactual: delicate fabrics of local inventions woven over centuries; composed of ancient metaphors and other tiny implements of human understanding, but as surely and intentionally made by human tongues and minds as roads are made by human backs and hands. Human languages, we would perhaps be surprised to learn, are as alterable as city-streets.

This entire tissue of consequences, of course, rides on the supposition--for that is all it is--that the Sapir-Whorf hypothesis will be experimentally confirmed. But it is perhaps just as likely that it will not be, that it will be thoroughly refuted, even that *no* Whorfian effect will show up to be related to Whorfian or any other kinds of causes. What then? It will repay us to look at this second set of outcomes, too, and just as carefully.

The negative outcome, if I may call it that, does not have so clear a skein of consequences; nor, at first glance, do they seem so useful. Still, some consequences of refuting Whorf seem clear. One of these is that the intellectual rivals of the Sapir-Whorf hypothesis would certainly be fortified even if not established. There are principally two of these: the Kantian view of knowledge, and the Chomskian view of grammar. The 18th century German philosopher Emanuel Kant, you may recall, decided after several decades of reflection that the forms of reason, pure and practical, were innate. So innate, in fact, that a certain rather precious variety of truth could be obtained, as it were, by the human thinker without leaving his armchair; in effect, by consulting da's own mind and not looking at the external world at all. These truths he called "synthetic *a priori*" truths, and they have mainly to do with reasoning itself. But this innate kind of knowledge also includes some ethical principles and some metaphysical ones, according to Kant, and together they constitute a sort of biologically accumulated and transmitted pool of practical wisdom that can be known to be true about the world before one has even looked at it. This innatist view, as we might call it, of the nature of at least some kinds of human knowledge, and therefore of the human thinking that discovers it, would certainly be revived by the failure of a rigorous experimental test to confirm the Sapir-Whorf hypothesis. At bottom, we could now again believe, thinking apparently runs on its own internal tracks, in ways quite independent of

the linguistic forms and other notational devices that we find waiting for us when we enter this world.

The view of grammar associated with the 20th century American linguist Noam Chomsky is a close intellectual relative of this Kantian view, but nevertheless a distinct one. Chomsky has argued vigorously over the past thirty years--over almost the same decades that Loglan has been developing--that all essential linguistic structures are universal, given innately by the very structure of the human brain, and therefore fixed in the human gene pool. As a consequence, given the Chomskian view of things, the real grammar of any language is the biologically determined "deep grammar" it shares with all other human languages. It follows that all the surface variability we observe in natural language is epiphenomenal, making no real difference in how we generate or understand utterances, and therefore contributing to no or only shallow differences in how we think. It is clear that, to the extent that this Chomskian view is correct, and also to the extent that human thought is in fact shaped by the forms of utterance, the surface variability we--and Whorf--think we observe in language can make no, or very little, difference in how we think.

There is little direct, descriptive evidence to support the Chomskian notion of a universal human grammar, at least not one with a scope wide enough to account for any but a tiny proportion of human utterance forms. But the failure of the Whorf hypothesis in an experimental setting, such as the one we have just been discussing, would certainly renew interest in the possibility that, in some new and experimentally sharpened sense, Chomsky might well turn out to be right.

Still, looked at closely, neither of these two rival views of the relationship between language and thought--in Kant's case, of the relationship between experience as a whole and thought--actually contradicts the Sapir-Whorf hypothesis. Certainly they are very different accounts of the same phenomena. But that does not mean that all three of them could not be true. For example, there could be, and probably are, some rules of human information-processing (i.e., "mentation") that have been rooted so deeply by evolution in the human genome--using a computer-science metaphor, we could call them "hard-wired"--that neither linguistic forms nor any other kind of post-natal experience has any influence on their expression. When these hard-wired cognitive rules or mechanisms are fully understood, as I am confident they soon will be, there will then be every justification in calling them "Kantian"; for this is exactly the kind of knowledge that Kant was talking about. So the Kantian model of these matters would be to that extent confirmed. But nothing in such a result would in itself defeat the Whorfian claim that the content of the mature human mind--its beliefs, its sense of possibilities, its convictions about the underlying structure of reality--had not been in some way shaped by the structure of the language or languages in which it has been entertaining those beliefs and arriving at those metaphysical and ontological conclusions. So the Kantian and the Whorfian models of human knowledge are compatible, even though each may be said to limit the possible scope, or the domain of action, of the other. Thus if there are proportionally *many* genomically-transported Kantian rules, there must be proportionally *fewer* linguistically-shaped Whorfian ones; and *vice versa*.

An entirely parallel observation may be made about the Chomskian view of grammar. This model, too, does not contradict the Whorfian one, although it certainly opposes it. For to discover that the scope of universal grammar--that is, the size of the genomically determined

portion of all human grammatical arrangements--was proportionally very large over the set of human languages would limit the domain in which Whorfian mechanisms could be at work in language; and again *vice versa*. Why is this? Because such a discovery about the depth to which genes determine human grammatical behavior would mean that at least some of the notational/structural differences we observe between natural languages were in some sense "unreal", that they were apparent only, and so unlikely to be robust enough to perform the duties of a Whorfian cause. This does not mean, of course, that a superficial difference in linguistic arrangements can have *no* effects on mentation. But it does mean that such a difference is unlikely to have any lasting effects on human minds. Thus, just as with Kant, the degree to which Chomsky turns out to be right will limit the degree to which Whorf *may* be right about the effects of linguistic differences on human mental life. But the opposite is also true. If Whorfian effects are large, and experimentation shows them to be so, and the grammatical features of the concerned languages which appear to produce those numerous effects also turn out to be numerous, then it follows that the extent of the universal grammar is probably small. So a positive outcome of the Whorfian experiment will occasion a reassessment of the Chomskian position without, of course, refuting it.

Thus, while the collapse of the Sapir-Whorf hypothesis during a program of experiments designed to test its claims directly would not give automatic support to these two genetic theories of human knowledge and grammar, respectively, it would corroborate them. Indeed, such a robust but negative result could give many unexpected and yet useful redirections to the group of sciences that deal with human knowledge, culture, and language.

In sum, the Whorfian experiment is very likely to be useful however it turns out. And those who contribute to its running by becoming adepts at the Loglan language, and therefore able to offer themselves as models of its speechways to learners taught in laboratory settings, will make an especially large contribution to that outcome. For while English-speaking teachers of French, German, Spanish and even Chinese exist in satisfactory numbers now in North America, teachers of Loglan do not. Therefore the first item on *any* agenda to test the Whorf hypothesis with Loglan must be to grow its teachers.

Developing a corps of fluent speaker/teachers of the language will therefore be high on The Institute's agenda for the 1990's. So I may end this chapter where I began it by addressing those who believe that the chance of the Whorf hypothesis's being true is sufficiently high, and the human benefits of finding that out with Loglan are sufficiently great, that we are justified in learning it. So, I confess, do I. Indeed, it is only if sufficient numbers of us do accept this calculated wager that we will ever find out if Loglan is Whorf's instrument...perhaps even whether the Whorf hypothesis is, in that qualified scientific sense, true or not.

The long period of patient engineering is over; the bridge is ready to be used. So let us now learn the language, and teach others to do so...in our own countries first, and then in others. Above all, let us try to become fluent. Only as we become fluent in a sutori language can we expect to feel its effects in the deeper chambers of our minds. Fluency can, of course, only be achieved in the company of other speakers. But this is not a unique requirement. After all, it is only when there is a living, breathing and, above all, visible community of Loglan-speakers that an experimental

test of this powerful idea will seem worthwhile to others. Conversely, whenever there is such a community, our decisive experiment will probably not be difficult to arrange.

One of the first successes of the Loglan-speaking community may very well be to bring about that decisive test of the Whorf hypothesis. Even if the experiment fails, however, and the decision goes against this grand idea, the test itself can only further our understanding of that mysterious triad of evolutionary novelties that emerged sometime in the Pleistocene and now seem to dominate human life: human languages, human cultures, and the not quite infinitely varied shapes of human minds. On our understanding of the interplay among these large planetary forces our very survival as a species probably depends.

Notes

1 Of course confirmation contributes something, and early ones, quite a lot. But the contribution even they make is more psychological (heartening, encouraging) than evidentiary. That is to say, the probability of an hypothesis being true does not rise much with each new confirmation; and once the number of confirmations is already large, the addition of a new one is often trivial. Observing the 597th black crow does not do much to allay the suspicion that there may be an albino somewhere...that the model "All crows are black" may be an over-simple one. It is the discovery of the albino crow that adds materially to the fund of knowledge. For whatever the probability was that all were black, it has now plummeted to zero. A great change in the body of evidence has been wrought.

2 Comparativists may apply the word 'restrict' to features absent from one culture or time and present in another; but in my opinion they do so improperly. The Amazonian Indian trotting through the rain forest with darts and blow-gun in search of food-animals in the canopy is in no meaningful sense *restricted* by da's non-possession of a shotgun. Similarly, the Roman arithmetician suffered no restriction from his zerolessness. That de's work was awkward, slow and clumsy by later standards--once zero had been invented (in India, as it happens, in about 600 A.D., from which it later spread throughout the world...although the Mayans, we've learned more recently, had invented a zero that didn't spread about five centuries earlier)--is a fact about the facilitating effect of zero, not about the "non-facilitation of non-zero", whatever that curious expression might be taken to mean.

3 Such a gesture would not be entirely wasted scientifically. For from this second lot of Loglan experimentals, subjects could be tracked for the on-going longitudinal studies to be completed later; see [Section 7.6](#). They would be as useful for such studies as the experimentals that had been created by the "true experiment" of the previous year.

4 Professor John B. Carroll, Whorf's editor, and in fact the assembler of Whorf's posthumously published (1956) collection of essays, *Language, Thought and Reality*, as well as a distinguished psycholinguist in his own right, suggests that a more piecemeal experimental approach to the Whorfian hypotheses, using Loglan as its instrument, might make a suitably convincing overture to the grand twelve-group design I have just described. What Prof. Carroll has in mind is laboratory tests of "specific hypotheses about the comparative performance of Loglan and non-Loglan speakers on certain specified tasks" (personal communication). I would be glad to

prepare a catalog of such "specific hypotheses" for any scholar interested in devising such experiments. The main problem, of course, with using existing loglanists in such experimental designs is matching them on all other relevant characteristics with non-loglanists. Spontaneously self-generated loglanists tend to be rather distinctive people and difficult to match. But even with this problem somehow solved, there remains the confinement of such designs to the exploration of enablement effects. Liberation effects, it seems to me, must be addressed globally: that is, by actually creating loglanists in the laboratory, and measuring the influence of such treatment in before-and-after experimental designs.

5 Dying first-languages are, in the current nature of things, almost always those associated with subdominant cultures, and with peoples now struggling for identity, and even existence, in the shadow of the world's dominant peoples. The languages associated with those dominant cultures--the once-imperial languages such as English, Russian, French, Dutch, Spanish, Japanese, Portuguese, German (some of which are still "imperial" in a now-commercial sense) are the languages which must now be learned by native speakers of dying languages; and it is always in the interests of the dominant cultures to diminish the importance of the local languages in every civil way they can...using the undoubted usefulness of education conducted in the dominant language, for example, as one of their justifications. The appearance of a world auxiliary language--the language that would eventually be everybody's second tongue--would change that asymmetric relationship immediately and completely. The instrument of communication between dominant and subdominant cultures would then be intermediate to them both; and, as people in the international language movement have long pointed out, there would then be no reason, neither commercial nor educational, to hasten the disappearance of the tiny languages of the Earth. Instead, there would be every reason to preserve them as repositories of the marvelous, the precious and the old.

APPENDIX A - LITTLE WORDS & LITTLE AFFIXES

V-Form

a	or/and (terms ¹)
e	and (terms)
i	[.] (full stop)
i-	(connective prefix, as in ice)
o	if and only if
u	whether (terms)
-y-	[-] (close hyphen within words, as in mekykiu)

C-Form

-n-	(2nd postvocalic hyphen, as in pienruu)
-r-	(1st postvocalic hyphen, as in baormao)
-z-	(acronymic hyphen, as in AzAzA = 'AAA')

VV-Form

ae	Yes, I hope to
ai	Yes, I will
-ai	(Latin u.c. consonants)
ao	Yes, I want to
au	I don't care
ea	Let's/I suggest that
ei	Is that so?
-ei	(Latin l.c. consonants)
eo	Please/May I?
-eo	(Greek l.c. consonants)
eu	Suppose that
ia	Yes, that's true/Certainly
ie	Which/Which of...?
ii	Perhaps
io	Probably
iu	I don't know
oa	I/you must

oe	I/you should
oi	I/you may
ou	It doesn't matter
ua	There! (completion)
ue	Well! (surprise)
ui	Good! (pleasure)
uo	What! (annoyance)
uu	Sorry!/Alas! (sorrow/regret)

CV-Form

ba	something/-one x
be	something/-one y
bi	[=] is (identity)
bo	something/-one w
bu	something/-one z
ca	or/and (words ²)
ce	and (words)
ci	[-] (open hyphen)
-ci	(connective suffix, as in aci)

co	if and only if (words)	gu	(proximal right boundary marker; all clauses)	lo	the mass of..
cu	whether (words)	ha	is how connected to?	lu	end quote (right mark)
da	X it, he,	he	is what/a what?	-ma	-00/-0/-hundred
de	Y she,	hi	[,] (close comma)	-ma	(Latin u.c. vowels, e.g., Ama)
di	Z they,	ho	how many?	me	(predifier)
do	W him, her,	hu	who/what?	mi	I/me
du	Q them	ja	who/which is (non- restrictive)	-mo	-000/-0/-thousand
fa	will/then/after.. (future tense)	je	of/by/to (1st desc. link)	mu	we/us (you & I/me)
fe	[5] five/five of	ji	that is (restrictive)	na	is/now/at.. (present tense)
-fi	(Greek l.c. vowels, e.g. afi)	jo	so to speak (metaphorizer)	ne	[1] a/an/one/one of
-fi	-ly (utterance ordinals, as in nefi = 'firstly')	ju	among/under/via (3rd passive)	ni	[0] zero/no/none of
fo	[4] four/four of	ka	either	no	no/not/non-/It is not the case that..
fu	from/by/for (2nd passive)	ke	both	no-	(connective prefix, as in noa, noca)
ga	(predicate marker)	ki	or/and/then	nu	-ed/un-/than (1st passive)
ge	type of/for a	ko	if and only if	nu-	(connective prefix, as in nuu, nucu)
-ge	(connective suffix, as in age)	ku	whether	pa	was/then/before.. (past tense)
gi	(right mark of displaced object(s))	la	the one named..	pe	of (possessive)
go	of (inversion operator)	le	the..		
		li	quote (left mark)		

pi [.] (decimal point)
po -ing (events/states)
pu -ness (properties)
ra all/each/every
-ra -some (cardinals)
re most/most of
ri several/a few of
-ri -st/-nd/-rd/-th (ordinals)
ro many/much of
ru enough/enough of
sa almost all/about..
se [7] seven/seven of
si at most/at most one of..
-si (Latin l.c. vowels, e.g., **asi**)
so [6] six/six of
su some/some of/at least/at least one of..
ta that/there
te [3] three/three of
ti this/here
to [2] two/two of

tu you
va near/there
ve [9] nine/nine of
vi at/in/here
vo [8] eight/eight of
vu far from/away
-za (as applied to words like **pa**: medium interval; as applied to words like **li**: speech)
ze and jointly
-zi (as applied to words like **pa**: short interval; as applied to words like **li**: text)
zo amount of
-zu (long interval)

CVV-Form

bea for example (used like **ui**)
beu Patients/Parts (case tag³)
bia is part of (used like **bi**)
bie is a member of (**bi**)⁴

biu it is possible that (**ui**)
bua is P/is a P (1st bound predicate variable)
bui is Q/is a Q (2nd bound predicate variable)
buo however/on the contrary (**ui**)
cao (emphasize next word)
cau Quantities/Values (tag)
cea that is/in other words (**ui**)
ceu anyway/in any case (**ui**)
cia similarly (**ui**)
cie [<] is less than (**bi**)
cio [>] is greater than (**bi**)
ciu as much as/to the same degree as (used like **pa**)
coa in short/summarizing (**ui**)
coi according to (**pa**)

cue	(right mark of a ge -group)	foa	Wholes/Sets (case tag)	guo	(right boundary mark for lepo -type clauses only)
cui	(left mark of a left connectand in word-strings)	fua	will habitually.. (pa)	hea	through../with..'s help (pa)
dau	it is probable that (ui)	gao-	(Greek u.c. prefix)	hie	[(] (left close parenthesis)
die	darling/dear	gau	(strong potentiality) (pa)	hiu	[)] (right close parenthesis)
dii	for/on behalf of.. (pa)	gea	again/I repeat (ui)	hoi	Hey!/O..! (vocative mark)
dio	Destinations/Receivers (case tag)	gia	is..-ing; continuous in a time-free sense (pa)	hue	says... (inverse vocative)
dou	given/by hypothesis (ui)	gie	[[] (left close bracket)	jae	who/which is one of (non-restrictive set membership)
dua	is/does the former (the 2nd free predicate variable)	giu	[]] (right close bracket)	jao	such that, incidentally, (non-restrictive clauses)
dui	is/does the latter (the 1st free predicate variable)	goa	Greater (in greater/lesser than relations, case tag)	jie	that is one of (restrictive set membership)
duo	in manner/by method.. (pa)	goi	(right mark of a sentence quantifier)	jio	such that (restrictive clauses)
fae	and vice versa (ui)	gua	does..; habitual in a time-free sense (pa)	jue	of/by/to (2nd descriptive link)
fao	finally/in conclusion (ui)	gue	(right boundary mark for je/jue -phrases only)	kae	Sir/Madam
feu	in fact/actually (ui)	gui	(right boundary mark for ji/ja/jiV/jaV -clauses only)	kao	Actors/Agents/Doe rs (tag)
fia	will be..-ing/since/ever since (pa)			kia	(delete previous word)
fie	friend/comrade				

kie	[() (left open parenthesis)	leu	the particular set of.. (le)	moi	because of (motive).. (pa)
kii	with/accompanied by.. (pa)	lia	like/as/in the way that.. (pa)	mou	as well as/in addition to.. (pa)
kio	(delete this utterance)	lie	(strong quotation mark) (used like li)	mua	X-and-we/us (da)
kiu	[)] (right open parenthesis)	lii	the letter/sound.. (li)	mue	Y-and-we/us (da)
kou	because of (cause).. (pa)	lio	the number..	mui	Z-and-we/us (da)
kua	[/] over/divided by..	liu	the word..(li)	muo	W-and-we/us (da)
kue	[\] under/dividing..	loa	goodbye/farewell	muu	Q-and-we/us (da)
kuo	usually/customarily (ui)	loe	the typical.. (le)	nao	(mark of new para./topic)
kuu	generally/generalizing (ui)	loi	hello/greetings	nea	[-] negative (sign of a negative number)
laa	the unique...(le)	lue	a/the sign/address of... (inverse of lae)	neu	Conditions/Circumstances/Fields (case tag)
lae	the addressee of.. (indirect designation)	lui	for/in order to please.. (pa)	nia	is...-ing/while (pa)
lao	the Linnaean taxon.. (used like la)	mao	Lessers (in greater/lesser than relations, case tag)	nie	in detail/looking closely (ui)
lau	the set... (le)	mia	X-and-I/me (used like da)	nio	[-] minus/less (sign of subtraction)
lea	the set of all.. (used like le)	mie	Y-and-I/me (da)	noa	only if (used like a)
lee	the actual... (le)	mii	Z-and-I/me (da)	noe	not..but.. (a)
		mio	W-and-I/me (da)	-noi	(connective suffix, as in anoi, kanoi)
		miu	Q-and-I/me (da)		

nou	not..whether (terms)	sea	instead of/in place of.. (pa)	toa	the former remark (da)
nua	habitually..-s (pa)	sia	thank you	toe	respectively (ui)
nue	Mr/Mrs/Miss	sii	apparently/evidentl y (ui)	toi	the latter remark (da)
nuu	whether..., .. (terms)	siu	you're welcome	tua	you-and-X (da)
pae	and so forth/etcetera (ui)	soa	because of (premise).. (pa)	tue	you-and-Y (da)
pea	[+] positive (sign of a positive number)	soi	(converts a predicate to an imagined act of the speaker)	tui	you-and-Z (da)
peu	re/concerning/as for.. (pa)	sua	to the power.. (math.)	tuo	you-and-W (da)
pia	was..-ing/until (pa)	sue	(onomatopoeia)	tuu	you-and-Q (da)
pio	[+] plus/and (sign of addition)	sui	also/too/moreover/i n addition/furthermor e (ui)	vau	skipping details (ui)
piu	in particular (ui)	suu	to the root...	veu	Events/States/Effec ts/Deeds/Means/Ro utes (tag)
pou	Products/Purposes (case tag)	taa	in turn/in sequence (ui)	via	throughout..., a medium place (pa)
pua	habitually..-ed (pa)	tao	the former situation (da)	vii	throughout..., a small place (pa)
rau	because of (reason).. (pa)	tia	[*] times/multiplied by	viu	throughout..., a large place (pa)
rie	Sire/Madam	tie	with.., a tool or means (pa)	zoa	["] double prime (math.)
rea	clearly/obviously (ui)	tio	the latter situation (da)	zoi	['] prime (math.)
saa	roughly/simplifying (ui)			zou	by the way/incidentally (ui)
sau	Sources/Reasons/C auses (case tag)				

zua (tag of the normally 1st argument, used like **dio**)
zue (tag of the normally 2nd argument, used like **dio**)
zui (tag of the normally 3rd argument, used like **dio**)
zuo (tag of the normally 4th argument, used like **dio**)
zuu (tag of the normally 5th argument, used like **dio**)

In addition, all:

Cei	-form words are Latin	lower case consonants	
Cai	"	"	upper case "
Ceo	"	Greek	lower case "
gaoCeo	"	"	upper case "
Vfi	"	Latin	lower case vowels
Vma	"	"	upper case "
Vzi	"	Greek	lower case "
gaoVzi	"	"	upper case "

1 Predicate expressions, arguments or modifiers.

2 Predicate words with any close-bound operators.

3 Words with capitalized English translations are optional case tags of the DIO-class.

4 A Loglan word in parentheses means that the definiendum has the same privileges as the parenthetic word.

APPENDIX B - PRIMITIVES, LOGLAN-ENGLISH

badjo	(baj) is a branch of..	batpi	(bap) is a bottle of..
badlo	(bad) is a package of..	batra	(-) is butter from source..
bakso	(bao) is a box of..	bedpu	(bed) is a bed.
bakto	(bak) is a bucket/pail of..	begco	(beg beo) requests..from..
balci	(bac bai) builds..from materials..	bekli	(bel) is a bell.
balko	(-) is a balcony of..	bekti	(bek) is an object/thing.
balma	(bam) is a ball/sphere.	beldu	(-) is the belly/abdomen of..
balpi	(bal) balances under forces..	 bendu	(ben beu) is an orchestra with players..
banbe	(-) is a bay of coast..	berci	(-) is a sheep.
banci	(ban) bathes in..	berna	(-) is the brain of..
bande	(ban bae) is beyond..from..on route/path..by..	berti	(ber bei) carries..to..from..
banko	(-) is a bank of community..	betcu	(bet) is more bent/crooked than..
banse	(-) is a basket of..	bidje	(bie) is the edge of..between surfaces..
bapra	(-) operates..with goal..	bidzi	(-) is a bead of..
barcu	(-) is a bar/tavern of..	bifci	(-) is a bee.
barda	(-) rewards..for..with..	bifte	(-) is a beefsteak.
barma	(bar baa) is an arm of..	bilca	(bic) is a member of the military forces of..
barta	(-) is a board of material..	bilra	(-) plays billiards with..
basni	(bas) is the base/basis of..	bilti	(bil bii) is more beautiful than..to..
batmi	(bat) trades..for..with..		

birhu	(-) is an amount of beer.	bredi	(bre) is ready for..
bisli	(bis) is an amount of ice.	breko	(rek) is the brake of..
bitce	(-) is a whip/lash.	briga	(rig ria) is braver than..under..
bitsa	(bit bia) is between/among..., pl. set.	briku	(rik) is a brick.
bivdu	(biv bid biu) behaves..under..	brili	(ril) is brighter than..by..
blabi	(lab) is whiter than..	brize	(bri) is a breeze/wind from..
blada	(bla) is the blade of..	brocu	(roc rou) is a brush.
blanu	(-) is bluer than..	broda	(rod) is broken/inoperable.
bleka	(ble) looks at..	broko	(bro) breaks into pieces..
blicu	(bli) is possible under conditions..	brona	(-) is browner than..
bloda	(blo) hits..with..	bruci	(-) is a brooch n.
bloku	(-) is a block of material..	brudi	(bru) is a brother of.. through parents..
bludi	(blu) is blood from source..	brute	(rue) breathes..
blusa	(-) is a blouse.	bucto	(buc) is a/are bush(es) of region..
bomba	(-) is a bomb.	bufpo	(buf) is opposite from..in quality..
bongu	(bon) is a bone of..	bukcu	(buk buu) is a book about.. by..
borku	(bor) is a bow (for arrows).	bulbi	(bul bui) is a bulb of plant..
botci	(boi) is a boy.	bulju	(buj) boils at temperature..
botni	(-) is a button of..	bunbo	(bun) is a fool/foolish about..
botsu	(bot bou) is a boat.	buste	(bus bue) steps on/in..
brana	(bra) is born to..	butpa	(-) is a boot n.
brato	(rao) is the ratio of..divided by..	cabro	(cab cao) burns at temperature..
breba	(reb) is a piece/loaf of bread.		

cadre	(-) is a dress/gown/frock.	cidja	(cid) is awake.
camle	(-) is a camel, genus Camelus.	ciktu	(cik ciu) equals..in/on dimension..
canli	(cna cai) is a quantity of..on scale..	cilda	(-) is an island in sea..
canse	(can cae) is by chance/random under conditions..	cimra	(cim) is the summer of year..
capri	(cap) prints..on..	cinta	(cin) is an infant/baby of..
carbo	(car) is carbon [C].	cirna	(cir cia) learns..from source..
cartu	(cat) is a chart/map of..by..	cirzo	(cio) is a pair of scissors.
caslo	(cas) is a whistle.	citlu	(cil) is a detail of..
catru	(-) is an otter.	citre	(cit cie) is an amount of thread.
cavle	(cav) is a shovel.	ckafe	(-) is a cafe of community..
cedzu	(ced) is the shade/shadow of..cast by light-source..	ckano	(cka) is kind to..
cefli	(cef) is a/the chief of..for activity..	ckela	(kea) is a school of community..
celhu	(cel) is a cell of..	ckemo	(cke keo)) is a time interval lasting from..to..
celna	(-) is a shelf of..	ckozu	(cko) causes..under conditions..
cenja	(cej cea) changes into/becomes..from..	clado	(cla) is louder than..by..
centi	(cen) is a hundredth part of..	clafo	(-) laughs at..
cersi	(cer cei) is a chair.	clesi	(cle) is without../..-less.
certa	(-) is a/are cherry(ies) from..	clidu	(-) slides/slips on..
cesni	(-) is a/are chestnut(s) from..	clife	(lif) is a leaf of plant..
cetlo	(cet ceo) is wet with..	clika	(cli) is like/similar to..in..
cibra	(-) is a bridge over/across..	clina	(lin lia) is a straight line through points..
		clivi	(liv lii) lives/is alive.

cloro	(clo) is chlorine [Cl].	cutci	(cuc) is a shoe.
cluva	(clu) loves..	cutri	(cut cui) is an amount/expanse of water.
cmalo	(cma) is smaller in volume than..by..	cutse	(cus cue) says..to..
cmeni	(cme) is an amount of money issued by..	dakli	(dak) is likelier than..under..
cmiza	(cmi) is amused by../by doing..	dalra	(-) is worth..in dollars; default 1.
cnida	(cni) needs..for..	damni	(dam) is lower than..by..in gravity field..
cninu	(cnu) is new to..in feature..	dampa	(-) is a pump for moving fluids..from..into..
colku	(col) is silk from source..	danci	(dan dai) is a design/plan for..by..
comtu	(com cot cou) is ashamed of doing/being..	danri	(-) is more ordinary than.. in..
condi	(con) is deeper than..by..	danse	(-) dances to..
corta	(cor coa) is shorter than.. by..	dante	(dat) is a tooth of..
cpula	(cpu) pulls..to..from..	danza	(daa) desires/wants..for..
crano	(cra) smiles at..	dapli	(dap) replies..to questioner..
crina	(cri) is rained on by..	darli	(dar) is farther than..from.. by..
cteki	(cte) is a/the tax on..paid by..to..	darto	(dao) is a door of/in..
ctifu	(cti) is stuff/matter/material.	daska	(-) is part of the Danish language.
ctuda	(ctu) is/are feces of..	daski	(-) is a Dane/a Danish person.
cundo	(cuo) is a window of..	dasko	(-) is part of Danish culture.
cupri	(cup) is copper [Cu].	daspa	(das) is responsible for.. to..
curca	(cur) is secure/safe from..	decti	(dec) is a tenth part of..
curdi	(-) insures..against..for fee..	dedjo	(ded dej) is a finger of..
curta	(-) is a shirt.		

dekto	(dek) is tenfold of..	djoso	(jos) sews..to..
denli	(del dei) is the daytime of day..	djoto	(-) is a toe of..
denro	(den) is dangerous to..under..	djudi	(dju) judges..to be..
dertu	(der deu) is an amount/expanse of dirt/soil/earth from..	djula	(jul) is a jewel in ornament..
detra	(det dea) is a daughter of..	djupo	(jup juo) supports..with/by..
dilko	(-) is more delicious than.. to..	donsu	(don dou) gives..gift to..
dilri	(dil) represents..in matter..	dorja	(dor) is at war with..over..
dipri	(dip) is dear/precious to..	dotca	(-) is part of the German language.
dirco	(dir dío) is in direction.. from..	dotci	(-) is a German.
dirlu	(-) loses person/thing..	dotco	(-) is part of the German culture.
dislu	(diu) discusses..with..	dotra	(dot) is the winter of year..
disri	(dii) decides../to do..about..	draka	(rak) is darker than..by..
ditca	(dic dia) teaches skill/subject..to..	dralu	(-) is a dragon.
ditka	(dit) bites..on/at..	drani	(dra) is dryer than..by..
djano	(dja) knows..about..	drara	(-) is a drawer of..
djela	(dje jel) is healthier than..	dreti	(dre) is correct by standard..
djesi	(-) digests..	drida	(-) is a drop of liquid..
djeta	(jet) owes..to..for..	driki	(dri) remembers..about..
djine	(dji) joins/is joined to..at..	dugri	(-) is a unit of scale..
djipo	(jip jio) is important to..in/for..	dupma	(dup) dupes/deceives/tricks..about..by..
djitu	(jit jiu) is tight on..	durna	(dun dua) adorns../is an ornament on..
djori	(djo) is a member of set/group..	durzo	(dru dur duo) do..to..

dustu (dus) is a particle/amount of dust.

dutci (dut) doubts../that..is true.

duvri (duv dui) discovers..about..

dzabi (dza) is real/exists for.. under conditions..

dzaso (zas) is a piece of soap.

dzeli (dze) an amount of jelly.

dzoru (dzo) walks to..from..via..

fagro (fag) is a fire in..

falba (fab faa) fails to do/be..under..

falji (fal fai) is false by standard..

famji (fam) is a family with members..

famva (-) is famous for..among..

fando (fad fao) is the end of thing/process..

fanra (fan) is a farm of community..

fanve (fav) is the reverse of..

farfu (fra far) is the father of.. out of mother..

farka (-) is an arch over..

fasli (-) is the face of..

fasru (fas) is easy for..under conditions..

fatru (fat fau) troubles/disturbs ..by..

fekto (fek feo) is a fact about.. observed by..

felda (fel fed fea) falls to..from..in gravity field..

femdi (fem) is a female of species..

ferci (fei) is an affair of/involving..

ferno (fen) is iron [Fe].

ferti (fet) is more fertile than.. for growing..

festi (fes) wastes..on/by doing..

fibru (fib) is more feeble/weaker than..by..

fieli (fic) is a fish.

fikco (fik) is a work of fiction by..

filidi (fii) is a field of farm/community..

filmo (fil fio) feels..about..

firpa (fir fia) fears../is afraid of/that..

fitpi (fit fip) is a foot of..

fizdi (fiz fid) is physical/nonmental.

flaci (-) is a flag of..

flaki (-) is a fly.

flami (fla) is a flame of fire/device..

flati (-) inflates..with..to dimension..

fleti (fle) flies to..from..via..

flidu (fli) is liquid from temperature..to..

flofu (-) floats on/in..

flora (lor loa) is a flower of plant..

fluro (flu) is fluorine [F].

foldi (fod) is a fold in..

folma (flo) is fuller than..by..

fordi (-) is a/the floor of..

forka (-) is a fork.

forli (fol) is stronger than..by..

forma (fom foa) is the form/shape of..

fosli (fos foi) forces/compels..to do/be..

fotpa (-) is fatter/plumper than..

fragu (rag) is foggy/covered by fog.

fraki (-) is worth..francs; default 1.

frama (ram) is a frame around..

frasa (-) is part of the French language.

frasi (-) is a French person.

fraso (-) is part of French culture.

frelo (-) is crazy/insane/mad.

fremi (rem) is a friend of..

frena (fre) is in front/ahead of..

frese (-) is fresher than..

frezi (rez) is free to do/be..

fruta (fru) is a fruit of..

fulri (ful) is richer than..in..

fumna (fum fua) is a woman.

fundi (-) is fonder of/likes..more than..

fusto (-) is a/the office of..in..

futbo (-) plays football with..

futci (fut fuc fui) is after/later than/in the future of..

gancu (gac gau) wins..from/over..

gandi (gad) is a/the god of people(s)..

ganli (gal) organizes..into..for..

ganta (gan gaa) is higher than.. by..in gravity field..

gardi (-) is a garden of family/community..

garni (gar gai) governs/rules..

garti (gat) is grateful to..for..

gasno (gas gao) is the anus of..

gasti (-) is a piece of steel.

genza (gen gea) is an instance/recurrence of..

gesko (ges geo) is a/the guest of..

getsi (get gei) gets..from..for..

gigdo (gig) is a billionfold of..

gimna (-) is a gymnast at feat..

ginru (gin giu) is a/the root of plant..

gleca (-) is part of the English language.

gleci (-) is an English person.
gleco (-) is part of English culture.
glida (gli) guides..to..from..via..
gliso (-) is glass/made of glass.
glopa (-) gallops to..from..over..
gluva (-) is a glove.
godru (-) is a drain of..into..
godzi (god goz goi) goes to.. from..via..
gokru (gok) is a hook.
goltu (-) is the throat of..
gomni (gom) adheres/sticks to..
gotca (goa) is a goat.
gotri (got) is an industry for producing..among..
grada (gra) is greater/grander than..
gramo (-) weighs..grams; default 1.
grasa (raa) is a blade/expanse of grass.
grato (-) is a cake.
gresa (gre) is an amount of fat/oil/grease.
grisi (-) is greyer than..
gritu (gri) sings..to..
groci (roi) is angry at..for..
groda (gro) is bigger than..by..

grunu (run) is grain from source..
grupa (gru) is a group with members..
gudbi (gud gub) is good/better than..for..
gunti (gun gui) is a/the country of people..
gusto (gus gut) is a taste/flavor of..
gutra (gur) is strange to..in features..
hanco (han) is a hand of..
hansu (hau) is sweat from/of..
hapci (hap hai) is happy about..
hardu (had) is harder/more resistant than..
harko (har hao) is a harbor/shelter for..from..
harmo (ham) seems harmonious with..to observer..
hasfa (has haf haa) is the house/dwelling/home of..
hatro (hat) is hotter than..by..
hedto (hed) is the head of..
hekto (hek) is a hundredfold of..
helba (hel hea) helps/assists..do..
henju (-) is a chicken.
herba (heb) is a plant.
herfa (her) is a hair/a quantity of hair from..
hidro (hid) is hydrogen [H].

hijra (hij hia) is here/attending/present at..
hinda (-) is part of the Hindi language.
hindi (-) is a Hindu/an Indian person.
hindo (-) is part of Hindu/Indian culture.
hirti (hir) hears..over noise..
hisri (his) is a history of..by..
hitlu (-) is a butterfly.
holdu (hol hou) is a hole/pit/depression in..
hompi (hom hoi) drinks..from..
horma (hor hoa) is a horse.
horno (-) is a horn of.; body part
horto (hot hoo) lasts..hours; default 1.
hospi (hos) is a hospital of community..
hotle (-) is a hotel of community..
hozda (-) is a hose/stocking/sock.
humni (hum hun) is a human.
hutri (hut hui) destroys..
jaglo (jag jao) is an angle at..between points..
jalti (jai) is the product of..multiplied by..
janro (jar) is narrower than..by..
janto (jan) hunts game/quarry..
jmite (jmi) meets/encounters.. at/in..

jokla (jok jol) is a clock.
jugra (jug jua) grabs/seizes.. with..
junga (-) is a part of the Chinese language.
jungi (-) is a Chinese.
jungo (-) is part of Chinese culture.
junti (jun) is younger than..by..
jupni (jui) opines/thinks..about..
jurna (-) earns..for service/labor..
kabni (-) is a/the cabin of..
kabre (-) is a cabaret/night-club of community..
kadta (-) is a tile.
kafso (-) coughs up/out..
kakto (kak kao) acts/does..with goal..
kalra (-) is the collar of garment..
kambi (-) compares..with..in..
kamda (kad) fights..over..
kamki (-) is funny to..in..
kamla (kam kaa) comes from.. to..via..
kampo (-) is a camp of..at..
kamra (kar) is a camera n.
kamti (-) is a committee of..with task..
kance (kac kae) is conscious/aware of..

kangu	(kau) is a dog.	kekti	(-) kicks..
kanla	(-) is a canal between points..via..	kemdi	(kem) is a chemical, a pure instance of..
kanmo	(kan) can/is able to be/do..under conditions..	kenti	(ken) is a question about.. by..to..
kanpi	(-) competes with..over..	kerju	(kej keu) cares for/takes care of..
kanra	(-) is a cane/rod/staff.	kerti	(ker) is a quantity of air.
kanti	(-) is the account/bill for ..presented to..by..	ketli	(ket) is a kettle of..
kapli	(kal) is complete by standard..	ketpi	(-) is a ticket to..from.. on..for price..
kapma	(-) is a cap/hat	kicmu	(kic kiu) doctors/treats/is a doctor who treats..for.. with..
kapni	(kap) is open/not shut.	kilto	(kil) is a thousandfold of..
kapta	(-) is the captain of..	kinci	(kin kii) is with/a companion of..in..
karci	(-) is the heart of..	kinku	(kik) is keener/sharper than..
karda	(-) is a card.	kitsa	(-) copulates with..
karku	(-) is a crack/fissure in..	klabu	(kla) is an amount of cloth.
karsa	(kas) is across..from..	klada	(-) is a cloud of airmass..
karti	(-) is a cart/carriage/wagon.	kleda	(-) is colder than..by..
kasfa	(kaf) punishes..for..by doing..	kleni	(-) is clay from..
kasni	(-) is a cow/bull/cattle.	klesi	(kle) is a class of..distinguished by property..
katca	(-) watches/observes..do..	klini	(-) is cleaner than..
katli	(kat kai) has quality/feature..	klipu	(lip) keeps/retains..
katma	(-) is a cat, a feline.	kliri	(kli) is clearer than..
katna	(-) is cotton from source..	klogu	(klo) is closed, as of a door, curve, or loop.
kecri	(kec kei) is sad about..		

kokfa
(kok) cooks..for..

kolhe
(-) is a cabbage from..

kolme
(-) is a piece of coal from..

kolro
(kol koo) is a color to/perceived by..

komcu
(kom) is a comb.

komfu
(kof kou) is comfortable
with/in/about..

kompi
(-) is a company chartered by..for..

konbi
(-) is the vagina of..

konce
(-) is a/the shell of..

konsu
(kos) is the consul of..in..

konte
(kon) is the count of/the number in
set..

kopca
(kop) is a copy of..

korce
(koc koe) is a cord/rope/an amount
of cordage.

korji
(koj koi) orders/commands ..to do..

korka
(-) is a piece of cork from source..

korti
(kor) is the body of..

korva
(kov koa) is a curve through points..

kosta
(-) is a coat.

kraco
(-) smashes..into pulp..

kraju
(raj) scratches..

kraku
(kra) cries/cries out.

krani
(-) drives/makes..go to.. from..

kredi
(-) credits..with..under conditions..

kreni
(kre) is a ray from source..

krido
(kri) believes..about..

krilu
(-) is a wheel of device/vehicle..

krima
(-) is cream from source..

krinu
(-) is a nut of plant..

kroli
(kro) is a flow/current from ..to..

kruli
(-) is cruel to..

kruma
(kru) is a room of/in..

kubra
(kub) is broader/wider than..by..

kukra
(kuk) is quicker/faster than..by..

kultu
(kul) is a/the culture of people(s)..

kumce
(kue) is the reciprocal of..

kumtu
(kum kuu) is common to/universal in
set..

kunci
(kuc kui) is related to/is a kin of..by
relation..

kupta
(kup) is a cup of..

kurfa
(kur) is a square with vertices..

kurma
(-) is a worm.

kurni
(kun) warns..of/about danger..

kurti
(-) is a curtain across..

kusmo
(kus kuo) is a custom/habit of..under conditions..

kuspo
(-) spreads/expands over/into..

kusti
(-) is more costly than..for..

kutla
(klu) cuts..into pieces..

kutra
(-) is more bitter than..to..

kuvga
(kuv kua) covers../is a cover of..

kuvla
(-) is a cave/cavity/cavern in..

ladzo
(-) is a louse.

lakse
(lak) is wax from source..

laldo
(lal lao) is older than..by..

landi
(lan lai) is a parcel/expanse of land.

langa
(lag laa) is longer than.. by..

lansa
(-) is a spear.

larku
(-) is a lark.

larte
(lar lae) is an/the art of making..among..

lasti
(las) is more elastic than..

latci
(-) is lighter/less heavy than..by..in gravity field..

ledri
(led) is lightning from..to..

ledzo
(lez) is left of../on the lefthand side of..

lelpi
(lel lep) is level in gravity field..

lengu
(len leu) is a/the language of people(s)..

lenki
(lek) is an electric charge on..

lenzo
(leo) is a lens of system..

lerci
(ler) is a letter to..from.. about..

lesta
(les) is east of../an eastern part of..

letci
(let lei) lets/permits..do.. under conditions..

letra
(lea) is a letter/letteral in alphabet/character-set..

lidji
(lid) is a/the religion of people(s)..

likro
(lio) is a quantity of liquor/distilled spirits.

likta
(lik) is a week of month/year..

lilfa
(lil) is a law against..by..under circumstances..

limji
(lim lij) is a limit of..

linbu
(-) is linen from source..

linco
(lic) is thinner than..by..

lista
(lis) is a list of set..in order..

litla
(lit) is the light from..falling on surface..

litnu
(liu) restrains../keeps..from doing..

lodji
(lod) is a logic for inferring/deducing..from..

logla
(log) is part of the Loglan language.

logli
(-) is a loglander.

loglo
(-) is a part of loglandic culture.

lokli
(loi) is local to../confined to..

lufta
(-) lifts..to..from..in field..

lunli
(lul) is wool from source..

lunra
(lun) is lunar, pert. to Earth's moon.

lupsu
(lup) is a wolf.

lusta
(lus) is west of../a western part of..

madji
(maj) is a magician/does magic before..

madzo
(mad maz mao) makes..out of..

magne
(-) is a magnet/magnetic.

makri
(-) is worth..marks; default 1.

maksi
(mas) is a maximum value of function..

malbi
(mal) is sick with..from..

malna
(man) is milk from source..

mande
(-) manages function..in..

manko
(mak) is a/the mouth of..

manti
(-) is an ant of hill/colony..

marka
(mra mar) is a mark on.. made by..

marli
(-) is..miles long; default 1.

marpi
(-) is a snake/serpent.

marte
(mae) is a market/mart of community..

matci
(mac mai) is a machine for doing..

matma
(mat mam maa) is the mother of..by father..

megdo
(meg) is a millionfold of..

melno
(-) is a melon from source..

mendi
(men) is a male of species..

menki
(mek) is an eye of..

mensa
(mea) is a month of year..

merji
(mer) is married to/is a spouse of..

merka
(-) is part of the American dialect of English.

merki
(-) is an American.

merko
(-) is part of American culture.

merli
(mel mei) measures..on scale..

metca
(-) is a match/incendiary device.

metli
(met) is metal/metallic.

metro
(meo) is..meters long; default 1.

midju
(mid mij) is in the middle/at the center of..

miksa
(mis) is a mixture of ingredients..

mikti
(mik) is a millionth part of..

mildo
(-) is mild/gentle to/with..

milfa
(mia) is a meal composed of foods/dishes..

milti
(mil) is a thousandth part of..

minku
(miu) is a mineral/ore from source..

minmi
(mim) is a minimum value of function..

minta
(-) lasts..minutes; default 1.

mipli
(mip mii) is an example of..

mirdo
(mir) is ten-thousand of..

misme
(-) is maize/corn from source..

mitro
(mit mio) is meat from source..

modvi
(mov moi) is a/the motive for..to do..in conditions..

molci
(-) is a mill of community..

molro
(mol) is softer/more malleable than..

monca
(mon moa) is a mountain of landmass..

monza
(moz) is a morning of day..

mordu
(mro mou) is more than/exceeds..in property..by..

morto
(mor moo) is dead.

motci
(moc) is a motor.

mrenu
(mre meu) is a man.

mroza
(roz) is a hammer.

mubre
(mub) is wood from..

munce
(mun) is a community of individuals/organisms..

murki
(muk) is a monkey.

mursi
(mur) is a sea of planet..

muslo
(mus) is a muscle of..

mutce
(mut muc mue) is much/very/more extreme than.. in property..

muvdo
(muv muo) move to..from ..over path..

muzgi
(muz mui) is music by composer..

nable
(nab) is a problem to..in doing task..

nadro
(nad) is sodium [Na].

nadzo
(naz nao) is now/simultaneous with..

najda
(naj) is a knife.

nakso
(-) fixes..for use/user..by..

naldi
(nal) is a nail.

namci
(nam) is a/the name of.. to/used by..

nanda
(-) is a knot in/between..

nanti
(nan) is a billionth part of..

nardu
(nau) is difficult/hard for ..under conditions..

narmi
(-) is an/the army of..

narti
(-) is apart/separate from..

natli
(nat nai) is the night/nighttime of day..

natra
(nar naa) natural/not caused by man.

nazbi
(-) is a/the nose of..

nedza
(ned nea) is next to..

negda
(neg) is an egg of/from source..

negvo
(nev) is negative.

nemdi
(-) is an/the enemy of..in struggle..

nenri
(nen nei) is in/inside of/the interior of..

nensu
(-) is a/the nest of..

nerbi
(neb) is necessary for process..

nerji
(nej) is the energy of system..

nesta
(nes) is honest with..about..

netre
(net) is a net.

nidla
(-) is a needle.

nigro
(nig) is blacker than..

niklo
(-) is nickel [Ni].

nikri
(nik) is cheese from source..

nilca
(-) is beneath/vertically below..in gravity field..

nimla
(nim nia) is an animal.

nirda
(-) is a bird.

nirli
(nil) is a girl.

nirne
(nin nie) is a year of epoch..

nitci
(nit) is neater than..

nitro
(-) is nitrogen [N].

nordi
(nod) is north of../a northern part of..

norji
(-) is more orange than..

norma
(nom noa) is the average of/an average instance of..

norsa
(-) is part of the Norwegian language.

norsi
(-) is a Norwegian person.

norso
(-) is part of Norwegian culture.

notbi
(not) is an other, someone/thing not the same as..

nukle
(nue) is a/the nucleus of..

numcu
(num nuu) is a number.

nervi
(nev) is a nerve of..

nutra
(-) is neutral in a/the struggle/fight/contest..between..

nuzvo
(nuz) is news about..from source..

packe
(-) is a pocket of garment..

padzi
(pad) is a cushion/pillow.

pafko
(-) digs..up out of..

palci
(-) is a quantity of polish.

palto
(-) is a potato from source..

panba
(pan) is a pan, a handled cooking vessel.

pandi
(-) is worth..pounds; default 1.

panki
(-) is panicked by..

pansu
(-) is a pine.

pantu
(-) is a pair of pants/trousers.

papre
(pre) is paper/made of paper.

parti
(par pai) is a part of whole..

pasko
(pas pak pao) is before../in the past of..; default = now.

paspo
(-) a passport issued to.. by..for..

pasti
(-) is a quantity of paste.

patce
(pac pae) is an apparatus/device for doing..

patmi
(pam) is pastry/pasta, any food made from dough.

patpe
(pat) is a pot, a deep cooking vessel.

pazda
(paz) pauses/waits for..before doing..

pelpi
(-) is leather/a skin/hide from source..

pelto
(-) is yellower than..

penbi
(-) is a pen, for writing.

pendi
(ped) hangs from..

penja
(pej) is a sponge.

penre
(pee) is a parent of..with co-parent..

penso
(pen peo) thinks about..

penta
(pet pea) is a/the point of..

perla
(-) is a pearl from..

pernu
(per peu) is a person.

persa
(-) is a pear from source..

perti
(pei) pertains to../concerns..

pesro
(-) is worth..pesos; default 1.

pesta
(-) is worth..pesetas; default 1.

petci
(pec) pays..to..for goods/service..

petri
(-) distributes/shares..out to/among..

pidri
(-) is page..of document..

pifno
(pif pio) is more frequent than..under conditions..

pikti
(pik) is a trillionth part of..

pilno
(pil) is flat/a plane through points..

pinca
(pic) is urine from..

pinda
(pid) is a pin.

pingu
(-) is the penis of..

pinsi
(-) is a pencil.

pinti
(pin) is an amount of paint.

piplo
(pip) is/are the people of place/land/country..

pirle
(pie) is parallel to..

pisku
(piu) is a piece of..

pismi
(pis) is at peace with..

pizdo
(-) is a/are pea(s) from..

plado
(lad) is a plow.

plata
(pla) is a plate/dish.

pleci
(ple) plays with..

pligo
(-) is an apple from source..

plizo
(pli) uses..for..

pluci
(plu) pleases..by..

pluma
(lum lua) is a feather of..

poldi
(pol) is a/the nation/state/polity of people..

polji
(-) is a pole.

polka
(-) is part of the Polish language.

polki
(-) is a Pole/a Polish person.

polko
(-) is part of Polish culture.

polsi
(-) is a policeperson.

ponda
(poa) responds..to stimulus..under conditions..

ponja
(-) is part of the Japanese language.

ponji
(-) is a Japanese.

ponjo
(-) is part of Japanese culture.

ponsu
(pon pou) owns..under law/custom..

porju
(poj) is a pig.

porli
(poi) is a/the lord/master of/has power over..

posta
(pos) posts/mails..to..from ..by..

pozfa
(poz) opposes..on issue..

pozvo
(pov) is positive.

prali
(ral) is a/the profit to.. from..

prano
(-) runs to..from..over path..

prase
(pra) is a process continuing through stages..

prati
(rat) is the price of..to.. from vendor..

preni
(-) is a prisoner of..for act/state..

prire
(pri) is behind/in back of..

prizi
(riz) is private to..

proju
(pro) produces..by process..

proza
(-) is a work of prose by..

pruci
(pru) is a test for..among..

prusa
(rus) approves plan/action..by..

prutu
(ruu) protests..to..by doing..

publi
(pub) is more public than..is among..

pubmo
(pum) is lead [Pb].

pucto
(puc puo) pushes..to..from ..via..

pudja
(-) is a thumb of..

pudru
(pud) is powder from source..

pulso
(pul) has an impulse to do..

pundo
(-) weigh..pounds; default 1.

punfo
(-) is purer/more uniform than..

puntu
(pun puu) hurts/feels pain in..

purcu
(-) is poorer than..in..

purda
(pur pua) is a/the word for ..in language..

purfe
(puf pue) is perfect by standard..

purpu
(pup) is more purple than..

radjo
(-) is a radio receiver in network..

ramgu
(-) is a drum.

rande
(rad rae) is round/circular/a disk/circle.

ranjo
(-) ranges/extends over..

ranta
(ran) is more rotten than..

rapcu
(-) is riper than..

rasto
(ras) is brass/made of brass.

ratcu
(rau) is a rat.

raznu
(raz) is a/the reason for..'s doing..under conditions..

redro
(red) is redder than..

renro
(ren reo) throws..to/at..

resfu
(res ref) is a garment, item of clothing.

resra
(-) is a restaurant of community..

resto
(ret) rests/reposes/lies down on..

retca
(rec rea) differs from..in..

retpi
(rep) is a/the answer/reply/solution to question/problem..put by..

revri
(rev rei) dreams../that..

ridle
(rid) reads..from surface/document..

rilri
(rii) is more regular than..

rinda
(-) is part of an Amerindian language.

rindi
(-) is an Amerind/an Amerindian person.

rindo
(-) is part of an Amerindian culture.

rinje
(rin) is a ring/band on/around..

rinta
(rit) is the rhythm of..

rirda
(rir) is a record of..on medium..

rirgu
(-) is a/are the buttock/-s of..

rismi
(-) is rice from source..

rispe
(ris) respects..for doing/being..

ritco
(ric) to the right of../on the righthand side of..

ritma
(-) is wheat from source..

rodja
(roj roa) grows in..under..

rodlu
(-) is a road between points..via..

rofsu
(rof ros) is rougher/more abrasive than..

rolgu
(rol) rolls/is a roller/cylinder.

romna
(rom) is part of the Roman language.

romni
(rom) is a Roman.

romno
(rom) is part of Roman culture.

rozme	(-) is a rose from source..	sanse	(sas sae) senses stimulus.. under conditions..
rubli	(-) is worth..rubles; default 1.	santi	(sai) is quieter than..
rulni	(rul rui) is a rule requiring.. to..under conditions..	sapla	(sap) is simpler than..in respect..
rulpi	(-) is worth..rupees; default 1.	sarni	(sar) is more sour than..to..
ruska	(-) is part of the Russian language.	satci	(sac) is the start/origin of..
ruski	(-) is a Russian.	satni	(-) is satin.
rusko	(-) is part of Russian culture.	satro	(sat) strokes/rubs..with..
rutma	(rut rua) is a/the route/path to..from..	secle	(-) is rye from..
sadji	(saj) is wiser than..about..	sekci	(sec) behaves sexually toward..
sagro	(-) is a cigar.	sekmi	(-) lasts..seconds; default 1.
sakli	(sak) is a sack/bag of..	sekre	(-) is a/the secretary of/to..
sakta	(-) is an amount of sugar.	sekta	(sek) is an insect.
saldi	(sal) is solid below temperature & pressure..	selji	(sel) is the self/self-image of..
salfa	(saf) is a sail of vessel..	sensi	(ses) is a science of/about..
salki	(-) is a willow.	sentto	(seo) is holy/sacred to..
samto	(sam sao) is the same/the same thing as..	setci	(set sei) is a set/group of elements..
sanca	(sna) is sand from source..	setfa	(sea) puts/places/sets..on/at..
sange	(-) suggests action..to..	sibli	(sib) is a sibling of..through parents..
sanla	(-) is an umbrella.	sidra	(-) is a cedar.
sanpa	(san saa) is a sign of..to.. disposing behavior..under conditions..	sidza	(siz) is a seed of organism..
		sigre	(-) is a cigarette n.
		siltu	(sil siu) shakes/oscillates/vibrates at rate..and amplitude..

simba	(-) is a lion.	sliti	(sli) is sweeter than..to..
simci	(sim sii) seems to be..to.. under conditions..	slopu	(slo) is sloped/inclined more steeply than..by..
sinma	(sin) is a cinema made by..	sluko	(slu) is a/the lock on..
sirna	(sir) is certain/sure that..is true.	smano	(sma) is smoke from..
sisto	(sis sio) is a system with function..and elements..	smike	(smi) is a secret/kept secret from..by..
sitci	(sic) is a city with hinterland..	smina	(min) is the mind of..
sitfa	(sit sif sia) is a site/place/location of..	smupi	(smu) is smoother than.. by..
skaca	(-) is part of the Scottish dialect of English.	snalu	(-) is a swallow.
skaci	(-) is a Scot.	sneku	(sne) is the neck of..
skaco	(-) is part of Scottish culture.	snice	(nic) is a quantity/expanse of snow.
skafi	(-) is a portion of coffee from..	snire	(sni) is nearer than..to..by..
skalu	(ska) is a scale for measuring..among..	snola	(sno) entails/implies..under rules..
skapi	(-) is the skin/rind/outer covering of..	socli	(soc) interacts socially with..
skara	(-) is a skirt.	sofha	(-) is a sofa.
skati	(-) is a sky/an expanse of sky at place..	sokcu	(-) is an oak from source..
skesa	(-) kisses..on..	solda	(sod) is a soldier of army..
skitu	(ski) sits/sits down on..	solra	(sol) is solar, pertaining to Earth's sun
skizo	(kiz) is a ski.	solte	(sot) is salt from source..
skori	(sko) is a screw, a threaded device.	sonda	(son soa) is a sound emitted by..
slano	(sla) is slower than..by..	sonli	(soi) is asleep.
		sordi	(sro) is a store/deposit/reserve of..

sorgu	(sog) is an ear of..	staga	(-) is the stalk/stem/trunk of..
sorme	(som soe) is a sister of.. through parents..	stali	(tai) stands/stands up on..
soske	(-) suspects..of..	stana	(-) is a station of transport system..
spadi	(-) is a mattress/pallet.	stari	(-) surprises/startles..by..
spali	(pal) is a side of..bounded by edges..	steti	(ste) is a sentence about..in language..
spana	(-) is part of the Spanish language.	stifa	(-) is stiffer than..in direction..
spani	(-) is a Spaniard.	stino	(-) is tin [Sn].
spano	(-) is part of Spanish culture.	stire	(tir tie) is/are stairs of structure..
spasi	(spa) is a space/volume occupied by..	stise	(sti) ceases/stops doing..
spebi	(peb) is specific to..among..	stolo	(sto) stays/remains at..
speci	(-) is a species of genus..	stuci	(stu) is a story about..told by..
speni	(spe) experiences../spends ..., some interval.	stude	(-) is a student of..at institution..
spetu	(-) is spit/spittle from..	stuka	(-) is a stick of/made of..
spicu	(spi) is a/the spirit/ghost of..as seen by..	stuli	(tui) adjusts/regulates..for function..
spopa	(spo) hopes for../that..will happen.	sucmi	(-) swims to..from..via..
spori	(-) is a spring, an elastic device.	sudna	(-) is sudden/abrupt to..
spuro	(spu) is expert/skilled at.. under conditions..	suksi	(sku) succeeds in..by effort..
sputa	(put) is a spoon.	sulba	(sul) is a swelling at/in/on..caused by..
srisu	(riu) is serious about..	sulfo	(-) is sulfur [S].
srite	(sri) writes..on surface..	sumji	(sum) is the sum of..plus..
stadi	(sta) is a/the stage of hall/theater..	sundi	(sui) sends..to..from... via route..
		sunho	(sun suo) is a son of..

supta (sup) is a soup/stew of ingredients..
surdi (sud) is south of../a southern part of..
surna (sru) hurts/harms/injures.. at/in..
surva (suv sua) serves..in/by../is a servant^ of..with duties..
sutme (sut) is an odor/smell emitted by..
svena (-) is part of the Swedish language.
sveni (-) is a Swede/a Swedish person.
sveno (-) is part of Swedish culture.
tabko (-) is tobacco from..
takma (-) attacks..with goal..
takna (tak taa) talks to../speaks to..about..
taksi (-) is a taxi/cab/taxicab.
talna (-) is part of the Italian language.
talni (-) is an Italian.
talno (-) is part of Italian culture.
tarci (tar) is a star of galaxy..
targo (tag tao) argues with/against..that..
tarle (tal tae) is tired by effort..
tarmu (tam tau) is a weapon for use..
tasgu (-) is disgusted by..
tatro (tat) is a theater of community..
tcaku (cak) is shocked/appalled by..

tcali (cal) is a wall of/around..
tcaro (tca) is a car/truck; a motor vehicle
tcati (-) is tea from source..
tcela (-) is a wing of..
tcena (-) is a length of chain.
tceru (tce) penetrates..in direction..
tceti (-) is a chest of..; body part
tcidi (cii) is a food of/edible to..
tciha (-) is a child/offspring/progeny of..
tcina (-) is the chin of..
tciro (-) is a mat.
tcoko (-) is chocolate from..
tcori (coi) is an authority in/on/over..
tcure (tcu) is a picture of..by..
tedji (ted tej tei) attends/pays attention to..
tekto (-) is an/the architect of..
telfo (-) is a telephone receiver in network..
telvi (-) is a television receiver in network..
tenri (ten) increases by..in dimension..
tenta (-) is a tent, a fabric dwelling.
tepli (tep) is a temple/church of religion..
terla (tel) is terrestrial, pertaining to Earth.

testi	(-) is a testicle of..	tosku	(-) is the skull of..
tetcu	(tec teu) stretches to length..from..	totco	(tco) touches..with..
tetri	(tet) is a weather phenomenon of place/region..	totnu	(tot) is thicker than..by..
tidjo	(tid tio) is heavier than.. by..in gravity field..	tovru	(tov) is over/vertically above..in gravity field..
tifru	(tiu) offers..to..for use..	traci	(rac) travels to..from..via..
tigra	(-) is a tiger.	tradu	(tra) is true by standard..
tilba	(-) is the tail of..	trali	(-) is a tray of..
tinmo	(tin) is an amount of ink.	trana	(tan) turns/rotates around axis..
tirca	(tic) is a length of wire.	trati	(rai) tries to do/attain..by..
tisra	(tia) chooses/selects..from set..	trece	(-) interests../is interesting to..in feature..
titci	(tci) eats..	trelu	(rel reu) is a rail/railing.
titfa	(-) is a breast of..	trena	(tre) is a train of system..
tobme	(tob toe) is a table.	tricu	(tri) is a tree.
tocki	(-) is a/the key to lock..	trida	(-) is a street of..
togri	(tog toi) agrees with..about/that..	trili	(til) attracts..by doing/being..
tokna	(toa) takes..away from..	trime	(rim rie) is a tool for doing..
tokri	(-) is chalk from source..	troku	(tro) is rock/stone from source..
tomki	(tok) is automatic in function..	troli	(tol) controls..in performance..
tomto	(-) is a tomato from..	troti	(-) trots to..from..
tongu	(-) is the tongue of..	trufa	(ruf) is a/the roof of..
tonme	(-) weighs..tons; default 1.	truke	(tru) is a/the structure of..
torni	(ton) twists under load..	tsani	(tsa) sneezes.

tsero	(tse) is an error in..by standard..	veslo	(veo) is a vessel of..
tsime	(tsi) is a crime among..punishable by..	vetci	(vet vei) happens/occurs to..
tsodi	(-) hates..for doing/being..	vetfa	(-) invents..for use..
tsufi	(tsu) is sufficient/enough for..	vidju	(vij viu) is a/the view of.. from point..
tubli	(tub) is a tube/length of tubing	vidre	(vid vie) is an idea about.. had by thinker..
tugle	(tul tue) is a leg of..	vinjo	(vin) is wine from..
tulpi	(-) is a tulip from source..	virta	(vit) is an ad/advertisement for..in medium..
turdu	(-) is a thrush.	visra	(-) is the gut of..
turka	(tur tua) works on/at..with goal..	vizka	(viz vik via) sees..against..
vaksi	(-) is a vaccine against disease..in..	vlaci	(-) washes..in..
valda	(vad) develops../acquires new property/feature..	vlako	(vla) is a lake of landmass..
valna	(van vaa) is violent in response to..	volsi	(vol voi) is the voice of individual..
valpu	(vap) is a wave in medium.. with properties..	volta	(-) has..volts electromotive force; default 1.
valti	(val vai) vaults/jumps over/across..	vrano	(-) is the liver of..
vamtu	(-) vomits..on..	vreti	(vre) is vertical in gravity field..
vapro	(vao) is a gas above temperature..	vrici	(vri) is a river of landmass..
vatlu	(vat vau) has a value of.. to..for use..	zakra	(-) grinds..into powder..
vedma	(ved vem vea) sell..to..for price..	zavlo	(zav zao) is bad/worse than..for..
vegri	(-) is greener than..	zavno	(zan) is an oven.
vendu	(ven veu) is a poison to.. under conditions..	zbuma	(zbu) explodes into..
versa	(ves) is a poem/verse about..by..	zinko	(-) is zinc [Zn].

zlupi

(-) is a lip of..

zvoto

(zvo) is out/outside of/exterior to..

APPENDIX C - PRIMITIVES, ENGLISH- LOGLAN

<i>abdomen</i>	belly of.. beldu	<i>alive</i>	living clivi (liv lii)
<i>able</i>	be - to do/be..under conditions.. kanmo (kan)	<i>American</i>	part of - culture merko
<i>above</i>	vertically over..in gravity field.. tovru (tov)	<i>American</i>	part of the - dialect of English merka
<i>abrupt</i>	be - with../sudden to.. sudna	<i>American</i>	an - person merki
<i>account</i>	bill for..to..by.. kanti	<i>Amerind</i>	an -ian person rindi
<i>across</i>	..from.. karsa (kas)	<i>among</i>	between..., pl. set bitsa (bit bia)
<i>act</i>	do..with goal.. kakto (kak kao)	<i>amused</i>	be - by../by doing.. cmiza (cmi)
<i>ad</i>	advertisement for..in medium.. virta (vit)	<i>angle</i>	between pts.. jaglo (jag jao)
<i>adhere</i>	stick to.. gomni (gom)	<i>angry</i>	at..for.. groci (roi)
<i>adjust</i>	..for function.. stuli (tui)	<i>animal</i>	n. nimla (nim nia)
<i>adorn</i>	../be an ornament of/on.. durna (dun dua)	<i>ant</i>	of hill/colony.. manti
<i>affair</i>	of/involving.. ferci (fei)	<i>anus</i>	of.. gasno (gas gao)
<i>after</i>	later than/in the future of.. futci (fut fuc fui)	<i>apart</i>	separate from.. narti
<i>again</i>	an instance/recurrence of.. genza (gen gea)	<i>apparatus</i>	device for doing.. patce (pac pae)
<i>agree</i>	with..about/that.. togri (tog toi)	<i>appear</i>	seem to be..to..under conditions.. simci (sim sii)
<i>ahead</i>	be - of/in front of.. frena (fre)	<i>apple</i>	from source.. pligo
<i>air</i>	a quantity of - kerti (ker)	<i>approve</i>	plan/action..by.. prusa (rus)
		<i>arch</i>	over/be an - over.. farka
		<i>architect</i>	of.. tekto

argue with/against..that.. **targo** (tag tao)
arm of.., body-part **barma** (bar baa)
army of.. **narmi**
art of making..among.. **larte** (lar lae)
ashamed of doing/being.. **comtu** (com cot cou)
ask request..of/from.. **begco** (beg beo)
attack ..with goal.. **takma**
attend be present at.. **hijra** (hij hia)
attend pay attention to.. **tedji** (ted tej tei)
attract ..by doing/being.. **trili** (til)
authority in/on/over.. **tcori** (coi)
automatic in function.. **tomki** (tok)
average the norm of distribution.. **norma** (nom noa)
awake be - **cidja** (cid)
aware be -/conscious of.. **kance** (kac kae)
back of/behind/to the rear of.. **prire** (pri)
bad worse than..for.. **zavlo** (zav zao)
bag sack of/containing.. **sakli** (sak)
balance -s under forces.. **balpi** (bal)
balcony of building.. **balko**
ball sphere n. **balma** (bam)

band orchestra of players.. **bendu** (ben beu)
band be a ring/- on/around.. **rinje** (rin)
bank of community.. **banko**
bar tavern of community.. **barcu**
base foundation/basis of.. **basni** (bas)
basket of/containing.. **banse**
bathe in.. **banci** (ban)
bay of coast.. **banbe**
bead of.. **bidzi**
bean of.. **bindo** (bio)
beautiful more - than.. **bilti** (bil bii)
become change into..from.. **cenja** (cej cea)
bed n. **bedpu** (bed)
bee of hive/colony.. **bifci**
beefsteak an amount of - **bifte**
beer an amount of - **birhu**
before ..in the past of.., default now **pasko** (pas pak pao)
beg request..of/from.. **begco** (beg beo)
beginning origin/start of.. **satci** (sac)
behave ..under conditions.. **bivdu** (biv bid biu)
behind in back/to the rear of.. **prire** (pri)

<i>believe</i>	..about.. krido (kri)	<i>body</i>	of.. korti (kor)
<i>bell</i>	sounding note.. bekli (bel)	<i>boil</i>	at temperature.. bulju (buj)
<i>belly</i>	abdomen of.. beldu	<i>bomb</i>	n. bomba
<i>beneath</i>	vertically below..in gravity field.. nilca	<i>bone</i>	of.. bongu (bon)
<i>bent</i>	more -/crooked than.. betcu (bet)	<i>book</i>	about..by.. bukcu (buk buu)
<i>between</i>	among.. bitsa (bit bia)	<i>boot</i>	n. butpa
<i>big</i>	-ger than..by.. groda (gro)	<i>born</i>	be - to.. brana (bra)
<i>bill</i>	account for..to..by.. kanti	<i>bottle</i>	of/containing.. batpi (bap)
<i>billiards</i>	play - with.. bilra	<i>bough</i>	limb/branch of.. badjo (baj)
<i>billion</i>	-fold of.. gigdo (gig)	<i>bow</i>	for arrows.. borku (bor)
<i>billionth</i>	-part of.. nanti (nan)	<i>box</i>	of/containing.. bakso (bao)
<i>bird</i>	n. nirda	<i>boy</i>	n. botci (boi)
<i>bite</i>	..on/at.. ditka (dit)	<i>brain</i>	of.. berna
<i>bitter</i>	more - than..to.. kutra	<i>brake</i>	of.. breko (rek)
<i>black</i>	-er than.. nigro (nig)	<i>branch</i>	limb/bough of.. badjo (baj)
<i>blade</i>	of tool/weapon.. blada (bla)	<i>brass</i>	made of - rasto (ras)
<i>block</i>	of material.. bloku	<i>brave</i>	-er than..under conditions.. briga (rig ria)
<i>blood</i>	of organism.. bludi (blu)	<i>bread</i>	an amount of - breba (reb)
<i>blouse</i>	n. blusa	<i>break</i>	into pieces.. broko (bro)
<i>blue</i>	-r than.. blanu	<i>breast</i>	teat of.. titfa
<i>board</i>	of material.. barta	<i>breathe</i>	v.t. brute (rue)
<i>boat</i>	n. botsu (bot bou)	<i>breeze</i>	wind from.. brize (bri)

<i>brick</i>	n. briku (rik)	<i>camel</i>	genus <i>Camelus</i> camle
<i>bridge</i>	over/across.. cibra	<i>camera</i>	n. kamra (kar)
<i>brilliant</i>	brighter than..by.. brili (ril)	<i>camp</i>	of..at.. kampo
<i>broad</i>	-er/wider than..by.. kubra (kub)	<i>can</i>	be able to do/be..under conditions.. kanmo (kan)
<i>broken</i>	inoperable broda (rod)	<i>canal</i>	between pts..via.. kanla
<i>brooch</i>	n. bruci	<i>cane</i>	n. rod/staff kanra
<i>brother</i>	of..through.. brudi (bru)	<i>cap</i>	n. hat kapma
<i>brown</i>	-er than.. brona	<i>captain</i>	of.. kapta
<i>brush</i>	n. brocu (roc rou)	<i>car</i>	truck, a motorized land vehicle tcaro (tca)
<i>bucket</i>	pail of/containing.. bakto (bak)	<i>carbon</i>	[C] carbo (car)
<i>build</i>	..from materials.. balci (bac bai)	<i>card</i>	n. karda
<i>bulb</i>	of plant.. bulbi (bul bui)	<i>care</i>	for/take - of.. kerju (kej keu)
<i>bundle</i>	package of/containing.. badlo (bad)	<i>carry</i>	..to..from.. berti (ber bei)
<i>burn</i>	at temperature.. cabro (cab cao)	<i>cart</i>	carriage/wagon karti
<i>butter</i>	an amount of - batra	<i>cat</i>	n. a feline animal katma
<i>butterfly</i>	n. hitlu	<i>cattle</i>	n. kasni
<i>buttock</i>	-s/rear-end of.. rirgu	<i>cause</i>	-/be a - of..under conditions.. ckozu (cko)
<i>button</i>	of.. botni	<i>cave</i>	cavity/cavern in.. kuvla
<i>cabaret</i>	nightclub of.. kabre	<i>cease</i>	stop doing.. stise (sti)
<i>cabbage</i>	from source.. kolhe	<i>cedar</i>	n. sidra
<i>cabin</i>	of.. kabni	<i>cell</i>	of.. celhu (cel)
<i>cafe</i>	of community.. ckafe		
<i>cake</i>	n. grato		

center
the middle of.. **midju** (mid mij)

certain
be sure that..is true **sirna** (sir)

chain
a length of - **tcena**

chair
n. **cersi** (cei)

chalk
from source.. **tokri**

chance
be random under conditions.. **canse**
(can cae)

change
into/become..from.. **cenja** (cej cea)

chart
map of..by.. **cartu** (cat)

cheese
from source.. **nikri** (nik)

chemical
a pure instance of.. **kemdi** (kem)

cherry
from.. **certa**

chest
of..., body part **tceti**

chestnut
from.. **cesni**

chicken
n. **henju**

chief
of..for activity.. **cefli** (cef)

child
offspring of.. **tciha**

chin
of.. **tcina**

Chinese
part of - culture **jungo**

Chinese
part of the - language **junga**

Chinese
a - person **jungu**

chlorine
[Cl] **cloro** (clo)

chocolate
an am't of - **tcoko**

choose
select..from set.. **tisra** (tia)

church
temple of religion.. **tepli** (tep)

cigar
n. **sagro**

cigarette
n. **sigre**

cinema
made by.. **sinma** (sin)

circle
-ular/round/a disk **rande** (rad rae)

city
with hinterland.. **sitci** (sic)

class
of..with property.. **klesi** (kle)

clean
-er than.. **klini**

clear
-er than.. **kliri** (kli)

clock
n. **jokla** (jok jol)

closed
as of a door **klogu** (klo)

cloth
an amount of - **klabu** (kla)

cloud
of airmass.. **klada**

coal
an amount of - **kolme**

coat
n. **kosta**

coffee
n. **skafi**

cold
-er than..by.. **kleda**

collar
of garment.. **kalra**

color
be a - perceived by.. **kolro** (kol koo)

comb
n. **komcu** (kom)

come
from..to..via.. **kamla** (kam kaa)

comfortable
be more - than..to.. **komfu** (kof kou)

<i>comic</i>	be funny to..in.. kamki	<i>cord</i>	a length of -/rope korce (koc koe)
<i>command</i>	order..to do.. korji (koj koi)	<i>cork</i>	from source.. korka
<i>committee</i>	of..with task.. kamti	<i>corn</i>	maize from source.. misme
<i>common</i>	to/universal in set.. kumtu (kum kuu)	<i>correct</i>	by standard.. dreti (dre)
<i>common</i>	more ordinary than..in.. danri	<i>costly</i>	more - than..for.. kusti
<i>community</i>	of organisms.. munce (mun)	<i>cotton</i>	from source.. katna
<i>companion</i>	be with../a - to..in.. kinci (kin kii)	<i>cough</i>	up/out.. kafso
<i>company</i>	chartered by..for.. kompi	<i>count</i>	the number in set.. konte (kon)
<i>compare</i>	..with..in.. kambi	<i>country</i>	of people.. gunti (gun gui)
<i>compel</i>	force..to do/be.. fosli (fos foi)	<i>cover</i>	../be a - of.. kuvga (kuv kua)
<i>compete</i>	with..over.. kanpi	<i>cow</i>	cattle kasni
<i>complete</i>	by standard.. kapli (kal)	<i>crack</i>	be a -/fissure in.. karku
<i>concern</i>	../pertain to.. perti (pei)	<i>crazy</i>	insane/mad frelu
<i>conscious</i>	be -/aware of.. kance (kac kae)	<i>cream</i>	from source.. krima
<i>consul</i>	of..in.. konsu (kos)	<i>credit</i>	../with..under.. kredi
<i>contain</i>	../be a -er of.. veslo (veo)	<i>crime</i>	punished by..among.. tsime (tsi)
<i>continue</i>	be a process -ing thru stages.. prase (pra)	<i>crooked</i>	more -/bent than.. betcu (bet)
<i>control</i>	..in process/performance.. troli (tol)	<i>cruel</i>	be - to.. kruli
<i>cook</i>	..for.. kokfa (kok)	<i>crush</i>	smash..into pulp.. kraco
<i>copper</i>	[Cu] cupro (cup)	<i>crush</i>	grind..into powder.. zakra
<i>copulate</i>	with.. kitsa	<i>cry</i>	cry out, v.i. kraku (kra)
<i>copy</i>	of.. kopca (kop)	<i>culture</i>	of people(s).. kultu (kul)
		<i>cup</i>	of/containing.. kupta (kup)

<i>current</i>	flow from..to.. kroli (kro)	<i>desire</i>	want..for.. danza (daa)
<i>curtain</i>	of/across aperture.. kurti	<i>destroy</i>	v.t. hutri (hut hui)
<i>curve</i>	through pts.. korva (kov koa)	<i>detail</i>	of.. citlu (cil)
<i>cushion</i>	pillow padzi (pad)	<i>develop</i>	into/toward.., v.i. valda (vad)
<i>custom</i>	habit of..under conditions.. kusmo (kus kuo)	<i>device</i>	apparatus for doing.. patce (pac pae)
<i>cut</i>	..into pieces.. kutla (klu)	<i>differ</i>	be -ent from..in.. retca (rec rea)
<i>cylinder</i>	roller rolgu (rol)	<i>difficult</i>	hard for..to do under conditions.. nardu (nau)
<i>dance</i>	to.. danse	<i>dig</i>	..up out of.. pafko
<i>Dane</i>	n. daski	<i>digest</i>	v.t. djesi
<i>danger</i>	-ous to..under conditions.. denro (den)	<i>direction</i>	be in - ..from.. dirco (dir dio)
<i>Danish</i>	part of the - language daska	<i>dirt</i>	soil/earth from/of.. dertu (der deu)
<i>Danish</i>	part of - culture dasko	<i>discover</i>	..about.. duvri (dov dui)
<i>dark</i>	-er than..by.. draka (rak)	<i>discuss</i>	..with.. dislu (diu)
<i>daughter</i>	of.. detra (det dea)	<i>disgusted</i>	be -ed by.. tasgu
<i>day</i>	-time of day.. denli (del dei)	<i>disk</i>	a round thing rande (rad rae)
<i>dead</i>	a. morto (mor moo)	<i>distribute</i>	share..out among.. petri
<i>dear</i>	precious to.. dipri (dip)	<i>disturb</i>	trouble..by.. fatru (fat fau)
<i>deceive</i>	dupe/trick..about..by.. dupma (dup)	<i>do</i>	..to.. durzo (dru dur duo)
<i>decide</i>	../to do..about.. disri (dii)	<i>doctor</i>	-s/treats..for..with.. kicmu (kic kiu)
<i>deep</i>	-er than..by.. condi (con)	<i>dog</i>	n. kangu (kau)
<i>delicious</i>	more - than..to.. dilko	<i>dollar</i>	be worth..-s, default 1 dalra
<i>design</i>	be a plan for..by.. danci (dan dai)	<i>door</i>	of/in.. darto (dao)

doubt that..is true of.. **ducti** (dut)

down lower than..by..in gravity field..
damni (dam)

drain of..into.. **godru**

drawer of/containing.. **drara**

dream ../that.. **revri** (rev rei)

dress gown/frock **cadre**

drink ..from.. **hompi** (hom hoi)

drive make..go to..from.. **krani**

drop of liquid.. **drida**

dry -er than..by.. **drani** (dra)

dupe deceive/trick..about..by.. **dupma**
(dup)

dust n. **dustu** (dus)

dwelling a house/home of.. **hasfa** (has haf
haa)

ear of.. **sorgu** (sog)

earn ..for work/service.. **jurna**

earth soil/dirt from/of.. **dertu** (der deu)

east of../an -ern part of.. **lesta** (les)

easy for..under.. **fasru** (fas)

eat v.t. **titci** (tci)

edge of..between.. **bidje** (bie)

egg of/from source.. **negda** (neg)

elastic more - than.. **lasti** (las)

electric - charge on.., -ity **lenki** (lek)

end of thing/process.. **fando** (fad fao)

enemy of..in struggle.. **nemdi**

energy of system.. **nerji** (nej)

English part of - culture **gleco**

English part of the - language **gleca**

English an - person **gleci**

enough sufficient for.. **tsufi** (tsu)

entail implies..under rules.. **snola** (sno)

equal ..in/on dimension.. **ciktu** (cik ciu)

error in..by standard.. **tsero** (tse)

event be an - involving/happen/occur to..
vetci (vet vei)

example of.. **mipli** (mip mii)

exceed be more than..in quality.. by.. **mordu**
(mro mou)

exist for../be real to..under conditions..
dzabi (dza)

experience v.t. **speni** (spe)

expert skilled at..under conditions.. **spuro**
(spu)

explode into.. **zbuma** (zbu)

extend to - /range over.. **ranjo**

<i>extreme</i>	much/very/more - than ..in.. mutce (mut muc mue)	<i>female</i>	of species.. femdi (fem)
<i>eye</i>	of.. menki (mek)	<i>fertile</i>	more - than..for.. ferti (fet)
<i>fabric</i>	an amount of -/cloth klabu (kla)	<i>fiction</i>	a work of - by.. fikco (fik)
<i>face</i>	of.. fasli	<i>field</i>	of farm/community.. fildi (fii)
<i>fact</i>	about..observed by.. fekto (fek feo)	<i>fight</i>	..over.. kamda (kad)
<i>fail</i>	to do/be..under conditions.. falba (fab faa)	<i>finger</i>	of.. dedjo (ded dej)
<i>fall</i>	to..from.. felda (fel fed fea)	<i>fire</i>	be a - in.. fagro (fag)
<i>false</i>	by standard.. falji (fal fai)	<i>fish</i>	n. ficli (fic)
<i>family</i>	with members.. famji (fam)	<i>fissure</i>	be a -/crack in.. karku
<i>famous</i>	for..among.. famva	<i>fix</i>	..for use/user.. nakso
<i>far</i>	-ther than..from..by.. darli (dar)	<i>flag</i>	of.. flaci
<i>farm</i>	of community.. fanra (fan)	<i>flame</i>	of fire/device.. flami (fla)
<i>fast</i>	be quicker than..by.. kukra (kuk)	<i>flat</i>	is a plane through pts.. pilno (pil)
<i>fat</i>	an amount of -/grease/oil gresa (gre)	<i>flavor</i>	taste of.. gusto (gus gut)
<i>fat</i>	plumper/stouter than.. fotoa	<i>float</i>	on/in.. lofu
<i>father</i>	of..out of mother.. farfu (fra far)	<i>floor</i>	of.. fordi
<i>fear</i>	be afraid of.. firpa (fir fia)	<i>flow</i>	current from..to.. kroli (kro)
<i>feather</i>	of..plumage of.. pluma (lum lua)	<i>flower</i>	of plant.. flora (lor loa)
<i>feces</i>	stool of.. ctuda (ctu)	<i>fluorine</i>	[F] fluro (flu)
<i>feeble</i>	-r/weaker than..by.. fibru (fib)	<i>fly</i>	n. flaki
<i>feel</i>	..about.. filmo (fil fio)	<i>fly</i>	to..from..via.. fleti (fle)
		<i>fog</i>	be -gy/covered by - fragu (rag)
		<i>fold</i>	..into.. foldi (fod)

fond be -er of/prefer..to.. **fundi**

food a - of/edible to.. **tcidi** (cii)

fool be -ish about.. **bunbo** (bun)

foot of.. **fitpi** (fit fip)

football -er/play - with.. **futbo**

force compel..to do/be.. **fosli** (fos foi)

fork n. **forka**

form shape of.. **forma** (fom foa)

foundation base/basis of.. **basni** (bas)

frame of/around.. **frama** (ram)

franc be worth..-s, default 1 **fraki**

free to do/be.. **frezi** (rez)

French part of - culture **fraso**

French part of the - language **frasa**

French a - person **frasi**

frequent more - than..under conditions.. **pifno** (pif pio)

fresh -er than.. **frese**

friend of.. **fremi** (rem)

frock dress/gown **cadre**

front be in - /ahead of.. **frena** (fre)

fruit of.. **fruta** (fru)

full -er than..by.. **folma** (flo)

funny comical to..in.. **kamki**

future after/later than.. **futci** (fut fuc fui)

garden of family/community.. **gardi**

garment clothing **resfu** (res ref)

gas -eous above temp.. **vapro** (vao)

gentle be - to/mild with.. **mildo**

German part of - culture **dotco**

German part of the - language **dotca**

German a - person **dotci**

get ..from..for.. **getsi** (get gei)

girl n. **nirli** (nil)

give to..gift.. **donsu** (don dou)

glass made of - **gliso**

glove n. **gluva**

go to..from..via.. **godzi** (god goz goi)

goat n. **gotca** (goa)

god of people(s).. **gandi** (gad)

good better than..for.. **gudbi** (gud gub)

govern rule over../be a -or of.. **garni** (gar gai)

gown dress/frock **cadre**

grab seize..with.. **jugra** (jug jua)

grain from source.. **grunu** (run)

gram weigh...s, default 1 **gramo**

grand -er/greater than.. **grada** (gra)

grass a blade/expanse of - **grasa** (raa)

grateful be - to..for.. **garti** (gat)

grease an amount of -/fat/oil **gresa** (gre)

great -er/grander than.. **grada** (gra)

green -er than.. **vegri**

grey -er than.. **grisi**

grind crush..into powder.. **zakra**

group with members.. **grupa** (gru)

grow in..under.. **rodja** (roj roa)

guide ..to..from..via.. **glida** (gli)

gummy adhere/stick to.. **gomni** (gom)

gut of.. **visra**

gymnast at feat.. **gimna**

habit custom of..under conditions .. **kusmo** (kus kuo)

hair of.. **herfa** (her)

hammer n. **mroza** (roz)

hand of.. **hanco** (han)

hang from.. **pendi** (ped)

happen -/occur to../be an event involving.. **vetci** (vet vei)

happy about.. **hapci** (hap hai)

harbor shelter../be a -/shelter for ..from.. **harko** (har hao)

hard difficult for..to do under conditions.. **nardu** (nau)

hard more resistant than.. **hardu** (had)

harmony be in - with..to.. **harmo** (ham)

hat n. cap **kapma**

hate ..for doing/being.. **tsodi**

head of.., body-part **hedto** (hed)

hear ..over noise.. **hirti** (hir)

heart of.. **karci**

heavy -ier than..by..in gravity field.. **tidjo** (tid tio)

help ..do.. **helba** (hel hea)

here attend/be present at.. **hijra** (hij hia)

hide skin/pelt from.. **pelpi**

high -er than..by..in gravity field|.. **ganta** (gan gaa)

Hindi part of the - language **hinda**

history of..by.. **hisri** (his)

hit ..with.. **bloda** (blo)

hold keep/retain.. **klipu**

hole pit/depression in.. **holdu** (hol hou)

holy sacred to.. **sento** (seo)

<i>home</i>	a dwelling/house of.. hasfa (has haf haa)	<i>implement</i>	tool/instrument for doing.. trime (rim rie)
<i>honest</i>	with..about.. nesta (nes)	<i>imply</i>	entails..under rules.. snola (sno)
<i>hook</i>	n. gokru (gok)	<i>important</i>	to..in/for.. djipo (jip jio)
<i>hope</i>	for../that..happens spopa (spo)	<i>impulse</i>	have an - to do.. pulso (pul)
<i>horn</i>	of.., body part horno	<i>in</i>	-side/interior of.. nenri (nen nei)
<i>horse</i>	n. horma (hor hoa)	<i>increase</i>	-s by..in dimension.. tenri (ten)
<i>hose</i>	stocking/sock hozda	<i>Indian</i>	part of - culture hindo
<i>hospital</i>	of community.. hospi (hos)	<i>Indian</i>	an - person hindi
<i>hot</i>	-ter than..by.. hatro (hat)	<i>industry</i>	producing..among.. gotri (got)
<i>hotel</i>	of community.. hotle	<i>infant</i>	baby of.. cinta (cin)
<i>hour</i>	last..-s, default 1 horto (hot hoo)	<i>inflate</i>	..with..to dimension.. flati
<i>house</i>	a dwelling/home of.. hasfa (has haf haa)	<i>injure</i>	hurt/harm..at/in.. surna (sru)
<i>human</i>	be -/a - being humni (hum hun)	<i>ink</i>	an amount of - tinmo (tin)
<i>hundred</i>	-fold of.. hekto (hek)	<i>insane</i>	crazy/mad frelo
<i>hundredth</i>	-part of.. centi (cen)	<i>insect</i>	n. sekta (sek)
<i>hunt</i>	game/quarry.. janto (jan)	<i>instance</i>	recurrence of.. genza (gen gea)
<i>hurt</i>	- in/feel pain in.. puntu (pun puu)	<i>instrument</i>	implement/tool for doing.. trime (rim rie)
<i>hurt</i>	harm/injure..at/in.. surna (sru)	<i>insure</i>	..against..for fee.. curdi
<i>hydrogen</i>	[H] hidro (hid)	<i>interact</i>	-s socially with.. socli (sol)
<i>ice</i>	an amount of - bisli (bis)	<i>interest</i>	-s../be -ing to..in.. trecci
<i>idea</i>	about..by thinker.. vidre (vid vie)	<i>interval</i>	time - from..to.. ckemo (cke keo)

invent ..for use.. **vetfa**
involve be an affair of/-ing.. **ferci** (fei)
involve be an event -ing.. **vetci** (vet vei)
iron [Fe] **ferno** (fen)
island in sea.. **cilda**
Italian part of - culture **talno**
Italian part of the - language **talna**
Italian an - person **talni**
Japanese part of - culture **ponjo**
Japanese part of the - language **ponja**
Japanese a - person **ponji**
jelly an amount of - **dzeli** (dze)
jewel in/of jeweled object.. **djula** (jul)
join be -ed to..at.. **djine** (dji)
judge ..to be.., be a - **djudi** (dju)
jump over/vault across.. **valti** (val vai)
keen -er/sharper than.. **kinku** (kik)
keep hold/retain.. **klipu** (lip)
keep ..from doing../restrain.. from.. **litnu** (liu)
kettle of/containing.. **ketli** (ket)
key a - to lock.. **tockti**
kick v.t. **kekti**

kind be - to.. **ckano** (cka)
kiss ..on.. **skesa**
knife n. **najda** (naj)
knot in/between.. **nanda**
know ..about.. **djano** (dja)
lake of landmass.. **vlako** (vla)
land a parcel/expanse of - **landi** (lan lai)
language of people(s).. **lengu** (len leu)
large -ger than..by.. **groda** (gro)
later than/after../in the future of.. **futci** (fut fuc fui)
laugh at.. **clafo**
law against acts of..by..under conditions.. **lilfa** (lil)
lead [Pb] **pubmu** (pum)
leaf of plant.. **clife** (lif)
lean thinner than..by.. **linco** (lic)
learn ..from source.. **cirna** (cir cia)
leather skin/hide from.. **pelpi**
left of../-hand side of.. **ledzo** (lez)
leg of.., body-part **tugle** (tul tue)
lens of system.. **lenzo** (leo)
let permit..to do..under conditions.. **letci** (let lei)

<i>letter</i>	-al in character-set.. letra (lea)	<i>location</i>	place/site of.. sitfa (sit sif sia)
<i>letter</i>	to..from..about.. lerci (ler)	<i>lock</i>	of/on.. sluko (slu)
<i>level</i>	in gravity field.. lelpi (lel lep)	<i>logic</i>	for inferring..from.. lodji (lod)
<i>lie</i>	down on../rest/repose on.. resto (ret)	<i>Loglan</i>	part of the - language logla (log)
<i>lift</i>	..to..from..in gravity field.. lufta	<i>loglander</i>	a Loglan-speaking person logli
<i>light</i>	-er than..by..in gravity field .. latci	<i>loglandic</i>	part of - culture loglo
<i>light</i>	from source..on.. litla (lit)	<i>long</i>	-er than..by.. langa (lag laa)
<i>lightning</i>	from..to.. ledri (led)	<i>look</i>	at.. bleka (ble)
<i>like</i>	similar to..in.. clika (cli)	<i>lose</i>	person/thing.. dirlu
<i>likely</i>	-ier/more probable than.. under conditions.. dakli (dak)	<i>loud</i>	-er than..by.. clado (cla)
<i>limb</i>	bough/branch of.. badjo (baj)	<i>louse</i>	n. ladzo
<i>limit</i>	of.. limji (lim lij)	<i>love</i>	v.t. cluva (clu)
<i>line</i>	a straight - through points.. clina (lin lia)	<i>low</i>	-er than..by..in gravity field.. damni (dam)
<i>linen</i>	from source.. linbu	<i>lunar</i>	pert. to Earth's moon lunra (lun)
<i>lion</i>	n. simba	<i>machine</i>	for use/function.. matci (mac mai)
<i>lip</i>	of.. zlupi	<i>mad</i>	crazy/insane frelo
<i>liquid</i>	be - from temperature..to.. flidu (fli)	<i>magic</i>	-ian, do - before.. madji (maj)
<i>liquor</i>	distilled spirits likro (lio)	<i>magnet</i>	n., -ic a. magne
<i>list</i>	of set..in order.. lista (lis)	<i>mail</i>	post..to..from..by.. posta (pot)
<i>live</i>	be alive clivi (liv lii)	<i>maize</i>	corn from source.. misme
<i>liver</i>	of.. vrano	<i>make</i>	..out of.. madzo (mad maz mao)
<i>local</i>	to../confined to.. lokti (loi)	<i>male</i>	of species.. mendi (men)

man n. **mrenu** (mre meu)
manage function..in.. **mande**
map chart of..by.. **cartu** (cat)
mark be a - on..made by.. **marka** (mra mar)
mark be worth..-s, deflt 1 **makri**
market of community.. **marte** (mae)
marry be -ied to..., spouse **merji** (mer)
mat n. **tciro**
match incendiary device **metca**
matter stuff/material **ctifu** (cti)
mattress pallet/pad **spadi**
maximum a - value of function.. **maksi** (mas)
meal composed of dishes.. **milfa** (mia)
mean ..to../be a sign of..to..disposing behavior..under conditions.. **sanpa** (san saa)
measure ..to be..on scale.. **merli** (mel mei)
meat from source.. **mitro** (mit mio)
meet encounter..at/in.. **jmite** (jmi)
melon from source.. **melno**
member of set/group.. **djori** (djo)
metal be -ic/made of - **metli** (met)
meter be..-s long, default 1 **metro** (meo)

middle at the center of.. **midju** (mid mij)
mild be gentle to/with.. **mildo**
mile be..-s long, default 1 **marli**
military part of the - forces of.. **bilca** (bic)
milk from source.. **malna** (man)
mill of community.. **molci**
million -fold of.. **megdo** (meg)
millionth -part of.. **mikti** (mik)
mind of.. **smina** (min)
mineral ore from source.. **minku** (miu)
minimum a - value of function.. **minmi** (mim)
minute lasts..-s, default 1 **minta**
mixture of ingredients.. **miksa** (mis)
money issued by.. **cmeni** (cme)
monkey n. **murki** (muk)
month of year.. **mensa** (mea)
more exceeds..in quality..by.. **mordu** (mro mou)
morning of day.. **monza** (moz)
mother of..by father.. **matma** (mat mam maa)
motive for..to do..under conditions.. **modvi** (mov moi)
motor n. **motci** (moc)

<i>mountain</i>	of landmass.. monca (mon moa)	<i>net</i>	n. netre (net)
<i>mouth</i>	of.. manko (mak)	<i>neutral</i>	in fight..between.. nutra
<i>move</i>	to..from..over path.. muvdo (muv muo)	<i>new</i>	to..in feature.. cninu (cnu)
<i>movie</i>	made by.. sinma (sin)	<i>news</i>	about..from source.. nuzvo (nuz)
<i>much</i>	very/more extreme than.. in.. mutce (mut muc mue)	<i>next</i>	to.. nedza (ned nea)
<i>muscle</i>	of.. muslo (mus)	<i>nickel</i>	[Ni] niklo
<i>music</i>	by composer.. muzgi (muz mui)	<i>night</i>	-time of day.. natli (nat nai)
<i>nail</i>	n. naldi (nal)	<i>nightclub</i>	cabaret of.. kabre
<i>name</i>	of..to.. namci (nam)	<i>nitrogen</i>	[N] nitro
<i>narrow</i>	-er than..by.. janro (jar)	<i>norm</i>	the average for distribution.. norma (nom noa)
<i>nation</i>	state/polity of people.. poldi (pod)	<i>north</i>	of../a -ern part of.. nordi (nod)
<i>natural</i>	not caused by man natra (nar naa)	<i>nose</i>	of.. nazbi
<i>near</i>	-er than..to..by.. snire (sni)	<i>now</i>	simultaneous with.. nadzo (naz nao)
<i>neat</i>	-er than.. nitci (nit)	<i>nucleus</i>	of.. nukle (nue)
<i>necessary</i>	for process.. nerbi (neb)	<i>number</i>	n. numcu (num nuu)
<i>neck</i>	of.. sneku (sne)	<i>nut</i>	of plant.. krinu
<i>need</i>	..for.. cnida (cni)	<i>oak</i>	from source.. sokcu
<i>needle</i>	n. nidla	<i>object</i>	enduring in space-time bekti (bek)
<i>negative</i>	a. negvo (nev)	<i>observe</i>	watch..do.. katca
<i>nerve</i>	of..., body-part nurvi (nuv)	<i>obtain</i>	..from..for.. getsi (get gei)
<i>nervous</i>	about.. nervo	<i>occur</i>	-/happen to../be an event involving.. vetci (vet vei)
<i>nest</i>	of.. nensu		

<i>ocean</i>	sea of planet.. mursi (mur)	<i>oven</i>	of.. zavno (zan)
<i>odor</i>	a smell emitted by.. sutme (sut)	<i>over</i>	vertically above..in gravity field.. tovru (tov)
<i>offer</i>	..to..for use.. tifru (tiu)	<i>owe</i>	..to..for.. djeta (jet)
<i>office</i>	of.. fusto	<i>own</i>	..under law/custom.. ponsu (pon pou)
<i>offspring</i>	child of.. tciha	<i>package</i>	bundle of/containing.. badlo (bad)
<i>oil</i>	an amount of -/fat/grease gresa (gre)	<i>page</i>	..of document.. pidri
<i>old</i>	-er than..by.. laldo (lal)	<i>pail</i>	bucket of/containing.. bakto (bak)
<i>open</i>	be -/not shut kapni (kap)	<i>pain</i>	-ed, hurt/feel - in.. puntu (pun puu)
<i>operate</i>	..with goal.. bapra	<i>paint</i>	n. pinti (pin)
<i>opine</i>	think..true of.. jupni (jui)	<i>pallet</i>	mattress/pad spadi
<i>oppose</i>	..on issue.. pozfa (poz)	<i>pan</i>	n. panba (pan)
<i>opposite</i>	from..in quality.. bufpo (buf)	<i>panic</i>	be -ked by.. panki
<i>orange</i>	be more - than.. norji	<i>pants</i>	trousers pantu
<i>orchestra</i>	band of players.. bendu (ben beu)	<i>paper</i>	n. papre (pre)
<i>order</i>	command/tell..to do.. korji (koj koi)	<i>parallel</i>	to.. pirle (pie)
<i>ordinary</i>	more - than..in.. danri	<i>parent</i>	is a - of..by.. penre (pee)
<i>ore</i>	mineral from mine/source.. minku (miu)	<i>part</i>	of whole.. parti (par pai)
<i>organize</i>	..into..for.. ganli (gal)	<i>passport</i>	issued to..by..for.. paspo
<i>origin</i>	start/beginning of.. satci (sac)	<i>past</i>	earlier than/before..; default = now pasko (pas pak pao)
<i>oscillate</i>	shake/vibrate at rate.. siltu (sil siu)	<i>paste</i>	n. pasti
<i>other</i>	not the same as.. notbi (not)		
<i>out</i>	-/-side of/exterior to.. zvoto (zvo)		

path route to..from..via pts.. **rutma** (rut rua)

pause wait for..before.. **pazda** (paz)

pay ..to..for goods/service.. **petci** (pec)

pea from.. **pizdo**

peace be at - with.. **pismi** (pis)

pear from source.. **persa**

pen writing instrument **penbi**

pencil n. **pinsi**

penetrate ..in direction.. **tceru** (tce)

penis of.. **pingu**

people of land.. **piplo** (pip)

perfect by standard.. **purfe** (puf pue)

permit let..do..under conditions.. **letci** (let lei)

person -/people **pernu** (per peu)

pertain to../concern.. **perti** (pei)

peseta be worth..-s, default 1 **pesta**

peso be worth..-s, default 1 **pesro**

physical non-mental **fizdi** (fiz fid)

physician treats..for..with.. **kicmu** (kic kiu)

picture of..by.. **tcure** (tcu)

piece of.. **pisku** (piu)

pig n. **porju** (poj)

pillow cushion **padzi** (pad)

pin n. **pinda** (pid)

pit hole/depression in.. **holdu** (hol hou)

place put/set..on/at.. **setfa** (sea)

place site/location of.. **sitfa** (sit sif sia)

plan be a design for..by.. **danci** (dan dai)

plane through pts.., flat **pilno** (pil)

plant n. **herba** (heb)

plate n. **plata** (pla)

play with.. **pleci** (ple)

please ..by.. **pluci** (plu)

plow n. **plado** (lad)

pocket of garment.. **packe**

poem a -/verse by.. **versa** (ves)

point be a/the - of.. **penta** (pet pea)

poison -ous to.. **vendu** (ven veu)

polish n. **palci**

poor -er than..in.. **purcu**

positive a. **pozvo** (pov)

possible under conditions.. **blicu** (bli)

post mail..to..from..by.. **posta** (pot)

pot n. **patpe** (pat)

potato from source.. **palto**

pound
be worth..-s, default 1 **pandi**

pound
weigh..-s, default 1 **pundo**

powder
from source.. **pudru** (pud)

power
-ful, have - over.. **porli** (poi)

precious
dear to.. **dipri** (dip)

prefer
..to../be fonder of..than.. **fundi**

present
be - at/attend..; default = this place
hijra (hij hia)

price
of..to..set by vendor.. **prati** (rat)

print
v.t., - ..on.. **capri** (cap)

prisoner
of..for act/state.. **preni**

private
to.. **prizi** (riz)

probable
more -/likely than..under.. **dakli**
(dak)

problem
to..in doing task.. **nable** (nab)

process
continuing through stages.. **prase**
(pra)

produce
..by process.. **proju** (pro)

product
of..multiplied by.. **jalti** (jai)

profit
be the - to..from.. **prali** (ral)

progeny
a child/offspring of.. **tciha**

prose
be a - work by.. **proza**

protest
..to..by doing.. **prutu** (ruu)

public
more - than..among.. **publi** (pub)

pull
..to..from.. **cpula** (cpu)

pump
for -ing..from..into.. **dampa**

punish
..for..by doing.. **kasfa** (kaf)

pure
-er/more uniform than.. **punfo**

purple
more - than.. **purpu** (pup)

push
..to..from..via.. **pucto** (puc puo)

put
place/set..on/at.. **setfa** (sea)

quality
have -/feature.. **katli** (kat kai)

quantity
of..on scale.. **canli** (cna cai)

question
about..by..to.. **kenti** (ken)

quick
be faster than..by.. **kukra** (kuk)

quiet
-er than.. **santi** (sai)

radio
receiver in network.. **radjo**

rail
n. -ing/bar **trellu** (rel reu)

rain
be -ed on by.. **crina** (cri)

random
by chance under conditions.. **canse**
(can cae)

range
to - /extend over.. **ranjo**

rat
n. **ratcu** (rau)

ratio
of..divided by..., math. **brato** (rao)

ray
radiant energy from source.. **kreni**
(kre)

read
..from surface/document.. **ridle** (rid)

ready
for.. **bredi** (bre)

<i>real</i>	be -/exist for..under conditions.. dzabi (dza)	<i>restaurant</i>	of community.. resra
<i>rear</i>	in back/behind/to the - of.. prire (pri)	<i>restrain</i>	keep..from doing.. litnu (liu)
<i>reason</i>	for..'s doing..under conditions.. raznu (raz)	<i>retain</i>	keep.. klipu
<i>record</i>	of..on medium.. rirda (rir)	<i>reverse</i>	be the - of../in - order from.. fanve (fav)
<i>recur</i>	be an instance/-rence of.. genza (gen gea)	<i>reward</i>	..for..with.. barda
<i>red</i>	-der than.. redro (red)	<i>rhythm</i>	be the - of.. rinta (rit)
<i>regular</i>	more - than.. rilri (rii)	<i>rice</i>	from source.. rismi
<i>regulate</i>	..for function.. stuli (tui)	<i>rich</i>	wealthier than..in.. fulri (ful)
<i>related</i>	to../be kin of..by relation.. kunci (kuc kui)	<i>right</i>	of../-hand side of.. ritco (ric)
<i>religion</i>	of people(s).. lidji (lid)	<i>ring</i>	be a -/band on/around.. rinje (rin)
<i>remain</i>	stay at/with.. stolo (sto)	<i>ripe</i>	-er than.. rapcu
<i>remember</i>	..about.. driki (dri)	<i>river</i>	of landmass.. vrici (vri)
<i>reply</i>	..to questioner.. dapli (dap)	<i>road</i>	between end-points..via.. rodlu
<i>represent</i>	..in/under conditions.. dilri (dil)	<i>rock</i>	stone from source.. troku (tro)
<i>request</i>	ask..of/from.. begco (beg beo)	<i>rod</i>	n. cane/staff kanra
<i>resistant</i>	be harder/more - than.. hardu (had)	<i>roll</i>	-s/be a -er/cylinder rolgu (rol)
<i>respect</i>	..for doing/being.. rispe (ris)	<i>Roman</i>	a - person romni
<i>respond</i>	..to..under conditions.. ponda (poa)	<i>roof</i>	of.. trufa (ruf)
<i>responsible</i>	for..to.. daspa (das)	<i>room</i>	of/in.. kruma (kru)
<i>rest</i>	repose/lie down on.. resto (ret)	<i>root</i>	of plant.. ginru (gin)
		<i>rope</i>	a length of -/cord korce (koc koe)
		<i>rose</i>	from source.. rozme

<i>rotate</i>	turn around axis.. trana (tan)		from source.. sanca (sna)
<i>rotten</i>	be more - than.. ranta (ran)	<i>say</i>	..to.. cutse (cus cue)
<i>rough</i>	-er/more abrasive than.. rofsu (rof ros)	<i>scale</i>	measuring..among.. skalu (ska)
<i>round</i>	circular, a disk/circle rande (rad rae)	<i>school</i>	of community.. ckela (kea)
<i>route</i>	path to..from..via pts.. rutma (rut rua)	<i>science</i>	of/about.. sensi (ses)
<i>ruble</i>	be worth..-s, default 1 rubli	<i>scissors</i>	shears cirzo (cio)
<i>rule</i>	over/govern.. garni (gar gai)	<i>Scot</i>	-tish part of - culture skaco
<i>rule</i>	requiring..to..under conditions.. rulni (rul rui)	<i>Scot</i>	-tish dialect skaca
<i>run</i>	to..from..over path.. prano	<i>Scot</i>	-tish a - person skaci
<i>rupee</i>	be worth..-s, default 1 rupli	<i>scratch</i>	v.t. kraju (raj)
<i>Russian</i>	part of - culture rusko	<i>screw</i>	n. a threaded device skori (sko)
<i>Russian</i>	part of the - language ruska	<i>sea</i>	ocean of planet.. mursi (mur)
<i>Russian</i>	a - person ruski	<i>second</i>	lasts..-s, default 1 sekmi
<i>sack</i>	bag of/containing.. sakli (sak)	<i>secret</i>	be kept - from..by.. smike (smi)
<i>sacred</i>	holy to.. seno (seo)	<i>secretary</i>	of.. sekre
<i>sad</i>	be - about.. kecri (kec kei)	<i>secure</i>	safe from.. curca (cur)
<i>safe</i>	secure from.. curca (cur)	<i>see</i>	..against.. vizka (viz vik via)
<i>sage</i>	wiser than..about.. sadji (saj)	<i>seed</i>	of organism.. sidza (siz)
<i>sail</i>	of vessel.. salfa (saf)	<i>seem</i>	appear to be..to..under conditions.. simci (sim sii)
<i>salt</i>	an amount of - solte (sot)	<i>seize</i>	grab..with.. jugra (jug jua)
<i>same</i>	be the - thing as.. samto (sam sao)	<i>select</i>	choose..from set.. tisra (tia)
<i>sand</i>		<i>self</i>	of./-image of.. selji (sel)
		<i>sell</i>	..to..for price.. vedma (ved vem vea)

<i>send</i>	..to..from...via route.. sundi (sud sui)	<i>short</i>	-er than..by.. corta (cor coa)
<i>sense</i>	stimulus..under conditions.. sanse (sas sae)	<i>shovel</i>	n. cavle (cav)
<i>sentence</i>	about..in language.. steti (ste)	<i>sibling</i>	of..through.. sibli (sib)
<i>separate</i>	apart from.. narti	<i>sick</i>	with..from.. malbi (mal)
<i>serious</i>	be - about.. srisu (riu)	<i>side</i>	of..bounded by edges.. spali (pal)
<i>serpent</i>	snake marpi	<i>sign</i>	of..to..disposing behavior.. under conditions.. sanpa (san saa)
<i>serve</i>	..in/by../be a -ant of..with duties.. surva (suv sua)	<i>silk</i>	made of - colku (col)
<i>set</i>	a group of elements.. setci (set sei)	<i>similar</i>	like to..in.. clika (cli)
<i>set</i>	place/put..on/at.. setfa (sea)	<i>simple</i>	-er than..in respect.. sapla (sap)
<i>sew</i>	..to.. djoso (jos)	<i>simultaneous</i>	with..; default = now nadzo (naz nao)
<i>sexual</i>	behave -ly toward.. sekci (sec)	<i>sing</i>	..to.. gritu (gri)
<i>shade</i>	shadow of..from source.. cedzu (ced)	<i>sister</i>	of..through parents.. sorme (som soe)
<i>shake</i>	oscillate/vibrate at rate.. siltu (sil siu)	<i>sit</i>	on.. skitu (ski)
<i>share</i>	..out/distribute..among.. petri	<i>site</i>	place/location of.. sitfa (sit sif sia)
<i>sharp</i>	-er/keener than.. kinku (kik)	<i>ski</i>	n. skizo (kiz)
<i>shears</i>	scissors cirzo (cio)	<i>skin</i>	rind/outer covering of.. skapi
<i>sheep</i>	n. berci	<i>skin</i>	hide/pelt/a piece of leather from .. pelpi
<i>shelf</i>	of/containing.. celna	<i>skirt</i>	n. skara
<i>shelter</i>	harbor..from.. harko (har hao)	<i>skull</i>	of.. tosku
<i>shirt</i>	upper-body garment curta	<i>sky</i>	an expanse of - at place.. skati
<i>shock</i>	..with/by.. tcaku (cak)	<i>sleep</i>	v. be asleep sonli (soi)
<i>shoe</i>	n. cutci (cuc)		

slide slip on.. **clidu**
slope -d/be steeper than..by.. **slopu** (slo)
slow -er than..by.. **slano** (sla)
small -er in volume than..by.. **cmalo** (cma)
smash crush..into pulp.. **kraco**
smell n. an odor emitted by.. **sutme** (sut)
smile at.. **crano** (cra)
smoke from source.. **smano** (sma)
smooth -er than..by.. **smupi** (smu)
snake serpent **marpi**
sneeze v.i. **tsani** (tsa)
snow a quantity/expanse of - **snice** (nic)
soap an amount of - **dzaso** (zas)
social is -/interacts -ly with.. **socli** (sol)
sock stocking/hose **hozda**
sodium [Na] **nadro** (nad)
sofa n. **sofha**
soft -er/more malleable than.. **molro** (mol)
soil dirt/earth from/of.. **dertu** (der deu)
solar pert. to Earth's sun **solra**
soldier of army.. **solda** (sod)
solid below temperature & pressure.. **saldi** (sal)

son of.. **sunho** (sun suo)
sound a - emitted by.. **sonda** (son soa)
soup -/stew of ingredients.. **supta** (sup)
sour more - than..to.. **sarni** (sar)
south of../a -ern part of.. **surdi** (sur)
space volume occupied by.. **spasi** (spa)
Spanish part of - culture **spano**
Spanish part of the - language **spana**
Spanish a - person **spani**
speak to../talk to..about.. **takna** (tak taa)
species of genus.. **speci**
specific to..among.. **spebi** (peb)
sphere ball n. **balma** (bam)
spirit ghost of..seen by.. **spicu** (spi)
spit spittle of.. **spetu**
sponge n. **penja** (pej)
spoon n. **sputa** (put)
spread -s/expands over/into.. **kuspo**
spring n. an elastic device **spori**
square with vertices.. **kurfa** (kur)
staff n. rod/cane **kanra**
stage of hall/theater.. **stadi** (sta)
stairs of structure.. **stire** (tir tie)

<i>stalk</i>	stem/trunk of.. staga	<i>stroke</i>	rub..with.. satro (sat)
<i>stand</i>	on.. stali (tai)	<i>strong</i>	-er than..by.. forli (fol)
<i>star</i>	of galaxy.. tarci (tar)	<i>structure</i>	of.. truke (tru)
<i>start</i>	origin/beginning of.. satci (sac)	<i>student</i>	of..at institution.. stude
<i>station</i>	of transport system.. stana	<i>stuff</i>	matter/material ctifu (cti)
<i>stay</i>	remain at/with.. stolo (sto)	<i>succeed</i>	in..by effort.. suksi (sku)
<i>steel</i>	made of - gasti	<i>sudden</i>	be -/abrupt to.. sudna
<i>steep</i>	-er/more sloping than..by.. slopu (slo)	<i>sufficient</i>	enough for.. tsufi (tsu)
<i>stem</i>	stalk/trunk of.. staga	<i>sugar</i>	n. sakta
<i>step</i>	on/in.. buste (bus bue)	<i>suggest</i>	action..to.. sange
<i>stick</i>	of/made of.. stuka	<i>sulfur</i>	[S] sulfo
<i>stick</i>	to../adhere to.. gomni (gom)	<i>sum</i>	total of..plus.. sumji (sum)
<i>stiff</i>	-er than..in direction.. stifa	<i>summer</i>	of year.. cimra (cim)
<i>stocking</i>	hose/sock hozda	<i>support</i>	..with/by.. djuopo (jup juo)
<i>stone</i>	rock from source.. troku (tro)	<i>sure</i>	certain that..is true sirna (sir)
<i>stop</i>	cease doing.. stise (sti)	<i>surprise</i>	startle..by.. stari
<i>store</i>	deposit/reserve of.. sordi (sro)	<i>sweet</i>	-er than..to.. sliti (sli)
<i>story</i>	about..told by.. stuci (stu)	<i>swelling</i>	at/in/on..caused by.. sulba (sul)
<i>straight</i>	be a - line through pts.. clina (lin lia)	<i>swim</i>	to..from..via.. sucmi
<i>strange</i>	to..in features.. gutra (gur)	<i>system</i>	with function..and parts.. sisto (sis sio)
<i>street</i>	of.. trida	<i>table</i>	n. tobme (tob toe)
<i>stretch</i>	to length..from.. tetcu (tec teu)	<i>tail</i>	of.. tilba

<i>take</i>	..away from.. tokna (toa)		about.. penso (pen peo)
<i>talk</i>	to../speak to..about.. takna (tak taa)	<i>think</i>	opine/- ..true of.. jupni (jui)
<i>taste</i>	flavor of.. gusto (gus gut)	<i>thousand</i>	-fold of.. kilto (kil)
<i>tavern</i>	bar of community.. barcu	<i>thousandth</i>	-part of.. milti (mil)
<i>tax</i>	on..by..for use.. cteki (cte)	<i>thread</i>	an amount/length of - citre (cit cie)
<i>taxi</i>	n. taksi	<i>throat</i>	of.. goltu
<i>tea</i>	from source.. tcati	<i>throw</i>	..to/at.. renro (ren reo)
<i>teach</i>	..to do/know.. ditca (dic dia)	<i>thumb</i>	of.. pudja
<i>telephone</i>	receiver in network.. telfo	<i>ticket</i>	to..from..on..for.. ketpi
<i>television</i>	receiver in network.. telvi	<i>tiger</i>	n. tigra
<i>temple</i>	church of religion.. tepli (tep)	<i>tight</i>	be -er than..on.. djitu (jit jiu)
<i>ten</i>	-fold of.. dekto (dek)	<i>tile</i>	n. kadta
<i>ten-thousand</i>	of.. mirdo (mir)	<i>time</i>	interval from..to.. ckemo (cke keo)
<i>tent</i>	a fabric dwelling of.. tenta	<i>tin</i>	[Sn] stino
<i>tenth</i>	-part of.. decti (dec)	<i>tired</i>	by effort.. tarle (tal tae)
<i>terrestrial</i>	pert. to Earth terla (tel)	<i>tobacco</i>	n. tabko
<i>test</i>	a - for..among.. pruci (pru)	<i>toe</i>	of.. djoto
<i>testicle</i>	of.. testi	<i>tomato</i>	from source.. tomto
<i>theater</i>	of town.. tatro (tat)	<i>tongue</i>	of.., body-part tongu
<i>thick</i>	-er than..by.. totnu (tot)	<i>tool</i>	implement/instrument for doing.. trime (rim rie)
<i>thin</i>	leaner than..by.. linco (lic)	<i>tooth</i>	of.. dante (dat)
<i>thing</i>	something that endures in space-time bekti (bek)	<i>total</i>	sum of..plus.. sumji (sum)
<i>think</i>		<i>touch</i>	..with.. totco (tco)

<i>trade</i>	barter..for..with.. batmi (bat)	<i>universal</i>	common to/- in set.. kumtu (kum kuu)
<i>train</i>	of system.. trena (tre)	<i>urine</i>	of.. pinca (pic)
<i>travel</i>	to..from..via route.. traci (rac)	<i>use</i>	..for.. plizo (pli)
<i>tray</i>	of/containing.. trali	<i>vaccine</i>	against disease..in.. vaksi
<i>treats</i>	treats..medically for.. with.. kicmu (kic kiu)	<i>vagina</i>	of.. konbi
<i>tree</i>	n. tricu (tri)	<i>value</i>	of..to..for use.. vatlu (vat vau)
<i>trick</i>	deceive/dupe..about..by. dupma (dup)	<i>vault</i>	jump over/across.. valti (val vai)
<i>trillionth</i>	-part of.. pikti (pik)	<i>verse</i>	a poem by.. versa (ves)
<i>trot</i>	to..from.., trotter troti	<i>vertical</i>	in gravity field.. vreti (vre)
<i>trouble</i>	v. disturb..by.. fatru (fat fau)	<i>very</i>	much/more extreme than.. in.. mutce (mut muc mue)
<i>trousers</i>	pants pantu	<i>vessel</i>	of/containing.. veslo (veo)
<i>truck</i>	-/car, a motor vehicle tcaro (tca)	<i>vibrate</i>	shake/oscillate at rate.. siltu (sil siu)
<i>true</i>	by rule/standard.. tradu (tra)	<i>view</i>	of..from point.. vidju (vij viu)
<i>trunk</i>	stalk/stem of.. staga	<i>violent</i>	in response to.. valna (van vaa)
<i>try</i>	to do/attain..by.. trati (rai)	<i>voice</i>	of individual.. volsi (vol voi)
<i>tube</i>	a length of -ing tubli (tub)	<i>volt</i>	have..-s electromotive force; default 1 volta
<i>tulip</i>	from source.. tulpi	<i>volume</i>	space occupied by.. spasi (spa)
<i>turn</i>	rotate around axis.. trana (tan)	<i>vomit</i>	../throw..up on.. vamtu
<i>twist</i>	under load.. torni (ton)	<i>wagon</i>	carriage/cart karti
<i>umbrella</i>	n. sanla	<i>wait</i>	pause for..before.. pazda (paz)
<i>uniform</i>	purer/more - than.. punfo	<i>walk</i>	to..from..via.. dzoru (dzo)
<i>unit</i>	of scale.. dugri		

<i>wall</i>	of/around.. tcali (cal)	<i>wide</i>	-er than.. blabi (lab)
<i>want</i>	desire..for.. danza (daa)	<i>wine</i>	be -er/broader than..by.. kubra (kub)
<i>war</i>	be at - with..over.. dorja (dor)	<i>win</i>	..from/over.. gancu (gac gau)
<i>warn</i>	..of/about danger.. kurni (kun)	<i>window</i>	of.. cundo (cuo)
<i>wash</i>	..in.. vlaci	<i>wine</i>	an amount of - vinjo (vin)
<i>waste</i>	..on/by doing.. festi (fes)	<i>wing</i>	of.. tcela
<i>watch</i>	observe..do.. katca	<i>winter</i>	of year.. dotra (dot)
<i>water</i>	an amount/expanse of - cutri (cut cui)	<i>wire</i>	a length of - tirca (tic)
<i>wave</i>	in medium.. valpu (vap)	<i>wise</i>	-r than..about.. sadji (saj)
<i>wax</i>	from source.. lakse (lak)	<i>with</i>	be - ../a companion to..in.. kinici (kin kii)
<i>weak</i>	-er/more feeble than..by.. fibru (fib)	<i>without</i>	be - ../be..-less clesi (cle)
<i>wealthy</i>	richer than..in.. fulri (ful)	<i>woman</i>	n. fumna (fum fua)
<i>weapon</i>	for use.. tarmu (tam tau)	<i>wood</i>	from source.. mubre (mub)
<i>weather</i>	of place/region.. tetri (tet)	<i>wool</i>	from source.. lunli (lul)
<i>week</i>	of month/year.. likta (lik)	<i>word</i>	be the - for..in language.. purda (pur pua)
<i>well</i>	healthier than.. djela (dje jel)	<i>work</i>	on/at..with goal.. turka (tur tua)
<i>west</i>	of../a -ern part of.. lusta (lus)	<i>worm</i>	n. kurma
<i>wet</i>	with.. cetlo (cet)	<i>worse</i>	than..for.. zavlo (zav zao)
<i>wheat</i>	from source.. ritma	<i>write</i>	..on surface.. srite (sri)
<i>wheel</i>	of device/vehicle.. krilu	<i>year</i>	of epoch.. nirne (nin nie)
<i>whip</i>	n. lash bitce	<i>yellow</i>	-er than.. pelto
<i>whistle</i>	n. caslo (cas)	<i>young</i>	-er than..by.. junti (jun)
<i>white</i>		<i>zinc [Zn]</i>	zinko

APPENDIX D - PREDICATE AFFIXES

baa	(barma) arm of.., body-part	ber	(berti) carry..to..from..
bac	(balci) build..from materials..	bet	(betcu) bent, more - than..
bad	(badlo) bundle package of..	beu	(bendu) band of players..
bai	(balci) build..from materials..	bia	(bitsa) between/among..
baj	(badjo) bough/branch of..	bic	(bilca) military of..
bak	(bakto) bucket pail of..	bid	(bivdu) behave..under..
bal	(balpi) balances under forces..	bie	(bidje) edge of..between..
bam	(balma) ball/sphere n.	bif	(bifci) beef from..
ban	(banci) bathe in..	bii	(bilti) beautiful, more - than..
bao	(bakso) box of/containing..	bil	(bilti) beautiful, more - than..
bap	(batpi) bottle of/containing..	bio	(bindo) bean from..
bar	(barma) arm of.., body-part	bis	(bisli) ice, an amount of -
bas	(basni) base/foundation of..	bit	(bitsa) between/among..
bat	(batmi) trade..for..with..	biu	(bivdu) behave..under..
bed	(bedpu) bed n.	biv	(bivdu) behave..under..
beg	(begco) beg/request..of..	bla	(blada) blade of tool/weapon..
bei	(berti) carry..to..from..	ble	(bleka) look at..
bek	(bekti) object/thing	bli	(blicu) possible under conditions..
bel	(bekli) bell sounding note..	blo	(bloda) hit..with..
ben	(bendu) band of players..	blu	(bludi) blood of organism..
beo	(begco) beg/request..of..	boi	(botci) boy n.

bon	(bongu) bone of..	cak	(tcaku) shock..with/by..
bor	(borku) bow, for arrows..	cal	(tcali) wall of/around..
bot	(botsu) boat n.	can	(canse) chance, a - event under conditions..
bou	(botsu) boat n.	cao	(cabro) burn at temperature..
bra	(brana) born, be - to..	cap	(capri) print..on..
bre	(bredi) ready for..	car	(carbo) carbon [C]
bri	(brize) breeze/wind from..	cas	(caslo) whistle n.
bro	(broko) break into pieces..	cat	(cartu) chart/map of..by..
bru	(brudi) brother of..through..	cav	(cavle) shovel n.
bue	(buste) step on/in..	cea	(cenja) change into..from..
buf	(bufpo) opposite from..in..	ced	(cedzu) shade/shadow of.. from light-source..
bui	(bulbi) bulb of plant..	cef	(cefli) chief of..for activity..
buj	(bulju) boil at temperature..	cei	(cersi) chair n.
buk	(bukcu) book about..by..	cej	(cenja) change into..from..
bul	(bulbi) bulb of plant..	cel	(celhu) cell of..
bun	(bunbo) fool, be -ish about..	cen	(centi) hundredthpart of..
buo	(bunbo) foolish about..	cet	(cetlo) wet with..
bus	(buste) step on/in..	cia	(cirna) learn..from source..
buu	(bukcu) book about..by..	cid	(cidja) be awake
cab	(cabro) burn at temperature..	cie	(citre) thread, an amount of -
cae	(canse) chance, a - event under conditions..	cii	(tcidi) food of../edible to..
cai	(canli) quantity of..on scale..		

cik	(ciktu) equal..in/on..	coa	(corta) shorter than..by..
cil	(citlu) detail of..	coi	(tcori) authority on/over..
cim	(cimra) summer of year..	col	(colku) silk, made of -
cin	(cinta) infant/baby of..	com	(comtu) ashamed of../being..
cio	(cirzo) shears/scissors	con	(condi) deeper than..by..
cir	(cirna) learn..from source..	cor	(corta) shorter than..by..
cit	(citre) thread, an amount of -	cot	(comtu) ashamed of../being..
ciu	(ciktu) equal..in/on..	cou	(comtu) ashamed of../being..
cka	(ckano) kind, be - to..	cpu	(cpula) pull..to..from..
cke	(ckemo) interval from..to	cra	(crano) smile at..
cko	(ckozu) cause..under..	cri	(crina) rain, be -ed on by..
cla	(clado) louder than..by..	cte	(cteki) tax on..by..for use..
cle	(clesi) without../be../less	cti	(ctifu) stuff/matter/material
cli	(clika) like/similar to..in..	ctu	(ctuda) feces/stool of..
clo	(cloro) chlorine [Cl]	cuc	(cutci) shoe n.
clu	(cluva) love v.t.	cue	(cutse) say..to..
cma	(cmalo) smaller than..by..	cui	(cutri) water, an amount of -
cme	(cmeni) money issued by..	cun	(cundo) window of..
cmi	(cmiza) amused by../doing..	cuo	(cundo) window of..
cna	(canli) quantity of..on scale..	cup	(cupro) copper [Cu]
cni	(cnida) need..for..	cur	(curca) secure/safe from..
cnu	(cninu) new to..in feature..	cus	(cutse) say..to..

cut
 (cutri) water, an amount of -
daa
 (danza) desire/want..for..
dai
 (danci) design/plan for..by..
dak
 (dakli) likelier than..under..
dam
 (damni) down, lower than.. by..in
 gravity field..
dan
 (danci) design/plan for..by..
dao
 (darto) door of/in..
dap
 (dapli) reply..to questioner..
dar
 (darli) farther than..from.. by..
das
 (daspa) responsible for..to..
dat
 (dante) tooth of..
daz
 (danza) desire..for..
dea
 (detra) daughter of..
dec
 (decti) tenth part of..
ded
 (dedjo) finger of..
dei
 (denli) daytime of day..
dej
 (dedjo) finger of..
dek
 (dekto) tenfold of..
del
 (denli) daytime of day..
den
 (denro) dangerous to..under..
der
 (dertu) dirt/soil/earth from..
det
 (detra) daughter of..

deu
 (dertu) dirt/soil/earth from..
dia
 (ditca) teach..to do/know..
dic
 (ditca) teach..to do/know..
dii
 (disri) decide../to do..about..
dil
 (dilri) represent..in..
dio
 (dirco) direction, in -..from..
dip
 (dipri) dear/precious to..
dir
 (dirco) direction, in -..from..
dis
 (disri) decide..about..
dit
 (ditka) bite..on/at..
diu
 (dislu) discuss..with..
dja
 (djano) know..about..
dje
 (djela) well, healthier than..
dji
 (djine) join, be -ed to..at..
djo
 (djori) member of set/group..
dju
 (djudi) judge..to be..., be a -
don
 (donsu) give..gift..
dor
 (dorja) war, at - with..over..
dot
 (dotra) winter of year..
dou
 (donsu) give..gift..
dra
 (drani) drier than..by..
dre
 (dreti) correct by standard..
dri
 (driki) remember..about..

dru	(durzo) do..to..	fas	(fasru) easy for..under..
dua	(durna) adorn../an -ment of..	fat	(fatru) trouble/disturb..by..
dui	(duvri) discover..about..	fau	(fatru) trouble/disturb..by..
dun	(durna) adorn../an -ment of..	fea	(felda) fall to..from..
duo	(durzo) do..to..	fec	(ferci) affair of../involving..
dup	(dupma) deceive..about..by..	fed	(felda) fall to..from..
dur	(durzo) do..to..	fei	(ferci) affair of../involving..
dus	(dustu) dust n.	fek	(fekto) fact about..seen by..
dut	(dutci) doubt that..is true of..	fel	(felda) fall to..from..
duv	(duvri) discover..about..	fem	(femdi) female of species..
dza	(dzabi) real/exist for..under..	fen	(ferno) iron [Fe]
dze	(dzeli) jelly, an amount of -	feo	(fekto) fact about..seen by..
dzo	(dzoru) walk to..from..via..	fer	(fe) five/five of..
faa	(falba) fail to do/be..under..	fes	(festi) waste..on/by doing..
fab	(falba) fail to do/be..under..	fet	(ferti) fertile, more - than.. for growing..
fad	(fando) end of thing/process..	fia	(firpa) fear/afraid of/that..
fag	(fagro) fire, be a - in..	fib	(fibru) weaker than..by..
fai	(falji) false by standard..	fic	(fikli) fish n.
fal	(falji) false by standard..	fid	(fizdi) physical, non-mental
fam	(famji) family with members..	fii	(fildi) field of farm..
fan	(fanve) reverse of..	fik	(fikco) fiction, a work of - by..
fao	(fando) end of thing/process..	fil	(filmo) feel..about..
far	(fanra) farm of..		

fi (filmo) feel..about..
fi (fitpi) foot of..
fi (firpa) fear/afraid of/that..
fi (fitpi) foot of..
fi (fibru) weaker than..by..
fi (fizdi) physical, non-mental/-social
fi (flami) flame of fire/device..
fi (fleti) fly to..from..via..
fi (flidu) liquid, - from temp..to..
fi (folma) fuller than..by..
fi (fluro) fluorine [F]
fi (forma) form/shape of..
fi (foldi) fold..into..
fi (fosli) force/compel..to do..
fi (forli) stronger than..by..
fi (forma) form/shape of..
fi (fo) four/four of..
fi (fosli) force/compel..to do..
fi (fotho) photo- (in sci. words)
fi (farfu) father of..out of..
fi (frena) front, in - /ahead of..
fi (fruta) fruit of..

fi (fumna) woman n.
fi (futci) future, later than..
fi (futci) future, later than..
fi (fulri) richer than..in..
fi (fumna) woman n.
fi (fu) -ed, 2nd converse
fi (fusto) office of..in..
fi (futci) future, later than..
fi (ganta) higher than..by..in gravity field..
fi (gancu) win..from/over..
fi (gandi) god of people(s)..
fi (garni) govern/rule over..
fi (ganli) organize..into..for..
fi (ganta) higher than..by..in gravity field..
fi (gasno) anus of..
fi (garni) govern/rule over..
fi (gasno) anus of..
fi (garti) grateful to..for..
fi (gancu) win..from/over..
fi (genza) again, a recurrent instance of..
fi (getsi) get..from..for..

gen	(genza) again, a recurrent instance of..	gud	(gudbi) good, better than.. for purpose..
geo	(gesko) guest of..	gui	(gunti) country of people..
ges	(gesko) guest of..	gun	(gunti) country of people..
get	(getsi) get..from..for..	guo	(gusto) taste of..
gig	(gigdo) billionfold of..	gur	(gutra) strange to..in..
gin	(ginru) root of plant..	gus	(gusto) taste/flavor of..
giu	(ginru) root of..	gut	(gusto) taste/flavor of..
gli	(glida) guide..to..from..via..	haa	(hasfa) house/dwelling of..
goa	(gotca) goat n.	had	(hardu) harder/more resistant than..
god	(godzi) go to..from..via..	haf	(hasfa) house/dwelling of..
goi	(godzi) go to..from..via..	hai	(hapci) happy about..
gok	(gokru) hook n.	ham	(harmo) harmonious with..to..
gom	(gomni) gummy, adhere to..	han	(hanco) hand of..
got	(gotri) industry for..among..	hao	(harko) harbor..from..
goz	(godzi) go to..from..via..	hap	(hapci) happy about..
gra	(grada) great than..	har	(harko) harbor..from..
gre	(gresa) fat/oil, an amount of	has	(hasfa) house/dwelling of..
gri	(gritu) sing..to..	hat	(hatro) hotter than..by..
gro	(groda) bigger than..by..	hea	(helba) help/assist..do..
gru	(grupa) group with members..	heb	(herba) plant n.
gub	(gudbi) good, better than.. for purpose..	hed	(hedto) head of.., body-part
		hek	(hekto) hundredfold of..

hel	(helba) help/assist..do..	jai	(jalti) product of..times..
her	(herfa) hair of..	jan	(janto) hunt game/quarry..
hia	(hijra) attend/be present at..	jao	(jaglo) angle between pts..
hid	(hidro) hydrogen [H]	jar	(janro) narrower than..by..
hij	(hijra) attend/be present at..	jel	(djela) well, healthier than..
hir	(hirti) hear..over noise..	jet	(djeta) owe..to..for..
his	(hisri) history of..by..	jio	(djipo) important to..in/for..
hit	(hitlu) butterfly n.	jip	(djipo) important to..in/for..
hoa	(horma) horse n.	jit	(djitu) tighter than..on..
hoi	(hompi) drink..from..	jiu	(djitu) tighter than..on..
hol	(holdu) hole/depression in..	jmi	(jmite) meet..at/in..
hom	(hompi) drink..from..	jok	(jokla) clock n.
hon	(horno) horn of..	jol	(jokla) clock n.
hoo	(horto) hour, last..-s, default 1	jos	(djoso) sew..to..
hor	(horma) horse n.	jua	(jugra) grab/seize..with..
hos	(hospi) hospital of place..	jug	(jugra) grab/seize..with..
hot	(horto) hour, last..-s, default 1	jui	(jupni) opine/think..true of..
hou	(holdu) hole/depression in..	jul	(djula) jewel in/of..
hui	(hutri) destroy v.t.	jun	(junti) younger than..by..
hum	(humni) human, a - being	juo	(djupo) support..with/by..
hun	(humni) human, a - being	jup	(djupo) support..with/by..
hut	(hutri) destroy v.t.	jur	(ju) -ed 3rd converse
jag	(jaglo) angle between pts..	kaa	(kamla) come from..to..via..

kac (kance) conscious/aware of..

kad (kamda) fight..over..

kae (kance) conscious/aware of..

kaf (kasfa) punish..for..by doing..

kai (katli) quality, have - ..

kak (kakto) act do..with goal..

kal (kapli) complete by standard..

kam (kamla) come from..to..via..

kan (kanmo) can do/be..under..

kao (kakto) act, do..with goal..

kap (kapni) open, not shut

kar (kamra) camera n.

kas (karsa) across..from..

kat (katli) quality, have - ..

kau (kangu) dog n.

kea (ckela) school of community..

kec (kecri) sad about..

kei (kecri) sad about..

kej (kerju) care for/take - of..

kem (kemdi) chemical, a pure instance of..

ken (kenti) question, be a - about..put by..to..

keo (ckemo) interval from..to

kep (ketpi) ticket for..at price..

ker (kerti) air, a quantity of -

ket (ketli) kettle of/containing..

keu (kerju) care for/take - of..

kic (kicmu) doctors..for..with..

kii (kinci) with../be a companion to..in..

kik (kinku) keener/sharper than..

kil (kulto) thousandfold of..

kin (kinci) with../be a companion to..in..

kiu (kicmu) doctors..for..with..

kiz (skizo) ski n.

kla (klabu) cloth, an amount of -

kle (klesi) class of..with defining property..

kli (kliri) clearer than..

klo (klogu) closed, as of a door

klu (kutla) cut..into pieces..

koa (korva) curve through pts..

koc (korce) cord/rope, an amount of -age

koe (korce) cord/rope, an amount of -age

kof (komfu) comfortable, more - than..is to..

koi (korji) order/command..to do..

koj (korji) order/command..to do..

kok	(kokfa) cook..for..	kum	(kumtu) common to..
kol	(kolro) color, a - perceived by..	kun	(kurni) warn..of/about..
kom	(kompi) company of..for..	kuo	(kusmo) custom of..under..
kon	(konte) count, the number in set..	kup	(kupta) cup of/containing..
koo	(kolro) color, a - perceived by..	kur	(kurfa) square with vertices..
kop	(kopca) copy of..	kus	(kusmo) custom of..under..
kor	(korti) body of..	kut	(kutra) more bitter than..to..
kos	(konsu) consul of..in..	kuu	(kumtu) common to..
kou	(komfu) comfortable, more - than..is to..	kuv	(kuvga) cover../a - of..
kov	(korva) curve through pts..	laa	(langa) longer than..by..
kra	(kraku) cry/cry out, v.i.	lab	(blabi) whiter than..
kre	(kreni) ray from source..	lad	(plado) plow n.
kri	(krido) believe..about..	lae	(larte) art of making..among..
kro	(kroli) flow/current from..to..	lag	(langa) longer than..by..
kru	(kruma) room of/in..	lai	(landi) land, an expanse of -
kua	(kuvga) cover../a - of..	lak	(lakse) wax from source..
kub	(kubra) wider than..by..	lal	(laldo) older than..by..
kuc	(kunci) related to..by..	lan	(landi) land, an expanse of -
kie	(kie) sign of inverse division	lao	(laldo) older than..by..
kui	(kunci) related to..by..	lar	(larte) art of making..among..
kuk	(kukra) faster than..by..	las	(lasti) elastic, more - than..
kul	(kultu) culture of people(s)..	lat	(latci) lighter than..by..in..

lea (letra) letter in alphabet..
led (ledri) lightning from..to..
lei (letci) let/permit..do..under..
lek (lenki) electric charge on..
lel (lelpi) level in gravity field..
len (lengu) language of people..
leo (lenzo) lens of system..
lep (lelpi) level in gravity field..
ler (lerci) letter to..from..about..
les (lesta) east of../-ern part of..
let (letci) let/permit..do..under..
leu (lengu) language of people..
lez (ledzo) left of../- side of..
lia (clina) line through points..
lic (linco) lean/thinner than..by..
lid (lidji) religion of people(s)..
lif (clife) leaf of plant..
lii (clivi) live/alive
lij (limji) limit of..
lik (likta) week of month/year..
lil (lilfa) law against..by..under..
lim (limji) limit of..

lin (clina) line through points..
lio (likro) liquor, distilled spirits
lip (klipu) keep/retain..
lis (lista) list of set..in order..
lit (litla) light from source..on..
liu (litnu) keep..from doing..
liv (clivi) live/alive
loa (flora) flower of plant..
lod (lodji) logic for inferring.. from..
log (logla) of the Loglan language
loi (lokti) local to../confined to..
lor (flora) flower of plant..
lua (pluma) feather of..
lul (lunli) wool from source..
lum (pluma) feather of..
lun (lunra) lunar, re Earth's moon
lup (lupsu) wolf n.
lus (lusta) west of../-ern part of..
maa (matma) mother of..by..
mac (matci) machine for use..
mad (madzo) make..out of..
mae (marte) market of place..

mag (magne) magnet n.
mai (matci) machine for use..
maj (madji) magic, do - before..
mak (manko) mouth of..
mal (malbi) sick with..from..
mam (matma) mother of..by..
man (malna) milk from source..
mao (madzo) make..out of..
mar (marka) mark on..made by..
mas (maks) maximum, a - value of function..
mat (matma) mother of..by..
maz (madzo) makes..out of..
mea (mensa) month of year..
meg (megdo) millionfold of..
mei (merli) measure..to be..on scale..
mek (menki) eye of..
mel (merli) measure..to be..on scale..
men (mendi) male of species..
meo (metro) meter, be..-s long; default 1
mer (merji) married to/a spouse of..
met (metli) metal, -ic/made of -
meu (mrenu) man n.

mia (milfa) meal composed of dishes..
mid (midju) middle/center of..
mii (mipli) example of..
mij (midju) middle/center of..
mik (mikti) millionth part of..
mil (milti) thousandth part of..
mim (minmi) minimum, a - value of function..
min (smina) mind of..
mio (mitro) meat from source..
mip (mipli) example of..
mir (mirdo) ten-thousand of..
mis (miksa) mixture of..
mit (mitro) meat from source..
miu (minku) mineral/ore from..
moa (monca) mountain of land..
moc (motci) motor n.
moi (modvi) motive for..to do..under conditions..
mol (molro) softer than..
mon (monca) mountain of land..
moo (morto) dead a.
mor (morto) dead a.

mou	(mordu) more, exceeds..in property..by..	naa	(natra) natural, not caused by humans
mov	(modvi) motive for..to do.. under conditions..	nab	(nable) problem to..in doing..
moz	(monza) morning of day..	nad	(nadro) sodium Na
mra	(marka) mark on..made by..	nai	(natli) nighttime of day..
mre	(mrenu) man n.	naj	(najda) knife n.
mro	(mordu) more, exceeds..in property..by..	nal	(naldi) nail n.
mub	(mubre) wood from source..	nam	(namci) name of..to/used by..
muc	(mutce) much/very, more extreme than..in..	nan	(nanti) billionth part of..
mud	(muvdo) move to..from..over..	nao	(nadzo) now, simultaneous with..
mue	(mutce) much/very, more extreme than..in..	nar	(natra) natural, not caused by humans
mui	(muzgi) music by composer..	nat	(natli) nighttime of day..
muk	(murki) monkey n.	nau	(nardu) difficult for..under..
mun	(munce) community of individuals..	naz	(nadzo) now, simultaneous with..
muo	(muvdo) move to..from..over path..	nea	(nedza) next to..
mur	(mursi) sea/ocean of planet..	neb	(nerbi) necessary for..
mus	(muslo) muscle of..	ned	(nedza) next to..
mut	(mutce) much/very, more extreme than..in..	neg	(negvo) negative of..
muv	(muvdo) move to..from..over path..	nei	(nenri) in/-side/interior of..
muz	(muzgi) music by composer..	nej	(nerji) is the energy of..
		nem	(nemdi) enemy of..in..
		nen	(nenri) in/-side/interior of..

ner	(ne) one/one of..	nun	(nu) -ed, 1st converse
nes	(nesta) honest with..about..	nur	(nu) -ed, 1st converse
net	(netre) net n.	nuu	(numcu) number n.
nev	(nervi) nerve of..	nuz	(nuzvo) news about..from..
nia	(nimla) animal n.	pac	(patce) device for doing..
nic	(snice) snow, an expanse of	pad	(padzi) cushion/pillow
nie	(nirne) year of epoch..	paf	(pafko) dig up..from..
nig	(nigro) blacker than..	pae	(patce) device for doing..
nik	(nikri) cheese from source..	pai	(parti) part of whole..
nil	(nirli) girl n.	pak	(pasko) past, earlier than..
nim	(nimla) animal n.	pal	(spali) side of..bounded by..
nin	(nirne) year of epoch..	pan	(panba) pan n.
nir	(ni) zero/none of..	pao	(pasko) past, earlier than..
nit	(nitci) neater than..	par	(parti) part of whole..
noa	(norma) average, the - of..	pas	(pasko) past, earlier than..
nod	(nordi) north of../-ern part of..	pat	(patpe) pot n.
noi	(notbi) other than..	paz	(pazda) wait for..before..
nom	(norma) average, the - of..	pea	(penta) point, a/the - of..
nor	(no) non-	peb	(spebi) specific to..among..
not	(notbi) other/not same as..	pec	(petci) pay..to..for..
nue	(nukle) nucleus of..	ped	(pendi) hang from..
num	(numcu) number n.	pee	(penre) parent of..through..

pei (petci) pay..to..for..
pej (penja) sponge n..
pen (penso) think about..
peo (penso) think about..
per (pernu) person n..
pet (penta) point, a/the - of..
peu (pernu) person n..
pic (pinca) urine of..
pid (pinda) pin n..
pie (pirle) parallel to..
pif (pifno) frequent, more - than ..under..
pik (pikti) trillionth part of..
pil (pilno) plane through pts..
pin (pinti) paint n..
pio (pifno) frequent, more - than ..under..
pip (piplo) people of place..
pir (pirle) parallel to..
pis (pismi) peace, at - with..
piu (pisku) piece of..
pla (plata) plate n..
ple (pleci) play with..
pli (plizo) use..for..

plu (pluci) please..by..
poa (ponda) respond..to..under..
poi (porli) power, have - over..
poj (porju) pig n..
pol (poldi) nation of people..
pon (ponsu) own..under law..
por (po) action/state/event
pos (posta) mail..to..from..by..
pou (ponsu) own..under law..
pov (pozvo) positive a..
poz (pozfa) oppose..on issue..
pra (prase) process with stages..
pre (papre) paper n..
pri (prire) behind/in back of..
pro (proju) produce..by process..
pru (pruci) test, a - for..among..
pua (purda) word, the - for..in..
pub (publi) public, more - than.. is among..
puc (pucto) push..to..from..via..
pud (pudru) powder from source..
pue (purfe) perfect by standard..
puf (purfe) perfect by standard..

pul (pulso) impulse, have an - to do..
pum (pubmo) lead [Pb]
pun (puntu) hurt, feel pain in..
puo (pucto) push..to..from..via..
pup (purpu) purple, more - than..
pur (purda) word, the - for..in..
put (sputa) spoon n.
puu (puntu) hurt, feel pain in..
raa (grasa) grass, a blade/expanse
rac (traci) travel to..from..via..
rad (rande) round circular, a disk
rae (rande) round circular, a disk
rag (fragu) fog, -gy/covered by -
rai (trati) try to do/attain..by..
raj (kraju) scratch v.t.
rak (draka) darker than..by..
ral (prali) profit, the - to..from..
ram (frama) frame of/around..
ran (ranta) rotten, more - than..
rao (brato) ratio of..divided by..
rap (rapcu) riper than..
rar (ra) all every..
ras (grasa) grass, a blade/expanse

rat (prati) price of..to..set by..
rau (ratcu) rat n.
raz (raznu) reason for..'s doing.. under..
rea (retca) differ/-ent from..in..
reb (breba) bread, an amount of -
rec (retca) differ/-ent from..in..
red (redro) redder than..
ref (resfu) garment/clothing
rei (revri) dream../that..
rek (breko) brake of..
rel (trelu) rail/-ing n.
rem (fremi) friend of..
ren (renro) throw..to/at..
reo (renro) throw..to/at..
rep (retpi) answer/solution to..
rer (re) most/most..
res (resfu) garment/clothing
ret (resto) rest/lie down on..
reu (trelu) rail/-ing n.
rev (revri) dream../that..
rez (frezi) free to do/be..
ria (briga) braver than..under..
ric (ritco) right of../- side of..

rid	(ridle) read..from..	ror	(ro) many of../multi-..
rie	(trime) tool for doing..	ros	(rofsu) rougher than..
rig	(briga) braveer than..under..	rou	(brocu) brush n.
rii	(rilri) regular, more - than..	roz	(mroza) hammer n.
rik	(briku) brick n.	rua	(rutma) route to..from..via..
ril	(brili) brighter than..by..	rue	(brute) breathe v.t.
rim	(trime) tool for doing..	ruf	(trufa) roof of..
rin	(rinje) ring/band on/around..	ruj	(rulni) rule requiring..to do.. under..
rip	(rispe) respect..for..	rul	(rulni) rule requiring..to do.. under..
rir	(rirda) record of..on medium..	run	(grunu) grain from source..
ris	(rispe) respect..for..	rus	(prusa) approve action..by..
rit	(rinta) rhythm, the - of..	rut	(rutma) route to..from..via..
riu	(srisu) serious, - about..	ruu	(prutu) protest..to..by doing..
riz	(prizi) private to..	saa	(sanpa) sign of..to..disposing behavior..under..
roa	(rodja) grow into..	sac	(satci) start/origin of..
roc	(brocu) brush n.	sad	(sadji) wiser than..about..
rod	(broda) broken/inoperable	sae	(sanse) sense..under..
rof	(rofsu) rougher than..	saf	(salfa) sail of vessel..
roi	(groci) angry at..for..	sag	(sange) suggest..to..
roj	(rodja) grow into..	sai	(santi) quieter than..
rol	(rolgu) roll, a -er/cylinder	saj	(sadji) wiser than..about..
rom	(romna/i/o) Roman n./a.	sak	(sakli) sack of/containing..
ron	(brona) browner than..		

sal
 (saldi) solid below temp..
sam
 (samto) same, the - thing as..
san
 (sanpa) sign of..to..disposing
 behavior..under..
sao
 (samto) same, the - thing as..
sap
 (sapla) simpler than..in..
sar
 (sarni) sour, more - than..to..
sas
 (sanse) sense..under..
sat
 (satro) stroke/rub..with..
sea
 (setfa) put/place/set..on/at..
sec
 (sekci) sexual, behave -ly toward..
sei
 (setci) set, group of elements..
sek
 (sekta) insect n.
sel
 (selji) self of../-image of..
seo
 (sento) holy/sacred to..
ser
 (se) seven/seven of
ses
 (sensi) science of/about..
set
 (setci) set, grp of elements..
sia
 (sitfa) site/place/location of..
sib
 (sibli) sibling of..through..
sic
 (sitci) city with hinterland..
sif
 (sitfa) site/place/location of..
sii
 (simci) seem to be..to..under..

sil
 (siltu) shake/oscillate at rate..
sim
 (simci) seem to be..to..under..
sin
 (sinma) cinema made by..
sio
 (sisto) system with function.. and
 elements..
sir
 (sirna) certain that..is true
sis
 (sisto) system with function.. and
 elements..
sit
 (sitfa) site/place/location of..
siu
 (siltu) shake/vibrate at rate.. and
 amplitude..
siz
 (sidza) seed of organism..
ska
 (skaluu) scale for measuring.. among..
ski
 (skitu) sit on..
sko
 (skori) screw n.
sku
 (suksi) succeed in..by effort..
sla
 (slano) slower than..by..
sli
 (sliti) sweeter than..to..
slo
 (slopu) steeper than..by..
slu
 (sluko) lock of/on..
sma
 (smano) smoke from source..
smi
 (smike) secret, a - from..by..
smu
 (smupi) smoother than..by..
sna
 (sanca) sand from source..

sne (sneku) neck of..
sni (snire) nearer than..to..by..
sno (snola) entail..under rules..
soa (sonda) sound, a - emitted by..
soc (socli) interact socially with..
sod (solda) soldier of army..
soe (sorme) sister of..through..
sog (sorgu) ear of..
soi (sonli) sleep/asleep
som (sorme) sister of..through..
son (sonda) sound, a - emitted by..
sor (so) six/six of..
sot (solte) salt, an amount of -
spa (spasi) space occupied by..
spe (speni) experience v.t.
spi (spicu) spirit of..seen by..
spo (spopa) hope for../that..
spu (spuro) skilled at..under..
sri (srite) write..on surface..
sro (sordi) store/reserve of..
sru (surna) harm/injure..at/in..
sta (stadi) stage of hall/theater..

ste (steti) sentence about..in..
sti (stise) cease/stop doing..
sto (stolo) stay/remain at/with..
stu (stuci) story about..told by..
sua (surva) serves..in/by..
sud (surdi) south of../-ern part of..
sui (sundi) send..to..from...via..
sul (sulba) swelling at/in/on.. caused by..
sum (sumji) sum of..added to..
sun (sunho) son of..
suo (sunho) son of..
sup (supta) soup of ingredients..
sut (sutme) smell, an odor of..
suv (surva) serve..in/by..
taa (takna) talk to..about..
tae (tarle) tired by effort..
tag (targo) argue against..that..
tai (stali) stand on..
tak (takna) talk to..about..
tal (tarle) tired by effort..
tam (tarmu) weapon for use..
tan (trana) rotate around axis..

tao (targo) argue against..that..
tar (tarci) star of galaxy..
tat (tatro) theater of community..
tau (tarmu) weapon for use..
tca (tcaro) car/truck
tce (tceru) penetrate..in direction..
tcj (titci) eat v.t.
tco (totco) touch..with..
tcu (tcure) picture of..by..
tec (tetcu) stretch to..from..
ted (tedji) pay attention to..
tei (tedji) pay attention to..
tej (tedji) pay attention to..
tel (terla) terrestrial, pert. to Earth
ten (tenri) increase by..in..
tep (tepli) temple of religion..
ter (te) three/three of..
tet (tetri) weather of region..
teu (tetcu) stretch to..from..
tia (tisra) select..from set..
tic (tirca) wire, a length of -
tid (tidjo) heavier than..by..in gravity field..

tie (stire) stairs of structure..
tif (tifru) offer..to..for..
til (trili) attract..by doing/being..
tin (tinmo) ink, an amount of -
tio (tidjo) heavier than..by..in gravity field..
tir (stire) stairs of structure..
tis (tisra) select..from set..
tiu (tifru) offer..to..for use..
toa (tokna) take..away from..
tob (tobme) table n.
toc (totco) touch..with..
toe (tobme) table n.
tog (togri) agree with..that..
toi (togri) agree with..that..
tok (tomki) automatic in function..
tol (troli) control..in..
ton (toni) twist under load..
tor (to) two/two of..
tot (totnu) thicker than..by..
tov (tovru) over/vertically above..in gravity field..
tra (tradu) true by rule/standard..
tre (trena) train of system..

tri	(tricu) tree n.	vea	(vedma) sell..to..for price..
tro	(troku) rock/stone from..	ved	(vedma) sell..to..for price..
tru	(truk) structure of..	vef	(vetfa) invent..for..from..
tse	(tsani) sneeze. v.i.	veg	(vegri) greener than..
tse	(tsero) error in..by standard..	vei	(vetci) happen/occur to..
tsi	(tsime) crime punished by.. among..	vel	(veslo) vessel of/containing..
tso	(tsodi) hate..	vem	(vedma) sell..to..for..
tsu	(tsufi) sufficient/enough for..	ven	(vendu) poisonous to..
tua	(turka) work on/at..with goal..	veo	(veslo) vessel of/containing..
tub	(tubli) tube, a length of -ing	ver	(ve) nine/nine of..
tue	(tugle) leg of.., body-part	ves	(versa) verse, a poem by..
tui	(stuli) adjust..for function..	vet	(vetci) happen/occur to..
tul	(tugle) leg of.., body-part	veu	(vendu) poisonous to..
tur	(turka) work on/at..with goal..	via	(vizka) see..against..
vaa	(valna) violent toward..	vid	(vidre) idea about..by..
vad	(valda) develop into..	vie	(vidre) idea about..by..
vai	(valti) jump over/across..	vij	(vidju) view of..from point..
val	(valti) jump over/across..	vik	(vizka) see..against..
van	(valna) violent toward..	vin	(vinjo) wine, an amount of -
vao	(vapro) gaseous above temp..	vit	(virta) ad for..in medium..
vap	(valpu) wave in medium..	viu	(vidju) view of..from point..
vat	(vatlu) worth..to..for use..	viz	(vizka) see..against..
vau	(vatlu) worth..to..for use..	vla	(vlako) lake of landmass..

voi (volsi) voice of individual..
vol (volsi) voice of individual..
vor (vo) eight/eight of..
vre (vreti) vertical in gravity..
vri (vrici) river of landmass..
zal (zavlo) bad/worse than..for..
zan (zavno) oven of..
zao (zavlo) bad/worse than..for..
zas (dzaso) soap, an amount of -
zav (zavlo) bad/worse than..for..
zbu (zbuma) explode into..
zor (zo) quantity/amount
zvo (zvoto) out/-side of..

APPENDIX E - A SAMPLE OF BORROWINGS

abrini

<ISV> n. abrrin

abbrikote

<F.> an apricot from..

absinte

<F.> is absinthe from..

acdi

<ISV> n. acid. a. acidic

achipenseri

<Lin.> an acipenserid, a fish of the
genus *Acipenser*

aghari

<ISV> n. agar/agar-agar

agherati

<Lin.> a plant of the genus
Ageratum

albocinerei

<ISV> albocinereous

albuminuri

<ISV> is albuminuric, has
albuminuria

alcioniumi

<Lin.> an alcionarian, an
invertebrate of the subclass
Alcyonium

alhofani

<ISV> n. allophane

alkali

<ISV> n. alkali. a. alkaline

almi

<ISV allium> n. onion

amblicirhiti

<Lin.> a fish of the genus
Amblycirrhites

amfibdeli

<Lin.> a fluke of the genus
Amphibdella

amfibolurui

<Lin.> a lizard of the genus
Amphibolurus

amhinei

<ISV> n. amine

amhini

<ISV> a. amino

angini

<ISV> anginal, has angina

anhalgesi

<ISV> a./n. analgesic

anhelidi

<Lin.> an annelid, a worm of the
phylum *Annelida*

anhemi

<ISV> anemic, has anemia

anhili

<ISV> n. anil

anhilini

<ISV> n./a. aniline

anhodi

<ISV> n. anode

antigeni

<ISV> n. antigen. a. -ic

antropoideai

<Lin.> anthropoidean, a primate of
the suborder *Anthropoidea*

apllasi

<ISV> aplastic, shows aplasia in..

arsenidi

<ISV> n. arsenide

arteri

<ISV> an artery from..

articoke

<I. articiocco> an artichoke from..

aspharage

<I. asparago> is asparagus from..

atheri

<Lin.> a snake of the genus *Atheris*

atherosklerosi

<ISV> atherosclerotic, has -osis

athomi

<ISV> an atom of../atomic

atlatlu

<Nahuatl> an atlatl

atlete

<Gk. athletes> an athlete in sport..

australopithekui

<Lin.> australopithecine, a hominid of the genus *Australopithecus*

bakteri

<ISV> n. bacterium/-ia. a. bacterial

banhane

<Eur.> a banana from..

bethongiai

<Lin.> a rodent of the genus *Bettongia*

bisdimetilaminotrifenilmethani

<ISV> n. bisdimethylaminotriphenylmethane

bishoni

<Lin.> bison/American buffalo, a member of the genus *Bison*

bojhole

<F.> a Beaujolais wine from..

bordo

<F.> a Bordeaux wine from..

brakeocefali

<ISV> bracheocephalic

brihe

<F.> a brie cheese from..

brokole

<I. broccoli> is broccoli from..

bronkiai

<ISV> n. bronkium/-ia

bronkiui

<ISV> n. bronchus/-chi

brankoneumoni

<ISV> bronchopneumonic, has -ia

cabli

<F.> a Chablis wine from..

campeine

<F.> a champagne from..

carbohidrati

<ISV> n. carbohydrate

cerkopithekui

<Lin.> cercopithecine, a primate of the genus *Cercopithecus*

cesthodi

<ISV> cestoid, a worm of the subclass *Cestoda*

cikli

<ISV> has cycle of..per unit time, default = 1 per sec.

cimpe

<abbr. of cimpenizi> n. chimp

cimpenizi

<Kongo chimpenzi> n. chimpanzee

cinhereai

<ISV> n. cinerea. a. -eous

cithosini

<ISV> n. cytosine

daltoni

<ISV> has an atomic mass of..daltons; default 1

dansika

Danish, part of the - language

dansiki

Dane, a -ish person

dansiko

Danish, part of - culture

dansiko blanu

a Danish blue cheese from..

dekstrozi

<ISV> n. dextrose

deoksiribonukli

<ISV> a. deoxyribonucleic

dolfini

<ISV> n. dolphin

edhame

<Du.> an Edam cheese from..

ekhinodermati

<Lin.> an echinoderm, an invertebrate of the phylum *Echinodermata*

entropi

<ISV> n. is the entropy of system..

enzimi

<ISV> an enzyme for reaction..

ephitaksi

<ISV> shows epitaxy/epitaxial growth with respect to substrate..

ephoxi
<ISV> a. epoxy. n. epoxy resin

eptialini
<ISV> n. ptyalin

etheri
<ISV> n. ether

ethileni
<ISV> n. ethylene

ethili
<ISV> n. ethyl

eurpa
[eigh-OOR-pah] European, part of a
- language

eurpi
European, a - person

eurpo
European, part of a - culture

famhili
is a Lin. Family, usu. cap.

farsa
Iranian, part of the - language

farsi
Iranian, an - person

farso
Iranian, part of - culture

fighe
<Eur.> a fig from..

filhariansi
<ISV> has filariasis

frika
African, part of an - language

friki
African, an - person

friko
African, part of an - culture

futbo
<Int.> a football player, plays
football for team..

galhasi
<ISV> n. galaxie

galno
<E.> has a volume of..gallons;
default 1; (**merko** vs. **gleco**)

gamheti
<ISV> a gamete of..

genhe
<ISV> a gene of..for..

genhomi
<ISV> the genome of..

gimnorhini
<Lin.> a bird of the genus
Gymnorhina

gimnorhinui
<Lin.> a bird of the genus
Gymnorhinus

glaosetere
<E.> a Gloucester cheese from..

globulini
<ISV> is globulin from..

gorgonzole
<I.> a Gorgonzola cheese from..

gorla
<Lin.> n. gorilla (*Gorilla gorilla*)

graniti
<ISV> is granite from..

gruiere
[groo-YEHR-reh] <F.> a Gruyere
cheese from..

gumbo
<Afr.> is okra from..

hadja
<I Asia> Asian, (part of) an -
language

hadji
<I Asia> Asian, an - person

hadjo
<I Asia> Asian, (part of) an - culture

helhioterapi
<ISV> is a
heliotherapist/treats..for..with -py..

helna
Greek, part of the - language

helni
Greek, a - person

helno
Greek, part of - culture

hemhoglobini
<ISV> is hemoglobin from..

herhese
<S. jerez> a sherry wine from..

herhoini

[hehr-HOY-nee] <ISV> is heroin from..

herzi

<ISV> one cycle per second, as in

kilherzi**hidroterapi**

[hee-drr-roh-tehr-RAH-pee] <ISV> is a hydrotherapist/treats..for..with..

homhinidei

<Lin.> is a hominid, a primate of the family *Hominidae*

homhinoideai

<Lin.> is a hominoid, a primate of the superfamily *Hominoidea* comprising the hominids and pongids

honcela

[hohn-SHEH-lah] <abbr. of **violhoncela**> n. cello

hormoni

<ISV> is a hormone of..

iglu

<Inuit> is an igloo of..

imhogoliti

<ISV> n. imogolite

imhuni

<ISV> a. is immune to..

inca

<E.> is..inches long; default 1

infraredri

<ISV> is infrared radiation

inhuita

Inuit, part of the language

inhuiti

Inuit, an - person

inhuito

Inuit, part of - culture

insulini

<ISV> is insulin from..

interferoni

<ISV> n. interferon

interleukini

<ISV> n. interleukin

intestini

<ISV> is an intestine from/of..

ionhi

<ISV> n. ion. a. ionic

ishopropili

<ISV> n. isopropyl

kambere

<F.> is a Camembert cheese from..

kambriani

<ISV> is Cambrian/of the Cambrian period

kanceri

<ISV> has cancer in organ..

karnivori

<Lin.> is a carnivore, a mammal of the order *Carnivora*

karpoidi

<Lin.> a fish of the genus *Carpoides*

kartilagi

<ISV> is cartilage from..

kathalisi

<ISV> is a catalyst of/-lizes reaction..

kathodi

<ISV> is a/the cathode of..

kelhati

<ISV> n. chelate

kerhatini

<ISV> n. keratin

kilhocikli

<ISV> has a frequency of..kilocycles; default 1. Variant of **kilcikli**.

kimherei

<Lin.> a fish of the order *Chimaerae*

kimheri

<Lin.> a fish of the genus *Chimaera*

kimheridei

<Lin.> a fish of the family *Chimaeridae*

klarete

<F.> a claret wine from..

konhiake

<F.> a cognac/brandy from..

kothinigi
<Lin.> a bird of the genus *Cotinga*

kranbere
<E.> a cranberry from..

krisitali
<ISV> n. crystal

kromosomi
<ISV> a chromosome from/of..

kuartu
<E.> is..quarts in vol.; default 1;
(**merko** vs. **gleco**)

lasheri
<ISV> n. laser

lemhuri
<ISV> n. lemur

leukhemi
<ISV> has leukemia

limburgere
<Flem.> a Limburger cheese from..

limneai
<Lin.> a snail of the genus *Lymnaea*

madheire
[mahd-HAY-reh] <Port.> a Madeira wine from..

madhokuai
<Lin.> an antelope of the genus
Madoqua

magnetoni
<ISV> n. magneton

malhari
<ISV> has malaria

mamhuti
<Lin.> a mastodon, a mammal of
genus *Mammut*

mamhutui
<Lin.> a mammoth, a mammal of
genus *Mammuthus*

mamla
<Lin.> a mammal, an animal of the
class *Mammalia*

manga
<Port.> a mango from..

manguse
<Prakrit manguso> n. mongoose

marsale
<I.> a Marsala wine from..

meiوشي
[meigh-YOHSS-hee] <ISV> divides
meiotically into../undergoes meiosis
with products..

melhone
<Eur.> a melon from..

membrrani
<ISV> a membrane of..

methaboli
<ISV> metabolizes.. into..by
chemical path..

methani
<ISV> n. methane

methopidui
<Lin.> a bird of the genus
Metopidius

mielhini
<ISV> n. myelin

mithosi
<ISV> divides mitotically
into../undergoes mitosis as..

molhekuli
<ISV> is a molecule of substance..

montereidjeke
<Amer.> is a Monterey Jack cheese
from..

moskhatele
<S.> is a Muscatel wine from..

mozhele
<G.> is a Moselle wine from..

munsitere
<G.> is a Muenster cheese from..

muonhi
<ISV> n. muon

mustharde
<Eur.> is mustard from..

neurhoni
<ISV> n. neuron

neutrtroni
<ISV> n. neutron

nittrati
<ISV> n. nitrate

ordre
is a Lin. Order, usu. cap.

orgeli
<ISV> is an organelle of..

orhogenesi
<ISV> undergoes orogenesis

osmmosi
[oh-smm-MOH-see] <ISV>
undergoes osmosis/moves
osmotically into..from.. across..

paintu
<E.> is..pints in vol.; default 1;
(**merko** vs. **gleco**)

palheozoiki
<ISV> is Paleozoic, from the
Paleozoic period

pampelmuse
<Eur.> a grapefruit from..

panhi
<Lin.> is a chimpanzee of either
species, i.e., of the genus *Pan*

parka
<Aleut> n. parka

persiki
<Lin.> n. peach

pirmidi
<ISV > n. pyramid

plasimi
<ISV> n. plasma

plasimidi
<ISV> is a plasmid of..

polhimerasi
<ISV> n. polymerase

pongidei
<Lin.> a pongid/ape, a primate of the
family *Pongidae*

porto
<Port.> is Port wine from..

poshitroni
<ISV> n. positron

precipitini
<ISV> n. precipitin

primati
<Lin.> is a mammal of the order
Primates

prosimi
<Lin.> ia a prosimian, a primate of
the suborder *Prosimii*

proteini
<ISV> n. protein

protoni
<ISV> n. proton

provolone
<I.> is a Provolone cheese from..

purhini
<ISV> n. purine

radhari
<ISV> is a radar device for
detecting..

rainvaine
<G.> is a Rhine wine from..

retroviri
<ISV> n. retrovirus

ribhosomi
<ISV> is a ribosome of..

rodhodendroni
<ISV> n. rhododendron

rokfore
<F> is a Roquefort cheese from..

sakhi
<J.> is sake wine from..

selhere
<I. seleri> is celery from..

sikhopati
<ISV> is psychopathic/a -
path/suffers from -pathia

singami
<ISV> is syngamic, reproduces
sexually

sintesi
<ISV> synthesizes..out of..

sklerosi
<ISV> is sclerotic, has sclerosis of..

sotherne
<F.> is a Sauterne wine from..

spekteri
<ISV> is a/the spectrum of..

stiltone
<E.> is a Stilton cheese from..

stirigi
<Lin.> n. owl

supherfamili

is a Lin. Superfamily, usu. cap.

suphernovi

<ISV> is a supernova of galaxie..

svera

Swedish, part of the - language

sveri

Swede, a -ish person

svero

Swedish, part of - culture

tcedare

<E.> is a cheddar cheese from..

trogoditi

<ISV> is a common chimpanzee
(**Pan troglodytes**)

tromba

<I.> n. trumpet

trombona

<I.> n. trombone

tubherkulosi

<ISV> is tubercular/has tuberculosis
of..

tulpa

<Eur.> is a tulip from..

uiski

<E.> is whiskey from..

vermute

<F.> is vermouth from..

violha

<I.> n. viola

violhina

<I.> n. violin

violhona

<I.> n. bass violin

violhoncela

<I.> n. violoncello/'cello

wlframo

[eulf-RAH-moh] <ISV> n. wolfram
(W)

yterbio

[uh-TEHRB-yoh] <ISV> n.
ytterbium (Yb)

ytrio

[UHT-ryoh] <ISV> n. yttrium (Y)

zukhine

<I.> is zucchini from..

APPENDIX F - A SAMPLE OF COMPLEXES

athomynukle

[aht-hoh-muh-NOOK-leh] <athom(i)
+ y + nukle = atom-nucleus>
(2n) is the nucleus of atom..

austrralopithekyfoa

[ah-oos-trr-rah-loh-peat-heh-kuh-
FOH-ah] <austrralopithek(ui) + y
+ fo(rm)a = australopithecine-form>
(1n) is an australopithecoid, similar
to the australopithecines in form

bakteryrodhopsini

[bahk-tehr-ruh-rohd-hohp-SEE-nee]
<bakter(i) + y + rodhopsini =
bacteria(l)-rhodopsin>
(1n) is bacteriorhodopsin, bacterial
rhodopsin

bamfoa

[bahm-FOH-ah] <ba(l)m(a) +
fo(rm)a = ball-form>
(3n) is a sphere of radius..and
center..
(1a) spherical

baormao

[BOUGH-rr-mough] <ba(ks)o + r +
ma(dz)o = box-maker>
(1n) is a box-maker

bragai

[BRAH-gigh] <bra(na) + ga(rn)i =
born-ruler>
(2n) is the king/queen/the hereditary
monarch of..

bragaigra

[brah-GIGH-grah] <br(an)a + ga(rn)i
+ gra(da) = born-ruler-great =
kingly-great>
(1a) is magnificent

cinkau

[sheen-KAH-oo] <cin(ta) + ka(ngu)
= infant-dog>
(2n) is a/the puppy of parents..

ckelista

[shkeh-LEES-tah] <cke(mo) + lista =
time-list>
(2n) is a time sequence/a set of time-
ordered elements..
(1a) sequential.
(av) sequentially/one at a time

ckerao

<cke(mo) + (b)ra(t)o = time-ratio>
(2n) is a/the rate, amount per unit
time, at which
process/action/motion..takes place

clucea

[shloo-SHEIGH-ah] <clu(va) +
ce(nj)a = lover-become>
(2v) falls in love with..
(1a) is in love

cmaceapoa

<cma(lo) + ce(nj)a + po(nd)a =
small-change-respond>
(3a) is sensitive to/responds to
changes in..as small as..

cnajai

<ca/n(li) + ja(lt)i = quantity-
product>
(3n) has the product of (some
number)..times (some quantity)..as a
characteristic. E.g., X has 3 times as
much as Y's energy; A is 1.1 times
B's height

corcue

<cor(ta) + cu(ts)e = shortly-say>
(3v) summarizes..by..
fu - (3n) is a summary of..made by..

cuidru

<cu(tr)i + du/r(z)o = water-do>
(2v) waters../gives..water

cutdou

[shoot-DOH-oo] <cut(ri) + do(ns)u>
= water-give>
(2v) waters../gives..water. [Variant
of **cuidru**.]

DaiNaiA

(DNA) <DeoksiriboNukli Acidi =
DeoxyriboNukleic Acid>
(2n) is DNA/deoxyribonucleic acid
from..

damlandi

<dam(ni) + landi = low-land>
(2n) is a lowland of landmass..

darpao

<dar(li) + pa(sk)o = far-past>
(2a) is more remote/ancient/farther
back in time than..
(1a) early/ancient/remote in time.
lo - (1n) the distant past

djacue

[JAHSH-weh] <dja(no) + cu(ts)e =
know-say>
(3v) says/claims/purports to
know../that..is true of..
nu - (3n) is a claim made by..about..

djadou

[jah-DOH-oo] <dja(no) + do(ns)u =
know(ledge)-give>
(3v) informs/tells..of/that..
fu - (3n) is information given to..by..

djasolsensi

<dja(no) + so(c)l(i) + sensi = know-
social-science>
(1n) is a sociological
fact/law/principle about human
knowing.
lo - (1n) the sociology of knowledge

djicea

<dji(ne) + ce(nj)a = joined-become>
(3v) joins../becomes joined to..at
joint..

djimao

<dji(ne) + ma(dz)o = join-make>
(4v) connects../makes..join with..at
joint..

djomao

<djo(ri) + ma(dz)o = member-make>
(3v) includes../enlists../makes.. a
member of group..

duodja

[doo-OH-jah] <du(rz)o + dja(no) =
do-know>
(2v) knows how to do../is used
to/familiar with procedure..

durbiesni

[doorb-YESS-nee] <dur(z)o + bi(dj)e
+ sni(re) = do-edge-near>
(2pp) is about to do../on the verge of
doing..

durcea

[door-SHEIGH-ah] <dur(z)o +
ce(nj)a = do-change>
(3v) turns to (doing)..from
(doing)../starts doing..and stops
doing..

fadpeo

<fa(n)d(o) + pe(ns)o = end-think>
(4v) concludes..about..from
data/evidence..

falcue

<fal(ji) + cu(ts)e = false-say>
(3v) contradicts../denies that..is true
to listener/reader..

faltaa

[fahl-TAH-ah] <fal(ji) + ta(kn)a =
false-talker>
(4v) lies to../speaks falsely
to..about..by saying..
(1n) liar.
ju - (4n) is a lie about..told to..by..

favgoi

[FAHV-goy] <fa(n)v(e) + go(dz)i =
reverse-go>
(4v) goes back/returns to..from..via..

ferdei

<fe + r + de(nl)i = fifth-day>
(2n) is the friday of week/month..
(1n) is a friday.
la Ferdei (na) Friday, the local
friday

fergalno

<fe + r + galno = five-gallons>

(2a) is five gallons of..

(a) has a five-gallon capacity

fermea

<fe + r + me(ns)a = fifth-month>

(2n) is the may of year..

(1n) is a may.

la Fermea (na) May, the local may

ficjankii

[feesh-uh-zhan-KEE-ee] <fic(li) + jan(ro) + ki(nc)i = fish- hunt- accompany>

(3v) goes fishing

with..for../accompanies..in fishing for..

fidsensi

<fi(z)d(i) + sensi = physical-science>

(1n) is a physical fact/law/principle.

lo - (1n) physics, the science of physics

fircko

<fir(pa) + cko(zu) = fear-cause>

(3a) is more

fearsome/formidable/redoubtable than..to..

fitgoi

<fit(pi) + go(dz)i = foot-go>

(4v) goes on foot to..from..via..

(1a) afoot.

(1n) pedestrian. (av) on foot

fomkua

<fo(r)m(a) + ku(vg)a = shape-cover>

(2n) is an/the envelope of..

(2v) envelopes/covers/contains the shape of..

fomveo

<fo(r)m(a) + ve(sl)o = shape-contain>

(2n) is an/the envelope of..

(2v) envelopes/covers/contains the shape of.. [Variant of **fomkua**.]

fordei

<fo + r + de(nl)i = fourth-day>

(2n) is the thursday of week/month..

(1n) is a thursday.

la Fordei (na) Thursday, the local thursday

formeia

<fo + r + me(ns)a = fourth-month>

(2n) is the april of year..

(1n) is an april.

la Formeia (na) April, the local april

fredirgoi

<fre(na) + dir(co) + go(dz)i = front-direction-go>

(3v) advances/progresses/goes forward from..to..

fregoi

<fre(na) + go(dz)i = front-go>

(3v) leads/precedes/goes in front of..to..

(2n) is a/the leader of..

(1a) leading

fuacli

<fu(mn)a + cli(ka) = woman-like>

(2a) is more feminine/womanly/more like a woman than..

(1a) womanly

fuidru

<fu(tc)i + du/r(z)o = after-doer>

(3v) follows../succeeds..in task/job/office..

(2n) is a/the successor of..

fulmao

<ful(ri) ma(dz)o = rich-make>

(4v) makes..richer/enriches..in..by..

nu - (4a) is enriched by..in property..by amount..

fumsua

<fum(na) + su(rv)a = woman-servant>

(3n) is a/the womanservant/maid of..with duties..

furvea

<fu + r + ve(dm)a = 2nd conv. of sell>
 (4v) buys..from..for price..
 (2n) is a buyer of..

futgoi

<fut(ci) + go(dz)i = after-goer>
 (4v) follows../goes later than..to..from..
 (2n) is a follower of..

futlinkui

<fut(ci) + (c)lin(a) + ku(nc)i = future-linear-kin>
 (3v) is a descendant of..via..
 (2n) are the progeny of..
lepo da - de (2n) the descent of X from Y.
lopo - (n) descent in general

ganbra

<gan(ta) + bra(na) = high-born>
 (2n) is a noble/high-born person/an aristocrat of/in society..

ganfua

<gan(ta) + fu(mn)a = high-woman>
 (2n) is a lady/gentlewoman of/in society..

ganmeu

<gan(ta) + m(r)e(n)u = high-man>
 (2n) is a gentleman of/in society..

geable

[geigh-AHB-leh] <ge(nz)a + ble(ka) = again-look>
 (2v) reviews../looks at..again

geoykre

[geigh-OH-uh-kreh] <geo + y + kre(na) = gamma-ray>
 (2n) is/are gamma-rays from source..

grasylandi

<gras(a) + y + landi = grass-land>
 (2n) is a prairie/grassland of landmass..

grobou

[groh-BOH-oo] <gro(da) + bo(ts)u = big-boat>
 (1n) is a ship

groracbao

<gro(da) + (t)rac(i) + ba(ks)o = big-travel-box>
 (2n) is a trunk of traveler..

heknirne

<hek(to) + nirne = hundredfold-years>
 (2n) is a century of epoch..

hisvalda

<his(ri) + valda = historically-develop>
 (3v) evolves into..over interval..
lepo da - (1n) the evolution of X.
lopo - (1n) evolution in general

horski

<hor(ma) + ski(tu) = horse-sitter>
 (2v) rides/is mounted on horse..
 (1n) rider/horseman/horsewoman.
 (a) mounted.
 (av) on horseback

huigro

[WHEE-groh] <hu(mn)i + gro(da) = humanly-big>
 (1n) is a giant.
 (1a) gigantic

humsenmao

<hum(ni) + sen(si) + ma(dz)o = human-science-maker>
 (1n) is an anthropologist

iglymao

[EEG-luh-mow] <igl(u) + y + ma(dz)o = igloo-maker>
 (1n) is an igloo-maker

jankaa

[zhahn-KAH-ah] <jan(to) + ka(ml)a = hunt-come>
 (4v) pursues..from..to..via..
 (1n) pursuer.
lepo da - (2n) the pursuit by X.
lepo da nu - (2n) the pursuit of X.
lopo - (1n) pursuit in general

jarklu

[ZHAR-kloo] <ja(n)r(o) + ku(t)/l(a) = narrow-cut>
 (3v) slices..into..

jolkeo

<jo(k)la + (c)ke(m)o = clock-time>
(3n) is the clock time from..to..;
defaults: the previous midnight and now.

kalmao

<ka(p)l(i) + ma(dz)o = complete-make>
(2v) completes../finishes../m
akes..whole.

nu - (1a) complete/-ed/finished

kalroa

<ka(p)l(i) + ro(dj)a = complete(ly) + grow(n)>
(2n) is an adult of species..
(1a) adult

kalroakeo

<ka(p)l(i) + ro(dj)a + (c)ke(m)o = (complete(ly) + grow(n) = adult)-interval>
(2n) is a generation/the generation interval in population/species.., the average age at which reproduction starts

kambei

[KAHM-bay] <kam(la) + be(rt)i = come-carry>
(5v) brings..from..to..via..

kaoflo

[KOW-floh] <ka(kt)o + fo/l(ma) = act(ion)-full>
(2a) is more active/energetic/lively than..
(1a) active

kempoa

<kem(di) + po(nd)a = chemically-respond>
(4v) reacts chemically to agent(s)..by becoming/producing..under conditions..
(1n) reagent.

nu - (1n) is a chemical agent.

fu - (1n) is a reaction product.

po - (1n) is a chemical reaction

kemesmao

<kem(di) + se(n)s(i) + ma(dz)o = chemical-science-maker>
(1n) is a chemist, a contributor to chemistry

kilcikli

(**kc** /KEIcei/) <kil(to) + cikli = thousandfold-cycles>
(2v) vibrates/oscillates at a frequency of..kilocycles per sec.; default = 1

kilgramo

(**kg** /KEIgei/) <kil(to) + gramo = thousandfold-grams>
(2v) weighs..kilograms; default = 1.
(1n) is a kilogram/something that weighs a kilogram

kilherzi

(**kHz** /keiHAIZEI/) <kil(to) + herzi = thousandfold-Hertz>
(2v) vibrates/oscillates at/has a frequency of..kilohertz; default = 1

kilnirne

<kil(to) + nirne = thousandfold-years>
(2v) is a millenium of epoch..

klemaosio

[kleh-MOWSS-yoh] <kle(si) + ma(dz)o + si(st)o = class-make-system>
(2n) is a taxonomy of/a system for making classes among.., e.g., the Linnaean taxonomy of biology

kofhatro

<ko(m)f(u) + hatro = comfortably-hot>
(2a) is warm enough for/is comfortably/agreeably warm to..
(1a) warm

kofkleda

<ko(m)f(u) + kleda = comfortably-cold>
(2a) is cool enough for/is comfortably/agreeably cool to..
(1a) cool

kolhyflora

<kolh(e) + y + flora = cabbage-flower>
(2n) is a cauliflower from source..

kresui

<kre(ni) + su(nd)i = ray-send>
(3v) emits/radiates/transmits signal/energy..in direction(s)..
nu - (2n) is an emission from source..

kuisni

<ku(nc)i + sni(re) = relationally-near>
(3n) is a closer relation than..is to../is a closer kin than..is to..

kumnurjui

<kum(tu) + nu + r + ju(pn)i = common-opinion>
(3n) is a consensus/an opinion about..held in common by..
(1a) consensual

lagmao

<la(n)g(a) + ma(dz)o = longer-make>
(3v) lengthens../makes..longer by..
nu - (a) is elongated/has been made longer

litnirne

[leet-NEER-neh] <lit(la) + nirne = light-year>
(3n) is..light- years away from X;
default X = the Sun

livosensi

<(c)liv(i) + sensi = alive-science>
(1n) is a biological fact/law/principle.
lo - (1n) biology, the science of life

livspasensi

<(c)liv(i) + spa(si) + sensi = living-space-science>
(1n) is an ecological fact/law/principle.
lo - (1n) ecology, environmental science

livspasesmao

<(c)liv(i) + spa(si) + se(n)s(i) + ma(dz)o = living-space- science-maker>
(1n) is an ecologist, an environmental scientist

maersensi

[mah-ehr-SEN-see] <ma(rt)e + sensi = market-science>
(1n) is a fact/law/principle about markets.
lo - (1n) market science

martysensi

[mahr-tuh-SEN-see] <mart(e) + y + sensi = market-science>
(1n) is a fact/law/principle about markets.
lo - (1n) market science. [Variation of **maersensi**.]

matmymatma

<matm(a) + matma = mother-mother>
(2n) is the maternal grandmother of..

megherzi

(**MHz** /maiHAIZEI/) <meg(do) + herzi = millionfold-Hertz>
(2v) vibrates/oscillates at/has a frequency of..megahertz; def'l't = 1

mekykiu

<me(n)k(i) + ki(cm)u = eye-doctor>
(1n) is an eye- doctor/ophthalmologist

melhatro

<me(r)l(i) + hatro = measure(d)-hot>
(2n) has a temperature of..

melkubra

<me(r)l(i) + kubra = measure(d)-wide>
(2n) has a measured width of..

melpao

<me(r)l(i) + pa(sk)o = measure(d)-before>
(3v) happened a measured interval of..before X; default X = the moment of speech/writing.
(2v) was..ago

melsurdi

<me(r)l(i) + surdi = measure(d)-south>
 (2a) is a measured distance of..south of X; default = the point of speech/writing

meltidjo

<me(r)l(i) + tidjo = measure(d)-heavy>
 (2v) has a measured weight of..

melyaldo

<me(r)l(i) + laldo = measure(d)-old>
 (2v) has a measured age of..

melylanga

[mel-uh-LAHNG-gah] <me(r)l(i) + langa = measure(d)-long>
 (2n) has a measured length of..

mercea

<mer(ji) + ce(nj)a = married-become>
 (2v) marries../gets married to..

milgramo

(mg /MEIgei/) <mil(ti) + gramo = thousandth-part-gram>
 (2a) weighs in milligrams..; default 1

miotci

[MYOH-chee] <mi(tr)o + (ti)tci = meat-eat>
 (1v) eats meat.
 (1n) is a meat-eater/carnivore.
 (1a) is carnivorous

mismao

[MEES-mough] <mi(k)s(a) + ma(dz)o = mixture-make>
 (3v) mixes ingredients..into mixture..

morcea

<mor(to) + ce(nj)a = dead-become>
 (1v) dies

morcko

[MAWR-shkoh] <mor(to) + cko(zu) = dead-cause>
 (2v) kills../causes..'s death, intentionally or unintentionally

mormao

[MAWR-mough] <mor(to) + ma(dz)o = dead-make>
 (2v) kills..intentionally

moutsu

[moh-OOT-soo] <mo(rd)u + tsu(fi) = more-than-sufficient>
 (3a) is excessive/more than is needed for doing..creating surplus..
fu - (3n) is a surplus/excess left over after use..of supply..

mrecli

<mre(nu) + cli(ka) = man-like>
 (2a) is more masculine/manly/more like a man than..
 (1a) manly

mrenyclika

<mren(u) + y + clika = man-like>
 (2a) is more masculine/manly/more like a man than..
 (1a) manly. [Variant of **mrecli**.]

mresua

[MRESS-wah] <mre(nu) + su(rv)a = man-servant>
 (3n) is a/the manservant/valet of..with duties..

mrotreci

<mo/r(du) + treci = more-interesting>
 (3a) is more interesting than..to..

mutpao

<mut(ce) + pa(sk)o = extremely-before>
 (2a) is early/ancient, an early part of epoch/interval.. [Variant of **darpa**.]

nedfui

<ned(zo) + fu(tc)i = next-after>
 (3a) is just after..in sequence/series..
 (2n) is the immediate successor of..
 (1a) following/just succeeding

nedpao

<ned(za) + pa(sk)o = next-before>
 (3a) is just before..in
 sequence/series..
 (2n) is the immediate predecessor
 of..
 (1a) previous/just preceding

nenbromao

<nen(ri) + bro(ko) + ma(dz)o = in-
 break-make>
 (3v) breaks..into.., as eggs into a
 batter.

nengoi

<nen(ri) + go(dz)i = in-go>
 (3v) enters../goes into..from..

nensea

<nen(ri) + se(tf)a = in-put>
 (3v) puts..into..
 (2v) puts..in

nerdei

<ne + r + de(nl)i = first-day>
 (2n) is the monday of week/month..
 (1n) is a monday.
la Nerdei (na) Monday, the local
 monday

nerdjo

<ne + r + djo(ri) = one-member>
 (2n) is the sole/unique/only member
 of class..
 (1a) unique. (av)
 only/uniquely/solely

nermea

<ne + r + me(ns)a = first-month>
 (2n) is the january of year..
 (1n) is a january.
la Nermea (na) January, the local
 january

nernenbei

<ne + r + nen(ri) + be(rt)i = first-in-
 carry>
 (4v) introduces..to../is the first to
 show..to../to bring..into..from
 source..

nernermea

<ne + r + ne + r + me(ns)a =
 eleventh-month>
 (2n) is the november of year..
 (1n) is a november.
la Nernermea (na) November, the
 local november

nernirmea

<ne + r + ni + r + me(ns)a = tenth-
 month>
 (2n) is the october of year..
 (1n) is an october.
la Nernirmea (na) October, the local
 october

niagro

[NYAH-groh] <ni(ml)a + gro(da) =
 animally-big>
 (1n) is a monster.
 (1a) monstrous

nichaa

[neesh-HAH-ah] <(s)nic(e) + ha(sf)a
 = snow-house>
 (2n) is an/the igloo of.., a house
 made of snow. [Variant of **iglu.**]

nicycri

[NEESH-uh-shree] <(s)nic(e) +
 cri(na) = snow-rained-on>
 (2v) is snowed on by weather
 system..
Ti - = It's snowing

nimsesmao

<nim(la) + se(n)s(i) + ma(dz)o =
 animal-science-maker>
 (1n) is a zoologist, a contributor to
 zoology

norcea

<no + r + ce(nj)a = non-changing>
 (1a) is constant/unchanging/consi-
 stent.
 (1n) is a constant

norfundi

<no + r + fundi = non-fond-of>
 (3v) dislikes..for being/doing..

numcmacea

<num(cu) + cam(lo + ce(nj)a = numerically-small-become>
(1a) become scarce/rare/few in number

numsensi

<num(cu) + sensi = number-science>
(1n) is a fact/law/principle of mathematics.

lo - (1n) mathematics

nurdia

<nu + r + di(tc)a = a-taught-thing>
(1n) is a discipline, a body of facts/principles/methods taught as a whole

nurfia

<nu + r + fi(rp)a = fear-inspiring>
(3a) is more fearsome/formidable/redoubtable than..to.. [Variant of **fircko**.]

nurmue

<nu + r + mu(tc)e = un-extreme>
(3a) is more moderate than..in property/feature..
(av) moderately

nurplifao

<nu + r + pli(zo) + fa(nd)o = useful-end>
(3n) is a function/useful consequence of action/process..for organism(s)..

nursia

<nu + r + si(tf)a = conv. of site>
(2a) is situated at site/location..

pashumsensi

<pas(ko) + hum(ni) + sensi = past-human-science>
(1n) is a fact/law/principle of paleoanthropology.

lo - (1n) paleoanthropology, the science of early man

paslivesmao

<pas(ko) + (c)liv(i) + se(n)s(i) + ma(dz)o = past-life-science- maker>
(1n) is a paleontologist, a contributor to paleontology

pasnaodei

<pas(ko) + na(zd)o + de(nl)i = before-now-day>
(3n) is the day before X, the day of some event Y; default Y = the moment of speech/writing; whence default X = today.
(1n) yesterday

pasnurmaosensi

<pas(ko) + nu + r + ma(dz)o + sensi = early-made-things- science>
(1n) is a fact/law/principle of archeology.
lo - (1n) archeology

pilylandi

<pil(no) + landi = plane-land>
(2n) is a flatland/plain of landmass..

pinduo

[peen-DOO-oh] <pin(ti) + du(rz)o = paint-do>
(3v) paints..with..
(1n) painter/housepainter

poltia

[POHLT-yah] <pol(di) + ti(sr)a = politically-choose>
(4v) votes for..for office/position..over rivals..

prigoi

<pri(re) + go(dz)i = behind-goer>
(4v) follows../goes behind..to..from..
(2n) is a follower of.. [Variant of **futgoi**.]

profoa

<pro(ju) + fo(rm)a = product-form>
(3n) is the form in which an output/product..of process..is manifested/displayed.
nu - (2n) output..has the form of..

racbao

<(t)rac(i) + ba(ks)o = travel-box>
(2n) is a/the suitcase of..

racveo

<(t)rac(i) + ve(sl)o = travel-container>
(2n) is a piece of luggage of traveler..

racysakli

[rah-shuh-SAHK-lee] <(t)rac(i) + sakli = travel-sack>
(2n) is a duffle-bag of traveler..

rardza

[RAHRD-zah] <ra + r + dza(bi) = all-that-exists>
(1n) is a/the universe. [Variant of **rardzabi**.]

rardzabi

<ra + r + dzabi = all-that-exists>
(1n) is a/the universe

rarfomkua

<ra + r + fo(r)m(a) + ku(vg)a = all-shapes-cover>
(2n) is an/the envelope of.., something that covers/contains all possible shapes of..

rarfomveo

<ra + r + fo(r)m(a) + ve(sl)o = all-shapes-contain>
(2n) is an/the envelope of.., something that covers/contains all possible shapes of.. [Variant of **rarfomkua**.]

rarmea

<ra + r + me(ns)a = allth-month>
(2n) is the december of year..
(1n) is a december.
la Rarmea (na) December, the local december

rarpai

<ra + r + pa(rt)i = all-parts>
(2v) .., pl. set, constitute/comprise/make up whole..
nu - (2v) is constituted/comprised/made up of.., pl. set

razdou

<raz(nu) + do(ns)u = reason-give>
(3v) justifies act..with reason(s)../gives reasons..for it.
(1a) is rational/gives reasons

reckambi

<re(t)c(a) + kambu = difference-compare>
(4v) contrasts..with..by noting their differences..on dimensions..

roacti

[roh-AHSH-tee] <ro(dj)a + cti(fu) = grow-stuff>
(2n) is a medium/culture/substrate on which..grows

rojhea

<ro(d)j(a) + he(lb)a = grow-help>
(2v) grows../helps..grow/cultivat es.. [Variant of **rojmao**.]

rojmao

<ro(d)j(a) + ma(dz)o = grow-make>
(2v) grows../helps..grow/- cultivates..

rojmaosensi

<ro(d)j(a) + ma(dz)o + sensi = grow-make-science>
(1n) is a fact/law/principle of agronomy.
lo - (1n) agronomy, the science of cultivation

rojmaosesmao

<ro(d)j(a) + ma(dz)o + se(n)s(i) + madzo = grow-make-science-maker>
(1n) is an agronomist, a contributor to agronomy

rorcirkea

<ro + r + cir(na) + (c)ke(l)a = many-learn(ings)-school>
(2a) is a university of country/region..

rornurdia

<ro + r + nu + r + di(tc)a = many-teachables>
(1a) is multidisciplinary, contributed to by many disciplines

rulkao

[ROOL-kow] <rul(ni) + ka(kt)o = rule-act>
(4v) is obliged/ought to do..under..by rule/principle/law..

saadja

[sah-AHD-jah] <sa(np)a + dja(no) = sign-know>
 (2v) understands/knows the meaning of sign..

sacduo

<sa(t)c(i) + du(rz)o = start-doing>
 (2v) begins/commences/starts doing..

seidjo

<se(tc)i + djo(ri) = set-member>
 (2pp) is among/included in/a member of set..

selfodcea

<sel(ji) + fo(l)d(i) + ce(nj)a = self-folded-become>
 (2v) folds itself up into../a..

selkopmao

<sel(ji) + kop(ca) + ma(dz)o = self-copy-make>
 (2v) divides/transforms/replicates itself into N copies; default N = 2.
 (1v) divides/reproduces itself by binary fission, as of organic cells

serdei

<se + r + de(nl)i = seventh-day>
 (2n) is the sunday of week/month..
 (1n) is a sunday.

la Serdei (na) Sunday, the local sunday

sermea

<se + r + me(ns)a = seventh-month>
 (2n) is the july of year..
 (1n) is a july.

la Sermea (na) July, the local july

sesmao

<se(n)s(i) + ma(dz)o = science-maker>
 (2n) is a scientist in field.., a contributor to scientific field/discipline..

silckerao

<sil(tu) + cke(mo) + (b)ra(t)o = vibration-(time-ratio = rate)>
 (2n) is a/the frequency at which..vibrates/oscillates/propagates waves

siodja

<si(st)o + dja(no) = system-know>
 (2v) understands/comprehends.., a system or individual

smabru

<sma(no) + bru(te) = smoke-breathe>
 (2v) smokes.., a smoke-producing device or substance.
 (1n) smoker

snipao

<sni(re) + pa(sk)o = near-past>
 (2a) is more recent/late in the past than..

(1a) recent/late in time.

lo - (1n) the recent past

sordei

<so + r + de(nl)i = sixth-day>
 (2n) is the saturday of week/month..
 (1n) is a saturday.

la Sordei (na) Saturday, the local saturday

sormea

<so + r + me(ns)a = sixth-month>
 (2n) is the june of year..
 (1n) is a june.

la Sormea (na) June, the local june

spalii

[spah-LEE-ee] <spa(ci) + (c)li(v)i = space-live-in>
 (2v) inhabits/lives in area/region/habitat..
 (1n) inhabitant

spapai

<spa(ci) + pa(rt)i = space-part>
 (2n) is a region/sector/division of area..

specymorcea

<spec(i) + y + mor(to) + ce(nj)a = species-dead-become>
 (1v) species..becomes extinct/an extinct species

specymorto

<spec(i) + y + morto = species-dead>
 (1a) is extinct, an extinct species

stutcu

<stu(ci) + tcu(re) = story-picture>
 (2n) is an illustration of
 story/document..

surlesta

<sur(di) + lesta = south-eastern>
 (2a) is southeast of..
 (2n) is a southeatern part of..

sutsae

[soot-SAH-eh] <sut(me) + sa(ns)e =
 odor-sense>
 (3v) smells/detects
 odor/scent..on/of/from source..

tarsensi

<tar(ci) + sensi = star-science>
 (1n) is a fact/law/principle of
 astronomy.

lo - (1n) astronomy

tcidynia

<tcid(i) + y + ni(ml)a = food-
 animal>
 (2n) is a/the prey/game/food-animal
 of predator/hunter..

tcutaa

<tcu(re) + ta(kn)a = picture-talk>
 (4v) describes..as..to..
 (3a) is described by..as..

tcutrapeo

<tcu(re) + tra(du) + pe(ns)o =
 picture-true-think>
 (3v) assumes..to be true of..
nu - (3n) is an assumption made
 by..about..

tedjua

<ted(ji) + ju(gr)u = attention-
 grabbing>
 (2a) is intriguing to../seizes..'s
 attention

telbie

<te(r)l(a) + bi(dj)e = Earth-edge>
 (3n) is the horizon/body's edge as
 seen from altitude..above the surface
 of body..

telfoa

<te(r)l(a) + fo(rm)a = Earth-form>
 (2n) is a planet of star..

telsesmao

<te(r)l(a) + se(n)s(i) + ma(dz)o =
 Earth-science-maker>
 (1n) is a geologist, a contributor to
 geology

tenmao

<ten(ri) + ma(dz)o = increase-make>
 (4v) increases../makes..increase by
 increment..in dimension..

tensea

[ten-SEIGH-ah] <ten(ri) + se(tf)a =
 increase-put>
 (3v) adds ingredient..to mixture..

terdei

<te + r + de(nl)i = third-day>

(2n) is the wednesday of
 week/month..

(1n) is a wednesday.

la Terdei (na) Wednesday, the local
 wednesday

terjaofoa

[tehr-zhough-FOH-ah] <te + r +
 ja(gl)o + fo(rm)a = three-angle-
 form>

(2n) is a triangle with vertices..

(1a) triangular

termea

<te + r + me(ns)a = third-month>

(2n) is the march of year..

(1n) is a march.

la Termea (na) March, the local
 march

tetsensi

<tet + sensi = weather-science>

(1n) is a fact/law/principle of
 meteorology.

lo - (1n) meteorology

tordei

<to + r + de(nl)i = second-day>

(2n) is the tuesday of week/month..

(1n) is a tuesday.

la Tordei (na) Tuesday, the local
 tuesday

torkrilu

[tawr-KREE-loo] <to + r + krilu = two-wheels>
(1n) is a bicycle

tormea

<to + r + me(ns)a = second-month>
(2n) is the february of year..
(1n) is a february.

la Tormea (na) February, the local February

troflo

<tro(ku) + fo/l(ma) = rock-full>
(2a) is rockier/stonier/more full of rocks/stones than..
(1a) rocky/stony

tsittoa

<tsi(me) + to(kn)a = criminally-take>
(3v) takes..wrongly/illegally from owner/legitimate user..
(1n) thief

vermea

<ve + r + me(ns)a = ninth-month>
(2n) is the september of year..
(1n) is a september.

la Vermea (na) September, the local september

vetcue

<vet(ci) + cu(ts)e = event-say>
(4v) gives account/report..concerning event..to..
nu - (3n) is an account/report/narration by..of events..

vormea

<vo + r + me(ns)a = eighth-month>
(2n) is the august of year..
(1n) is an august.

la Vormea (na) August, the local august

vrelaa

[vreh-LAH-ah] <vre(ti) + la(ng)a = vertically-long>
(3a) is taller than..by difference..
(1a) tall

Xai-kre

[KHIGH-uh-kreh] <Xai + y + kre(ni) = X-ray>

(2n) is X-ray radiation from source..
nu - (1n) is an X-ray source

Xai-kreni

[khigh-uh-KREH-nee] <Xai + y + kreni = X-ray>

(2n) is X-ray radiation from source..
nu - (1n) is an X-ray source. [Variant of **Xai-kre**.]

zvofoa

<zvo(to) + fo(rm)a = outer-form>
(2n) is the shape/outline/silhouet te/outer form of object..from viewpoint..

zvosui

<zvo(to) + su(nd)i = out-send>
(3v) emits/radiates/transmits signal/energy..in direction(s)..
nu - (2n) is an emission from source.. [Variant of **kresui**.]

zvotorspa

<zvo(to) + to + r + spa(si) = outer-two-space>
(2n) is the surface/outer surface of object..

APPENDIX G - TRANSLATIONS

These translations are of the leading paragraphs of four articles from the *Scientific American*, reprinted here with the permission of the editors. The first, on archeology, is from the October 1983 issue; the second, on astronomy, is from November 1983; the third, on molecular biology, is from January 1984; and the fourth, on paleoanthropology, is from March 1984. We are grateful to the editors of the *Scientific American* and to the several authors of these articles for permission to publish these brief translations of their work.

The Loglan texts of the four translations are first given in block form for those readers who wish to tackle them head on. In a later section they are given line by line. The first line in each set is a line from the original English text; the second is the corresponding line from the Loglan translation; the third is the back-translation of the Loglan into a special kind of English designed to reveal the structure of the Loglan; this last component usually occupies several lines.

An effort has been made in the back-translation to coordinate elements between the two languages. This has often meant hyphenating English phrases into quasiwords in order to make them correspond positionally to specific Loglan words. Loglan words which have no corresponding elements in the original English are represented in the back-translations by English expressions in square brackets. Alternative English wordings are in parentheses. Words or phrases which are not in the same positions in the translation as the corresponding elements are in the original English have been put in angle brackets in both languages. All these devices contrive to "explain" the structure of the Loglan sentence, which is almost always a little different from that of the English sentence despite my effort to conserve the natural word-order wherever possible.

The articles chosen all appeared in the seven foreign language editions of the *Scientific American*. The publishers have kindly furnished me with copies of these editions of the relevant issues. I was thus able to examine the structure of several natural language translations while contriving the Loglan one. In the interlinear section of this appendix I have tried to suggest the multilingual flavor of this work by putting the titles, at least, of the four articles in those five of the SA's languages--English, Spanish, French, Italian and German--which can be printed in the Latin alphabet.

Translation No. 1

So Kilnirne ji Katli lopo Bishoni Mormao
kao la Bn On Kn Rivz

Six Milleniums of Buffalo Kills
by B. O. K. Reeves
SA, October 1983, p.120

Coi ro darpao neveri ci heknirne nu vetcue ce stutce la Rindi, ji vi la Grada Pilnylandi, ji vi la Nord Ame'rikas, pa janto lo bishoni duo lopo jangoi je bei go horski. I toi snola lepo levi ri piplo no pa suksi ge bishoni janto pia ba ji futci lepo la Eurpi, pa nernenbei lo horma la Nord Ame'rikas, na le nesori heknirne. I lo pasnurmaosensi po turka ji vi le ri kubra grasylanti ji lesta la Troflo Monca, ga falcue levi nu tcutrapeo. I fia le neri genza je lopo la Darpao Rindi, pa nengoi le spapai gue, ji na ba ji melpaonao lio sanenimoNai gu, Rai pa fircko janto nokou lepo Rai pa janto go fitgoi. I lo mamhuti pa ciirnia go nu tisra Rai na le satci, ice na lepo leva grada nimla pa numcmacea gu, Rai pa durcea lepo janto to norsa speci je lo bishoni gue, ji lea groda ce jitlia ci nu horno ji lao *Bison antiquus*, ze le cmalo ji lao *Bison occidentalis*, ice le to Bai na specymorto. I le la Darpao Rindi, gu futkaa ji vi lo pilnylandi pa prase lopo janto lo bishoni duo lopo fitgoi ce munce.

Nao vi, mi fa tcutaa ba ji napa nu pafko vi ne leva munce bishoni ci janto sitfa ja melsurdi la Ka'lgrris, lio netenikeimei, e nursia le surlesta bidje je la Po'rkiupain Hilz, ji vi le lusta parti je la Albrtys.

Translation No. 2

La Centaurus Aman, ja le No Nu Snire ge Kaoflo Galhasi
kao la Djek On Brnz, ze la Rn Markys Prais

Centaurus A: the Nearest Active Galaxy
by Jack O. Burns and R. Marcus Price
SA, November 1983, p.56

Ga seidjo le groda ce mordu ci tedjua bekti ji napa nu vizka ba le rardzabi, ga le bekti ji nu tcutaa be lo kaoflo galhasi. I lo kaoflo galhasi, ja rarpai siritiapinine lea fu djano galhasi gu, suna kresui su nerji ji cnajai lio nemomo le nerji je loe danri galhasi gu, e ji nu profoa lo elhektromagni kreni. I le ro nu kresui je loe kaoflo galhasi ga ranjo ro norsa silckerao, ja nu seidjo lo geoykre, e lo Xaiykre, e lo nu vizka kreni, e lo infraredri kreni, e lo radjo kreni. I ro lopo snipao ge katca turka napa nu durzo vi lo radjo silckerao, jao vi sei lezo ne kaoflo galhasi ga kresui suna cnajai lio nemamo lezo loe danri galhasi ga kresui.

Nao le kaoflo galhasi ji no nu snire ra norsa kaoflo galhasi lemu galhasi bi la Centaurus Aman, ja litirne lio sanefemomo mu. I le nu vizka zvofoa je la Centaurus Aman, ga melkubra lio rinenitianemoLaiNai. I ga ranjo vi ne pilno ji slopu le pilno go midju je le nu vizka truke, ga buo ne nu lagmao radjo ci fomkua ji merli lio satemomoLaiNai sau ne fando dio le norsa. I kanoi le radjo kresui spapai je la Centaurus Aman, ga eu nu vizka su katca ji vi la Ter, ki sei simci ba ji cnajai lio toni lezo la Lun, kubra.

Translation No. 3

Lopo Troli Lopo Sintesi Lo Ribhosomi
kao la Masaiasus Nomuras

The Control of Ribosome Synthesis
by Masayasu Nomura
SA, January 1984, p.102

Ra ribhosomi ga orgeli je ne clivi celhu gu go proteini madzo. I vi le zvotorspa je rei su amhini acdi ga ckelista djicea su rodja ge proteini tcena. I le nu kalmao tcena ga selfodcea ne molhekuli ja kanmo ne parti je le le celhu gu truke gue, a ne enzimi ji cea kathalisi su spebi ge methaboli po kempoa. I soaki ra levi methaboli nurplipra ga cnida lo enzimi, ki moiki su celhu ga rodja, e selkopmao go mordu kukra ki cei gromao lezo cei madzo lo proteini. I loe ribhosomi buo ga katli su nu limji zo djimao je lo amhini acdi jue loe proteini tcena. I bea vi lo bakteri ji lao *Escherichia coli*, ra ribhosomi ga kanmo lepo djimao nefe amhini acdi na ra sekmi na lepo rei melhatro lio tesci. I kanoi lepu hatro ga stolo go norcea, ice buo le roacti jio lao *En coli*, spalii reo ga nu fulrymao ba lo ciircti, ki le bakteri ga sacduo lepo selkopmao duo su ganta ckerao. I soaki lezo loe ribhosomi ga proteini madzo ga nu limji, ki kanoi loe celhu ga eu gromao le ckerao je lopo proteini sintesi, ki cei madzo ba ji mordu lena konte je lecei ribhosomi. I lepo madzo loe ribhosomi ga nerji kusti, ice lepo madzo eu ne groda moutsu je lo ribhosomi ga festi. I nukou ra bakteri ga kanmo lepo stuli lepo ribhosomi proju guo, tie su fu penso pu cmaceapoa.

Translation No. 4

Lepo lo Homhinoideai, e lo Homhinidi ga Futlinkui
kao la Deivid Pilbim

The Descent of Hominoids and Hominids
by David Pilbeam
SA, March 1984, p.56

Lopo lo humni ga siodja lepo lo humni ga hisvalda napa fredirgoi go grada na le nedpao kalroakeo, e sui ue na lepa fe nirne. I fia la Nevesonein, bea lo darpaohumsensi napa stisi lepo nurdia go nerdjo ferici lo fizdi humsenmao, e ri nu terci paslivsesmao. I dei napa hisvalda ne kubra rornurdia ji djomao lepo nu surva lo hisri telsesmao, e lo livspasesmao, e lo molhekuli livsesmao, e lo nimsesmao, e lo stude je lo nimla po bivdu gue, e ue lo kemsesmao, e lo fidsesmao.

Nao coi le mela Linean, klemaosio je lo clivi lo humni ga seidjo la Ordre, ji lao *Primates*, ja sui nu seidjo lo pongidi, e lo murki, e lo prosimi ja nu seidjo lo lemhuri. I ga nenri leva ordre ga la Supherfamili, ji lao *Hominoidea*, ja nu rarpai lo humni ze lo pongidi. I ga nenri leva supherfamili taa ga la Famhili, ji lao *Hominidae*, ja nu rarpai lo humni ze lehei specymoo kunci ji kuisni lo pongidi.

Nao letci mi lepo corta geable lepo lepo lo homhinoideai ze lo homhinidi pa hisvalda gu, pa nu siodja na ba ji melpaonao lio safeNai gu, kao ne fregoi ge fizdi humsesmao ji la Crruyd Ln Uacbrn, pe la Rorcirkea, je la Kalifornias, gue ji vi la Brkklis, guo, e reckambi leva fu corcue je lepa kumnurjui le kumnurjui ji na.

Interlinear Analysis of Translation No. 1

Six Milleniums of Buffalo Kills
Seis milenios de matanzas de bisontes
Six mille ans de chasses au bison
Sei millenni di caccia al bisonte
Sechs Jahrtausende Bisonjagd
Copyright © 1983 by Scientific American, Inc.

So Kilnirne ji Katli lopo Bishoni Mormao

Six Thousandfold-years (Milleniums) that Have (are Characterized by) [Events of] Bison-Killing
by B. O. K. Reeves **kao la Bn On Kn Rivz**

[kow-la-bighn.ohn.kighn.REEVZ]

According to many early 19th-century accounts and

Coi ro darpao neveri ci heknirne nu vetcue ce

According-to many far-before (early) one-nine-th (nineteenth) [hyphen] hundredfold-year
(century) [passive] event-saids (accounts) and

illustrations, the Indians of the Great Plains of North America

stutce la Rindi, ji vi la Grada Pilnylandi, ji vi la Nord Ame'rikas,

story-pictures (illustrations) the Amerind(s) that-were in the Great Flat-lands that-were in [the
named] North America

hunted buffalo by riding them down on horseback. The implication is

pa janto lo bishoni duo lopo jangoi je bei go horski. I toi snola

before hunted the-mass-of bisons by-the-method-of the-mass-of-events-of hunt- going-to
(pursuing) b (them, the bison) horse-sitting-ly (on horseback). [And] This (last sentence) implies

that these peoples were not successful buffalo hunters until

lepo levi ri piplo no pa suksi ge bishoni janto pia

that (the event that) these several peoples not were successful as bison hunters continuously-before

some time after the Europeans introduced horses into North America

ba ji futci lepo la Eurpi, pa nernenbei lo horma la Nord Ame'rikas,

some-(time)-x that-was after the-event-of the Europeans before first-in-carried (introduced) the (mass of) horse(s into) [the named] North America

in the 16th century. Archeological work in the wide

na le nesori heknirne. I lo pasnurmaosensi po turka ji vi le ri kubra

in the one-six-th hundredfold-year. [And] The (mass of) past-made-things- science work-events that-are in the several wide

grasslands east of the Rocky Mountains contradicts this assumption.

grasylandi ji lesta la Troflo Monca, ga falcue levi nu tcutrapeo.

grass-lands that-are east-of the Rock-full Mountains does 'false'-say-about this picture-true-thought-thing (assumption).

From the time the <first> Paleo-Indians entered the region

I fia le <neri> genza je lopo la Darpao Rindi, pa nengoi le spapai gue,

And continuously-after the <first> instance of the Early Amerinds before in-went-to (entered) the space-part [end-the je-clause]

<some 10,000 years ago>, they were redoubtable hunters even though

ji na ba ji melpaonao lio sanenimoNai gu, Rai pa fircko janto nokou

that-was at some-(time)-x that-was measurably-before-now the-number about-one- zero- thousand-Enn-(‘N’ for ‘nirne’ = ‘years’) [end clause], R (the Indians) were fear-causing (redoubtable) hunters despite

they hunted on foot. Mammoths were the game they favored

lepo Rai pa janto go fitgoi. I lo mamhuti pa ciirnia go nu tisra Rai

the-event-that (fact-that) R (they) hunted foot-going-ly. [And] The (mass of) mammoths were a-food-animal that-was [passive] chosen-by R (them, la Rindi)

at the start, and when those great beasts became scarce, they

na le satci, ice na lepo leva grada nimla pa numcmacea gu, Rai

at the start; and when the-event-of those great animals before numerically- small-becoming (happened) [end clause] R (they)

turned to hunting two different species of buffalo: the large,

pa durcea lepo janto to norsa speci je lo bishoni gue, ji lea groda

before do-changed-to (turned to) [the event of] hunting two other species of the (mass of) bison [end-clause] That-are the-set-of-all big

straight-horned *Bison antiquus* and the smaller *Bison*

ce jitlia ci nu horno ji lao *Bison antiquus*, ze le cmalo ji lao *Bison*

and tight-line [hyphen] [passive] be-horned-ones that-are [the Linnaean taxon] *Bison Antiquus*, and-jointly the small-ones that-are [the Linnaean taxon] *Bison*

occidentalis, both now extinct. The Paleo-Indians'

***occidentalis*, ice le to Bai na specymorto. I le la Darpao Rindi, gu**

occidentalis; and the-two-B (them, the Bison species mentioned) are now species-dead (extinct).
[And] The [the] Early Amerinds' [end phrase]

successors on the plains continued to hunt buffalo on foot,

futkaa ji vi lo pilnylandi pa prase lopo janto lo bishoni duo lopo fitgoi

after-comers that-were on the plains before continued the (mass of events of) hunting-of the
(mass of) buffalo(s) in-a-manner-of the (mass of events of) being-on-foot

and as a communal enterprise.

ce munce.

and being-a-community (communally).

Here I shall describe what has been unearthed at one such

Nao vi, mi fa tcutaa ba ji napa nu pafko vi ne leva

Now (new-paragraph) here, I will picture-talk (describe) something that has-been dug-up at one-
of those

communal bison-hunting site, <130 kilometers> south of Calgary

munce bishoni ci janto sitfa ja melsurdi la Ka'lgrris,

communal bison [hyphen] hunting sites which-is-incidentally measurably- south-of [the-named]
Calgary

at the southeastern edge of the Porcupine Hills

<lio netenikeimei>, e nursia le surlesta bidje je la Po'rkiupain Hilz,

<by-the-number one-three-zero-kay-emm>, and situated-at the south-eastern edge of the
Porcupine Hills

in western Alberta.

ji vi le lusta parti je la Albrrtys.

that-are in the western part of [the-named] Alberta.

Interlinear Analysis of Translation No. 2

Centaurus A: the Nearest Active Galaxy
Centauro A: la galaxia activa mas cercana
Centaurus A: la galassia attiva piu vicina
Centaurus A: Eine nahe aktive Galaxie
Copyright © 1983 by Scientific American, Inc.

La Centaurus Aman, ja le No Nu Snire ge Kaoflo Galhasi

The Centaurus (Latin Upper-Case) A, [which-Incidentally-is] the Non-Exceedably Near (the Nearest) Action-Full Galaxy

by Jack O. Burns and R. Marcus Price

kao la Djek On Brnz, ze la Rn Markys Prais

Among the largest and most intriguing objects that have yet been

Ga seidjo le groda ce mordu ci tedjua bekti ji napa

[Subject is deferred] Set-members-of (included in) the large(r) and more [hyphen] attention-seizing objects that have-been

observed in the universe are the objects known as active galaxies.

nu vizka ba le rardzabi, ga le bekti ji nu tcutaa be lo kaoflo galhasi.

[passive] seen [by someone] (against the background of) the all-that- exists (universe), are (deferred subject begins) the objects that-are [passive] talked-about [by someone else] as-the-mass-of action-full (active) galaxies.

Active galaxies, which make up only a few percent of all known

I lo kaoflo galhasi, ja rarpai siritiapinine lea fu djano

[And] The (mass-of) active galaxies, which-incidentally are-all-parts-of (constitute) at-most-a-few-times-point-zero-one-of (at most a few hundredths of) the-set-of-all known-about

galaxies, can emit a million times as much energy <in the form of

galhasi gu, suna kresui su nerji ji cnajai lio nemomo le nerji

galaxies, sometimes ray-sends (emits) some energy that-is a-quantity-product-of the-number one-thousand-thousand (multiplied by) the energy

electromagnetic radiation> as an ordinary galaxy. The

je loe danri galhasi gu, <e ji nu profoa lo elhektromagni kreni>. I le ro

of the-typical ordinary galaxy [end clause], <and that-has [passive] a- product-form-of the (mass of) electromagnetic rays>. [And] The [many]

emissions from an active galaxy extend over many different

nu kresui je loe kaoflo galhasi ga ranjo ro norsa

[passive] rays-sent-by the-typical active galaxy [start predicate] range-over many not-the-same-as-each-other (different)

frequencies, including gamma rays, X-rays, visible radiation,

silckerao, ja nu seidjo lo geoykre, e lo Xaiykre, e lo nu vizka kreni,

vibrate-time-ratios (frequencies), which-incidentally [passive] include the (mass of) gamma-rays, and the (mass of) X-rays, and the (mass of) [passive] visible rays,

infrared radiation, and radio waves. Much of the recent

e lo infraredri kreni, e lo radjo kreni. I ro lopo snipao

and the (mass of) infrared rays, and the (mass of) radio rays. [And] Much- of the (mass of events of) recent

observational work has been done at radio frequencies, where <the

ge katca turka napa nu durzo vi lo radjo silckerao, jao vi sei lezo ne

for watching work has-been [passive] done at the (mass of) radio frequencies, which-are- incidentally-such-that at s (them, those frequencies) the-quantity-of exactly-one

emissions from> an active galaxy can be 100,000 times as strong as

kaoflo galhasi <ga kresui> suna cnajai lio nemamo

active galaxy's <emission> is-sometimes a-quantity-product-of the-number one-hundred-thousand (times)

those from an ordinary galaxy.

lezo loe danri galhasi ga kresui.

the-quantity-that the-typical ordinary galaxy is emitting.

The active galaxy nearest our own

Nao le kaoflo galhasi ji no nu snire ra norsa kaoflo galhasi lemu

Now (new paragraph) the active galaxy that is non-exceedably nearer-than any other active galaxy (to) our

galaxy is Centaurus A, which is about 15 million light-years away.

galhasi bi la Centaurus Aman, ja litnirne lio sanefemomo mu.

galhasi is-the-same-as [the] Centaurus A, which-incidentally is-in- light-years the-number about-one-five-thousand-thousand (away from) us.

The visible outline of Centaurus A is a few tens of

I le nu vizka zvofoa je la Centaurus Aman, ga melkubra lio rinenitia-

[And] The [passive] seeable outer-shape of [the] Centaurus A is measurably- in-width the-number several-one-zeros-(tens)-times-

thousands of light-years across. Extending at an angle from the

nemoLaiNai. I ga ranjo vi ne pilno ji slopu le

one-thousand-ell-Enns ('LN' from 'litnirne'). [And] [subject will come later] Ranging in a plane that is-inclined-to the

central plane of the visible structure, however, is an elongated radio

pilno go midju je le nu vizka truke, ga buo ne nu lagmao radjo ci

plane which is-medial to the [passive] seeable structure, is (deferred subject begins) however exactly-one [passive] long(er)-made radio [hyphen]

envelope some three million light-years from tip to tip.

fomkua ji merli lio satemomoLaiNai sau ne fando dio le norsa.

form-cover (envelope) that measures [the number] about-three-thousand- thousand-ell-Enn from exactly-one end to the other.

If the radio-emitting region of Centaurus A were visible to an

I kanoi le radjo kresui spapai je la Centaurus Aman, ga eu nu vizka su

[And] If the radio emitting space-part (region) of [the] Centaurus A is let- us-suppose [passive] seeable-by at-least-one

observer on the earth, it would appear to be 20 times <as wide as> the moon.

katca ji vi la Ter, ki sei simci ba ji cnajai lio toni lezo la Lun,

<kubra>.

watcher that-is on the Earth, then s (it, that region) would-seem-to-be something that is-a-quantity-product-of the-number two-one (twenty) times the- amount-by-which the Moon <is-wide>.

Interlinear Analysis of Translation No. 3

The Control of Ribosome Synthesis
Control de la sintesis de ribosomas
La regulation de la synthese des ribosomes
Il controllo della sintesi dei ribosomi
Die Regulation der Ribosomen-Synthese
Copyright © 1984 by Scientific American, Inc.

Lopo Troli Lopo Sintesi Lo Ribhosomi

The (Mass of Events of) Controlling the (Mass of Events of) Synthesizing the (Mass of) Ribosomes

by Masayasu Nomura **kao la Masaiasus Nomuras**

The ribosome is the organelle of the living cell where proteins

Ra ribhosomi ga orgeli je ne clivi celhu gu go proteini

Each ribosome is an-organelle of exactly-one living cell [end clause] which-(the organelle)-is protein

are made. On it amino acids are joined one at a time to a

madzo. I vi le zvotorspa je rei su amhini acdi ga ckelista djicea su

making. [And] On the outer-two-space (surface) of r (it, the ribosome) some (one or more) amino acids are time-list-ly (sequentially) joined-to (become joined to) one-or-more

growing protein chain. The completed chain folds itself up into a

rodja ge proteini tcena. I le nu kalmao tcena ga selfodcea ne

growing type-of protein chains. [And] (Each of) The [passive] completely-made chains [start predicate] self-folded-becomes (folds itself into) exactly-one

molecule that can serve as part of the cell's structure or as an

molhekuli ja kanmo ne parti je le le celhu gu truke gue, a ne

molecule, which is-able-to-be exactly-one part of the the cell's [end possessive phrase] structure [end je-phrase], or exactly-one

enzyme: the catalyst of a specific metabolic reaction. Since all

enzimi ji cea kathalisi su spebi ge methaboli po kempoa. I soaki ra

enzyme that, in-other-words, catalyzes some (one or more) specific type-of metabolic events-of chemically-responding (reactions). [And] Since all

such metabolic functions require enzymes, it follows that in order for

levi methaboli nurlipra ga cnida lo enzimi, ki moiki

these metabolic useful-processes (functions) [start predicate] need the (mass of) enzymes, then-it-follows-that in-order-for

a cell to grow and divide faster it must increase its capacity

su celhu ga rodja, e selkopmao go mordu kukra ki cei gromao lezo cei

some (one or more) cell(s) (to) grow and self-copy-make [start modifier] more quickly, then c (it, the cell) (must) big(ger)-make (increase) the-amount- of c's (its)

to make proteins. The ribosome, however, has a limited capacity for

madzo lo proteini. I loe ribhosomi buo ga katli su nu limji zo

making-of the (mass of) protein(s). [And] The-typical ribosome however [start predicate] has (is characterized by) some (one or more) [passive] limited quantity(-ies)-of

adding amino acids to the protein chain. For example, in the

djimao je lo amhini acdi jue loe proteini tcena. I bea vi lo

join-making of the (mass-of) amino acids to the-typical protein chain. [And] For example in the (mass of)

bacterium *Escherichia coli* each ribosome can add

bakteri ji lao *Escherichia coli*, ra ribhosomi ga kanmo lepo djimao

bacteria that-is the (Linnaean taxon) *Escherichia coli*, each ribosome [start predicate] can-do the-event-of join-making

15 amino acids per second at 37 degrees Celsius. If

nefe amhini acdi na ra sekmi na lepo rei melhatro lio tесеCai. I kanoi

fifteen amino acids during every second when the-state-of r (it, the ribosome) measures-hot-at the-number three-seven-See. [And] If

the temperature remains constant but the medium in which the *E.*

lepu hatro ga stolo go norcea, ice buo le roacti jio lao *En*

the-property-of hotness [start predicate] remains as non-changing, and however the grow-stuff (medium/culture) such-that the (Linnaean taxon) *E.*

coli live is enriched with nutrients, the bacteria begin

coli, spalii reo ga nu fulrymao ba lo ciirecti, ki le bakteri ga sacduo

coli space-live-in (live in/inhabit) reo (it, the medium) is [passive] rich-made-by someone (in) the (mass of) food-stuffs (nutrients),

then the bacteria [start predicate] begin-to-do

to divide at a higher rate. Since the capacity $\langle \rangle$ of the ribosome

lepo selkopmao duo su ganta ckerao. I soaki lezo loe ribhosomi \langle ga

the-event-of replicating in-the-manner-of some (one or more) high(er) time- ratio (rate). [And] Since the-amount-by-which the-typical ribosome \langle [start predicate]

is limited, if the cell is to increase the

proteini madzo \rangle ga nu limji, ki kanoi loe celhu ga eu gromao le

protein makes \rangle is [passive] limited, it-follows-that if the-typical cell is, let-us-suppose, to-big(ger)-make (increase) the

rate of protein synthesis, it must make more

ckerao je lopo proteini sintesi, ki cei madzo ba ji mordu lena konte je

rate of the (mass of events of) protein synthesis, then c (it, the cell) (must) make [something-x that-is] more [-than the-current count (number) of]

ribosomes. The ribosome is energetically expensive \langle to

lecei ribhosomi. I \langle lepo madzo \rangle loe ribhosomi ga nerji kusti,

the-c's (its) ribosomes. [And] <The-event-of making> The-typical ribosome is energetically costly,

manufacture>, and making a large surplus of ribosomes would be

ice lepo madzo eu ne groda moutsu je lo ribhosomi ga

and the-event-of making let-us-suppose a large more-than-enough (surplus) of the (mass of) ribosomes is

wasteful. Therefore the bacterium must be able to adjust its ribosome

festi. I nukou ra bakteri ga kanmo lepo stuli lepo ribhosomi

wasting. [And] Therefore each bacterium is able-to-do the-act-of adjusting the-event-of ribosome

output with considerable sensitivity.

proju guo, tie su fu penso pu cmaceapoa.

producing [end inner **lepo**-clause] with some [passive] think-about- able property-of small-change-responding.

Interlinear Analysis of Translation No. 4

The Descent of Hominoids and Hominids
Origen de hominoideos y hominidos
Des Primates a l'Homme
L'origine degli ominoidei e degli ominidi

Die Abstammung von Hominoiden und Hominiden
Copyright © 1984 by Scientific American, Inc.

Lepo lo Homhinoideai, e lo Homhinidi ga Futlinkui

The-Event(s) of the (Mass of) Hominoids and the (Mass of) Hominids being After-Linear-Kin
(Descending).

by David Pilbeam **kao la Deivid Pilbim**

Human understanding of human evolution has advanced

Lopo lo humni ga siodja lepo lo humni ga hisvalda napa fredirgoi

The (mass of events of) the (mass of) humans [start predicate] system- knowing (understanding) the-event-of the (mass of) humans [start predicate] historically-developing (evolving) now-before (has) front-direction-gone (advanced)

greatly in the past generation, and even in the past five years. [And]

go grada na le nedpao kalroakeo, e sui ue na lepa fe nirne. I

[begin modifier] greatly in the contiguously-past (previous) completely- grow-interval (generation), and also-surprisingly during the former five years. [And]

Since the 1960's, for example, paleoanthropology has ceased being

fia la Nevesonein, bea lo darpaohumsensi napa stisi lepo

Continuously-after (ever since) the-thing-named One-nine-six-enn ('196n', n = 0-9 (the decade of the 1960's), for example, the (mass of) far-past- (early)-human-science has ceased-being-in the-state-of

a discipline of concern only to physical anthropologists and a few

nurdia go nerdjo ferce lo fizdi humsenmao, e ri

a-taught-thing (which is) one-member-ly (uniquely) an-affair-of the (mass of) physical human-science-maker(s), and a-few

interested paleontologists. It has evolved into a broad multi-

nu terci paslivsesmao. I dei napa hisvalda ne kubra ror-

[passive] interested, past-life-science-makers. [And] d (it, paleoanthropology) has evolved-into a wide many-

disciplinary pursuit which enlists the services of historical geologists,

nurdia ji djomao lepo nu surva lo hisri telsesmao,

teachables (multidiscipline) that member-makes (enlists) the-events of-being- served-by the (mass of) historical earth-science-makers,

ecologists, molecular biologists, zoologists,

e lo livspasesmao, e lo molhekuli livsesmao, e lo nimsesmao, e

and the (mass of) living-space-science-makers, and the (mass of) molecular life-science-makers, and the (mass of) animal-science-makers, and

students of animal behavior, and even chemists and physicists.

lo stude je lo nimla po bivdu gue, e ue lo kemsesmao, e lo fidsesmao.

the (mass of) students of the (mass of events of) animal(s) behaving [end **je-** clause], and, I-am-surprised-to-say, the (mass of) chemical-science-makers, and the (mass of) physical-science-makers.

In the Linnaean classification of living things human beings

Nao coi le mela Linean, klemaosio je lo clivi lo humni

Now (new paragraph) according-to the [start predified name] Linnaean class-make-system of the (mass of) living-things the (mass of) humans

belong to the Order Primates, which also includes the apes, the

ga seidjo la Ordre, ji lao *Primates*, ja sui nu seidjo lo pongidi, e lo

are members-of (included in) the-named Order that-is the (Linnaean taxon) *Primates*, which-
incidentally also [passive] includes the (mass of) pongids, and the (mass of)

monkeys and prosimians such as the lemurs. Within that order is the

murki, e lo prosimi ja nu seidjo lo lemhuri. I ga nenri leva ordre ga la

monkeys, and the (mass of) prosimians, which-incidentally [passive] includes the (mass of)
lemurs. [And] [subject will come later] Inside that order are (deferred subject begins) the-named

superfamily Hominoidea, including only humans and the apes.

Supherfamili, ji lao Hominoidea, ja nu rarpai lo humni ze lo pongidi.

Superfamily that-is the (Linnaean taxon) *Hominoidea*, which-incidentally-is [passive] all-parts-
of (constituted of) the (mass of) humans and-jointly the (mass of) pongids.

Within that superfamily, in turn, is the family Hominidae,

I ga nenri leva supherfamili taa ga la Famhili, ji lao Hominidae,

And [subject will come later] Inside that superfamily in turn is (deferred subject begins) the-
named Family that-is the (Linnaean taxon) *Hominidae*,

including only humans and their extinct relatives closer than the apes.

ja nu rarpai lo humni ze lehei specymoo kunci ji kuisni lo pongidi.

[which-incidentally-is] [passive] constituted-of the (mass of) humans and-jointly the-aitch's
(their, the human's) species-dead (extinct) relatives that are-relationally-nearer-than the (mass of)
pongids.

Let me briefly review how <the evolution of> hominoids and

Nao letci mi lepo corta geable lepo lepo lo homhinoideai ze lo

Now (new paragraph) let me (do) the-act-of briefly again-looking-at the- event-of the-event-of the (mass of) hominoids and-jointly [the (mass of)]

hominids was understood <some five years> ago

homhinidi <pa hisvalda> gu, pa nu siodja na ba ji melpaonao [lio

hominids having evolved [end clause], was [passive] understood at sometime that is-measurably-before-now-by <[the number]

by a leading physical anthropologist, Sherwood L. Washburn

safeNai> gu, kao ne fregoi ge fizdi humsesmao ji la Crruyd Ln Uacbrn,

about-five-Enn (for 'nirne' = 'years')> [end-clause], by a front-going type-of physical anthropologist who-is the-named Sherwood L. Washburn

of the University of California at Berkeley, and

pe la Rorcirkea, je la Kalifornias, gue ji vi la Brrklis, guo, e

of the-named Many-learnings-(studies)-school (University) of [the-named] California [end-clause] of the Berkeley [end inner **lepo**-clause], and

contrast that summary of the consensus then with the consensus now.

reckambi leva fu corcue je lepa kumnurjui le kumnurjui ji na.

difference-compare (contrast) that [passive] short-saying of the-former common-opinion (consensus) (with) the consensus that-is now.

BIBLIOGRAPHY

(*TLn* refers to *The Loglanist*, Vol. n.)

Aho, A.V., S.C. Johnson and J.D. Ullman.

(1975) Deterministic parsing of ambiguous grammars. *Comm. ACM* 18:8, 441-52

Bar-Hillel Y.

(1963) *Four Lectures on Algebraic Linguistics and Machine Translation*. Applied Logic Branch, Hebrew University, Jerusalem, (mimeographed)

Bar-Hillel Y., M. Perles and E. Shamir.

(1960) *On Formal Properties of Simple Phrase Structure Grammars*. Applied Logic Branch, Tech. Report No. 4, Hebrew University, Jerusalem

Barton, C.J.

(1978a) On Adding 'H'. *TL2*:203-5

(1978b) The Transcription of C, J, H, S & G Target Language Sounds into Loglan. *TL2*:216-223

(1978c) How to Form a New C-Prim. *TL2*:224-47

Bichakjian, B.H.

(1988) *Evolution in Language*. Karoma, Ann Arbor, Michigan

Bickerton, D.

(1981) *Roots of Language*. Karoma, Ann Arbor, Michigan

Brown, J.C.

(1987) *Notebook 3: The Present State of the Loglan Language*. The Loglan Institute, Gainesville, Florida

(1984a) Loglan Grammar in Evolutionary Perspective. *TL7*:2-7

(1984b) The Teaching Corpus. *TL7*:10-80

(1983a) The Great Morphological Revision, 1978-1983. *TL6*:2-17

(1983b) The New Morphology. *TL6*:18-46

(1983c) Morphology and Emotion in Evolutionary Perspective. *TL6*:68-80

(1982a) *Notebook 1: The Machine Grammar and Corpus of Loglan*. The Loglan Institute, Gainesville, Florida

(1982b) *Notebook 2: A Proposed Revision in the Structure of Loglan Words*. The Loglan Institute, Gainesville, Florida

(1980a) The Great Morphological Revision (GMR). *TL4*:5-20

(1980b) Report on GMR. *TL4*:109-17

(1980c) Sec. 4.6.6 Lio, in J. Parks-Clifford (1980b):50-52

(1979a) The Search for a Resolvable Affix System. *TL3*:23-45

(1979b) Long Primitives & Decipherable Complexes: A Footnote on the Resolvable Affixes Problem. *TL3*:196-9

(1979c) On *TL2/1*, February 1978: RR on Descriptors. *TL3*:222-5

(1979d) On *TL2/1*, February 1978: RD on Descriptors, Copulas and Subordinators. *TL3*:225-6

(1979e) Commentary on *TL3* by JCB: RWJ on Chinese Resultatives. *TL3*:288

(1979f) On *TL3/2*, March 1979: Everybody on Quotation. *TL3*:303-4

(1979g) On *TL3/2*, March 1979: JSP on Quoting Non-Loglan *TL3*:305-6

- (1979h) A Third Predicate Lineage: A Footnote to a Footnote. *TL3*:319-320
- (1977a) On the Creatures of Lo. *TL1*:176-9
- (1977b) On 'Pretty Little Girls School', Part 1, Dialogue 3. *TL1*:204-5
- (1977c) A Companion for Short-Scope Ge. *TL1*:288-294
- (1975) *Loglan 1: A Logical Language*. 3rd edition. The Loglan Institute, Gainesville, Florida
- (1975a) *Loglan 4 and 5: A Loglan-English/English-Loglan Dictionary*. 2nd edition. The Loglan Institute, Gainesville, Florida
- (1969) *Loglan 1: A Logical Language*, 2nd edition. University Microfilms (Cat. No. S-398), Ann Arbor, Michigan
- (1969a) *Loglan 2: Methods of Construction*. University Microfilms (Cat. No. S-399), Ann Arbor, Michigan.
- Reprinted in *TL1&2*:
- Ch. 1:
Loglan Phonology. *TL2*:17-30.
- Ch. 2:
The Resolvability of Loglan Words. *TL1*:353-63.
- Ch. 3:
The Selection of Primitives. *TL*:305-11.
- Ch. 4:
The Derivation of Primitives. *TL1*:364-76.
- Ch. 5:
The Construction of Complex Predicates. *TL1*:296-304.
- Ch. 6:
The Word-Order Problem. *TL1*:54-61.
- Ch. 7:
The Formal Grammar *TL1*: 113-59.
- Ch. 8:
A Note on Loglan Semantics. *TL2*:31-41
- Ch. 9:
The Place-Structure of Predicates. *TL1*:101-9.
- Ch.10:
A Provisional System of Tense Operators. *TL1*:377-81.
- Ch.11:
A Provisional System of Location Operators. *TL1*:382-85.
- Ch.12:
Some Alternative Ways of Making Scientific Words. *TL1*:386-90
- (1966) *Loglan: A Logical Language*. The Loglan Institute, Gainesville, Florida
- (1960) Some Observations on the Loglan Predicate. *International Language Review*, 6:21, December
- (1960a) Loglan. *Scientific American*, June
- (1956) *Loglan: An Experiment in Language Construction*. Dept. of Sociology and Anthropology, University of Florida, Gainesville (mimeographed)
- Brown, J.C., and L.F. Brown
- (1969) *Loglan 3: Learning Loglan*. University Microfilms (Cat. No. S-400), Ann Arbor, Michigan

- (1969a) *Loglan 4: A Loglan-English Dictionary*. University Microfilms (Cat. No. S-401), Ann Arbor, Michigan
- (1969b) *Loglan 5: An English-Loglan Dictionary*. University Microfilms (Cat. No. S-402), Ann Arbor, Michigan
- Brown, J.C., and W. Greenhood
- (1988) Paternity, Jokes & Song: A Possible Evolutionary Scenario for the Evolution of Language and Mind, with commentary by G.W. Hewes, C.T. Hodge, L. Lieberman, Y. Masuda, F.G. Patterson et al., R.C. Pile and J. Wind. *Proc. of the Poznan Conference on the Biology of Language*. In press
- (1985) Paternity Jokes & Song: A Possible Evolutionary Scenario for the Evolution of Language & Mind. *Cultural Futures Research* 8/2:7-53, Winter
- Brown, J.R.
- (1979) Some Food Words. *TL3*:123-125
- (1977a) On Internal Connectives. *TL1*:273-8
- (1977b) Comment on Binary Ge, #2. *TL1*:285-6
- Carnap, R.
- (1937) *The Logical Syntax of Language*. Kegan Paul, London
- (1948) *Introduction to Semantics*. Harvard, Cambridge
- Carter, J.F.
- (1981) Loglan Names. *TL5*:20-7
- Chapman, S.
- (1978) Packed and Unpacked Predicate Spaces. *TL2*:148-151
- Chomsky, N.
- (1963) *Formal Properties of Grammars*. In R.D. Luce, R.R. Bush, E. Galanter (eds.) *Handbook of Mathematical Psychology*, Vol. II. Wiley, New York
- (1961) On the Notion 'Rule of Grammar'. In Jakobson (1961)
- (1957) *Syntactic Structures*. Mouton and Co., 's-Gravenhage
- (1956) Three Models for the Description of Language. *IRE Trans. on Inform. Theory*, pp. 113-124 and Schutzenberger, M.
- (1963) The Algebraic Theory of Context-Free Languages. In P. Braffort and D. Hirschberg (eds.), *Computer Programming and Formal Systems*, North-Holland, Amsterdam
- Darwin, R.
- (1979) A Rebuttal on Phonemes. *TL3*:241
- (1978a) Descriptors and Subordinators. *TL2*:164-6
- (1978b) On Consonant Clusters. *TL2*:206
- Eaton, H. S.
- (1940) *Semantic Frequency List*. Univ. of Chicago, Chicago
- Empson, W.
- (1930) *Seven Types of Ambiguity*. Chatto and Windus, London
- Feigl, H., and W. Sellars (eds.)
- (1949) *Readings In Philosophical Analysis*. Appleton-Century-Crofts, New York
- Fillmore, C.
- (1968) The Case for Case. In E. Bach and R.T. Harms (eds.), *Universals In Linguistic Theory*, p.1-88. Holt, Rinehart and Winston, New York
- Fodor, J.A., and J.J. Katz (eds.)

- (1964) *The Structure of Language*. Prentice-Hall, Englewood Cliffs, N.J.
- Forster, P.G.
 (1982) *The Esperanto Movement*. Mouton, London
- Frege, G.
 (1892) On Sense and Nominatum. Reprinted in Feigl and Sellars (1949)
- Goodman, N.
 (1951) *The Structure of Appearance*. Harvard, Cambridge
- Greenberg, J.H. (ed.)
 (1966) *Universals of Language*, 2nd edition M.I.T., Cambridge
 (1966a) Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements. In Greenberg (1966)
- Greenberg, J.H., Osgood, C.E. and Jenkins, J.J.
 (1966) Memorandum Concerning Language Universals. In Greenberg (1966)
- Greibach, S.
 (1963) Inverses of Phrase Structure Generators. In *Mathematical Linguistics and Automatic Translation*. Report NSF-11, The Computation Laboratory of Harvard University, Cambridge
- Halle, M.
 (1964) On the Bases of Phonology. In Fodor and Katz (1964)
- Harris, Z.S.
 (1952) Discourse Analysis. *Language*, 28, 1-30; reprinted in Fodor and Katz (1964)
 (1951) *Structural Linguistics*. University of Chicago, Chicago
- Hickerson, D.
 (1977) On 'Pretty Little Girls School', Part 1, Dialogue 3. *TLI*:204
- Hockett, C.F.
 (1961) Grammar for the Hearer. In Jacobson (1961)
 (1954) Chinese Versus English: An Exploration of the Whorfian Theses. In H. Hoijer (ed.), *Language in Culture*. University of Chicago, Chicago.
- Jacob, H. (ed.)
 (1946) *On the Choice of a Common Language*. Pitman, London
- Jacobson, R. (ed.)
 (1961) *Structure of Language and its Mathematical Aspects*. *Proc. 12th Sympos. in Appl. Math*, Amer. Math. Soc., Providence, R. I
- Jespersen, O.
 (1937) *Analytic Syntax*. Levin and Hunksgaard, Copenhagen
- Johnson, R.W.
 (1979) A Grammatical Form Based on the Chinese Resultative Verb. *TL3*:86-9
 (1978) Revised Loglan Phoneme Set. *TL2*:207-9
- Johnson, S.C.
 (1975) YACC--Yet Another Compiler Compiler. *CSTR 32*. Bell Laboratories, Murray Hill, NJ.
- Kuno, S.
 (1963) The Multiple-Path Syntactic Analyzer for English *Mathematical Linguistics and Automatic Translation*, Report NSF-9. The Computation Laboratory of Harvard University, Cambridge and A.G. Oettinger.

- (1963) The Multiple-Path Syntactic Analyzer. *Mathematical Linguistics and Automatic Translation*, Report NSF-8. The Computation Laboratory of Harvard University, Cambridge
- Layson, S.W.
 (1979) Measurement Statements in Loglan. *TL3*:70-80
- LeChevalier, R.J.
 (1985) Hyphens. *Lognet* No.51.5
- Leech, G.
 (1981) *Semantics: The Study of Meaning*, 2nd Edition. Penguin, Harmondsworth
- Lovatt, A.S.
 (1977) Consonant Combinations. *TL1*:183-4
- May, R.
 (1981) RMR: Radical Morphological Revolution or Rex May's Response. *TL5*:125-31
- McCawley, J.D.
 (1979) *Adverbs, Vowels, and Other Objects of Wonder*. University of Chicago, Chicago
- McCreight, K., and J.C. Brown.
 (1978) The Timeless Tense: Challenge and Response. *TL2*:53-4
- McCreight, K., J.C. Brown and J. Parks-Clifford.
 (1979) More on "Timeless Tense" & Potency. *TL3*:264-72
- McIvor, R.A.
 (1983) Comments on the GMR Notebook. *TL6*:59-63
 (1981a) Results of Taste Test 1. *TL5*:111-5
 (1981b) Results of Taste Test 2. *TL5*:116-20
 (1981c) Results of Taste Test 3. *TL5*:121-4
 (1980) A Proposal for Tones for Loglan. *TL4*:229-30
- Meijer, R.W.
 (1977a) Some Comments on Predicate Expressions *TL1*:208-13
 (1977b) Some Comments on Internally Connected Predicates *TL1*:213-4
 (1977c) Some Comments on '(P(LG))S'. *TL1*:287
- Mengarini, W.
 (1977a) On 'Pretty Little Girls School', Part 1, Dialogue 2. *TL1*:203-4
 (1977b) Comment on Binary Ge, #1. *TL1*:284-5
 (1977c) Status Report on Quotational Paradoxes. *TL1*:321-6
 (1976) Two Specialized Descriptors for Loglan. *TL1*:34-5
- Morris, C.W.
 (1964) *Signification and Significance*. M.I.T., Cambridge
 (1946) *Signs, Language and Behavior*. Prentice-Hall, New York
 (1938) *Foundations of a Theory of Signs*. Encyclopedia of Unified Science, Vol.1, pp.77-137, University of Chicago, Chicago
- Oettinger, A.G.
 (1961) Automatic Syntactic Analysis and the Pushdown Store. In Jacobson (1961)
- Ogden, C.K.
 (1933) *The Basic Words*. Kegan Paul, London
- Ogden, C.K., and I.A. Richards.
 (1938) *The Meaning of Meaning*. Kegan Paul, London
- Osgood, C.E.

- (1966) Language Universals and Psycholinguistics. In Greenberg (1966)
- (1960) The Cross-Cultural Generality of Visual-Verbal Synesthetic Tendencies. *Behavioral Science* 5, pp.146-169
- Parks-Clifford, J.
- (1980a) Imported Names and Legitimate Finals: An Inquiry. *TL4*:127-30
- (1980b) Supplement to Loglan 1: 1975-1980. *TL4/3*, a special issue
- (1979) on (CCV)ⁿ Complexes. *TL3*:273-76
- (1978) Comments on Loglan Phonological Questions. *TL2*:211-5
- (1977a) Mr. Lovett's Proposed Consonant Combinations *TL1*:185-7
- (1977b) On 'Pretty Little Girls School', Part 1, Dialogue 1 *TL1*:193-8
- (1977c) On 'Pretty Little Girls School', Part 1, Dialogue 2 *TL1*:203
- (1977d) On 'Pretty Little Girls School', Part 1, Dialogue 4 *TL1*:207
- (1977e) Interpretations of PLGS. *TL1*:278-80
- (1977f) Binary Ge. *TL1*:280-3
- (1977g) The Case of the Missing Right Binder: A Summary of PLGS. *TL1*:294-5
- (1977h) Predicate Packing. *TL1*:391-6
- (1977i) The Inclusion of H. *TL1*:327-8
- Parlette, R.R.W.
- (1978) Two Proposals for Unpacking. *TL2*:49
- Polya, G.
- (1954) *Mathematics and Plausible Reasoning*, 2 Vols Princeton
- Prothero, J.
- (1981) Simplicity in GMR. *TL5*:109-10
- (1979) Ambiguity in Li ... Lu. *TL3*:154-5
- Quine, W.V.
- (1961) *Methods of Logic*. 2nd Edition. Holt, New York
- (1961a) *From a Logical Point of View*. 2nd Edition. Harvard, Cambridge
- (1960) *Word and Object*. Wiley, New York
- (1958) Speaking of Objects. *Proc. and Addresses of the Amer. Philos. Assoc.*, 1957-58, Antioch, Yellow Springs; reprinted in Fodor and Katz (1964)
- Reichenbach, H.
- (1948) *Elements of Symbolic Logic*. Macmillan, New York
- Rosenberger, R.
- (1981) On Loglan Names. *TL5*:18-9
- (1978) Loglan Descriptors. *TL2*:159-63
- Russell, B.
- (1905) On Denoting. *Mind* 14. Reprinted in Feigl and Sellers (1949)
- Ryle, G.
- (1962) *Dilemmas*. Cambridge, England
- (1961) Use, Usage and Meaning. *Proc. of the Aristotelian Soc.*, Supp. Vol. XXXV
- Sapir, E.
- (1921) *Language*. Harcourt Brace, New York
- Shamir, E.
- (1961) *On Sequential Languages*. Applied Logic Branch, Tech. Report No.4, Hebrew University, Jerusalem
- Thomas, R.

- (1977) On 'Pretty Little Girls School', Part 1, Dialogue 1. *TLI*:193,198-202
- Walsh, B.
(1983) Joint Lubrication. *TL6*:55
- Weinreich, U.
(1966) On the Semantic Structure of Language. In Greenberg (1966)
- White, M.G.
(1950) The Analytic and the Synthetic: An Untenable Dualism. In S. Hook (ed.) *John Dewey: Philosopher of Science and Freedom*. Dial Press, New York
- Whorf, B.L.
(1956) *Language, Thought and Reality*. J.B. Carroll (ed.) M.I.T., Cambridge
- Wise, C.M.
(1957) *Applied Phonetics*. Prentice-Hall, Englewood Cliffs, N.J.
- Wright, K.
(1977) On 'Pretty Little Girls School', Part 1, Dialogue 4. *TLI*:205-7
- Wu Jingrong
(1983) (ed) *The Pinyin Chinese-English Dictionary*. The Commercial Press, Beijing, and Wiley, New York
- Yngve, V.H.
(1961) A Model and a Hypothesis for Language Structure, *Proc. of the Amer. Philos. Soc.*, 104;444- 466
- Ziff, P.
(1960) *Semantic Analysis*. Cornell, Ithaca, N.Y.
- Zipf, G. K.
(1935) *The Psycho-Biology of Language*. Houghton Mifflin, Boston
- Zwicky, A.M.
(1969) Review of 'Loglan: A Logical Language' *Language*, vol. 45, No. 2; 444-457