Typology and Universals
Second Edition

WILLIAM CROFT

Department of Linguistics
University of Manchester

CAMBRIDGE
UNIVERSITY PRESS

PUBLISHED BY THE PRESS SYNDICATE OF THE UNIVERSITY OF CAMBRIDGE
The Pitt Building, Trumpington Street, Cambridge, United Kingdom

CAMBRIDGE UNIVERSITY PRESS
The Edinburgh Building, Cambridge CB2 2RU, UK
40 West 20th Street, New York, NY 10011-4211, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
Ruiz de Alarcón 13, 28014 Madrid, Spain
Dock House, The Waterfront, Cape Town 8001, South Africa

http://www.cambridge.org

© William Croft 1990, 2003

This book is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without
the written permission of Cambridge University Press.

First published 1990
Reprinted 1993, 1996
Second Edition 2003

Printed in the United Kingdom at the University Press, Cambridge

Typeface Times 10/13 pt *System* LaTeX 2$_\varepsilon$ [TB]

A catalogue record for this book is available from the British Library

Library of Congress Cataloguing in Publication data

Croft, William.
Typology and universals / William Croft. – 2nd edn.
p. cm. – (Cambridge textbooks in linguistics)
Includes bibliographical references and index.
ISBN 0-521-80884-7 – ISBN 0-521-00499-3 (pbk.)
1. Typology (Linguistics) 2. Universals (Linguistics) I. Title. II. Series.
P204 .C7 2002
410′.1 – dc21 2002019247

ISBN 0 521 80884 7 hardback
ISBN 0 521 00499 3 paperback

Contents

List of figures *page* xii
List of tables xiii
Preface to the second edition xv
Preface to the first edition xvii
List of abbreviations xix
List of symbols xxiv

1 Introduction 1
1.1 What is typology? 1
1.2 Typology, universals and generative grammar 4
1.3 Cross-linguistic comparison 6
1.4 The problem of cross-linguistic comparability 13
1.5 Language sampling for cross-linguistic research 19
1.6 Data sources 28

2 Typological classification 31
2.1 A cross-linguistically valid description of morphosyntactic structures 31
2.1.1 Simple strategies 32
2.1.2 Relational strategies 33
2.1.3 Indexical strategies 34
2.1.4 Classifiers: indexical or relational? 37
2.1.5 More grammaticalized strategies 38
2.1.6 Summary 40
2.2 What is being classified? 42
2.3 Morphological typology 45

3 Implicational universals and competing motivations 49
3.1 Restrictions on possible language types 49
3.2 Unrestricted and implicational universals 52
3.3 Competing motivations 59
3.4 Deeper explanations for word order and affix order universals 69
3.5 Typology, universals and generative grammar revisited 80
3.6 Conclusion 86

4 Grammatical categories: typological markedness, economy and iconicity 87
4.1 Typological markedness 87
4.1.1 Structural coding 91
4.1.2 Behavioral potential 95
4.1.3 Neutral value: not a criterion for typological markedness 100
4.2 Economy and iconicity 101
4.2.1 Structural coding, economy and syntagmatic isomorphism 102
4.2.2 Economy, paradigmatic isomorphism and polysemy 104
4.3 Frequency and deeper explanations for economy and iconicity 110
4.4 Typological asymmetries in word order and phonology 117
4.5 Conclusion 120

5 Grammatical hierarchies and the semantic map model 122
5.1 Grammatical hierarchies and implicational universals 122
5.2 The animacy and definiteness hierarchies 128
5.3 A deeper explanation for hierarchies and categories: the semantic map model 133
5.4 Conceptual spaces, structural coding and behavioral potential 140
5.5 The grammatical relations hierarchies 142
5.5.1 The external definition of grammatical relations 142
5.5.2 Subject and object, ergative and absolutive 144
5.5.3 Objects: direct and indirect, primary and secondary 152
5.5.4 The conceptual space for grammatical relations 154
5.6 Conclusion 155
Appendix: typological markedness patterns in grammatical categories 156

6 Prototypes and the interaction of typological patterns 158
6.1 Interactions of categories 158
6.1.1 Place of articulation 158
6.1.2 Person 160
6.2 Interactions of values: typological prototypes 162
6.3 Grammatical relations 165
6.3.1 Animacy, definiteness and participant roles 166
6.3.2 Transitivity 175
6.3.3 Deeper explanations for the typology of grammatical relations 178
6.4 Parts of speech 183
6.5 Other prototypes and markedness reversals 188
6.6 Conclusion 192

7 Syntactic argumentation and syntactic structure in typology 194
7.1 Typology and syntactic argumentation 195
7.2 Iconicity, economy and syntactic structure 201
7.2.1 Conceptual distance and constituent structure 205
7.2.2 Syntactic and conceptual independence 213
7.2.3 The encoding of objects and events 219
7.2.4 Other universals of linguistic structure 224
7.3 Typological conspiracies and communicative motivation 226
7.4 Conclusion 231

8 Diachronic typology 232
8.1 The dynamicization of synchronic typology 232
8.2 From states to processes 244
8.3 Grammaticalization 253
8.3.1 Phonological processes 254
8.3.2 Morphosyntactic processes 257
8.3.3 Functional processes 261
8.3.4 Issues in grammaticalization 264
8.3.5 Explanations for grammaticalization 268
8.4 Inferring diachrony from synchrony 272
8.5 Conclusion 279

9 Typology as an approach to language 280
9.1 Scientific approaches (research traditions) and linguistic theories 280
9.2 Thinking like a typologist 282
9.3 Description, explanation and generalization 283
9.4 Typology, the Saussurean dichotomies and the evolutionary model 286

List of references 291
Map of languages cited 313
Author index 324
Language index 329
Subject index 333

Figures

2.1 Diachronic paths for dependency codings *page* 40
3.1 Harmonic relations between word orders based on evidence in Greenberg 1966a and Hawkins 1983 63
3.2 Correlations between word orders based on evidence in Dryer 1992a 73
3.3 Correlations between word orders based on log-linear analysis 75
3.4 Attested constructional changes across word orders analyzed by Justeson and Stephens 1990 78
4.1 Form–meaning correspondence in *This car runs* 103
5.1 Semantic maps of plural inflection in various languages 134
5.2 Conceptual space for indefinite pronouns 135
5.3 Semantic map of Hungarian indefinite pronouns 137
5.4 Semantic maps of plural inflection and plural indexation 142
5.5 Conceptual space for participant roles in transitive and intransitive situations 145
5.6 Attested semantic maps of syntactic roles defined by case-marking 145
5.7 Conceptual space for intransitive, transitive and ditransitive participant roles 154
6.1 Semantic maps for animate/definite direct objects 168
6.2 Semantic maps for incorporation in Southern Tiwa 169
6.3 Semantic maps of Dyirbal and Cashinawa split ergativity 173
6.4 Semantic map for Lummi active and passive constructions 175
6.5 Conceptual space for parts of speech 187
6.6 Semantic map of English parts of speech constructions 188
6.7 The causal structure of typological markedness 193
8.1 Dynamicization of a word order universal 238
8.2 Conceptual space for basic color terms 277

Tables

3.1	Dominance patterns for word order universals	*page* 61
3.2	The OV and VO word order types	72
3.3	Predicted and attested language types for the pro-drop parameter	82
3.4	Universals and evidence for universals pairs of pro-drop properties	83
4.1	Possible form–meaning correspondences in syntagmatic isomorphism	104
4.2	Possible form–meaning correspondences in paradigmatic isomorphism	106
4.3	Asymmetric cross-linguistic patterns among paradigmatic alternatives	120
6.1	Prototypical transitivity	176
6.2	Overtly marked structural coding constructions for parts of speech	185
7.1	Linguistic distance among expressions of possession	206
7.2	Low categoriality ‘noun’ and ‘verb’ types, and their clustering patterns	214
7.3	Distribution of [−case] and [+case] relativization strategies	230
8.1	Dynamicization of typological markedness	241
8.2	Evolution of word order in Ethiopian Semitic languages	249
8.3	Grammaticalization processes	255
8.4	Clustering and grammaticalization	259
8.5	Two- to five-term basic color term systems	277

Abbreviations

The abbreviations for grammatical morphemes and categories have been standardized in the examples, in accordance with the abbreviations adopted by the Framework for Descriptive Grammars project (Bernard Comrie, William Croft, Bruce Harold, Christian Lehmann and Dietmar Zaefferer) in 1991, and subsequently adopted (with some modifications) by the European Typology project. Abbreviations in this list have a maximum length of five, and were designed to eliminate ambiguity, maintain uniqueness of abbreviation, and to render some less-used abbreviations more 'natural'. All of the standard abbreviations are listed here, in the hope that their use will become more widespread. Some additional abbreviations found in the examples are also listed below. At the end of the list, abbreviations found in the text, where they are different from those found in the examples, are listed.

1	first person
2	second person
3	third person
12	first person dual inclusive (if treated as a quasi-singular)
A	transitive agent
ABESS	abessive ('without')
ABL	ablative ('from')
ABS	absolutive case
ABSL	absolute form
ABST	abstract (nominalization)
ACC	accusative
ACCID	accidental (action)
ACCESS	accessory (case)
ACT	active
ACTR	actor
ADESS	adessive ('on')
ADJR	adjectivalizer
ADM	admonitive
ADVRS	adversative
ADVR	adverbializer
AFF	affirmative
AFFCT	affective
AG	agent(ive)
AL	alienable
ALL	allative ('to')
ALLOC	allocutive
AN	animate
ANA	anaphoric
ANT	anterior
ANTI	antipassive
AOR	aorist
APPL	applicative
ART	article
ASP	aspect
ASS	assertive

ASSOC	associative
AT	attributor
AUG	augmentative
AUX	auxiliary
AVERS	aversive
BEN	benefactive
BUFF	phonological buffer element
CARD	cardinal (numeral)
CAUS	causative
CIRC	circumstantial
CLF	classifier
CLn	noun class n
CMPL	completive
CMPR	comparative
CONJ	conjunction
CJPRT	conjunctive participle
CO	co-ordinator
COLL	collective
COM	comitative
COMP	complementizer
CONC	concessive
COND	conditional
CONN	connective
CONST	construct form
CONT	continuous
CONTR	contrastive
COP	copula
CORR	correlative
CUST	customary
D1	deictic of 1 person
D2	deictic of 2 person
D3	deictic of 3 person
D12	deictic of 12 person
DAT	dative
DECL	declarative
DEF	definite
DEFR	deferential
DEM	demonstrative
DEP	dependent verb form
DER	derivational morpheme
DES	desiderative
DET	determiner
DETR	detransitivizer
DIM	diminutive
DIR	directional
DIST	distal (=3 person deictic)
DITR	ditransitive
DO	direct object
DS	different subject
DSTR	distributive
DU	dual
DUB	dubitative
DUR	durative
DWNT	downtoner
DYN	dynamic (vs. stative)
EL	elative ('out of')
EMPH	emphatic
EQT	equative (adjective)
ERG	ergative
ESS	essive ('as')
EVID	evidential
EX	exclusive
EXCL	exclamation
EXST	exist(ence)
F	feminine
FACT	factitive
FAM	familiar
FIN	finite
FNL	final position marker
FOC	focus
FREQ	frequentative
FRM	formal
FUT	future
G	ditransitive 'goal'
GEN	genitive
GER	gerund (verbal adverb)
GNR	generic
HAB	habitual
HEST	hesternal (past, future)
HOD	hodiernal (past, future)

HON	honorific
HORT	hortative
HUM	human
HYP	hypothetical
ILL	illative ('into')
IMM	immediate (past, future)
IMP	imperative
IMPF	imperfect(ive)
IMPR	impersonal
IN	inclusive
INAL	inalienable
INAN	inanimate
INCH	inchoative
INCP	inceptive
IND	indicative
INDF	indefinite
INESS	inessive ('in')
INF	infinitive
INFR	inferential evidential
INGR	ingressive
INJ	injunctive
INST	instrumental
INT	interrogative
INTR	intransitive
INTS	intensifier/intensive
INV	inverse
INVS	invisible
IO	indirect object
IRR	irrealis
ITER	iterative
JUSS	jussive
LIG	ligature
LNK	linker
LOC	locative
LOG	logophoric
M	masculine
MAL	malefactive
MAN	manner
MDL	modal
MED	medial (verb form)
MEDP	mediopassive
MEDT	mediate (= 2 person deictic)
MID	middle
MOD	modifier
N	neuter
NARR	narrative (tense)
NCLF	numeral classifier
NCMP	noncompletive
NEAR	near (past, future)
NEC	necessity
NEG	negative
NFNL	nonfinal position marker
NFOC	nonfocus
NFUT	nonfuture
NHUM	nonhuman
NOM	nominative
NPST	nonpast
NR	nominalizer
NSG	nonsingular
NSPEC	nonspecific
NTOP	nontopic
NVOL	nonvolitional
OBJ	object
OBL	oblique
OBLG	obligative
OBV	obviative
OPT	optative
ORD	ordinal (numeral)
P	transitive patient
PART	participle
PASS	passive
PAU	paucal
PCLF	possessive classifier
PEJ	pejorative
PFCT	perfect
PL	plural
PLT	pluritive
PLUP	pluperfect
PNCT	punctual
PO	primary object

POL	polite
POSS	possessive
POST	postposition
POT	potential
PRED	predicative
PREP	preposition
PREV	preverb
PRF	perfective
PRN	pronoun
PROG	progressive
PROH	prohibitive
PROL	prolative ('along')
PROX	proximal
PRS	present
PRT	preterit
PRTT	partitive
PRVT	privative ('without')
PRXT	proximate (= 1 person deictic)
PST	past
PTCL	particle
PURP	purpose, purposive
QUAD	quadral
QUOT	quotative
RDP	reduplication
REC	recent (past)
RECP	reciprocal
REF	referential
REFL	reflexive
REFR	referential ('about')
REL	relative clause marker (other than relative pronoun)
RPRN	relative pronoun
REM	remote (past, future)
REMT	remote (distance)
REP	reportive evidential
RES	resultative
RL	realis
RLT	relative (case)
S	intransitive subject
SBJ	subject
SENS	sensory evidential
SEQ	sequential, consecutive
SG	singular
SGT	singulative
SIM	simultaneous
SMLF	semelfactive
SO	secondary object
SPEC	specific
SS	same subject
STAT	stative
SUBJ	subjunctive
SUBR	subordinator
SUP	superlative
T	ditransitive 'theme'
TEMP	temporal
TERM	terminative
TNS	tense
TOP	topic
TR	transitive
TRNSF	transformative ('as')
TRNSL	translative ('becoming')
TRL	trial
TRNS	transitivizer
UNDR	undergoer
UNSP	unspecified (agent, etc.)
VAL	validator
VERS	version
VIS	visible
VISL	visual evidential
VN	verbal noun
VOC	vocative
VOL	volitional
VR	verbalizer

Additional abbreviations found in the text:

A, Adj	adjective
Adp	adposition
Adv	adverb
CN	common noun
G	genitive
L1	first language
N	noun
NP	noun phrase
Num	numeral
O	object
Ocmpr	object of comparison
Ocomp	object complement
Oprn	object pronoun
OT	Optimality Theory
PP	adpositional phrase
prn	pronoun
Purp	purpose clause
Q	interrogative particle
Rel	relative clause
S	subject
Sent	sentence
Std	standard of comparison
V	verb
VP	verb phrase

Symbols

The following symbols are used in example sentences in the original language and their interlinear morpheme translations, and in symbolic representations of syntactic structures. These symbols follow the conventions found in Lehmann (1982a), revised by the Framework for Descriptive Grammars project (Bernard Comrie, William Croft, Bruce Harold, Christian Lehmann and Dietmar Zaefferer) in 1991.

In both original language and interlinear morpheme translation:

x y	word boundary between x and y
x-y	morpheme boundary between x and y
x + y	x and y form a compound or a derivative stem
x = y	x and y are joined by clisis
$x_i \ldots y_i$	x and y are coreferential elements

In original language only:

Ø	null expression of meaning (optionally represented)
a<x>b	x is an infix, a . . . b is the discontinuous root/stem
a>y<b	a . . . b is a circumfix, y is the root/stem

In interlinear morpheme translation only:

(x)	x is not overtly marked in the original (i.e. null expression of meaning)
y<x>	x is the infix, a . . . b = y is the root/stem
<x>y	a . . . b = x is the circumfix, y is the root/stem
x \ y	y is an internal modification of lexeme x in the original
x:y	morpheme boundary between x and y not shown in the original
x.y	x and y are grammatical (sub)categories of one original language morpheme
x/y	x acts on y (indexation)
[x]	x is a syntactic constituent in the original language

$[x]_Y$	x is a syntactic constituent of category Y in the original language
[X Y Z]	a construction consisting of elements X, Y and Z, whose linear order is not necessarily fixed

The following logical symbols are used in the text in the formulation of language universals:

$P \& Q$	P and Q
$P \vee Q$	P or Q
$P \supset Q$	if P, then Q
$P \equiv Q$	P if and only if Q
$\sim P$	not P

1 Introduction

1.1 What is typology?

The term **typology** has a number of different uses, both within linguistics and without. The common definition of the term is roughly synonymous with 'taxonomy' or 'classification', a classification of the phenomenon under study into types, particularly structural types. This is the definition that is found outside of linguistics, for example in biology, a field that inspired linguistic theory in the nineteenth century.

The most unassuming linguistic definition of typology refers to a classification of structural types across languages. In this definition, a language is taken to belong to a single type, and a typology of languages is a definition of the types and an enumeration or classification of languages into those types. We will refer to this definition of typology as **typological classification**. The morphological typology of the nineteenth and early twentieth centuries is an example of this use of the term. This definition introduces the basic connotation that the term typology has in contemporary linguistics: typology has to do with **cross-linguistic comparison** of some sort. Methodological issues in cross-linguistic comparison will be discussed in §§1.3–1.6, while chapter 2 will be devoted to the notion of a linguistic type, including morphological typology, and its refinements in twentieth-century research.

A second linguistic definition of typology is the study of patterns that occur systematically across languages. We will refer to this definition of typology as **typological generalization**. The patterns found in typological generalization are language **universals**. The classic example of a typological universal is the implicational universal. An example of an implicational universal is the generalization, 'if the demonstrative follows the head noun, then the relative clause also follows the head noun.' This universal cannot be discovered or verified by observing only a single language, such as English. One has to do a general survey of languages to observe that the language type excluded by the implicational universal – namely a language in which the demonstrative follows the head noun and the relative clause precedes it – indeed does not exist.

Typological generalization is generally regarded as a subdiscipline of linguistics – not unlike, say, first language acquisition – with a particular domain of linguistic facts to examine: cross-linguistic patterns. Typology in this sense began in earnest with Joseph H. Greenberg's discovery of implicational universals of morphology and word order, first presented in 1960 (Greenberg 1966a). The primary purpose of the present volume is to discuss the kinds of cross-linguistic patterns that have been discovered and the methodological and empirical issues raised by the study of these patterns. Chapters 3–7 are devoted to discussing these patterns and the empirical and methodological issues that their discovery raises. The kinds of cross-linguistic patterns actually found represent a coherent set of language universals which are basic phenomena to be explained by any linguistic theory.

The third and final linguistic definition of typology is that typology represents an approach or theoretical framework to the study of language that contrasts with prior approaches, such as American structuralism and generative grammar. In this definition, typology is an approach to linguistic theorizing, or more precisely a methodology of linguistic analysis that gives rise to different kinds of linguistic theories than found in other approaches. Sometimes this view of typology is called the Greenbergian, as opposed to the Chomskyan, approach to linguistic theory (after their best known practitioners; see, for example, Smith 1982:256). This view of typology is closely allied to **functionalism**, the view that linguistic structure should be explained primarily in terms of linguistic function (the Chomskyan approach is contrastively titled **formalism**). For this reason, typology in this sense is often called the **(functional–)typological approach**, and will be called so here. More precisely, we may characterize this definition of typology as **functional–typological explanation**. The functional–typological approach became generally recognized in the 1970s; important figures beginning at that time include Givón, Haiman, Comrie, Hopper and Thompson. Functional–typological explanation has well-established historical antecedents, however (see Haiman 1985 and chapter 9), not least Greenberg himself.

The three linguistic definitions of typology correspond to the three stages of any empirical scientific analysis. Typological classification represents the observation of an empirical phenomenon (language) and classification of what we observe. Typological generalization – language universals – is the formation of generalizations over our observations. And the functional-typological approach constructs explanations of the generalizations over what we have observed. In this sense, typology represents an **empirical scientific** approach to the study of language.

Of course, in any empirical science the actual process of doing science does not proceed in these three discrete stages. In particular, explanations offer themselves at all stages in the scientific process. We will present typological explanations of

language universals as the universals themselves are introduced in chapters 3–7. The explanatory models used by typologists include competing motivations, economy, iconicity, processing, semantic maps in conceptual space, and a rethinking of syntactic argumentation. One significant dimension of typological explanation is that explanations of many grammatical phenomena are fundamentally diachronic, not synchronic. The diachronic approach requires a fundamental rethinking of typological principles, and is discussed in chapter 8. Chapter 9 then summarizes the approach to language that typology presents.

Not surprisingly, these differing definitions of typology – typological classification, typological generalization and functional–typological explanation/approach – have led to some confusion about what typology is, or is supposed to be. For example, it is sometimes claimed that typology is 'merely descriptive' or 'taxonomic'; that is to say, it does not provide a means for developing theories of language which can function as an alternative to, for example, generative linguistic theory. This represents a confusion of typological classification with typological generalization and explanation. Typological generalization represents a well-established method of analysis, and the typological approach is now a well-articulated approach to language.

The emphasis on theory and methodology in this volume should not be interpreted as minimizing the descriptive work necessary to develop typological analyses. The descriptive work which has been and, I hope, will continue to be done on the tremendous number of languages in the world is absolutely essential not just to typological theory but to all linguistic theories. Unfortunately, typological studies have often had to withhold or remove their data sections upon publication due to size limitations,[1] while many good descriptive works such as the University of Hawaii Press PALI series of Micronesian language grammars rapidly go out of print. The attitude that descriptive work is not valued (it is 'merely' descriptive or, disparagingly, 'descriptivist') must be abandoned for there to be progress in linguistic theory.

This matter becomes even more urgent because of the alarming loss of the empirical data base for linguistic theory. Hundreds of languages have become extinct in the last century. Hundreds, perhaps thousands, of others no longer survive in viable speech communities; the languages are dying and there are often serious consequences affecting grammatical structure. This situation is getting worse, not

[1] On some occasions, the data is published elsewhere. The data for Keenan and Comrie's study on the Noun Phrase Accessibility Hierarchy (Keenan and Comrie 1977; see chapter 5) was eventually published in another journal (Keenan and Comrie 1979); the data from Maxwell's study on linearization (Maxwell 1984) was published by a linguistics department (Maxwell 1985); and the data on Kortmann's study of adverbial subordinators in European languages (broadly construed; Kortmann 1997) was published on diskette by LINCOM Europa.

better, and is finally achieving the attention it deserves (Dorian 1981; Krauss 1992; Crystal 2000; Nettle and Romaine 2000). The empirical problems with language research parallel the problems in biological research, in particular in evolutionary theory and ecology: the extinction of languages and the loss of the linguistic communities is like the extinction of species and the loss of their habitat (ecosystems). In both disciplines it threatens theoretical progress.

1.2 Typology, universals and generative grammar

Greenberg's approach to language universals emerged at about the same time as Chomsky's, in the late 1950s. The conception of language universals in typology and generative grammar is quite different. In this section, we will briefly describe the emergence of Greenberg's and Chomsky's ideas, and the similarities and differences that are found in the two approaches to language (for more detailed discussion, see Hawkins 1988). We will return to the relationship between typology and generative grammar in later chapters in the context of more specific theoretical issues (see §§3.5, 7.2, 9.2–9.3).

Language universals reflect the belief that there exist linguistic properties beyond the essential definitional properties of language that hold for all languages. Although this belief has considerable modern currency, it is by no means a necessary fact or universally-held opinion, and in fact the opposite view was widely held until around 1960. To a considerable degree, the difference between the generative and typological approaches to language universals can be traced to the different traditions to which Chomsky and Greenberg responded. The generative approach represents a reaction against behavioristic psychology, while the typological approach represents a reaction against anthropological relativism.

The behaviorist view of language, in particular language learning, is anti-universalist in that it posits no innate, universal internal mental abilities or schemas. In the behaviorist view, linguistic competence is acquired through learning of stimulus–response patterns. In contrast, the generative approach posits the existence of innate internal linguistic abilities and constraints that play a major role in the acquisition of language. It is these constraints that represent linguistic universals in this approach. The argument used by Chomsky (e.g. Chomsky 1976) for the existence of innate universal linguistic competence refers to the 'poverty of the stimulus'. It is argued that the child has an extremely limited input stimulus, that is, the utterances that it is exposed to from the mother and other caregivers. This stimulus is incapable of permitting the child to construct the grammar of the adult's language in a classic behaviorist model; therefore, the child must bring innate universals of grammatical competence to bear on language acquisition. Hence,

the primary focus on universals in the generative tradition has been on their innate character.

The anthropological relativist view of language is that the languages of the world can vary arbitrarily: 'languages could differ from each other without limit and in unpredictable ways', in Martin Joos' famous passage (Joos 1957:96). This view of language was particularly strong among anthropological linguists studying North American Indian languages, which indeed differ radically in many ways from so-called Standard Average European languages. However, the comparison of one 'exotic' language or a limited number of languages to English only indicates diversity, not the range of variation, let alone limits thereto. Greenberg and others discovered that a more systematic sampling of a substantial number of languages reveals not only the range of variation but constraints on that variation. Those constraints demonstrate that languages do not vary infinitely, and the constraints represent linguistic universals. Hence, the primary focus on universals in the typological tradition has been on their cross-linguistic validity, and on universals that restrict possible language variation (see §3.1).

The innate universals posited by generative grammar are intended to explain linguistic structure. The poverty of the stimulus argument is essentially a deductive argument from first principles (although it does make assumptions about the nature of the empirical input, and what counts as relevant input). The poverty of the stimulus argument is one aspect of Chomsky's more generally **rationalist** approach to language. The universals posited by typology are intended to represent inductive generalizations across languages, in keeping with typology's **empiricist** approach to language. Typological universals call for explanation in terms of more general cognitive, social-interactional, processing, perceptual or other abilities. These abilities may also be innate, but they extend beyond language per se. The generative grammarian argues that the discovery of innate principles that the child brings to bear in learning a single language can be extrapolated to language in general (Chomsky 1981). The typologist argues that a grammatical analysis based on one language or a small number of languages will not suffice to reveal linguistic universals; only a systematic empirical survey can do so.

These differences in approach have led to claims that the Greenbergian approach and the Chomskyan approach to language universals and linguistic explanation are diametrically opposed to each other. In fact, there are significant similarities between the generative and (functional–)typological approaches. Both approaches begin with the analysis of language structure. Both approaches consider the central question of linguistics to be 'What is a possible human language?' (though see §§3.1, 8.1). Both approaches are universalist, in contrast to their predecessors. There is broad agreement that there do exist a substantial number of universals that hold of all languages (assuming attested exceptions can be accounted for by

other principled factors). For both approaches, the construction of linguistic generalizations involves abstraction over the data, though the Greenbergian abstracts patterns across languages and the Chomskyan abstracts patterns within languages (see §9.2). Likewise, explanations for linguistic universals rest on universal human abilities, which may or may not be language specific, and which probably have a significant innate component, though perhaps are not entirely innate. In fact, for both generative and typological approaches, the foundations of linguistic explanation are ultimately biological, although for the Chomskyan the biological basis is found in genetics (innate linguistic knowledge) and for the Greenbergian the biological basis is indirect, and is to be found in evolutionary theory (see §9.3; Croft 2000).

Nevertheless, there are two salient distinctive characteristics of the Greenbergian approach: the central role of cross-linguistic comparison, and the close relationship between linguistic form and language function. These two characteristics are discussed in the following two sections.

1.3 Cross-linguistic comparison

The first question that may be asked of typology is, what is the role of cross-linguistic comparison – the fundamental characteristic of typology – in linguistic analysis? Cross-linguistic comparison places the explanation of linguistic phenomena in a single language in a new and different perspective. For example, the distribution of the definite and indefinite articles in English is fairly complex:

(1a) He broke **a vase**.
(1b) He broke **the vase**.
(1c) The concert will be on **Saturday**.
(1d) He went to **the bank**.
(1e) I drank **wine**.
(1f) The French love **glory**.
(1g) He showed **extreme care**.
(1h) I love **artichokes** and asparagus.
(1i) Birds have **wings**.
(1j) His brother became **a soldier**.
(1k) **Dogs** were playing in the yard.

The eleven sentences given above characterize eleven types of uses of the articles (or their absence) in English, given as follows:

(a) specific (referential) indefinite (see §5.2);
(b) specific and definite;
(c) proper name;

(d) specific manifestation of an institution/place;
(e) partitive of a mass noun;
(f) generic mass noun;
(g) specific manifestation of an abstract quality (mass noun);
(h) generic of a count noun;
(i) generic of an indefinite number of a count noun;
(j) predicate nominal;
(k) specific but indefinite number of a count noun.

It might be possible to develop a set of generalizations – an **analysis** – that predicts exactly the distribution of the two articles (including their absence) in English. Such an account may be syntactic, semantic or pragmatic, or a combination of all three. Whatever is the case, it will have to be a fairly complex and subtle analysis, especially since the eleven different construction types given here do not exhaust the possibilities.

At this point, the typologist will ask: what is the significance of these generalizations posited in English for the class of human languages as a whole? Examining even a relatively closely related language, French, produces difficulties for those generalizations. In the exact same contexts, illustrated here by translation equivalents of the English sentences, the distribution of definite and indefinite articles *le/la/les* and *un/une* respectively (and their absence) is quite different:

(2a) Il a cassé **un vase**.
(2b) Il a cassé **le vase**.
(2c) Le concert sera **samedi**.
(2d) Il est allé à **la banque**.
(2e) J'ai bu **du vin**. (du = de + le)
(2f) Les Français aiment **la gloire**.
(2g) Il montra **un soin** extrême.
(2h) J'aime **les artichauts** et les asperges.
(2i) Les oiseaux ont **des ailes**. (des = de + les)
(2j) Son frère est devenu **soldat**.
(2k) **Des chiens** jouaient dans le jardin.

It is quite likely that the analysis of the distribution of the English articles would have to be drastically altered if not abandoned and a new one developed for the distribution of the French ones. In French, we find a more widespread use of both the French definite and indefinite articles, the appearance of the partitive marker *de* plus the definite article, and the absence of the French indefinite article in the predicate nominal construction.

One cannot be certain how much we would have to start all over again, of course, since to the best of my knowledge no complete analysis has been worked out. However, a generalization for a subset of three of the eleven contexts has been proposed,

for the generic count nouns in (h) and (i) and the indefinite number of count-noun usage in (k). Carlson (1977) proposes a unified analysis of the bare plural construction used in both situation types, in which both are of the same semantic type and the differing interpretations are attributed to the semantic type of the predicate. But when we turn to French, we see that in fact two different types of constructions are found – compare 2h and 2i,k – and so this generalization does not clearly apply to the grammatical facts of French. One may try to attribute the difference to the French partitive marker *de*. But if we turn to still other languages such as Rumanian (Farkas 1981:40–45), which distinguish the two uses solely by the presence vs. absence of the article, then we will not be able to invoke such an alternative.

The fact that analyses of linguistic phenomena 'one language at a time' cannot be carried over from one language to the next is somewhat disturbing for the search for language universals. Intricate interactions of internal structural generalizations are proposed by linguists to 'predict' grammatical patterns that do not apply even to neighboring languages. This is true not only in structuralist–generative analyses. Functionalist analyses, which invoke external (semantic or pragmatic) generalizations to account for the distribution of phenomena like the articles of English, often have the same problems:

> Volumes of so-called functionalism are filled with ingenious appeals to perception, cognition or other system-external functional domains, which are used to 'explain' why the language in question simply has to have a grammatical particularity that it does – when a moment's further reflection would show that another well-known language, or even just the next dialect down the road, has a grammatical structure diametrically opposed in the relevant parameter.
> (DuBois 1985:353)

The question here is, to what level of generalization should an analysis of language-specific facts be developed before taking into consideration cross-linguistic patterns? The typologist essentially takes the position that cross-linguistic patterns should be taken into consideration at virtually every level of generalization about human languages (see §9.3).

A cross-linguistic comparative approach – that is the construction of typological generalizations – allows us to make progress on universal characteristics of the distribution of articles, for example, and in turn causes us to reassess an analysis formulated without reference to the facts in other languages.

There are certain generalizations that cut *across* the two languages that are very likely to be characteristic of language in general. For instance, the first three uses, (a)–(c), are identical in English and French, and it is only in the following seven that there is substantial variation between the two languages. With the exception of the (k) use, all of the variable uses across the two languages concern generic

and mass-noun contexts of various sorts. This suggests that there may be some degree of uniformity across languages in specific NP contexts that does not exist in generic and mass NP contexts. (In fact, there is also variation in specific NP contexts, but of a more constrained type; see §8.2.)

There are two important points implicit in this proposed generalization over the English and French facts which summarize the argument for cross-linguistic comparison. The first is that this generalization could not be formulated without looking at more than one language. (Examining still more languages would, of course, further refine this generalization.) That is what makes this analysis of the grammatical phenomenon typological.

The second point pertains to the description and analysis of the grammar of a particular language, given the sorts of cross-linguistic generalizations that exist. Awareness of cross-linguistic variation allows the linguist describing a particular language to provide a more fine-grained description of the phenomenon in question. For example, being aware of the differences between English and French in generic and mass-noun contexts implies that a grammatical description should explicitly indicate how a language with articles expresses or **encodes** those different semantic types of NPs.

A fine-grained description of the linguistic facts of a language is sufficient for descriptive completeness. Of course, one always wants to seek generalizations in the data. Moreover, one would like the generalizations to correspond to some empirically real phenomenon, such as a speaker's knowledge of her (or his) language. If the generalizations are intended to represent a speaker's knowledge of her language, then such an analysis must integrate cross-linguistic comparison, according to the typological approach. For example, the generalizations about the distribution of the articles in both English and French ought to characterize the distribution in specific NP contexts in each language as typical or even universal (if that turns out to be the case), and the distribution in generic and mass NP contexts as arbitrary and language specific, or perhaps subject to other conditions that would be revealed by further cross-linguistic comparison. In this view, the analysis of the articles in French or English would be incomplete – and therefore an inadequate explanation of the phenomenon – if its relationship to cross-linguistic generalizations about articles is not taken into account. The generalizations revealed by examining more than one language at a time are the only ones which can be said to hold of languages in general. A speaker's knowledge of her language involves both universal and language-particular properties.

Until relatively recently, typology has not directed its attention to the relationship between language universals and the generalizations posited in particular language grammars (Croft 1999; §9.1). However, it is not the case that language universals exist independently apart from the linguistic knowledge of language

speakers. More recent typological research has begun to address this question, and has developed models of representing language-particular facts and language universals (see in particular §5.3).

Another illustration of the need for a cross-linguistic approach in formulating linguistic generalizations, and the difference between a cross-linguistic approach and a 'one language at a time' approach, is found in syntactic argumentation. Syntactic arguments are constructed by means of the **distributional method**: one examines the occurrence or **distribution** of a grammatical category in a series of different constructions, and the existence of the category is justified if the distribution pattern is the same across the constructions. For example, in arguing for the category subject in English, the distribution of the immediately preverbal NP is the same in the constructions illustrated in 3–7, and justifies its categorization as the subject:

(3) **He**/*him congratulated him.
(Nominative case of the pronoun *he* as opposed to *him*.)

(4) Teresa **likes**/*like horses.
(Agreement of the verb with *Teresa*.)

(5) Jack$_i$ wants **Ø**$_i$ to leave.
(The person understood to be leaving is Jack; Jack controls the unexpressed argument of the infinitive following *want*.)

(6) **Ø**$_i$ Take out the garbage.
(The unexpressed argument in the imperative construction.)

(7a) **John**$_i$ found a ring and **Ø**$_i$ took it home with him.

(7b) *John found a ring$_i$ and Ø$_i$ was gold.
(The unexpressed shared argument in a conjoined sentence.)

In terms of standard syntactic argumentation, 3–7 give five independent pieces of evidence for identifying the immediately preverbal NP as the subject of the clause. Another way of putting it is that positing the existence of a category subject in English is constructing a generalization over the distributional facts presented in 3–7.

A typological analysis, on the other hand, would not present the preceding facts as arguments for a category subject. The facts in 3–7 are a generalization formed by examining just one language. For the typologist, the significant questions all refer to the status of this correlation cross-linguistically. Again, we must ask: What elements of this correlation are accidental, a peculiarity of English? What elements of this correlation are universal? What correlations systematically vary across languages, and why? (An answer to these questions for the constructions above, other than 6, is presented in §7.1.)

The other side of the coin in invoking cross-linguistic comparison is that by examining a number of diverse languages, one will find striking, fascinating and

sometimes mysterious connections between certain linguistic structures that one would not have imagined if one's attention were restricted to one language or a few typologically similar languages. This may take the form of a peculiar fact of one language which turns out to be widespread, or of a connection between two linguistic phenomena that is widespread but not manifested in one's own language.

An example of the former is the apparently arbitrary irregularity of the objective forms of the English pronouns (*me*, *us*, *him*, *her*, *them* vs. invariant *it*). This irregularity is actually a manifestation of an extremely widespread pattern of relationship between case marking and animacy, namely that direct objects that refer to more highly animate beings are more likely to have distinct object case forms (see §6.3.1). The lack of an objective form for *you* is an apparent exception which also may be due to a general pattern, namely the typological markedness of plural forms (see chapter 4; *you* was originally the second person plural form).

Another example is the variety of uses of the preposition *with* illustrated in the following sentences:

(8)	I went to New York **with** John.	(comitative)
(9)	He opened the door **with** a crowbar.	(instrument)
(10)	He swims **with** ease.	(manner)

Intuitively, there seems to be little if any semantic connection between these three distinct uses of the same preposition, but a typological study of the distribution of adposition/case uses reveals that the subsumption of these and certain other uses under the same adposition or case marker is actually quite common (Croft 1991a:184–92; Stolz 1996). Consider for example Hausa *dà* and Classical Mongolian *-iyer* ~ *-iyar* in the following examples:

Hausa (Abraham 1959:22; Kraft and Kirk-Greene 1973:85)

(11) nā hàrbē shī **dà** bindingà
1SG.COMP shoot 3SG **with** gun
'I shot him with a gun.'

(12) mun ci àbinci tãre **dà** shī
1PL.COMP eat food together **with** 3.SG
'We ate food with him.'

(13) yā gudù **dà** saurī
3SG.COMP run **with** speed
'He ran fast ["with speed"].'

Classical Mongolian (Poppe 1974:153–54)

(14) küol **-iyer** giški-
foot **-with** tread.on-
'to tread on with the foot'

(15) manu morin tegün -ü morin **-iyar** belčimüi
1PL.GEN horse that.3SG -GEN horse **-with** grazes
'Our horse grazes with his horse.'

(16) türgen **-iyer** yabumui
speed **-with** goes
'He goes fast.'

Investigation of this cross-linguistic phenomenon suggests that the connection between these three uses and certain other uses can be defined in terms of causal relations between participants and properties of an event (Croft 1991a: chapters 4–5).

An example of two apparently unrelated constructions in English hiding a cross-linguistically evident connection is found with conditionals and topics (Haiman 1978a). The antecedent (protasis) of a conditional sentence is marked with *if* while a sentence topic is marked in English with *as for* or *about*:

(17) **If** you eat that, you will get sick.
(18) **As for** Randy, he's staying here.

Haiman discovered that in fact conditional protases and topics are encoded identically in many languages. For example, in the Papuan language Hua a suffix *-mo* is attached to both (potential) sentence topics and conditional protases; Turkish *-sA*, the conditional marker, can also mark the contrastive topic, and the Tagalog word for 'if', *kung*, can mark contrastive topics in conjunction with the preposition *tungkol* 'about' (Haiman 1978a:566, 577). This somewhat mysterious connection between conditional protases and sentence topics found in several languages – though not in English – led Haiman to the discovery that the two are actually quite closely related in semantic and pragmatic terms.

Finally, cross-linguistic examination may also suggest that a phenomenon found in well-known languages is actually extremely unusual if not unique in the world's languages and thus may be a rather peripheral linguistic phenomenon from a cross-linguistic perspective. For example, the use of the indefinite article in predicate nominals illustrated in 1j is quite uncommon, and the phenomenon of stranding prepositions as in *the book that I told you about* is extremely rare among the languages of the world. The obligatory presence of unstressed pronouns in subject position in English is also quite uncommon cross-linguistically (see §3.5). This is not to say that such phenomena do not need to be accounted for. It is just that they are perhaps not of as great importance to the study of language universals as the more widespread or universal phenomena, such as the extremely widespread use of the bare noun for predicate nominals and the subsumption of certain case roles under the same adposition or case affix.

1.4 The problem of cross-linguistic comparability

The characteristic feature of linguistic typology is cross-linguistic comparison. The fundamental prerequisite for cross-linguistic comparison is cross-linguistic comparability, that is the ability to identify the same grammatical phenomenon across languages. One cannot make generalizations about subjects across languages without some confidence that one has correctly identified the category of subject in each language and compared subjects across languages. This is in fact a fundamental issue in all linguistic theory. Nevertheless, this problem has commanded remarkably little attention relative to its importance for linguistic theorizing.

Greenberg's original paper on word order offers the basic answer to the problem of cross-linguistic comparability:

> It is here assumed, among other things, that all languages have subject–predicate constructions, differentiated word classes, and genitive constructions, to mention but a few. I fully realize that in identifying such phenomena in languages of differing structure, one is basically employing semantic criteria. There are very probably formal similarities which permit us to equate such phenomena in different languages... The adequacy of a cross-linguistic definition of "noun" would, in any case, be tested by reference to its results from the viewpoint of the semantic phenomena it was designed to explicate. If, for example, a formal definition of "noun" resulted in equating a class containing such glosses as "boy," nose," and "house" in one language with a class containing such items as "eat," "drink," and "give" in a second language, such a definition would forthwith be rejected and that on semantic grounds. (Greenberg 1966a:74)

These remarks summarize the essential problem and a general solution. The essential problem is that languages vary in their structure to a great extent: indeed, that is what typology (and, more generally, linguistics) aims to study and explain. But the variation in structure makes it impossible to use structural criteria, or only structural criteria, to identify grammatical categories across languages. If we did use structural criteria, we would be prejudging the result of our supposedly empirical analysis, by excluding a priori structural types that do not fit our criteria. Hence, the ultimate solution is a semantic one.

Greenberg's remarks are echoed by Keenan and Comrie in their analysis of relative clauses in their pioneering work on noun-phrase accessibility:

> We are attempting to determine the universal properties of relative clauses (RCs) by comparing their syntactic form in a large number of languages. To do this it is necessary to have a largely syntax-free way of identifying RCs in an arbitrary language. Our solution to this problem is to use an essentially semantically based definition of RCs. (Keenan and Comrie 1977:63; see also Downing 1978:377–80, and more generally Stassen 1985:14)

In the case of relative clauses, the variation of morphosyntactic expression is such that a number of languages use morphological rather than syntactic means for forming what we would intuitively, that is semantically, identify as relative clauses (Comrie 1989:143).

The term 'semantic' as usually understood is in fact too narrow a description. Various pragmatic features, such as discourse structure (for comparing everything from forms of greeting, to discourse-defined connectives such as *anyway*, to the information structure of clauses) and conversational context (as in expressions of politeness and interlocutor status) also play a role in determining the cross-linguistic identification of the morphosyntactic phenomena that linguists are concerned with. Semantics is also irrelevant for phonological comparison. For cross-linguistic comparison of sound structure, one must base the analysis on phonetic realization (see below). These parameters are all essentially **external**, that is outside the syntactic, morphological and phonological structure of the language itself. Hence, the solution to the problem of cross-linguistic comparability is to use external definitions of grammatical categories (but see below).

Recognition of the problem of cross-linguistic comparability and its solution has led to the formulation of a standard research strategy for typological research:

(i) Determine the particular semantic(-pragmatic) structure or situation type that one is interested in studying.

(ii) Examine the morphosyntactic construction(s) or **strategies** used to **encode** that situation type.

(iii) Search for dependencies between the construction(s) used for that situation and other linguistic factors: other structural features, other external functions expressed by the construction in question, or both.

This solution to the problem of cross-linguistic comparability implies a close relationship between form and external function. Typological classification – the descriptive prerequisite to typological generalization and explanation – requires a cross-linguistic analysis of the relationship between linguistic form and function. Since this is a controversial point in contemporary linguistic theory, it is worth examining the problem more closely.

Many grammatical categories are identified cross-linguistically by semantic means without significant objections. For instance, if one is trying to find out if a set of verbal suffixes represents tense or aspect, one examines their meaning and use, not any formal properties. In these categories, difficulties in cross-linguistic comparability arise chiefly when a single form combines multiple functions (as often happens). The main problematic categories for cross-linguistic identification

are the fundamental grammatical categories: noun, verb and adjective, subject and object, head and modifier, argument and adjunct, main clause and subordinate clause, etc. (Croft 2001). Needless to say, these categories are central to linguistic theory. On the one hand, these categories do not have an obvious functional (semantic and/or pragmatic) definition. On the other hand, these grammatical categories and the categories defined by them do vary considerably in their structural expression across languages, once we have identified the categories cross-linguistically by semantic/pragmatic means.

The problem of cross-linguistic identification should not be overstated. In most cases it is not difficult to identify the basic grammatical categories on an intuitive basis. To a great extent this is accomplished by examining the translation of a sentence and its parts, which is of course the semantic/pragmatic method. On the other hand, the weaknesses of an intuitive cross-linguistic identification of categories become apparent when one focuses on an example which is not so intuitively clear after all (for example, is the English gerund form in *Walking the dog is a chore* a noun or a verb?).

To give an idea of how unavoidable considerations of external function are, we will briefly discuss some of the problems involved with a cross-linguistic identification of subject. First, across languages, the grammatical relation of subject is expressed structurally in several different ways: by case-marking (including adpositions), by indexation (agreement), by word order, or by a combination of both of these. Yet, how does one know this in the first place? Only by using a cross-linguistic definition involving external function, including some notion of agent of an action and topic of the sentence, to determine what is a subject in each language.

Now one must have a cross-linguistic means to identify case/adposition, indexation and word order. Word order appears to be the easiest, since it is clearly based on a physical property of the utterance, the sequence of units, which can be directly observed. However, the correct word order analysis requires that the grammatical category of each unit be identified. For example, the assertion that Yoruba subjects can be identified by their position before the verb requires the identification of verbs in Yoruba, not to mention noun phrases or at least nouns (and not to mention a cross-linguistic means of individuating syntactic units, a problem that we will not deal with here).

A cross-linguistic definition of case/adposition and indexation on a structural basis is difficult as well. Case/adposition markers can be attached to the NP argument, or be independent particles, or even be attached to the verb in some cases, so syntactic position and dependency cannot be suitable criteria for a cross-linguistic definition.

Attachment to subject: Russian

(19) pis'm **-o** lež -it na stol -e
letter **-NOM.SG.N** lie -3SG.PRS on table -LOC.SG.M.
'The letter is lying on the table.'

Independent particle: Rumanian (Nandris 1945:145)

(20) pune cartea **pe** masă!
put:IMP book:DEF **on** table
'Put the book on the table!'

Attachment to verb: Mokilese (Harrison 1976:164)

(21) Ngoah insingeh **-ki** kijinlikkoau -o nah pehnn -o
I write.TRNS **-with** letter -DET his pen -DET
'I wrote that letter with his pen.'

Indexation markers (agreement; see §2.1.3) are syntactically at least as variable: they can be affixes to the verb, independent particles, or attached to other constituents of the sentence, including the noun phrase denoting the same referent as the index:

Attachment to verb: Hungarian (Whitney 1944:15)

(22) áll **-unk**
stand **-1PL**.INDF
'We are standing.'

Independent particle: Woleaian (Sohn 1975:93)

(23) Sar kelaal **re** sa tangiteng
child those **3SG** ASP cry.RDP
'Those children over there cried and cried.'

Attachment to other constituents: Ute (first constituent; Givón 1980a:311)

(24) kavzá -yi **-amụ** -'ura maĝá -x̂a -páa-ni
horse -OBJ **-3PL** -be feed -PL -FUT
'They are going to feed the horse.'

Attachment to any constituent, including noun phrase: Bartangi (Payne 1980:163, 165; compare Santali, cited in Sadock 1991:146)

(25) āz **-um** tā -r kitob vuj
I **-1SG** you -to book bring.PRF
'I have brought you a book.'

Thus, morphosyntactic dependence – e.g. case marking on subjects, agreement on verbs – will not provide an unproblematic cross-linguistic definition, at least not by itself. A more suitable definition would be that a case marker/adposition is **relational**, that is, a morpheme that denotes the semantic relation that holds between the noun phrase and the verb, while agreement is **indexical**, that is, a

morpheme that denotes the argument itself (Croft 1988; §2.1). This definition is essentially a semantic one.

If we assume a cross-linguistic definition for case marking and indexation that fits our intuitions, then we encounter a larger problem. Our intuitive notion of subject is based on English subjects (or Standard Average European subjects, to use Whorf's [1956:138] term), specifically, on the semantic relation between the event denoted by the verb and the participant denoted by the English subject. Examining more 'exotic' languages, we find that what we have identified as the subject by the use of a particular case-marking or indexation form does not correspond to English subjects, or the English subject does not conform to the other language's subject. For example, in Chechen-Ingush (Nichols 1984:186), the English translation 'subjects' of the following three examples display quite different case-marking and indexation patterns.

(26) bier -Ø d- ielxa
child -NOM CL- cries (CL indexes 'child')
'The child is crying.'

(27) a:z yz kiniška -Ø d- ieš
1SG.ERG this book -NOM CL- read (CL indexes 'book')
'I'm reading this book.'

(28) suona yz kiniška -Ø d- iez
me.DAT this book -NOM CL- like (CL indexes 'book')
'I like this book.'

If we identify the subject with the nominative noun phrase that the verb indexes, then 'this book' in the second and third sentences is the subject. If we treat the ergative and/or dative noun phrase as subject, then the first sentence appears not to have a subject. Whatever solution is taken to this problem must refer to the actual semantic relations that hold between the subject and the verb (§5.4). Thus, a cross-linguistically valid definition of subject referring to external properties is unavoidable.

It is possible to develop cross-linguistic definitions of grammatical categories that are partially structural in nature. Many grammatical constructions are defined in terms of the basic grammatical categories whose difficulties in cross-linguistic identification we have discussed: subject, noun, verb, etc. If these basic categories can be identified across languages by external definitions, one may develop **derived structural** definitions for the construction in question. For example, the passive construction can be defined as one in which the subject of the passive verb is the object of the counterpart active verb. This is a structural definition of the passive that can be used for cross-linguistic identification, once one has already identified subject, verb, object and the active construction on external grounds.

The choice of a purely external vs. a derived structural definition of a construction depends on the purposes of the typological study. For example, we may compare external and derived structural definitions for the subjunctive. An external definition is that the situation denoted by the subjunctive clause is nonfactual or irrealis modality. A derived structural definition is that a subjunctive clause is a clause which (1) expresses the subject and the object of the clause in the same way as an ordinary declarative main clause does, but (2) whose verb inflections differ from those of the verb in an ordinary declarative main clause. Condition (1) is intended to distinguish the subjunctive from various types of nonfinite clauses; and condition (2) is intended to distinguish the subjunctive from the indicative. The external definition would be more useful in a typological study of modality (e.g. Palmer 1986; Bybee, Perkins and Pagliuca 1994); but the derived structural definition has proved more useful in studies of complex sentence structure (e.g. Stassen 1985; Koptjevskaja-Tamm 1993; Croft 2001: chapter 9; Cristofaro 2003).

Not all externally based definitions are created equal. For example, in seeking a cross-linguistically valid definition of subject, one would not use translation equivalents of expressions such as 'The lightning struck the tree' or 'I like bananas'; one would more likely use expressions like 'I broke the stick' or 'He killed the goat.' A priori, there is no reason to select the latter two as better for defining subject than the former two. In either case, one determines the grammatical relation of the relevant predicate–argument relation and identifies it as the subject. Nevertheless, our pretheoretic intuitions about grammatical categories strongly suggest that some external definitions are better cross-linguistic criteria than others, and detailed analysis of the relevant linguistic phenomena generally bears out those intuitions. Hence, we use physical actions with animate agents for defining subject, the relationship of ownership for defining (alienable) possession, and so on.

Of course, these choices are based on pretheoretic intuitions and may turn out to be incorrect. For example, many linguists, e.g. Faltz (1978), use the recipient of the verb "give" as the defining environment for the dative, but others have argued that 'in many languages ... "give" is syntactically a very atypical ditransitive verb ... selection of "give" always requires cross-checking with a variety of other verbs of similar valency' (Borg and Comrie 1984:123). Reliance on single exemplars can lead to building a typological generalization on too narrow an empirical base. What matters are the cross-linguistic facts. The best external definitions are those that yield categories with more consistent coding across languages and more consistent grammatical behavior (distribution patterns). In fact, a cross-linguistic study must be somewhat broad in semantic range in order to discover the best cross-linguistic definitions.

In phonology, the problem of cross-linguistic comparison also arises. The cross-linguistic identification of English /p/ with Russian /p/ is based primarily on their

articulatory-acoustic similarity, that is, their external, phonetic, values. Also, to argue that a category [p] participates in a typological pattern involving a hierarchy of stops including [t] and [k] (see §5.5) presumably means that the articulatory gestures and/or acoustic features involved in [p] are related to those involved in [t] in such a way as to manifest the linguistic behavior which led us to postulate the hierarchy in the first place. It is difficult to see how one could use any other criterion, because there may be no obvious way to identify anything in the alternative phonemic system with English /p/, because of differences between the other phonemic system and the English system.

For example, if the language is Hindi, which distinguishes between aspirated /p^h/ and unaspirated /p/, the whole phonemic system is different, and so it would be impossible to identify English /p/ with Hindi /p/ on the basis of the phonemic system. The problem is, it is extremely difficult to gauge which Hindi phoneme the English /p/ should be identified with phonetically. Most allophones of English /p/ are quite aspirated like Hindi /p^h/; but those allophones do not contrast with phoneme /p/, unlike Hindi /p^h/. Most phonological typological studies have involved the analysis of phoneme inventories, making generalizations based, for example, on five-vowel systems vs. seven-vowel systems. However, phonetically, not all seven-vowel systems are alike; the individual vowels differ acoustically, and this is generally true for all phonological segments (Ladefoged and Maddieson 1996). In a typological approach to phonology, one must also do cross-linguistic comparison on the basis of the relationship between the linguistic system and its external (phonetic) manifestation.

1.5 Language sampling for cross-linguistic research

There are approximately six thousand languages in the world today. The majority of them are not documented at all, or have only minimal documentation (e.g. word lists). Of the rest, documentation varies substantially in quality. Even so, there are hundreds of languages for which good documentation is available. If one is examining a phenomenon which is exhibited in only a relatively limited number of languages – such as implosives or numeral classifiers – then one can examine virtually all attested examples. For example, in his study of glottalic consonants, Greenberg (1970) used a sample of 150 languages which was virtually exhaustive at the time for implosives (though not for ejectives). But in most cases, the available documentation is far greater than can be handled in most realistic typological studies. Hence, typologists must use a subset of these languages in studying cross-linguistic variation, that is, a **sample**. But by using a subset of the world's languages, two methodological problems arise.

The first problem is that the sample may not capture all linguistic diversity. Consider for example the English passive voice construction:

(29) The boy **was** taken to school (**by** his parents).

The English passive differs from the English active by the presence of two words, the auxiliary *be* and the preposition *by*, as well as the verbal inflection (the passive participle suffix). Other European languages have structurally identical passives, so one might venture the hypothesis that passives always involve the presence of an auxiliary and/or a preposition governing the agent phrase. In fact, this is not so. Lummi, like many languages, expresses the passive without an auxiliary, simply with a verbal inflection (Jelinek and Demers 1983:168):

(30) ẋči -t -ŋ -sx^{w} ə cə swəy?ə?
know -TR -**PASS** -2 **by** the man
'You are known by the man.'

Bambara represents a much rarer case, a 'passive' without overt marking of the verb form as passive (Chris Culy, pers. comm.):

(31) o fo -ra dugutigi **fè**
3SG greet -CMPL.INTR chief **with**
'S/he was greeted by the chief.'

The second problem is that what we think of as a theoretically significant relationship between two grammatical properties may be an accident. For example, it has been suggested that there is a biconditional relationship between the absence of obligatory independent subject pronouns and indexation (the 'Taraldsen generalization' [Taraldsen 1980]; see, for example, Huang 1984:534). The basis for this hypothesis is the fact that English has obligatory subject pronouns but very little indexation, whereas many European languages (so-called pro-drop or null subject languages) do not have obligatory subject pronouns but have rich indexation systems. The difference can be illustrated by comparing the English examples in 32 to the Spanish examples in 33:

(32a) **I** ate the bread.
(32b) *Ate the bread.

(33a) **Yo** comé (**Tú** comiste, **Él/Ella** comió, *etc.*) el pan.
'I ate (you ate, he/she ate, *etc.* the bread.'
(33b) Comé (comiste, comió, *etc.*) el pan.

Nevertheless, there exist many languages – in fact more languages than the English type according to one typological survey (Gilligan 1987:131–32) – that do

not have obligatory independent subject pronouns and also do not have indexation (see also Huang 1984). These languages include Japanese, Chinese and Rennellese, the last of which is illustrated here (Elbert and Momberg 1965):

(34) aano tutuku i mu'a Hangemangama
and.then spill in front H.
'And then **[he]** spilled **[it (earth)]** in front of Hangemangama.'

These two problems can be addressed by two different types of samples. A **variety sample** selects a subset that is intended to maximize the likelihood of capturing all the linguistic diversity for the phenomenon under study. A **probability sample** selects a sample from the set of languages whose probability of being chosen over another sample is known in advance (Bell 1978:127). That is to say, we know in advance the likelihood of choosing one set of languages over another, and we may therefore ascertain which correlations between traits in the sample chosen are in fact significant. Much research has been conducted on the construction of both variety and proportional samples. We will briefly discuss the issues underlying the construction of such samples here. An important conclusion to be drawn, however, is that one must not lose sight of the original goals of the sampling process. Other solutions besides sampling will allow us to address the problems in capturing diversity and identifying significant correlations.

The general principle behind a variety sample is that the best way to capture the full range of linguistic variation is to select languages that have evolved independently from each other for a long enough time to have developed different strategies for the grammatical expression of the phenomenon under study. That is, the greater time depth from divergence, the greater likelihood of diversity (Bell 1978:146-47). Hence, the focus on constructing variety samples has been on selecting languages from different genetic families, and if the sample is large enough to select more than one language from a single genetic family, to select the languages from as distantly related branches in the family as possible. This type of sample is a quota sample (Bell 1978:128): categorize the languages genetically, and choose a fixed number of languages from each category.

A method for constructing a variety sample has been developed by Rijkhoff and colleagues (Rijkhoff et al. 1993; Rijkhoff and Bakker 1998). Rijkhoff et al. use the structure of the genetic family tree in order to select languages for a sample; they give examples of samples for varying numbers of languages in the sample. They demonstrate that their method gives similar results whether using a genetic classification recognizing very deep (ancient) families, such as that found in Ruhlen (1987), or one that does not, such as that used by Ethnologue (Grimes 2000).

Although in many cases, the structure of the family tree is a good stand-in for the relative time depth of divergence of languages, it is problematic in a number of

significant cases. The number of branches at each level in the tree determines the diversity value. But the number of branches at each level, and as a consequence the number of levels, is a function of the intensity of research in a family, how widely a proposed family is accepted, and the choice of competing hypotheses for a family (e.g. Indo-Hittite, with two initial branches – Anatolian and the rest – vs. Indo-European, with ten initial branches). Also, if one family's branches are much older than another family's branches, then its branches should be weighted more heavily in a variety sample, since its branches have had much more time to diverge typologically.

The solution to this problem is calibration of the branching structure by the relative time-depth of the branches (Bell 1978:147). Although this has not been accomplished, some subjective estimates exist, and it is possible to apply lexicostatistical methods to compare relative time depths (for a defense of such methods, see Kaufman 1990:26–27 and Lohr 1998:26–32). Another factor that must also be taken into consideration in variety samples is to maximize geographical dispersion of the sample, because of areal diffusion of typological traits (for further discussion, see below).

However, even an improved variety sample does not capture a crucial feature of linguistic diversity. A variety sample is designed to capture the range of variation, that is, the most extreme differences in structural type found in the world's languages. For small samples especially, a good variety sample may lead to the impression that structural types are more discrete than they actually are. But another feature of linguistic diversity is the range of intermediate types between the extreme types. The intermediate types arise in large part because of the gradual nature of language change (see chapter 8, and Croft 2001: chapter 8). Hence, intermediate types are mostly likely to be found in genetically (or geographically) closely related languages. Depending on the relative speed of such a change, intermediate types may be quite rare, and since they are likely to be genetically closely related to languages with more common types, they are unlikely to be captured by a variety sample.

For example, there is great diversity in the voice systems of Salishan languages. The Lummi passive was illustrated above: the patient triggers subject indexation and the agent is governed by a preposition. The passive in Upriver Halkomelem is slightly different (Galloway 1993:425–26):

(35) tə́s -l **-əm** θúλ'à tə swíyəqə
bump.into -ACCID **-3SG.PASS** she ART man
'She was bumped into by the man.'

The patient is in subject position, but triggers a special set of indexation suffixes, while the agent is not governed by a preposition and the verb lacks a distinct passive

suffix. The Bella Coola passive is yet another variation (Forrest 1994:151–52):

(36) k'x **-im** ci- xnas -cx **x-** ti- ʔimlk -tx
see **-3SG.PASS** ART- woman -ART **PREP-** ART- man -ART
'The woman is seen by the man.'

Here the patient triggers a special set of indexation suffixes (like Upriver Halkomelem), while the agent is governed by a preposition (like Lummi).

In order to capture the full range of linguistic diversity, both the extremes and the intermediate types, one requires both a genetically and areally dispersed variety sample, and the examination of closely related languages in families with significant internal diversity.

In identifying significant correlations between grammatical traits, such as optional pronouns and agreement, probability samples are necessary. With probability samples, however, the statistical requirements are stricter: the sample must consist of independent occurrences of the combinations of traits. In the case of languages, this means historically independent occurrences of the combination of traits.

There are two ways in which occurrences of traits are not historically independent: because of genetic descent from a common ancestor or through contact. For example, in both Russian and Czech there is an interesting pair of constructions that distinguish expressions of location and expressions of motion. The same preposition is used for motion and location, but the locative case is used for location and the accusative case for motion.

Czech

(37) pokládám knihu **na** stůl
I.put book.ACC **on** table.ACC
'I am putting the book on the table.'

(38) kniha leží **na** stol **-e**
book.NOM lie **on** table **-LOC**
'The book is lying on the table.'

Russian

(39) ja kladu knigu **na** stol
I put.1SG.PRS book.ACC **on** table.**ACC**
'I put the books on the table.'

(40) kniga ležit **na** stol **-e**
book.NOM lie **on** table **-LOC**
'The books are lying on the table.'

On the basis of this evidence, one might propose that if a language uses both adpositions and case affixes for indicating grammatical relations, then the case affixes will be used to distinguish motion from location. However, the resemblance

between Russian and Czech illustrated here is clearly the result of common inheritance. The actual morphology is cognate, and the same distinction is found in Old Church Slavonic, generally considered to be close to the Common Slavic parent language of Czech and Russian (Schmalstieg 1976:180, 183). Thus, the two occurrences of the phenomenon in Russian and Czech are not historically independent. It is just a single occurrence in a single language (Common Slavic) that happens to have survived into the daughter languages (Czech and Russian).

Genetic relatedness through common descent is not the only way that two occurrences of a phenomenon are not independent. Areal contact can result in a borrowing of the resemblance, a phenomenon that can be illustrated by structural resemblances found in languages of the Balkans (see Sandfeld 1930; Comrie 1989:205–7; Campbell, Kaufman and Smith-Stark 1986:559–60). Languages in this area include Bulgarian, Rumanian and Albanian which are all Indo-European languages but from different branches of Indo-European. These languages have developed certain structural features which are not characteristic of their parent languages or of their sister languages outside the Balkan area. For example, these languages have for the most part eschewed the use of infinitival verbal forms for complements, any infinitive present in the parent languages being lost. In addition, these languages have also developed a pattern of an enclitic or suffixed definite article. One would not want to propose a typological connection between these two features on the evidence of these three languages alone because these two developments are probably historically the same phenomenon, resulting from a contact situation in the Balkan area. Thus, it only represents one instance of the correlation of absence of the infinitive and postposed definite article.

The general view is that wide geographical and genetic distribution will provide a reasonable guarantee for independence of cases. Hence, most probability samples in typology are stratified probability samples (Bell 1978:138), stratified by genetic and/or geographical properties. However, wide areal and genetic distribution is neither a necessary nor a sufficient condition for historical independence. First, two phenomena in genetically closely related languages, even if they use cognate forms, may be historically independent. Consider the use of the reflexive morpheme as a middle voice marker of verbs of certain semantic classes and as a marker of generic passives and other construction types in Spanish and Russian. These two instances appear to be historically independent: the Slavic development was largely completed by the time the Romance development began, and the two language groups were not in contact at the time of the Romance development. Thus, we may consider the Spanish and Russian instances of the reflexive as a middle voice marker to be independent occurrences of the phenomenon, even though both languages are Indo-European and are located in Europe, and even though the morphemes in question (Spanish *se* / Russian *sja*) are cognate.

Conversely, genetic and geographic distance may not be a guarantee of historical independence. Fula is in the Atlantic group of the Niger-Congo branch of Niger-Kordofanian, found in the northwest portion of sub-Saharan Africa. Kinyarwanda is a Bantu language, a tenth-degree subgroup of the Central Niger-Congo branch and, thus, genetically quite distant from Fula, and is found in East Africa in the area of Rwanda. It is quite plausible that both Fula and Kinyarwanda could be found in an evenly distributed sample of about a hundred languages. The basic word order of both Fula and Kinyarwanda is SVO. It is quite possible that the SVO word order of these two languages is a common retention from Proto-Niger-Congo; the vast majority of all Niger-Congo languages are SVO, and the few Niger-Congo SOV languages that are found occur sporadically across the whole group (see the extended sample description in Hawkins 1983:28–31).[2] Hence, a hundred-language sample for the purposes of examining the word order of subject, verb and object may quite likely be dealing with historically the same phenomenon in the vast majority of Niger-Congo languages.

This problem varies depending on the degree of stability of the phenomenon in question, of course: highly unstable phenomena are much less likely to turn out to be common retentions from the parent language (Greenberg 1974a:40; Bell 1978:141; Dryer 1989a:262). But for more stable phenomena, historical independence of cases can be quite a serious problem. Dryer (1989a) suggests that there are very large areas of linguistic diffusion – such as Eurasia, Africa and North America – at least for word order phenomena.

A second problem with probability samples is identifying the proportion of languages to select from different linguistic families and areas. Bell merely suggests that in a stratified sample 'the number [in each category] is proportional to the size of the category or may be determined by other criteria' (Bell 1978:138). One approach is to obtain a proportional distribution for each geographic and/or genetic group; for example, ensuring that the proportion of Indo-European languages in the sample is equal to the proportion of Indo-European languages in the world (see Bell 1978:138; Tomlin 1986:24–29).

In order to determine the proper distribution of languages in the sample, we have to know the distribution of languages in the world: how many are Indo-European, how many are Austronesian and so on. But we do not know the distribution of languages, because the definition of a language is itself problematic. How do we know that the Swabian 'dialect' of German is just a dialect of German and so should not be counted in the total number of Germanic and Indo-European languages; but that the five varieties Bierebo, Baki, Mari, Bieria and Lewo on the

[2] This is not an uncontroversial position; Heine and Reh (1984:186–214) and Claudi (1993) argue that SVO is the original order, whereas Givón (1975a) and Hyman (1975) argue for SOV as the original order, and Gensler (1997) argues that the original order was SAuxOV.

small island of Epi in Vanuatu, totaling altogether 1,640 speakers, are all distinct languages (as claimed by Wurm & Hattôri 1981) and should be included in the count for Austronesian? The answer is, we don't, and probably never will, since the definition of language as opposed to dialect involves nonlinguistic as well as linguistic factors (see, for example, Chambers and Trudgill 1980:3–4; Croft 2000:13–20).

Dryer (1989a) develops a sampling method that deals with this problem and the independence problem, which he applies to word order studies (e.g. Dryer 1988; 1991; 1992a). Dryer stratifies the genetic grouping of languages at the level of a **genus**, i.e. a level equivalent to a major branch of Indo-European (compare Bell 1978:147, who uses a somewhat deeper time depth). Instead of sampling a single language from each genus, he pools together all the languages in the genus. If, for example, they are all SOV, then the data point from the genus is counted as SOV. If some languages are SVO, then there are two data points from the genus, an instance of SOV and an instance of SVO. Dryer also proposes six continent-sized linguistic areas – Africa, Eurasia, Southeast Asia & Oceania, Australia-Papua New Guinea, North America and South America – and pools the genus data in the same way as described in the preceding paragraph. Thus, Dryer assumes only six independent cases (or more precisely twelve, since he always separates Verb–Object from Object–Verb cases in each area).

Dryer's method allows one to take into consideration all of the data at hand, and attempts to minimize the problem of independence of cases. However, it has certain difficulties. One problem pertains to the relationship between genetic and geographic factors in language change. Dryer's method essentially assumes that genetic factors are more important in shallower time depths and geographical factors at deeper time depths. But genetic vs. geographic factors probably vary depending on the grammatical phenomenon being studied. Stable phenomena resist change, presumably either internal change or external change (diffusion via contact). Stable phenomena will survive in genetic families and, hence, genetic stratification will be more critical even at greater time depths. Unstable phenomena may change for either internal reasons or through diffusion; hence, geographic stratification may also be important. An understanding of the genetic and geographic distribution of a grammatical phenomenon is necessary in order to develop the best stratification of a probability sample for statistical purposes. This is essentially what Perkins argues for (Perkins 1989). Perkins describes statistical tests for determining independence of cases, and suggests that samples on the order of a hundred languages, and possibly as few as forty or fifty, are reasonable. In order to use such a method, one must construct a large sample and then draw a subset of reasonably independent cases from the large sample.

Dryer uses genera instead of individual languages because of the apparent bias caused by large but historically shallow genetic groups such as Bantu and

Oceanic, each of which consists of hundreds of languages but constitutes only one genus (compare Bell 1978:146–49). This is an external historical accident (Dryer 1989a:259–60). Dryer's pooling technique essentially brings the sample back to the linguistic state of the world at about 1000BC (the approximate time depth of a genus), since if a whole genus is SOV, then the protolanguage is likely to have been SOV. For example, Dryer suggests that there were more SOV languages then than now, because the recently expanded Bantu and Oceanic families are largely SVO. Bantu and Oceanic constitute about 10% of the languages of the world (500–600 languages each), yet they make up only 0.4% of the genera.

But the linguistic situation circa 1000BC was itself biased by whatever large families existed then. Moreover, the sample of language families that have survived since then – the only sample we can construct – is further biased by the external historical accident of the extinction of other languages that existed in 1000BC, such as those that have been replaced by the Bantu and Oceanic languages. It could be that the languages in 1000BC that have not survived were SVO and so the balance of SOV to SVO languages has not really changed significantly since then. However, Dryer's method treats the six language areas independently; the likelihood of the current distribution of a trait such as SOV/SVO being biased in the same direction in all six areas is less than 0.05, which is considered acceptable for statistical purposes (Matthew Dryer, pers. comm.).

Also, if there were any genera in 1000BC with large numbers of languages, the numbers of their languages have been pared down by history. Genera at 1000BC would presumably go back to 4000BC (the level sometimes called a **stock**; e.g. Nichols 1992). But no extant stock has anywhere close to as many genera as the Bantu and Oceanic genera have languages (I am grateful to Matthew Dryer for pointing out this fact). Moreover, the large number of languages in the Bantu and Oceanic and certain other genera is probably unique to recent human history. Language density is inversely proportional to ecological risk to the speech community (Nettle 1999: chapter 4). Ecological risk is lowest in the tropical areas nearest the equator, where Bantu and Oceanic expanded. But the low ecological risk in the tropics has existed as such only since the end of the last Ice Age (Klein 1999:60). Also, the expansions of the Bantu, Oceanic and certain other large genera probably accompanied the expansion of agriculture (Bellwood 1997), again only a recent development in human history. (Nevertheless, the recent expansion of the Pama-Nyungan genus of Australian aboriginal languages to 172 languages demonstrates that hunter-gatherer bands can expand significantly in an environment of relatively high ecological risk.)

There still remains a fundamental problem, however: we do not know if the current population of languages has achieved stationary distribution in the statistical sense, that is, that the current proportion of language types is more or less independent of the random birth-and-death process of languages (Maslova 2000:312–13).

A stationary distribution implies that enough time has passed for a language to have possibly passed through all the relevant types (e.g. for a language to shift from SVO to SOV to VSO to . . . , and back again). If that much time has not passed, the distribution of relevant language types may reflect the starting distribution plus some additional changes, without having settled into the neutral probability distribution of types. Maslova argues that we are not certain that the current situation is a stationary distribution relative to the historical accident of whatever type the first modern human language or languages were. Dryer (2000:345–47) suggests that the current situation is probably not even a stationary distribution relative to major demographic events such as the expansion into Oceania.

As with variety samples, however, we must not lose sight of the goal of probability samples, which is to discover theoretically significant relations between grammatical traits. If the current state of the world's languages is not a stationary distribution, then one cannot rely solely on a probability sample to ascertain relationships between grammatical traits. These relations can be observed directly in the process of language change, either through direct documentation (where available) or through comparative studies. For example, if trait A – say, relative order of genitive and noun – is correlated with trait B – relative order of object and verb, then a language that changes to type B should also (relatively soon) change to type A. These changes are what Maslova describes as **transition probabilities** for the different structural types that a language may belong to (Maslova 2000:328–29). In fact, Bell writes: 'I think that a case can be made that such research [on language universals] can properly be conceived as sampling language changes, not languages themselves' (Bell 1978:146). Maslova has recently proposed a method for approximating the transition probabilities of a two-way typological classification – transitions from type A to type B and vice versa – by constructing a probability sample of pairs of closely related languages and comparing the proportion of pairs which are both type A, both type B, and split between A and B (Maslova 2002); this method can be extended to more complex typological classifications.

This is one reason why typological research has shifted its attention toward diachronic typology (see chapter 8). In fact, examination of the distribution of language types in genetic units of similar and different time depths, and in geographic areas of varying size and topography, will often be as enlightening about the grammatical interrelationships among types as a carefully crafted probability sample.

1.6 Data sources

Finally, there remains the problem of the quality of the actual data used in typological research. This is an extremely important issue, since no one typologist can achieve the level of knowledge of all of the languages in his or her sample that

a specialist in each language, let alone a linguistically trained native speaker, has. For this reason, the typologist has to rely on a variety of data sources. The data sources used by typologists are: native speaker elicitation, texts and descriptive grammars.

Reliance on native speakers is unfortunately impractical if a large and diverse sample is desired; it also has its difficulties. The process of eliciting grammatical information is not a natural language situation, and so the data provided do not always accurately represent actual language use. In particular, the native language consultant does not report actual usage, but instead an unsystematic perception of usage, colored by social attitudes toward the speech form and even toward the interrogator (e.g. a desire to give the interrogator an agreeable answer). Also, the linguist elicits information selectively, and crucial information that is relevant to the phenomenon may not be elicited precisely because it does not fit the linguist's prior expectations. As Comrie puts it: 'elicitation techniques and the elicitation situation impose a number of intermediary stages between the structure of a language and the elicitor's perception of it' (Comrie 1983:909).

A method developed more recently to avoid the problem of the impracticality of interviewing informants from dozens if not hundreds of languages is to construct a questionnaire to elicit relevant data (Dahl 1985), and distribute the questionnaire to native consultants and to field specialists who are willing to fill it out. However, designing questionnaires to elicit accurate information is extremely difficult, as any sociologist will attest. Questionnaires are essentially like elicitation, but at a further remove. Hence, they suffer from the same difficulties as elicitation but to a higher degree, and are therefore unreliable.

Another relatively direct form of data that can be used for typological analysis is textual data (e.g. Myhill 1992). This has the advantage of being data of actual language, unfiltered by artificial elicitation situations or by informant's self-perceptions. Also, texts provide quantitative data, which play an important role in typological analysis (see chapters 4, 7, 8). However, even textual data have their difficulties. Most texts are narratives, sometimes literary or sacred in origin, and there are very few available texts of face-to-face spoken conversation. It may be difficult, if not impossible, to find the relevant data in a given set of texts, if the phenomenon is rare. Finally, the proper interpretation may not be adequately captured by the morpheme-by-morpheme gloss and free translation. Consultation of an informant for interpretation is often necessary, but often impossible. Even so, it is not always possible to reconstruct the intended meaning without the original context.

This leaves descriptive grammars, written by native speakers or fieldworkers. Descriptive grammars have one great advantage over the data sources discussed above: they present a relatively comprehensive description of the grammatical system, without the bias of the researcher that may skew elicitation techniques for

a specific grammatical phenomenon. Descriptive grammars vary in their comprehensiveness, of course, and their lack of detail poses a problem for typologists, particularly if some relatively esoteric phenomenon is being examined. There are also the potential biases of the author of the grammar, whether a native speaker with respect to language attitudes or a linguist with respect to length of exposure to the language and theoretical orientation. Grammars supplemented with texts can go some way to providing a check on author bias. Finally, the descriptive grammar's comprehensiveness is of value only if the typologist uses it; as Greenberg once said in a class lecture: 'you gotta muck around in grammars; you can't just pick a fact out from a grammar.'

Descriptive grammars are certainly superior to the use of secondary sources, in which data from primary sources is gathered together. The selection and interpretation of the data in secondary sources is often biased by the hypothesis of the analyst, whose knowledge of the language(s) is at best indirect. Secondary sources must always be confirmed by the primary sources they cite (see Mallinson & Blake 198l:14–15; Holisky 1987:106–8, 122).

These considerations, pro and con, on the sources of linguistic data apply to all linguistic analysis, not just typological analysis. They have particular importance for the typologist because the typologist must handle a large amount of data for a large number of languages, for most of which he or she must rely on indirect knowledge. No source of data – native consultants, actual texts or descriptive grammars – is perfect; but any and all sources can provide relevant data when used judiciously.

2 Typological classification

Typological classification is the process of describing the various linguistic types found across languages for some grammatical parameter, such as grammatical number or the formation of relative clauses. Typological classification is historically the first manifestation of typology in modern linguistics, starting with the morphological classification of languages in the nineteenth century. The notion of a linguistic type has changed somewhat since that time, particularly under the impact of structural linguistics (the term 'typology' was first used in linguistics in 1901; Gabelentz 1901/1972:481). The following section will describe the current concept of a linguistic type, or **strategy** as it is sometimes called, while the concluding section will discuss morphological typology and the major conceptual changes that have occurred in the evolution of the concept of a linguistic type.

The usual procedure for initiating a cross-linguistic comparison of a particular grammatical phenomenon for the purposes of a typological analysis is to survey the range of structures used for the phenomenon in question. In morphosyntax, the phenomenon is generally a grammatical construction, defined on an external basis precisely because of the degree of structural variation actually found in languages (see §1.3). Thus, given a particular external definition of a category, such as that proposed for the relative clause, one may then classify the linguistic structures found across languages to express or manifest that external definition. These structures are called **types** or **strategies**. This is typology in the first sense, a cross-linguistic structural classification of morphosyntactic phenomena.

2.1 A cross-linguistically valid description of morphosyntactic structures

In §1.4, we argued that cross-linguistic comparison must be ultimately founded on external functional definitions. Nevertheless, one must have a cross-linguistically valid means to describe formal grammatical structures. This section presents such a system.

In order to illustrate the classification of cross-linguistic structural types, we will use the example of the possessive construction, defined as the semantic relationship of ownership as used when the speaker intends to refer to the **possessum** (possessed item); i.e. the possessum is the head of the possessive noun phrase and the **possessor** is a modifier. This example has the virtue of being relatively simple (compared to clause-level constructions such as relative clauses and comparatives) and relatively uncontroversial (compared to grammatical subjects).

The typology of possessive constructions provided here is not exhaustive (see §2.3); it does not give justice to the complexity of this grammatical domain. It is intended more to illustrate the range of morphosyntactic strategies used by languages than to present the full diversity of possessive constructions. The possessive construction displays the range of problems that we wish to address here. Possessive constructions display practically the full range of morphosyntactic strategies used to relate two morphemes or syntactic elements, and thus serve as a useful introduction to the basic grammatical structures that will appear throughout this volume. In a few cases, however, we will have to draw on examples of other constructions.

We begin by describing simple strategies that do not involve an additional morpheme to express the relation between possessor and possessum. We then turn to strategies with an additional morpheme, either relational (encoding the relation itself) or indexical (indexing one of the members of the relation; see §1.4). We then look at more highly grammaticalized strategies involving an additional morpheme.

2.1.1 *Simple strategies*

The first set of constructions are those which do not involve an additional morpheme beyond the forms used to express the possessor and the possessum. The simplest strategy is **juxtaposition** of the possessor and the possessum, in one order or the other, without any morphological attachment or alteration of either constituent. This strategy is quite common:

Yoruba (Rowlands 1969:44)

(1) fílá Àkàndé
cap Akande
'Akande's cap'

Kobon (Davies 1981:57)

(2) Dumnab ram
Dumnab house
'Dumnab's house'

The second strategy is morphological **concatenation**. In one type of concatenation, affixation, the possessor is morphologically an affix on the head noun (possessum). This is most commonly found with pronominal possessors, which are affixes:

Tigre (Raz 1983:37)

(3) səʔli -hom
photograph -3SG
'his photograph'

However, it is occasionally found with nominal possessors, in which case it is called compounding since it involves two roots of major syntactic categories:

Kiowa (Watkins 1984:107)

(4) nɔ́:- tɔ̀: -cègùn
my- brother -dog
'my brother's dog'

Affixation and compounding are historical developments from juxtaposition: the juxtaposed elements become morphologically bound.

The third strategy, **fusion**, combines or fuses the two elements, possessor and possessum, into one unit. Fusion is rare but is found with basic kin terms and pronominal possessors (i.e. possessive modifiers) in some languages.

Lakhota (Buechel 1939:103)

(5) ina/nihų/hųku
'my mother/your mother/his, her mother'

Fusion may arise from a compounding of pronominal possessor and kin term, possibly a suppletive kin term form, that is no longer analyzable.

2.1.2 Relational strategies

The next set of strategies involves the employment of an additional morpheme to encode the relation between possessor and possessum. Following the definitions in §1.4, we distinguish relational and indexical morphemes. Relational and indexical morphemes originate from a lexical item in the process called **grammaticalization** (see §8.3), and evolve further to the point that their relational or indexical character cannot be identified. For this reason, the boundaries between morpheme types are not sharp, and so we will discuss the diachronic developments as well as the morpheme types.

Relational morphemes are called **case markers**; bound relational morphemes are called **case affixes**, and free relational morphemes are called **adpositions**

(prepositions precede and postpositions follow). A genitive case affix is illustrated in 6 for Russian, and a genitive adposition is illustrated in 7 for Bulgarian (Scatton 1983:317):

(6) kniga Ivan **-a**
book Ivan **-GEN**
'Ivan's book'

(7) nova -ta kniga **na** majka mi
new -the book **of** mother my
'my mother's new book'

Diachronically, case affixes arise from adpositions that become affixed to the noun. (In some cases, the adposition comes to be affixed to the verb, as we saw in Mokilese in §1.4; in such contexts, the relational morpheme is not usually called a case marker.) Adpositions in turn arise from relational nouns. For example, the Tzutujil adposition *majk* 'because of, on account of', developed from its lexical meaning, 'sin' (Dayley 1985:153):

(8) xch'ejyi jar iixoq ruu- **majk** jar aachi
was.hit the woman 3SG.POSS- **because.of** the man
'The woman was hit because of the man.'

Adpositions may also arise from verbs, in a serial verb construction with another verb. One verb describes the main event while the other verb signals a semantic participant role. For example, the Yoruba verb *fún* performs the dative function, which developed from its lexical meaning 'give' (Bamgbose 1966:77):

(9) wọ́n á sọnwó **fún** mi
they will pay.money **DAT** me
'They will pay me.'

Finally, adpositions may arise from adverbs, as has occurred in the history of Indo-European, where directional adverbs such as *in*, *out*, *through* and so on have become adpositions as in English *They went in/through (the cave).*

2.1.3 *Indexical strategies*

The most common indexical morphemes are called agreement markers, concord markers, cross-reference markers or indexation markers. The term agreement, although used far more commonly than the others, implies that there is a phrase in the utterance that is 'agreed with' (the **controller**) that is necessarily present. In fact, it often is not, and so the term **indexation** will be used here.

There is a natural classification of indexical coded dependencies into two types, depending on whether they encode the category of person, which in turn is due

to their origin in personal pronouns or in demonstrative pronouns. Lacking better terms for these two types, I will call them **person indexation** and **nonperson indexation** respectively.

Person indexation can be illustrated by the indexation of a possessed noun with its possessor, as in Mam (England 1983:142):

(10) **t-** kamb' meeb'a
3SG- prize orphan
'[the] orphan's prize'

Person indexation arises through the attachment of a personal pronoun, usually to the head noun (or verb, in clauses), but sometimes to another constituent, and the allowing of a second noun phrase to accompany ('double') the former pronoun in reference. The most easily accessible examples of the rise of person indexation are from verb indexation, not possessive indexation (see also §6.3.3). The following examples capture the evolution of doubling in progress. In Chichewa, no indexation of the direct object occurs if the object follows the verb (11), but indexation is required if the object is fronted (12; Bresnan and Mchombo 1987:744–45):

(11) njûchi zi- ná- lúm -a **alenje**
CL10:bee CL10.SBJ- PST- bite -IND CL2:hunter
'The bees bit the hunters.'

(12) **alenje** njûchi zi- ná- **wá-** lúm -a
CL2:hunter CL10:bee CL10.SBJ- PST- **CL2.OBJ-** bite -IND
'The hunters, the bees bit them.'

In Kanuri, the object indexation marker may occur alone (13), but its presence is optional when an independent pronoun occurs (compare 14 and 15; Hutchison 1981:139; see also §§6.3.1, 6.3.2):

(13) **nzú-** rú -kɔ́ -nà
2SG- see -1SG -PRF
'I saw/have seen you.'

(14) **nyí** -à rú -kɔ́ -nà
2SG -ASSOC see -1SG -PRF
'I saw/have seen you.'

(15) **nyí** -à **nzú-** rú -kɔ́ -nà
2SG -ASSOC **2SG-** see -1SG -PRF
'I saw/have seen you.'

The prototypical example of nonperson indexation is indexation of an adjective or other modifier in gender, number and/or case with a head noun, as with the

Russian possessive adjectives:

(16) mo **-ja** knig **-a**
my **-FSG** book **-FSG**
'my book'

It appears that nonperson indexation originates from articles (which in turn arise from demonstratives) in a headless modifier construction which is then combined with an ordinary noun head (Lehmann 1982b:70–74). The most easily accessible examples of the rise of nonperson indexation are from adjective indexation, not possessive indexation, so we must again digress from possessive constructions.

In Modern Hebrew (and its classical forerunner, Biblical Hebrew), articles occur with both the head noun and the modifier (Glinert 1989:104):

(17) **ha-** toxnit **ha-** zot **ha-** xadaša
the- program **the-** this **the-** new
'this new program'

In Modern Greek, an emphatic double article construction for postnominal modifiers coexists with a prenominal modifier construction with only a single article for the whole noun phrase (Holton, Mackridge and Philippaki-Warburton 1997:286):

(18) **o** oréos ántras
the.MSG handsome:MSG man:MSG
'the handsome man'

(19) **o** ántras **o** oréos
the.MSG man:MSG **the.MSG** handsome:MSG
'the handsome man'

Returning to possessive constructions: in Supyire, a pro-headed possessive phrase uses the possessive pro-form *wú*, which inflects for gender of the noun to which the pro-form refers (Carlson 1994:205):

(20) bàmbɛmɛ **wú** -yi
Babemba **POSS** -DEF.CL2.PL
'Babemba's [bones]'

As in Modern Greek adjectives, an ordinary prenominal modifier construction coexists with a postnominal modifier construction doubling the pro-form with an ordinary head noun, and the pro-form indexes the head noun (Carlson 1994:203, 229):

(21) ŋ̀kùù -ŋi fùkàn -yí
chicken -DEF.CL1.SG wing -DEF.CL2.PL
'the chicken's wings'

(22) kàsunnté' níŋjyéé' **wóóre**
feast:DEF.CL4 this.year **POSS:DEF.CL4**
'this year's feast'

2.1.4 Classifiers: indexical or relational?

A class of overt coded dependencies whose status as indexical or relational is somewhat problematic are **classifiers**. Classifiers are used in a variety of grammatical constructions, including possessive constructions. The **possessive classifier** denotes a property of the possessed object. Example 23 is a possessive construction in Kosraean (Kusaiean) with the classifier for plants (Lee 1975:117; the possessor is expressed only as a person suffix on the classifier):

(23) mos **SAnA** -k
breadfruit **CLF.PLANT** -1SG
'my breadfruit tree'

Possessive classifiers are not the only type of classifier; in fact they are not even the commonest type of classifier. **Numeral classifiers** are commonly found in numeral constructions; the classifier chosen reflects a property of the object quantified by the numeral. Example 24 is a numeral construction in Chrau with the classifier for long objects (Thomas 1971:134):

(24) du **tong** aq
one **CLF.LONG** crossbow
'one crossbow'

A third, also uncommon, classifier construction is a **verbal classifier**, in which a separate morpheme reflects a property of one of the arguments.[1] As such, verbal classification looks very much like person indexation. Example 25 illustrates a verb–argument construction in Caddo, with the classifier for granular substances (Chafe 1977:30, as glossed in Mithun 1984:865):

(25) kas- sah- kú- n- **dân-** na- 'na' kišwah
should- 2.AG- 1.BEN- DAT- **GRAN.SUBST-** PL- make parched.corn
'You should make me some parched corn.'

The chief diachronic sources of classifiers are nouns (Aikhenvald 2000:353). One common source of classifiers is a repeater construction, in which the noun,

[1] The term 'verbal classifier' is also used for verbs in some languages, including Athapaskan languages and some California Indian languages, which select arguments according to their shape, texture and other properties. Unlike the verbal classifiers illustrated in the text, however, these languages do not have separate morphemes to indicate the property of the argument. Instead, the verbs are specialized for different types of objects (Croft 1994:156–59).

or the generic part of a noun compound, is repeated with the modifier, as in the following Nakhi demonstrative construction (Aikhenvald 2000:362):

(26) ʐ̩ər- **ndzər** **ʈ̩s'ɨ** **ndzər**
willow- **tree** this **tree**
'this [willow] tree'

The verbal classifiers described by Mithun (1984) represent another path of origin of classifiers. They are what she calls Type IV noun incorporation, namely, noun incorporation that has been extended to an indexation function.

The nominal source of most classifiers strongly suggests that classifiers are fundamentally indexical in nature: the classifier denotes the object classified, which is one of the elements of the syntactic relation. Further evidence in favor of this position is that all classifiers have an anaphoric function (Aikhenvald 2000:321). However, some classifiers, particularly possessive classifiers (to return to our typological classification of possession), arise from verbs (Lichtenberk 1983a). Example 27 is a Manam possessive construction with the edible object classifier, contrasting with the general possessive classifier in 28 (Lichtenberk 1983a:158):

(27) paŋana **ʔana** -gu
head **CLF.EDIBLE** -1SG
'my head' (e.g. fish head, for my consumption) (<ʔan 'eat' [Lichtenberk 1983a:161])

(28) paŋana **ne** -gu
head **CLF.GENERAL** -1SG
'my head' (e.g. the head I found, cut off, etc.)

However, many of the classifiers in languages that elaborate the possessive classifier system beyond edible/potable/other are nominal in origin.

2.1.5 *More grammaticalized strategies*

The grammaticalization process may proceed to the point that it makes progressively less sense to classify a marker as indexical or relational, because there is just one invariant morpheme that is used to code the dependency. Moreover, their diachronic sources are both relational and indexical. For this reason, we will simply call these more highly grammaticalized coded dependencies **linkers**.

An example of a linker derived historically from a case affix is the English possessive enclitic -'*s*, illustrated in 29:

(29a) Theresa**'s** shoes
(29b) The Queen of England**'s** dress

The English possessive enclitic arose from the Old English genitive case suffix (this view has been contested, but Allen [1997] argues persuasively for its sole origin in the genitive case suffix). It differs from a case affix in that there are no other case affixes in English with which it contrasts, and it always occurs between possessor and possessum (in fact, as an enclitic on the former).

The Persian ezafe linker, illustrated in 30 (Mace 1962:19), arose from a relative pronoun, an indexical marker:

(30) asb **-é-** mard
horse **-LNK-** man
'[the] man's horse'

The Woleaian possessive linker, illustrated in 31 (Sohn 1975:106), also arose from an indexical morpheme:

(31) meta **-l** John me Mary
eye **-LNK** John and Mary
'John and Mary's eyes'

The Woleaian linker is identical with the third person singular possessive indexation suffix *-l*, but is now used with singular and plural nominal possessors (the third person plural indexation suffix *-r* is still used for pronominal possessors).

The Moroccan Arabic linker originated from a demonstrative (Harrell 1962:202; for discussion of the etymology of the possessive, see Harning 1980:112–13):

(32) ž- žmel **dyal** had r- ṛažel
the- camels **POSS.LNK** this the- man
'this man's camels'

In Tunisian Arabic, there is a possessive linker using a word that formerly meant 'possession' or 'property', hence having a nominal origin like many classifiers (Harning 1980:103):

(33) el- ḥōš **mtāʕ** -i
the- house **POSS.LNK** -my
'my house'

Finally, the third morpheme may itself become fused with one or other of the elements in the construction, and no longer analyzable. In this case, we have a **special form** of the element, found specifically in the construction. An example of a special form of the possessor is commonly found with independent pronominal possessors, as in Yoruba (Rowlands 1969:46):

(34) ilé **wa**
house **our** [compare *a* 'we']
'our house'

An example of a special form of the possessum is the construct form found in the Semitic languages, e.g. Syrian Arabic (Cowell 1964:163):

(35) ʔəṣṣeṭ haz- zalame
story:CONST that- fellow [compare *ʔəṣṣa* 'story']
'that fellow's story'

Note that the special forms may be suppletive with their paradigmatically contrasting forms (as in Yoruba), or simply a morphologically irregular alternative form (as in Syrian Arabic).

2.1.6 Summary

The different strategies for encoding grammatical structure and their diachronic relationships are given in Figure 2.1 (adapted from Croft 1995b:95: Figure 4.1).

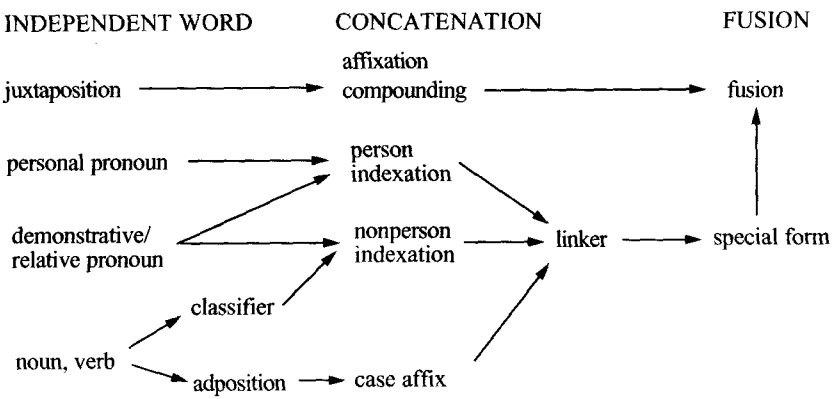


Figure 2.1 *Diachronic paths for dependency codings*

Figure 2.1 represents two basic grammatical properties for describing grammatical structure, to which we add a third grammatical property, order of elements:

(i) additional morpheme: none, relational, indexical, linker, (special form);
(ii) degree of fusion of elements: none, concatenation, fusion;
(iii) order of elements.

All three properties presuppose the ability to identify discrete elements in a construction. This is partly formal, based on what elements can occur independently in utterances, and partly external, to the extent that the morphological analysis must make reference to the discrete meanings of each element. Once we assume that the elements of a construction are identified, then the number of elements (and hence

the presence, if any, of an additional morpheme), their degree of fusion and their order are formal properties of the utterance. The further classification of additional morphemes is externally defined.

A grammatical construction can be described in terms of these properties, which can combine in a number of ways. For example, we find various combinations of the different strategies involving additional morphemes, some of which are illustrated here:

Case Affix + Indexation: Turkish (Lewis 1967:42)

(36) uzman **-ın** rapor **-u**
man -GEN report **-3SG**
'[the] man's report'

Central Sierra Miwok (Freeland 1951:180)

(37) čów **-uŋ** té:ṭe **-ʔ** **-hǐ:**
Joe -GEN sister -SBJ **-3SG**

Linker + Adposition: English

(38) a book **of** John's

Suppletion + Adposition: English

(39) a book **of mine**

We must also describe the multiple properties of a complex construction such as the genitive in accordance with (i)–(iii) above. The following represents an analysis of the structure of some of the genitive constructions used above:

Yoruba

(1) fílá Àkàndé
cap Akande
'Akande's cap'

NG; juxtaposed G and N; no additional morpheme

Bulgarian

(7) nova -ta kniga **na** majka mi
new -the book **of** mother my
'my mother's new book'

NG; additional morpheme is a case marker, is constituent with G, and precedes G (preposition); all three morphemes juxtaposed

Mam

(10) **t-** kamb' meeb'a
3SG- prize orphan
'[the] orphan's prize'

NG; additional morpheme is an index, is constituent with N, is affixed to N and precedes N (= prefix)

Persian

(30) asb -é- mard
horse -LNK- man
'[the] man's horse'

NG; additional morpheme is linker and is between N and G; all three morphemes affixed

2.2 What is being classified?

We have now illustrated the basic means for describing grammatical structures across languages. All of the basic genitive types have been described, although there are variants that have not been illustrated. In addition, some of the more complex genitive types, involving combinations of the basic strategies, have been given to show that the typology must be extended beyond what we have provided here. But this will suffice to make two important refinements to the concept of typological classification.

Typology, in the sense of a cross-linguistic classification of types, is often considered to be a classification of whole languages into types, that is, a classification of **language types**. For example, Mam is an indexing genitive language type, Bulgarian is an adpositional genitive language type, etc. The notion of a language type originates in the nineteenth-century view of the morphological typology of languages (see §2.3). In the vast majority of cases, however, a classification of language types is difficult, if not impossible. Most languages have available several different structural types for a given construction such as the genitive. For example, English has many different constructions, all of which are genitive constructions on the basis of our external definition, that represent several different types and combinations of types:

(40a) *suppletion*: **my** house
(40b) *linker*: Jan**'s** house
(40c) *adposition*: the library **of** Boston
(40d) *linker* + *adposition*: a book **of** Jan's
(40e) *suppletion* + *adposition*: a book **of mine**

Instead, we can say the particular genitive construction illustrated by *the library of Boston* belongs to the adposition type. This is our first refinement of the notion of a type in typology: a structural type is represented by a particular construction in a particular language. We will call this a classification of **linguistic types**. A language may have more than one construction representing more than one linguistic type. Technically, therefore, one cannot say that languages are of one type or another, or that languages use one strategy or another. This point is crucial in

evaluating claims concerning 'OV languages' or 'ergative languages' (see chapters 3 and 5 respectively). In most cases, such claims must be identified with the actual constructions in which OV word order or ergative morphology are used.

Although it is impossible to say in general that a language belongs to a particular structural type, such as the adpositional genitive type, it is very often possible to determine which of the many structural types a language uses is the **basic** type. A language's basic type may be useful in making typological generalizations; for example, there has been a good deal of success in making typological generalizations on basic word order types. Thus, there may be a legitimate sense in which we may be able to speak of a language belonging to a language type, as opposed to a construction belonging to a structural type. This raises the question of determining which of several structural types a language uses for a given function is the basic one. There are four criteria that can be used to identify a basic type. We will illustrate these criteria by establishing the basic word order of subject (S), verb (V) and object (O) in English clauses as SVO, as in *The chicken crossed the road.*

First, if the construction is restricted to a grammatical subclass, then it represents a less basic type. For example, the English existential construction has VS word order (41a) but is found with only a subset of verbs (compare 41b), hence it is not as basic as the SVO construction:

(41a) There goes the ice cream truck.
(41b) *There crashes the ice cream truck.

Second, if the construction is pragmatically or semantically specialized, then it represents a less basic type. For example, the English existential construction is used to introduce new referents into a discourse. Likewise, the English topicalization construction, which can have OSV order, requires a special information status for the object (see Prince 1981):

(42) Philosophy I've always enjoyed.

Third, if the construction is structurally unusual – typically (though not always) more complex – then it represents a less basic type. For example, the English cleft construction, which can also have an OSV order, involves a complex structure with *It*, a form of *be* and a relative clause (it is also pragmatically specialized):

(43) **It's** Hana **that** Federico likes.

Finally, the less frequent construction is less basic. The basic SVO construction of English is much more frequent that the existential, topicalization or cleft constructions. Dryer has proposed the heuristic that one construction must be at least twice as frequent as the alternative construction in order to be categorized

as basic (assuming just two occurring types, as in VO vs. OV order; Dryer 1989b: 70–71).

Lacking other more specific structural evidence, simple text frequency is used as an indicator of basicness. For example, in Derbyshire and Pullum's (1981) survey of languages with object before subject, they frequently had to resort to this criterion. The frequency criterion may appear to be a 'last resort', but it is also universally applicable and remarkably reliable. A construction that is grammatically restricted or semantically/pragmatically specialized is almost certainly going to be less frequent. Although there is no a priori reason to expect structurally more complex constructions to be less frequent, in fact they usually are, and this relationship is an important typological generalization (see §4.3).

There are some exceptions to this latter generalization, however. For example, in Modern Armenian the structurally simplest declarative construction, lacking an auxiliary, is semantically restricted to weak obligation or hortative function (Bybee, Perkins and Pagliuca 1994:231). There is a historical explanation for this type of example (Bybee, Perkins and Pagliuca 1994:230–36; Haspelmath 1998c). The simpler construction was used for the present tense, and extended to other functions such as the subjunctive. As such it was the most frequent construction. However, in Modern Armenian it was then replaced by a more complex construction – a progressive with the auxiliary verb 'be' – for the most frequent function of present tense, and the simpler construction was restricted to a less frequent function.

Of course, it may be that no one construction is the most basic in a language by these criteria. In such a case, one must simply describe the language as belonging to multiple types. While this may appear to be a problem for typological classification, it turns out to be extremely useful for diachronic typological research, because it often represents a language in transition from one type to another (see §§8.2, 8.4).

Finally it should be noted that the structural types themselves are morphosyntactically complex and subject to analysis, as seen in §2.1. One can construct a typological classification of constructions based on a subset of their structural properties, or even just one property, such as the relative order of genitive possessor (G) and possessum noun (N) in the genitive construction.

Linguistic types based on individual structural properties form the foundation of most typological analysis. Each structural property represents the independent variables on which cross-linguistic generalizations are based. This is not to say that a more holistic view of constructions may not reveal important typological generalizations that call for explanation. However, the analysis into structural features allows us to construct significant language universals as will be seen in chapter 3. For example, the separation of the structural feature of word order allows us to construct implicational universals such as 'SOV word order implies GN word order.' If it turned out that within the possessive construction there is a

dependency between word order and the type of additional morpheme such that there do not exist languages with NG order and adjectival indexation, then we would be able to construct an implicational universal linking these two features: 'adjectival indexation in possessive constructions implies GN word order.' And if it turned out that a more holistic analysis of the construction were necessary, that is, that a combination of structural features plays a role in an implicational universal, then we would be able to construct this imaginary universal using a conjunction of the relevant structural features: 'If the possessive construction is GN, with an indexation prefix indexing G, then . . .'

Thus, the structural analysis of types is essential to typological analysis. The necessity of the structural analysis of the types in order to do a proper typology demonstrates the debt that typology, like other modern approaches to language, owes to the structuralist approach to linguistic analysis.

2.3 Morphological typology

The first typological classification of languages (i.e. classification by structure rather than by genetic affiliation) was the so-called **morphological typology**.[2] Although this typological classification has undergone many refinements, the basic descriptions of language types developed in the nineteenth century are still widely used, and so it merits a brief discussion here (for a fuller historical discussion, see Greenberg 1974a: chapter 3, and references cited therein). Also, morphological classification plays a significant role in diachronic typology, in particular, in the process of grammaticalization (see §8.3).

The original formulation (F. Schlegel 1808) divided languages into two types: affixal and flectional. Schlegel was vague about the definition of these types, but the distinction may be characterized roughly as the simple combination of morphemes vs. the phonological alteration of morphemes in combination. Schlegel's brother, August, added a third type: languages with 'no structure' (i.e. no affixation or inflection), with Classical Chinese being the paradigm example (A. Schlegel 1818). Humboldt added a fourth type, **incorporating**, to designate languages such as those of North America that treated the verb and the object as a single word (Humboldt 1825).

The classical formulation of the morphological classification, by Schleicher, distinguishes three types: isolating, agglutinative and inflectional, corresponding to August von Schlegel's 'no structure', affixal and inflectional respectively (Schleicher did not include the incorporating type; Schleicher 1859, cited in

[2] This section is based largely on the discussion in Greenberg 1954; 1974a.

Greenberg 1974a). Under the classical formulation, **isolating** languages do not use affixes at all; **agglutinative** languages use affixes that denote single grammatical categories (such as number), and are concatenated with relatively little phonological alteration; and **inflectional** languages use affixes which often fuse together several grammatical categories (such as number, gender and case) into a single morpheme, and which often undergo major phonological alterations when combined with roots.

The typological classification of languages at the time differs from the modern concept of typological classification in two important respects. First, the classification recognized only a single parameter on which languages varied, the morphological structure of words. Second, it was conceived as a classification of languages as a whole, not parts of a language. Both of these characteristics can be attributed to what is called the Humboldtian view of language. In this view, each human language has its organic unity which manifests an 'inner form' (a point of view which at the beginning had clear connotations of cultural superiority). Greenberg (1974a) calls this view – that a language as a whole has an organic, even unique, character – the **individualizing** approach to typological classification.

The structuralist movement in linguistics altered the view of the morphological typology of languages. By postulating that a language constituted a structural system, it made it possible to examine parts of language in isolation and to make a typological classification of various features of language. (On the other hand, by postulating a structural unity to language in which everything holds together – *tout se tient* in Meillet's phrase – the individualizing approach to language persists.) Thus, one may typologize different parts of language, and one may typologize languages in different ways, as we have done with the example of genitive constructions in §2.1.

Sapir's revision of morphological typology illustrates the possibility of typologically classifying languages in different ways. Sapir divided the morphological properties of the nineteenth-century classification into two independent parameters: the number of morphemes per word and the degree of phonological alteration of morphemes in combination. Sapir distinguished three language types in terms of the number of morphemes: **analytic** (one morpheme per word); **synthetic** (a small number of morphemes per word); and **polysynthetic** (a large number of morphemes, particularly multiple roots, per word). He then distinguished four types in terms of the degree of alteration of morphemes: isolating (no affixation at all); agglutinative (simple affixation); fusional (considerable morphophonemic alternation); and symbolic (suppletive).

Greenberg (1954) takes the morphological typological classification one step further in developing the concept of a linguistic type. He observes that there are no

clear boundaries between the analytic, synthetic and polysynthetic types, because the number of morphemes per word is a quantitative value that is for all practical purposes continuous. Greenberg constructs a quantitative index, M/W (morphemes per word), which one can measure using text counts. The significance of this representation of language types for typological classification is that languages (or constructions) need not be classified into discrete types or, to put it differently, languages can be ranked on some structural parameter relative to other languages. Greenberg also quantifies the degree of phonological alternation, that is, the degree of allomorphy, and a host of other structural parameters, as follows:

(i) M/W morphemes / word
(ii) A/J agglutinations / morpheme junctures
(iii) R/W root morphemes / word
(iv) D/W derivational morphemes / word
(v) I/W inflectional morphemes / word
(vi) P/W prefixes / word
(vii) S/W suffixes / word
(viii) O/N word order used to indicate grammatical relations / total grammatical relations
(ix) Pi/N pure inflections used to indicate grammatical relations / total grammatical relations
(x) Co/N concordial inflections used for grammatical relations / total grammatical relations

The first two indices correspond to Sapir's two morphological parameters and, hence, the original morphological classification. The next five indices typologize words by the type of morpheme (root, derivational, inflectional) and by affix position (prefix, suffix). The last three indices typologize grammatical relations (taken in the broadest sense of any grammatical dependency, not just subject and object) by the means of expression of the relation: word order, 'pure' inflections (not involving indexation, i.e. usually case affixes) or concordial inflections (indexation).

Although the traditional morphological typology is generally applied to a language as a whole, it could just as easily be applied to different parts of the linguistic system. For instance, the nominal system of a language may be agglutinative while the verbal system is inflectional. Also, Greenberg's first seven indices could be computed separately for words of different categories, so that, for example, one might discover that nouns in a single language (or perhaps in languages in general) are more likely to be suffixing than verbs.

The current concept of a linguistic type (§2.2) is a characteristic of what Greenberg (1974a) calls the **generalizing** approach to typological classification, that

is, the classification of languages – or more precisely elements of a language – by structural features of maximal generality. The individualizing approach, taken to its extreme, defines languages by their individual and perhaps unique combination of grammatical features. The truth has to be somewhere in between, since languages are different structurally, though not so different as to be incommensurable. If language as a structure does hang together in a certain way, then the identification of one structural feature – the feature defining the linguistic type – would imply the presence of certain other structural features.

The generalizing approach to typological classification, with its emphasis on single morphosyntactic features rather than the language as a whole, is the primary contribution to modern typology. It does so by separating the typological classification of **logically independent** grammatical properties of languages from the discovery and explanation of relationships *between* features *across* languages. The latter is the topic of the next five chapters.

3

Implicational universals and competing motivations

3.1 Restrictions on possible language types

The first step beyond typology as the classification of types and toward the explanation of the cross-linguistic variation that classification describes is the discovery of restrictions on possible language types. Linguistic theory in any approach, formalist or functional–typological, has as its central question, what is a possible language (§1.2)? This question can in turn be paraphrased as: of the logically possible types of languages, how do we account for what types actually exist?

One of the features that distinguishes the typological method of discovering constraints on possible language types is the empirical method applied to the problem. If a typologist wants to find restrictions on possible relative clause structures, for example, he or she gathers a large sample of languages and simply observes which of the possible relative clause types are present and which are absent. That is, the restrictions on logically possible language types are motivated by the actually attested language types. If there is a gap in the attested language types, then it is provisionally assumed that the gap represents a constraint on what is a possible language, and explanations are sought for the gap. This is the **inductive** method, which must be used in constructing generalizations from empirical data. In contrast, the generative approach uses a rationalist deductive method, in which it is argued that certain analyses of a single language represent universals of human language because they cannot possibly be learned by a child (the 'poverty of the stimulus' argument; §1.2).

There are a number of objections that have been raised to the inductive method for determining gaps in logically possible language types. The first is that there may have existed languages that represented an unattested language type, or there may come to exist languages that do so. Virtually all linguists, however, use a working hypothesis of linguistic uniformitarianism; that is, it is assumed that the rules that govern language structure today are the same that governed language structure yesterday and will be the same that will govern language structure tomorrow. Although human language arose from some prelanguage in perhaps some gradual

way, those steps in the evolution of language are unattested, and the oldest records of human languages display the full range of structural complexity and the same kinds of structural types found in modern languages.In fact, the greatest problem facing typological research is that the number of living languages, most of which are poorly described at best, is decreasing so rapidly that there may indeed be such a reduction of the data base that the resulting typological generalizations will be less secure.

A second objection is that an unattested language type is not necessarily an impossible language type. This fact cannot be denied, of course; it can only be mitigated. The primary mitigation is to have a language sample that is larger than the space of possible language types. For instance, let us consider a typological study of the word order of demonstratives, numerals, genitives and adjectives relative to the head noun. Each element may precede or follow the head noun; hence, each parameter has two possible values (modifier precedes or modifier follows). There are four logically independent parameters corresponding to the four kinds of modifiers. Multiplying together the number values on each independent parameter yields $2 \times 2 \times 2 \times 2 = 16$ logically possible types. For this study, a sample of fifteen languages is simply inadequate. Even if every language were of a different type, one type would be unattested simply because the number of logically possible types is one more than the number of languages in the sample. A much larger sample, such as fifty or a hundred languages, is necessary to avoid this problem.

Determining sample size for a typological study presupposes a clear definition of **logically possible** language types. This is not as easy as it appears. Some language types are logically impossible and hence can be excluded from the set of possible language types. For example, in a typological study of pronouns and definiteness, one would not find a language with indefinite first person pronouns. This corresponds to a logically impossible type: indefiniteness means the referent is not known to the hearer, but the first person refers to the speaker by definition and hence is known as such to the hearer. Likewise, one will not find a language with pharyngeal or laryngeal nasals: 'with a closure in the pharynx or larynx it is not possible for air to pass into the nasal cavity' (Ladefoged and Maddieson 1996:103). Logically impossible types are of course accounted for by straightforward external semantic or phonetic reasons.

Nevertheless, the number of logically possible types is usually far greater than the possible types typically explored in typological studies. For example, studies of the category of number examine categories such as singular (one referent), dual (two), trial (three) and plural (unrestricted nonsingular number). Universals can be formulated such as Greenberg's Universal 34: 'No language has a trial number unless it has a dual. No language has a dual unless it has a plural' (Greenberg 1966a:94). This universal constrains the partitioning of sets of referents of the noun

by the cardinality of the set. But the categories singular, dual, etc. by no means exhaust the logical possibilities. A language might have one number inflection if the number of referents is even, or a prime number, and another if the number is odd, or not a prime number. Yet no languages do (Greenberg 1969/1975:300). This fact is as deserving of explanation as Greenberg's Universal 34 (see Greenberg 1969/1975:301). Another example of a similar phenomenon is in the study of number in person marking systems (pronouns and pronominal indexation systems). In a survey of 265 person marking systems, Cysouw (2001:72) argues that no language distinguishes a true first person plural – multiple speakers, as in a chorus – from the usual first person plural (speaker plus other nonspeakers), and likewise no language distinguishes a true second person plural (multiple addressees) from a pronoun denoting addressees plus possible non-addressees. This universal also demands theoretical explanation.

The range of genuinely logically possible types for any grammatical phenomenon is probably very large and in some cases infinite. Can – or should – one decide in advance how many logically possible types there are, and thus how large a sample is necessary? The answer is no. One constructs a small sample and observes the range of attested types and, more important, the logically independent formal and external parameters defining the attested types. For example, a small survey of number systems will turn up some duals and perhaps a trial as well as plurals, but no odd–even or prime–nonprime systems. One can quickly form the universal that number categories will subsume contiguous portions of the cardinal number sequence – which, if made properly explicit, can be further tested – and then construct a sample intended to capture the sorts of types Universal 34 refers to, and also other plausible possible categories such as quadral and quintal. A typological study always involves an interplay between deductive hypotheses and inductive generalization from languages.

One might still object that even if we examined every existing human language, this still does not guarantee that unattested language types cannot ever come to exist. This objection to the empiricist method applies to any other method, however. Any method for proposing constraints on possible language types can only be verified by the examination of actual languages. In those cases one cannot be absolutely certain that one has verified the proposed constraint, any more than one can be certain that an empirically arrived at typological universal is absolutely valid.

A final important point about empirical generalization is that theoretical significance also accrues to the *frequency* of a language type, not just to whether it is attested or unattested. This is a crucial point because most language universals (other than those excluding bizarre types like prime–nonprime number) have exceptions. A language universal is in fact a universal of cross-linguistic distribution (Greenberg 1957:87). If one language type is very rare and another type very

common, this distribution merits explanation even though both types are classed as attested. For example, the first universal listed in Greenberg's original paper on implicational universals is 'In declarative sentences with nominal subject and object, the dominant order is *almost always* one in which the subject precedes the object' (Greenberg 1966a:77; my italics). As the italicized words indicate, Greenberg was aware of exceptions (Greenberg 1966a:105, note 5); a later probability sample indicated that the exceptional languages numbered approximately 5% of the total (Tomlin 1986). Although Greenberg's universal has some exceptions, it still remains to be explained why 95% of the world's languages have the subject preceding the object in normal declarative sentences, whereas only 5% have the opposite order. Dryer argues that most universals are of this type: a 'core' of frequent types, fading out to a periphery of progressively rarer types, without a sharp line between 'possible' and 'impossible' types (Dryer 1997a:124, Figure 1a; see also §8.2). One important theoretical mechanism for explaining frequency patterns, competing motivations, will be introduced in this chapter. For didactic purposes, however, we will begin by treating universals as exceptionless.

3.2 Unrestricted and implicational universals

Greenberg's first universal on the order of subject and object is an example of an **unrestricted universal**. An unrestricted universal is an assertion that all languages belong to a particular grammatical type on some parameter, and the other types on the same parameter are not attested (or are extremely rare). Unrestricted universals characterize the distribution of languages along a single parameter; for example, the order of subject and object, or whether or not a language has oral vowels. The parameter allows for the logical possibility of more than one type, but only one type is attested (or is extremely common, in the case of unrestricted universals with exceptions). This is illustrated here with the unrestricted universal 'all languages have oral vowels' ($\surd$ = languages of that type exist; – = no languages of that type exist):

Oral vowels	No oral vowels
$\surd$	–

In other words, there is a gap in the logically possible language types, and the unrestricted universal states the constraint on language types along the relevant parameter.

The number of unrestricted universals, again other than those excluding bizarre types such as prime–nonprime number, is relatively small. Most unrestricted universals are built into the frameworks of linguistic theories because they are true of

all languages. Nevertheless, as noted above, unrestricted universals require deeper explanation just as much as implicational universals or other more complex cross-linguistic patterns do.

Implicational universals differ from unrestricted universals in that they do not assert that all languages belong to one type. Instead, they describe a restriction on logically possible language types that limits linguistic variation but does not eliminate it. We may illustrate this with a simple implicational universal, 'If a language has noun before demonstrative, then it has noun before relative clause' (Hawkins 1983:84, Universal XI′). This implicational universal covers the following four logically possible types:

(i) Demonstrative and relative clause both follow the noun (NRel, NDem): Tinrin (Osumi 1995:267, 90):

(1a) nrâ ta traiki nrâ **moo [nrâ fi ghe mê giwe]**
3SG hit dog SBJ man 3SG go from to.here mountain
N Rel
'The man who came from the mountain hit the dog.'

(1b) moo **hòrrò ha**
DET prayer this
N Dem
'this prayer (going on now)'

(ii) Relative clause precedes the noun and demonstrative follows the noun (RelN, NDem). This type is not unattested but it is quite rare, found in only nine genera of 201 for which information is available (Dryer 2001).

(iii) Relative clause follows the noun and demonstrative precedes the noun (NRel, DemN), as in English:

(2a) the **book [that she is reading right now]**
N Rel

(2b) **this book**
Dem N

(iv) Demonstrative and relative clause both precede the noun (RelN, DemN): Limbu (van Driem 1987:196, 359):

(3a) **[anchige thuŋ -ɛ -tch -u -ge -bɛ -n] thi:**
1DU.EX drink -PRET -DU.A -3.P -EX -NR -ABS millet.beer
Rel N
'the millet beer we drank'

(3b) **khɛŋ** nɛpphu **cum** -ha?
that two friend -PL
Dem N
'those two friends'

The implicational universal restricts language variation to types (i), (iii) and (iv) by excluding type (ii). Thus, implicational universals capture a pattern in language *variation*, and differ from unrestricted universals, which account for uniformity, not variation. As such, implicational universals cannot even be discovered without cross-linguistic comparison. One can examine a single language alone, such as English, and observe properties such as the presence of oral vowels that turn out to manifest unrestricted universals. (Even so, one cannot assume that oral vowels are universal without examining a significant range of other languages.) However, one could not guess from looking at English, which is type (iii), that types (i) and (iv) are attested but type (ii) is not. One must look at a large sample of languages to determine the range of possible variation. This is what makes implicational universals the paradigm example of typological generalization: they represent the simplest form of restriction in language variation, and they can only be discovered through cross-linguistic comparison.

What makes implicational universals more interesting than unrestricted universals above all, however, is that they state a dependency between two **logically independent** parameters. The four logically possible language types described in the preceding paragraph actually represent two independent parameters, demonstrative–noun order and relative clause–noun order. Each parameter has two values: the modifier precedes or the modifier follows. We may construct a table, called a **tetrachoric table**, that displays the two parameters as two dimensions:

	DemN	NDem
RelN	√	–
NRel	√	√

The tetrachoric table is a useful means of displaying the empirical data of attested and unattested language types. An implicational universal, on the other hand, is a relation that characterizes the distribution of attested and unattested language types. The pattern in the tetrachoric table basically matches the pattern of truth values in the truth table for implication found in propositional logic, where T stands for 'true' and F for 'false':

Truth table for implication

P	Q	P ⊃ Q
T	T	T
T	F	F
F	T	T
F	F	T

Distribution of attested types

Type	NDem	NRel	Attested (NDem ⊃ NRel)
(i)	yes	yes	yes
(ii)	yes	no	no
(iii)	no	yes	yes
(iv)	no	no	yes

The truth table indicates that when P is true and Q is false, the proposition 'if P, then Q' is false. When both P and Q are true, the proposition is, of course, true. When P is false, then the proposition 'if P, then Q' is not false because it only indicates what must be the case when P is true. In logic, 'if P, then Q' is taken to be true in these conditions. The same applies to the implicational universal NDem ⊃ NRel. If a language is NDem but not NRel, then it would violate the universal NDem ⊃ NRel, and in fact that is the unattested type (ii). If a language is NDem and NRel, then it is allowed under the implicational universal. If a language is not NDem, then it can be either NRel or RelN: the implicational universal does not exclude either type. Thus, we may retitle the column titled 'attested' by the implicational universal NDem ⊃ NRel, with the values 'yes/no' in the second table corresponding to 'T/F' in the truth table.

The implicational universal characterizes the gap in attested language types as a dependency between values on two logically independent parameters, in this case, NDem and NRel. Unlike unrestricted universals, implicational universals begin to assemble the independent parameters of a grammar together into an integrated whole. Implicational universals are central to typological analysis, because they are the lowest-level link between grammatical parameters. More complex universals of the types to be described in the following chapters, and the deeper patterns described later in this chapter, are ultimately decomposable into a set of simpler implicational universals.

Another important feature of both unrestricted and implicational universals is that they are universal, not language specific. Unlike assertions of dependencies between grammatical properties in individual languages, unrestricted and implicational universals hold – or are intended to hold – for all languages (setting aside exceptions for now). In the case of implicational universals, the universal dependencies between grammatical properties may not even be apparent in individual languages taken one at a time, because they are patterns of variation. Even so, since implicational universals cover all human languages, the forces that account for their existence must be operating in the grammars of individual languages (see §§3.3, 3.5, 5.3, 7.1, 9.3).

Implicational universals represent an application of propositional logic to typology. For that reason, we have the full power of propositional logic at our disposal, and we now use it to further illuminate the dependencies among grammatical parameters.

Propositional logic asserts that for every universal of the form P ⊃ Q, there is a logically equivalent universal, ~Q ⊃ ~P ('if not Q, then not P'), called the **contrapositive**. We may illustrate this with the truth tables for the contrapositive of RelN ⊃ DemN:

Type	NDem	NRel	NDem ⊃ NRel	~NRel	~NDem	~NRel ⊃ ~NDem
(i)	yes	yes	attested	no	no	attested
(ii)	yes	no	unattested	yes	no	unattested
(iii)	no	yes	attested	no	yes	attested
(iv)	no	no	attested	yes	yes	attested

One can observe that the truth values for the columns headed by NDem ⊃ NRel and ~NRel ⊃ ~ NDem are identical, demonstrating their logical equivalence. Since the opposite of NDem is DemN and the opposite of NRel is RelN, we may replace ~NRel with RelN and ~NDem with DemN. This yields RelN ⊃ DemN for the last column, and we can see that RelN ⊃ DemN is equivalent to NDem ⊃ NRel.

We can construct the contrapositive of NDem ⊃ NRel because each parameter has two values, and each value can be treated as the opposite of the other value. This is not possible, however, if there are more than two values for a parameter. Consider Greenberg's Universal 3: 'Languages with dominant VSO order are always prepositional,' and the table of attested languages that it is derived from the following (Greenberg 1966a:78; exceptions were found after this date, however):

	VSO	SVO	SOV
Prep	6	10	0
Post	0	3	11

In this example, the parameter of declarative-clause word order has three values: VSO, SVO and SOV. Greenberg's universal can be restated as the formula VSO ⊃ Prep, but its contrapositive is only Post ⊃ ~VSO, since languages that are not VSO can be either SVO or SOV.

A standard implicational universal is a generalization over a tetrachoric table in which three types are attested and one type is not (or is extremely rare). The pattern of attested and unattested language types in a tetrachoric table (or larger table) is the central fact; an implicational universal is a hypothesis of an inductive generalization over that pattern. There are other possible patterns of attested language types in which only two types are attested, or even just one type is attested. If just one type is attested, then one is typically dealing with two unrestricted universals, such as 'All languages have consonants' and 'All languages have vowels':

	Consonants	No consonants
Vowels	√	–
No vowels	–	–

If two types are attested and two are unattested, there are two possible patterns. In one pattern, the unattested types are in the same row or column (it does not matter whether it is a row or a column, since a table can always be inverted). In the vast majority of cases, this represents an unrestricted universal on one parameter,

and a second parameter in which both types are attested:

	Uvular consonants	No uvular consonants
Vowels	√	√
No vowels	–	–

The unattested types in the second row are accounted for by the unrestricted universal, 'All languages have vowels,' while the two columns simply note that some languages have uvular consonants and some languages do not. This does not indicate any relationship or dependency between the presence or absence of uvular consonants and the presence of vowels, since all languages have vowels anyway.

This is not true in all cases, however. Greenberg (1978d:50–51) describes the example of oral vowels and nasal vowels:

	Nasal vowels	No nasal vowels
Oral vowels	√	√
No oral vowels	–	–

Based on this table, one may formulate an unrestricted universal that states 'All languages have oral vowels.' However, this unrestricted universal may not be the best generalization from the perspective of an explanatory account of the cross-linguistic facts. The unattested type with no oral vowels or nasal vowels can be accounted for by the unrestricted universal 'All languages have vowels,' and the unattested type with nasal vowels but no oral vowels can be accounted for by the implicational universal 'If a language has nasal vowels, then it has oral vowels.'

Other evidence suggests that the alternative hypothesis is the correct one. First, there is additional evidence about the relationship between nasal vowels and oral vowels that implies that a dependency holds between the two of the sort described by the implicational universal (see §4.4). Second, the unrestricted universal 'All languages have vowels' can be attributed to the impossibility, or at least extreme difficulty, of articulating speech without vowels, whereas the unrestricted universal 'All languages have oral vowels' cannot be accounted for in the same fashion, since a language with only nasal vowels does not have the same articulatory restrictions.

The lesson to be drawn from this example is that unrestricted and implicational universals cannot be mechanically read off tables of attested and unattested language types. Both wider typological patterns and deeper explanations of what is going on must be appealed to in order to construct the best combination of unrestricted and implicational universals to account for the data. Above all, the choice of the correct generalization(s) to account for the constraints on possible language types is determined by the proposed theory behind the relationships between parameters.

The other pattern of two attested and two unattested types is much more straightforward, and can be illustrated by Greenberg's Universal 2: 'In languages with prepositions, the genitive almost always follows the governing noun, while in languages with postpositions it almost always precedes' (Greenberg 1966a:78):

	NGen	GenN
Prep	√	–
Post	–	√

In this universal, which is not exceptionless (see §8.1), the unattested types are found on a diagonal in the tetrachoric table. Greenberg phrased his universal as two opposite implicational universals: Prep ⊃ NGen and Post ⊃ GenN. These can be combined to a **biconditional universal**: Prep ≡ NGen (and its contrapositive, Post ≡ GenN). The relationship between a biconditional universal and a logical equivalence (indicated by ≡) is given below (compare to the truth table for implication above):

Truth table for implication			Distribution of attested types		
P	Q	P ≡ Q	Prep	NGen	Attested (Prep ≡ NGen)
T	T	T	yes	yes	yes
T	F	F	yes	no	no
F	T	F	no	yes	no
F	F	T	no	no	yes

A biconditional universal is not the same as an implicational universal. For example, RelN ⊃ DemN is not equivalent to DemN ⊃ RelN; in fact, DemN ⊃ RelN is *false* (look at English, for example). The true equivalent to RelN ⊃ DemN is its contrapositive, ~DemN ⊃ ~RelN, or NDem ⊃ NRel, as we saw above. One way to remember this is that the tetrachoric table for a genuine biconditional universal will have two gaps in it, whereas a tetrachoric table for a one-way implicational universal will have only one gap in it.

So far, we have discussed universals that involve only one typological parameter (unrestricted universals) or two parameters (simple implicational universals of the form 'If P, then Q'). It is quite possible to combine three or more parameters into implicational universals involving the full power of propositional logic. There are two arguments for using complex implicational universals instead of simple ones (Hawkins 1980; 1983). The first is that adding further conditions on a simple implicational universal can remove exceptional cases, making the universal into an exceptionless universal. This process can be quite useful, because it may turn out that the further condition can contribute to the correct explanation for the exception to the simpler version.

For example, consider a candidate universal, 'If a language is postpositional, then the genitive precedes the noun' (SOV ⊃ GN). However, there are a number

of languages which are postpositional and NG. It turns out that in all of those languages the adjective follows the noun. Thus, we may modify this universal to read, 'If a language is postpositional, then if the noun precedes the genitive, then the noun precedes the adjective,' i.e. Post ⊃ (NG ⊃ NA), equivalent to (Post & NG) ⊃ NA (Dryer 2001). This universal is now exceptionless in Dryer's sample. Since one has to include adjective–noun order in the universal in order to make it exceptionless, it implies that genitive–noun order is somehow dependent on adjective–noun order as well as declarative clause order. Matthew Dryer (pers. comm.) suggests that this is because the genitive construction is adjectival in character in these languages (see §3.4).

On the other hand, adding conditions to make an implicational universal with exceptions into an exceptionless universal may turn out to be unproductive if the additional conditions do not have anything to do with the universal. Dryer gives the example of the implicational universal VO ⊃ NRel (Dryer 1997a:142). There is only one exception to this case, the family of Chinese languages. Hence, any property that Chinese accidentally has may be added to the antecedent to make the universal exceptionless. Changing the universal would make it exceptionless but it would not help to account for the exceptions. The logical structure of the implicational universal implies a deeper set of dependencies between the grammatical properties found in the universal. For that reason, it is worth complicating implicational universals to make them exceptionless only if there is reason to believe that the additional complications play a role in explaining the exceptions that are removed.

The second reason that Hawkins has argued for more complex implicational universals is that by combining individual universals, one can discover larger patterns that underlie individual implicational universals. These larger patterns – which can be found with sets of simple implicational universals as well – will concern us for the rest of this chapter and most of the following chapters.

3.3 Competing motivations

If one examines all of Greenberg's universals that refer to adjective–noun order, a striking pattern emerges:

(SOV & NG) ⊃ NA	Universal 5
VSO ⊃ NA	Universal 17
NDem ⊃ NA	
NNum ⊃ NA	(both derivable from Universal 18)

In all of the implicational universals involving adjective–noun order, one finds the order noun–adjective in the implicatum of the universal. If the contrapositive of

these universals were taken, they would all have the order adjective–noun in the implicans:

AN ⊃ ~(SOV & NG)
AN ⊃ ~VSO
AN ⊃ DemN
AN ⊃ NumN

The generalization that covers these universals is that all implicational universals whose implicatum involves the order of noun and adjective will have the order NA as the implicatum (and a complementary statement for the contrapositives). Greenberg calls this pattern **dominance** (Greenberg 1966a:97): the dominant order is the one that always occurs in the implicatum. To say that some word order D is dominant is to say that implicational universals involving D will be of the form X ⊃ D (or the contrapositive ~D ⊃ ~X), and never of the form X ⊃ ~D (or D ⊃ ~X). Intuitively, the dominant order can be thought of as the preferred order of elements, other things being equal.

Dominance can be read directly from a tetrachoric table. Consider the table for AN ⊃ DemN:

	DemN	NDem
NA	√	√
AN	√	–

The dominant order is the order that occurs with either possible order of the cross-cutting parameter. Thus, NA is dominant because it occurs with either DemN or NDem, whereas AN can occur with DemN only. Likewise, DemN is dominant (note also that with the universal RelN ⊃ DemN, DemN order is dominant as expected). The orders that are not dominant, AN and NDem, are called **recessive** by Greenberg.

The status of a word order in an implicational universal is not the only evidence for dominance. The dominant word order is generally more frequent cross-linguistically than its recessive opposite order. For example, DemN order occurs almost twice as frequently as NDem order. The greater cross-linguistic frequency of DemN order does not necessarily follow from its being the implicatum of the implicational universal. The implicational universal NDem ⊃ NRel means that DemN will occur in both RelN and NRel languages, but NDem will occur in only NRel languages. But it could still be the case that NDem languages would outnumber DemN languages, if the following imaginary situation held:

	NRel	RelN
DemN	30	30
NDem	80	–

Table 3.1 *Dominance patterns for word order universals*

Dominance	Universals	Frequency	Source
Clausal elements			
SO	1	96%	Tomlin 1986 (n = 402)
		91%	Dryer 2001 (g = 286)
SV	5, 17	86%	Tomlin 1986 (n = 402)
		83%	Dryer 2001 (g = 325)
VO??	5, 13, *17*, 21, 25	54%	Tomlin 1986 (n = 402)
		40%	Dryer 2001 (g = 325)
Phrasal elements			
NRel	24, IX′, XI′, XII′, XXIII	69%	Hawkins 1983:96, 100 (n = 163)
		73%	Dryer 2001 (g = 191)
DemN	V′ (= 18), XI′	63%	Hawkins 1983:96, 100 (n = 158)
		61%	Dryer 2001 (g = 309)
NumN	VI′ (= 18), XII′	68%	Hawkins 1983:96, 100 (n = 147)
		55%	Dryer 2001 (g = 272)
NA	5, 17, 18, 21, 24, *40*, XXI	55%	Hawkins 1983:96, 100 (n = 350)
		68%	Dryer 1988 (n = 287)
		63%	Dryer 2001 (g = 309)
GN?	IX′	53%	Hawkins 1983:96, 100 (n = 348)
		69%	Dryer 2001 (g = 298)
Prep??	24	37%	Dryer 2001 (g = 275)

Notes: Universals supporting hypotheses: Greenberg 1966a (Arabic numerals), Hawkins 1983 (Roman numerals). Universals in italics are counterexamples to the proposed dominance pattern. Frequency: n (languages), g (genera; see §1.5). The percentages from Dryer 2001 represent the average of the percentage of genera with the putatively dominant word order in each of his six large linguistic areas.

In this situation, NDem occurs in eighty languages and DemN occurs in only sixty languages (compare Greenberg 1966a:97). Hence the fact that DemN is indeed more common than NDem is an independent piece of evidence supporting the dominance of DemN.

Table 3.1 lists the word orders for which there is some evidence that one order is dominant and its opposite is recessive. Some orders in the table are probably not dominant. For example, there is only one implicational universal supporting dominance for each of Prep and GN, and the cross-linguistic frequency for Prep (for genera across areas) is only 37%, the opposite that one would expect from the universal. VO has several universals supporting dominance, and one universal questioning it; but the proportions of VO languages and VO genera differ drastically. OV is more common in only four of six areas, and in one of them (North America) by only one genus (Matthew Dryer, pers. comm.). These counts must

be taken with a grain of salt. Genus frequencies represent the linguistic state of the world some four millennia ago, apart from genera that have died out without trace, whereas language frequencies represent the current linguistic state of the world (§1.5). It appears that at that earlier stage, there were significantly more OV languages, or at least more than survived to the present, and also significantly more GN and Post languages. And these orders happen to be strongly correlated with each other, as we will see immediately below. Hence some of the variance in figures may represent the possibility that the proportions of language types have not reached a stationary distribution (§1.5). Nevertheless, it is unlikely that adposition order or object–verb order display any dominance pattern.

The other pattern that Greenberg discovered in his universals is **harmony**. This pattern is also derivable directly from the tetrachoric table, though it is less obviously manifested in the implicational universal. A word order on one parameter is **harmonic with** an order on the cross-cutting parameter if it occurs *only* with that other order. In the implicational universal AN ⊃ DemN for example, AN and DemN are harmonic, and NDem and NA are harmonic.[1]

In a biconditional universal, Prep is harmonic with NG and vice versa, and Post is harmonic with GN and vice versa. However, there is no dominant order in a biconditional universal, since each word order type occurs with only one word order type on the other parameter. Conversely, in an unrestricted universal such as Greenberg's Universal 1 (subjects almost always precede objects), there is a dominant order – SO in this case – but there are no harmonic orders.

In other words, Greenberg's model of harmony leads to a complex set of pairwise harmony relationships between word order patterns. These relationships are illustrated in Figure 3.1, for the universals in Greenberg (1966a) and Hawkins (1983), using an arrangement of word order types that will be applied to more recent analyses in §3.4. The figure is quite complex but, as we will see in §3.4, later attempts to simplify the relationships are problematic. The orders on the right hand side of Figure 3.1 are clause level orders, and those on the left hand side are phrasal orders. The orders enclosed in the dotted region are those for a head with an NP or PP dependent (genitive, standard of comparison, subject, object, prepositional object). The vertical stroke indicates harmony of a binary order parameter and its opposite: for example the link between A|N and Num|N means that AN is

[1] Greenberg is unclear whether harmony should be asymmetric or symmetric. He writes regarding VOprn ⊃ VO: 'the order noun object – verb is harmonic with pronoun object – verb but is disharmonic with verb – pronoun object *since it does not occur with it*' (Greenberg 1966a:97; my italics). However, later on the same page he writes: 'The entry [in the tetrachoric table] with zero is always the recessive one for each construction, and the two constructions involved are disharmonic *with each other*' (p.97; my italics). It appears that Greenberg probably intended harmony to be symmetric. All subsequent research (other than the first edition of this book) has assumed harmony to be symmetric, and I will follow that view here.

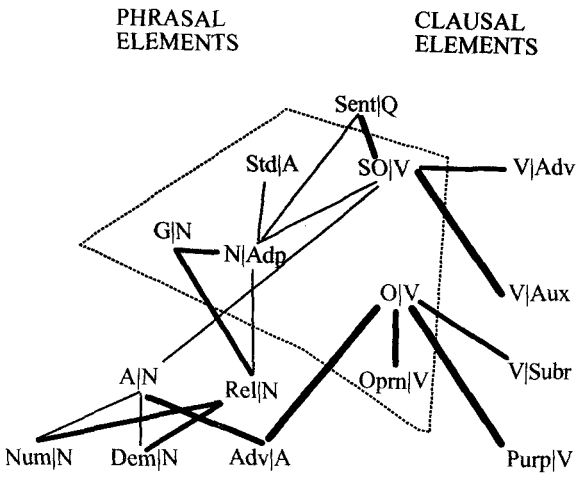


Figure 3.1 *Harmonic relations between word orders based on evidence in Greenberg 1966a and Hawkins 1983*

harmonic with NumN and NA is harmonic with NNum. The parameter SO|V refers to Greenberg's universals involving VSO vs. SOV languages. The lines link two word orders that are harmonic according to Greenberg's and Hawkins' universals. The thickness of the lines represents the strength of the implicational relation in terms of Greenberg's or Hawkins' descriptions: thicker lines represent universals with fewer exceptions.

Greenberg's analysis illustrates the next step in a typological analysis. Whereas an implicational universal describes a relationship between just two parameters (or maybe three or four, in the case of complex implicational universals), concepts like dominance and harmony describe a relationship between a large number of parameters in a single stroke. The concept of dominance, for example, defines a relationship between a particular word order type and any other parameter that is involved with it. Many of these deeper and broader typological concepts can be recast in terms of a generalization over implicational universals. However, they can also be directly read off tetrachoric tables or other descriptive representations of the distribution of attested language types. As more of these broader concepts have been discovered and employed, they have replaced the implicational universals as typological generalizations.

Greenberg considers both dominance and harmony to operate in explaining word order patterns. He proposes the following generalization:

(4) 'A dominant order may always occur, but its opposite, the recessive, occurs only when a harmonic construction is likewise present' (Greenberg 1966a:97).

Greenberg's generalization is one of the earliest examples of an important type of explanation of cross-linguistic variation, the concept of **competing motivations** (see also DuBois 1985; Optimality Theory is compared to competing motivations in §3.5). Competing motivations models describe the interaction of universal typological principles or **motivations** in order to account for the existence of variation in language types. The motivations are generally functionally based in typological analyses, but the competing motivations model does not require the motivations to be functional. Competing motivations such as dominance and harmony are not strictly functional, although functional explanations have been offered for them (see §3.4).

In a competing motivations model, no one language type is ideal (wholly motivated) because the different principles governing the existence of language types are in conflict (competition). In Greenberg's word order analysis, some word orders, such as NA, are motivated by dominance, while either NA or AN order is motivated by harmony in terms of its alignment with the order of other modifiers. Since for some modifiers, modifier–noun order is dominant, and for others noun–modifier order is dominant, a language cannot be harmonic without having some recessive orders. However, an order is predicted not to be both recessive and disharmonic at the same time.

The value in competing motivation models for typology is that they can account for both variation in language types and also frequency of language types across the world. Thus, competing motivations provide an important class of explanations for both typological variation and constraints on that variation. However, it should not be thought that in, say, an NA language only dominance is part of its grammar of modifiers, and in an AN language only harmony is part of its grammar of modifiers. The motivations are ultimately functional in origin (see §3.4), and are present for all speakers of all languages. Competing motivations influence (i.e. constrain) the conventions of a grammar of a particular language, and can alter the conventions in the process of language change (see chapter 8). But they are not part of the conventions of a particular language at a particular time per se. All speakers have all motivations as part of their social and cognitive context.

Competing motivation analyses can exclude certain logically possible types, and therefore are not necessarily 'vacuous' (see below). In Greenberg's analysis of word order, one logically possible type is excluded: the type in which the two word orders are disharmonic and both recessive. This type is, of course, the one type excluded by the implicational statement of the word order pattern. In general, we may characterize a **nonvacuous** competing motivation model as one in which:

(i) Satisfaction of all motivations simultaneously is logically impossible (hence the competition between the two).

(ii) Some allowed logically possible type(s) can be attributed to satisfaction of one motivation.

(iii) The other allowed logically possible type(s) can be attributed to satisfaction of another motivation.

(iv) The prohibited logically possible type(s) represent the satisfaction of no motivation.

At this point, the value for typology of nonvacuous competing motivation analyses should be clear: they allow for universal characterization of typological variation. All languages, and therefore all human beings, have both underlying motivations attributed to them. A particular language at a particular historical stage has *conventionally* resolved the competing motivation in one of the several possible acceptable ways. Moreover, languages can change over time, reflecting a reassertion of one motivation at the expense of the other (see chapter 8). Nevertheless, certain possible types are excluded – or at least assumed to be very rare – by virtue of satisfying no motivation.

Condition (i) above may be too strong for specific subsets of competing motivations. For example, NRel order appears to be dominant, and VO order may be dominant (see Table 3.1). If so, then VO&NRel languages satisfy both dominance and harmony simultaneously, violating condition (i) (Matthew Dryer, pers. comm.; note also that Greenberg himself did not posit a direct relationship between verb–object and noun–relative order). If all motivations are satisfied, why do OV&NRel and OV&RelN languages exist? Presumably, it is because we have examined only a subset of the competing motivations involved, and other competing motivations may not be satisfied in VO&NRel languages.

In a vacuous competing motivation analysis, condition (iv) above does not apply. Hence, every logically possible type is allowed. In other words, one could reach the same explanatory goal simply by stating that every logically possible type is actually possible. Most linguists would select the latter explanation over a vacuous competing motivation analysis because the latter is simpler. However, the latter explanation – anything goes – is really a non-explanation. Typologists generally take two approaches to vacuous competing motivation models. The first is to refine a vacuous competing motivation analysis so that some logically possible language type is indeed excluded by the analysis, and is indeed empirically unattested. The second is to make quantitative predictions instead of qualitative ones. The fact that a competing motivation analysis does not exclude any possible types does not mean that the analysis is invalid: if it can predict relative frequencies of the language types, then it is a genuine explanation. We illustrate both strategies here.

A number of linguists have proposed a set of universal pragmatic principles motivating word order. These principles have a long history in functionalism; the

three most important ones are listed here, as formulated by Haiman (1985:237–38; see also Jespersen 1909–49, vol. VII:54; Behaghel 1923–32, vol. IV; Tomlin 1986; Mithun 1987; Givón 1988):

1 What is old information comes first, what is new information comes later, in an utterance.
2 Ideas that are closely connected tend to be placed together. [see §7.2.1]
3 What is at the moment uppermost in the speaker's mind [less predictable, more important, more intended to be attended to by the hearer; Givón 1988:275–76] tends to be first expressed.

Most critical attention has been focused on principles 1 vs. 3. New information is generally what is at the moment uppermost in the speaker's mind and old information is not. By principle 1, new information should follow old information. By principle 3, new information should precede old information. Principles 1 and 3 appear to provide a classic vacuous competing motivation for the ordering of old and new information in utterances. A more refined definition of old vs. new and of being 'uppermost in the speaker's mind' may allow us to separate these motivations and construct a proper nonvacuous competing motivations analysis.

But Haiman notes that principle 3 is in conflict with principle 2 as well. Fronting of uppermost information often splits up otherwise conceptually close constituents. Thus, principle 2 will tend to place certain constituents together, and principle 3 will tend to separate them, other things being equal. This is again a classic case of vacuous competing motivation, since no possibility is excluded.

Haiman's argument against vacuity is applied to one word order phenomenon: the position of the questioned element in information questions and of the often identical relative pronoun in relative clauses (so-called *wh*-movement). Haiman identifies principle 3 with linguistic focus, which is most likely to be uppermost in the speaker's mind. He argues that principle 3 applies to information questions only: the questioned element is in focus, and will therefore be found in the focus position (if focus is indicated by a special position). Haiman predicts that relative pronouns will behave differently from interrogative pronouns, even though they are usually analyzed to be the same kind of syntactic element as interrogative pronouns. Principle 3 does not apply, since they are not in focus (and, apparently, principle 1 does not apply either). Instead, principle 2 applies: they are attracted to the head noun of the relative clause. In other words, for information questions, focusing – generally governed by principle 3 – overrides conceptual closeness, while for relative pronouns focusing does not apply, and so principle 2 is free to apply. Typologically this means that language types in which the relative pronoun is not positioned next to the head noun should not exist, even

if the question word (allegedly the same constituent type) is moved to a focus position.

Haiman's conjecture is confirmed by his typological survey, with one exception (Luganda). The crucial test cases are those languages in which focused elements are not fronted. An example of this language type is Hungarian, in which relative pronouns consist of the definite article *a* combined with the interrogative pronoun. In Hungarian, focused elements are placed immediately before the verb. Relative pronouns are moved next to the head noun, which precedes the relative clause. The crucial examples are those in which the question word is not initial, thus demonstrating that it is in preverbal, not sentence-initial, position:

(5) A lova -t **ki** hozta haza?
the horse -ACC **who** brought home
'Who brought the horse home?'

and those in which the relative pronoun is separated from the verb, thus demonstrating that the relative pronoun position is sentence initial, not preverbal (Haiman 1985:244):

(6) az újság **amit** Pista végig olvasott
the newspaper **which** Stephen to.the.end read
'the newspaper which Stephen read to the end'

Haiman has demonstrated that principles 2 and 3 exist and operate independently in the ways that a competing motivation analysis would predict.[2]

The second approach to competing motivation analyses can be illustrated for generalizations over affix order within words. It has long been noted that there is an overall cross-linguistic frequency preference for suffixes (Greenberg 1957; Cutler, Hawkins and Gilligan 1985; Hawkins and Cutler 1988). This evidence suggests that the morpheme order Root–Suffix is dominant. Hawkins and Gilligan (1988) also provide evidence supporting the implicational universal OV/Post ⊃ Root–Suffix and conversely, Prefix–Root ⊃ VO/Prep (they did not distinguish between object and adposition orders in the cross-linguistic studies they made and/or drew upon). This implicational universal supports the dominance of Root–Suffix over Prefix–Root order. It also suggests that OV is harmonic with suffixing and that prefixing is harmonic with VO. Thus, we have a typical dominance–harmony competing motivation analysis.

[2] One apparent problem with Haiman's analysis is that anaphoric, as opposed to relative, pronouns do not move to the antecedent; instead they stay in their 'normal' position. Haiman argues that the normal position of anaphoric pronouns is maintained due to analogy with main clauses. This does not, however, explain why anaphoric pronouns are not attracted to their antecedents in main clauses. An alternative analysis is that an anaphoric pronoun is not truly anaphoric, but indexical, referring directly to an external referent (Barlow 1988; Ariel 1990; van Hoek 1997).

Hawkins and Gilligan support the implicational universal by examining specific affix types, such as gender suffixes on nouns. In this case, they extrapolated the following proportional distribution of gender affixes (Hawkins and Gilligan 1988:232):

Word order type	Gender prefixes	Gender suffixes
VO or Prepositional	20%	30%
OV or Postpositional	0%	50%

This distribution would arise if there is approximately equal balance between Root–Suffix dominance and affix–word-order harmony. In OV languages, dominance and harmony motivate exclusive suffixing. In VO languages, dominance and harmony compete, motivating an approximately equal division between prefixing and suffixing.

Hawkins and Gilligan propose that the overall suffixing preference is simply a sum of individual suffixing preferences; there is no general suffixing preference. However, while the pattern given above for gender is found also with affixes encoding indefiniteness, definiteness, plural, tense, aspect, modality and causative, the pattern for case is different: case affixes are almost exclusively suffixes, no matter what the word order is. This fact can be analyzed in two ways. The first analysis is that case has a much stronger motivation for suffixing. The second analysis is that there is an overall suffixing preference for all affixes, which accounts for gender, etc., but that case has an additional suffixing motivation.

Also, Hawkins and Gilligan observe that five types of affix are found as both prefixes and suffixes in both VO and OV languages: person indexation for subject, object and possessor, negative affixes, and (more equivocally) voice affixes (Hawkins and Gilligan 1988:235). However, another possibility is that these affixes have individual motivations that compete with word-order harmony and possibly with a general suffixing dominance. The proportions for the indexation patterns and for negation from one cross-linguistic sample are given below (Dryer 2001):

Negation (g = 123)

	Prefix	Suffix
VO	17%	7%
OV	21%	55%

Possessor indexation (g = 186)

	Prefix	Suffix
VO	19%	25%
OV	35%	21%

Subject indexation (g = 227)

	Prefix	Suffix
VO	26%	15%
OV	19%	40%

Object indexation (g = 131)

	Prefix	Suffix
VO	10%	32%
OV	32%	26%

There seems to be a motivation for person and negative affixes to be prefixes despite the harmony of OV with suffixation found with other affix types. On the other hand, one would then expect a higher proportion of prefixes than suffixes in

VO languages, and that is clearly found only with negation: subject and possessor indexation are approximately equal. Object indexation seems to have an anti-harmonic pattern: more prefixes in OV languages, and more suffixes with VO languages (see §3.4). In this model, then, there are three competing motivations:

(i) an overall suffixing preference;
(ii) harmony of VO/Prep with prefixing and OV/Post with suffixing;
(iii) individual preferences for particular inflectional categories (suffixing for case, prefixing for negative and subject and possessor indexation).

The lesson to be drawn from the competing motivation analysis of affix order is that a more fine-grained approach to typological classification (here, differentiating affix types) will reveal significant universals as well as more complex patterns of cross-linguistic distribution in some cases. The more complex interactions in a competing motivation analysis will require more sophisticated quantitative techniques; however, competing motivation analysis provides a theoretical framework in which to convert statistical distributions into underlying motivating factors.

In sum, competing motivations analyses offer an explanation for language variation. There are multiple motivations for language types. The motivations compete with one another, such that no single language type satisfies all competing motivations simultaneously. All language types that are partially motivated may exist; hence, variation in language types is found. Moreover, the proportions of attested language types reflects the number and/or degree of motivation of each language type.

3.4 Deeper explanations for word order and affix order universals

Many proposals have been made to explain the patterns of dominance and harmony that Greenberg discovered. Before reviewing these proposals, however, an important rephrasing of Greenberg's typological classification of clausal word order must be made.

Greenberg's original classification of clausal word order was based on a six-valued parameter: SOV, VSO, SVO, VOS, OVS and OSV. Of those orders, Greenberg analyzes only SOV, VSO and SVO, although he was aware of the existence of VOS and OVS languages. Later research confirmed the existence of VOS and OVS languages, and has suggested that there also exist OSV languages (Derbyshire 1977; Derbyshire and Pullum 1981; Pullum 1977, 1981).

The six-way classification can be divided into binary parameters, SV/VS and OV/VO. This division has a number of advantages (Dryer 1997b). Many languages have much freer word order than English, yet some orders are more frequent than

others, and hence one can reasonably speak of a basic clausal word order for that language. However, very few sentences in texts have full nominal subjects and full nominal objects (see §6.3.3). An analysis of the SOV/VSO, etc. order in such a language would be based on a tiny fraction of the whole corpus. However, many sentences have just a nominal subject or just a nominal object. Hence, it is much sounder to evaluate SV/VS and OV/VO orders for such languages.

Also, there are many languages which are verb-initial, but which are difficult to classify as VSO or VOS. Such languages can be classified as VS&VO, with no value for SO/OS. Likewise, some verb-final languages frequently have OSV order, and can be described as SV&OV. In fact, verb-initial languages share many typological features, which led Hawkins (1983) to collapse them into a single type, V-1 (i.e. VS&VO). Finally, some languages may not have a basic verb–subject order but may have basic verb–object order (e.g. Masakin is VO but SV/VS; Dryer 1997b:85); or lack a basic verb–object but may have basic verb–subject order (e.g. Logbara is SV but VO/OV; Dryer1997b:85).

One consequence of this recasting of the typological classification of clausal word order is that many of Greenberg's universals are now complex universals. For instance, the universal VSO ⊃ QSent must now be phrased as (VS & VO) ⊃ QSent, or more precisely as (VS & VO & SO) ⊃ QSent. This modification has important consequences for the analysis of harmony in work after Greenberg 1966a.

Two main approaches for explaining the motivations underlying word order and affix order have been taken: by the processing of syntactic structure, and by diachronic relationships between word orders. These two approaches need not be mutually exclusive.

Hawkins has largely proposed processing explanations for word order patterns. In his earlier work (Hawkins 1980; 1983), he proposed separate principles for dominance and harmony. Hawkins used a sample of over 300 languages and thus brought in a much greater range of data, especially data for the various noun modifiers (demonstrative, numeral, adjective, genitive and relative clause). Hawkins introduces two competing motivations for noun–modifier order. The first motivation is **heaviness** (Hawkins 1983:90). Certain types of modifiers tend to be larger grammatical units, in terms of number of syllables, number of words and syntactic constituency (relative *clauses* vs. genitive *phrases* vs. single-*word* demonstratives and numerals), and could be ranked in order of heaviness as follows:

(7) Rel < Gen < Adj < Dem, Num

Hawkins interprets 7 as a preference for heavier modifiers to follow the head noun, and lighter modifiers to precede (see §5.1). This concept resembles Greenberg's concept of dominance in its effect of complementing harmony: heavier modifiers follow the noun even if the harmonic order is modifier–noun, and lighter

modifiers precede the noun even if the harmonic order is noun–modifier. Since demonstrative and numeral are lighter, and adjective and relative clause are heavier, Hawkins' heaviness ranking in 7 corresponds roughly to Greenberg's dominant orders DemN, NumN, NA and NRel.

Hawkins' heaviness principle, if it is indeed equivalent to Greenberg's dominance, can be thought of as an explanation of many cases of word order dominance. The dominant order is that which places the lighter element before the heavier element. This explanation actually represents a putative relationship between one grammatical parameter – word order taken in general, and another, independent grammatical parameter – the length (in phonological and syntactic terms) of the grammatical element. This relationship has a plausible and well-supported functional explanation: order of constituents reflects ranking in size for processing reasons (see Hawkins 1983:98–106 and references cited therein).

The dominant subject–verb order may also be accounted for by heaviness. Recent text studies have demonstrated that across languages subjects, especially transitive subjects, tend to be pronominal, and nominal subjects when they occur tend to follow the verb cross-linguistically (DuBois 1985; 1987; Lambrecht 1987). Thus with subjects as well, heaviness may be a contributing factor to the dominant word order, though DuBois and Lambrecht emphasize principles of information flow (such as those discussed in §3.3 above). Principles of information flow may also be involved in the unequivocal dominance of subject–object order and antecedent–consequent order in conditionals.

Hawkins' second motivation is harmony. Explaining harmony has drawn much greater attention. Word order typologists immediately after Greenberg focused almost exclusively on harmony (e.g. Lehmann 1973; Vennemann 1973). The two harmonic types were named **OV** and **VO** after the declarative-clause order type, and included the word orders shown in Table 3.2 (p.72). The major drawback of this approach, still widespread today, is that it is empirically less adequate than Greenberg's original formulation. The harmony-only analysis treats all of the word order universals as if they were biconditional universals, but in fact most of them are not; dominance also plays a role in word order typology. Although many languages fit one or the other of the two harmonic word order types, many other languages do not, having instead one or more dominant word orders that are disharmonic with the overall pattern of the language. Harmony is only one half of the picture (for a critique of the harmony-only approach, see Comrie 1989:94–102). Another difference between Greenberg's original formulation of harmony and later proposals is that Greenberg only posited two-way harmonic relations (see Figure 3.1 and below). The Lehmann/Vennemann analysis assumed an n-way cluster correlation among all the VO orders and all the OV orders.

In a series of recent papers, Dryer has applied his sampling technique to a very large word order database and in so doing has challenged a number of empirical

Table 3.2 *The OV and VO word order types*

Clausal orders	OV	VO
	SV	VS
	VAux	AuxV
	VAdv	AdvV
	VSubr	SubrV
	PurpV	VPurp
	OcompV	VOcomp
	*Sent*Q	QSent
Phrasal orders	Post	Prep
	GN	NG
	RelN	NRel
	AN	NA
	DemN	NDem
	NumN	NNum
	AdvA	AAdv

Sources: Lehmann 1973; Vennemann 1973

generalizations on word order that have previously been taken for granted. For example, Dryer questions the correlation of adjective–noun order with verb–object order, by demonstrating that it is a side effect of the Eurasian bias of most language samples (Dryer 1988; Greenberg 1966a incidentally does not propose this correlation). In another paper (Dryer 1991), Dryer argues that SVO is not as 'mixed' a type as some typologists have argued: SVO languages pattern in most respects like verb-initial languages, and only in three characteristics do SVO languages display a 'mixed' behavior, two having to do with interrogative sentences and the third being genitive–noun order.

Dryer's major paper on word order (Dryer 1992a) returns to VO and OV as the basic predictors of word order correlations, and identifies correlations as statistically significant quantitative distributions rather than exceptionless implicational universals. His data show that certain word orders that were previously thought to be harmonic with VO and OV in fact do not appear to correlate, in particular adjectives, demonstratives and (arguably) numerals, which are three of the basic noun modifiers. The evidence presented in Dryer's paper supports the correlations in Figure 3.2, replacing Oprn|V in Figure 3.1 with PP|V.

Dryer argues that in general the orders that do correlate with OV/VO order are those that order a fully recursive phrasal category – i.e. NP, PP, VP or S – relative to a category that is not so; he calls this analysis the Branching Direction Theory (Dryer 1992a:108–17). Dryer concludes that the correlations in the Branching Direction Theory are ultimately to be explained in processing terms, namely that

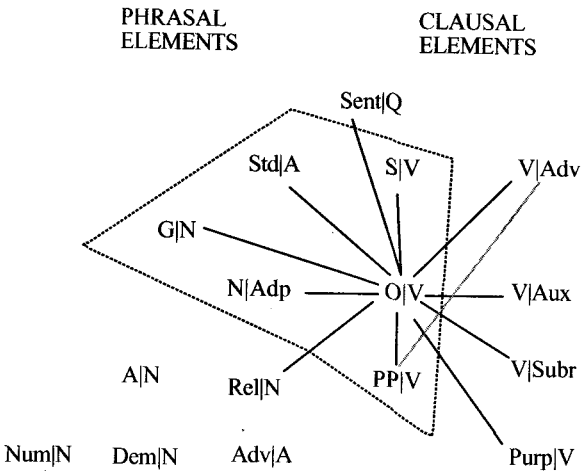
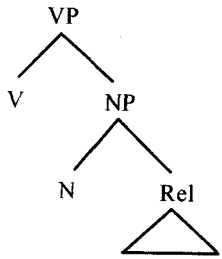


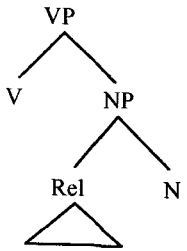
Figure 3.2 *Correlations between word orders based on evidence in Dryer 1992a*

utterance structures that conform to the Branching Direction Theory are easier to parse. For example, a harmonic VO&NRel language consistently has the recursive phrasal category on the right (right-branching), as in 8, while a disharmonic VO&RelN language would have the recursive object category to the right of the verb but the recursive relative clause to the left of the noun, as in 9.

(8) VO&NRel:



(9) VO&RelN:



Dryer compares his theory to other parsing models, including a more recent model of Hawkins' (Hawkins 1990; 1994). In this work, Hawkins has proposed a single principle, Early Immediate Constituents (EIC; Hawkins 1990; 1994) as a constraint on syntactic structures, including word order. EIC is based on a sophisticated processing model which cannot be fully described here. The basic idea is that certain elements in a phrase determine what parent node is constructed over the constituent in parsing a sentence into its syntactic constituents. The parsing model involves constructing the phrase structure tree as quickly as possible once construction begins. For example, in 8 the VP node is constructed when the first element, V, is recognized, and the NP node is constructed immediately afterward, when the second element, N, is recognized. In 9, on the other hand, although the VP node is constructed when the first element is recognized, the NP node cannot be constructed until the third element is recognized, since N is third. Hawkins argues that although languages may conventionalize word orders that have lower EIC ratios, such as 9, such languages will be cross-linguistically less frequent. Moreover, their cross-linguistic frequency will be proportional to their EIC ratio. Hawkins tests this prediction against Dryer's database for verb–object and adposition order, and several other orders, and Hawkins' prediction is confirmed (Hawkins 1994:250–82).

Dryer's Branching Direction Theory for harmony is very similar to Hawkins' Early Immediate Constituents theory (Dryer 1992a:131–32). Dryer's analysis is based on the most detailed empirical study of word order achieved so far, and contains a number of major insights. However, both Dryer's and Hawkins' parsing theories to account for the word order harmony correlations imply that there is a single correlation between all of the harmonic orders, since all of the harmonic orders share the same syntactic structure. Yet Dryer's cross-linguistic evidence for his theory is not a single n-way correlation, but a series of pairwise correlations between verb–object order and the other word order being compared (see Figure 3.2). Moreover, even this set of correlations – not the same as predicted by the Dryer–Hawkins theories – might not be the case. For example, manner adverbs are harmonic with verb – object order, contrary to the prediction of the Branching Direction Theory. Dryer suggests that manner adverbs may not be directly correlated with verb–object order but instead indirectly correlated via verb–PP order, indicated by the gray line in Figure 3.2; verb–PP order is strongly correlated with verb–object order (Dryer 1992a:92). But it is possible that the other orders which correlate with verb object order and conform to his Branching Direction Theory are indirect correlations also.

One way to resolve this issue is to use a more sophisticated quantitative analysis of the data, such as a log-linear analysis, as Justeson and Stephens (1990) have done. A log-linear analysis finds a best-fit model simultaneously considering all

possible interactions of variables. The equation used for a log-linear analysis of three variables is given in 9 (after Justeson and Stephens 1990:2372):

$$\log x_{ijk} = u + u_i^1 + u_j^2 + u_k^3 + u_{ij}^{12} + u_{jk}^{23} + u_{ik}^{13} + u_{ijk}^{123} \quad (10)$$

The simple value u represents a constant reflecting the overall mean of type frequencies. The values dependent on one variable are a preference of one value over its opposite; in the case of word order, this corresponds to dominance. The values dependent on two variables (i.e. two-way interactions) can be thought of as representing simple implicational universals involving two word orders. The last value, dependent on all three variables represents a more complex interaction, such as n-way relationship between word orders of the sort accounted for by the theories of Lehmann, Vennemann, Hawkins and Dryer.

Justeson and Stephens use a 147 language sample based on Hawkins (1983), with data on subject–verb, object–verb, adposition, genitive, adjective and relative clause order. They found a best-fit model that requires only values dependent on one variable (dominance) and two-way interactions (like the simple implicational universals proposed by Greenberg). The two-way interactions are presented in Figure 3.3 (adapted from Justeson and Stephens 1990:2375).

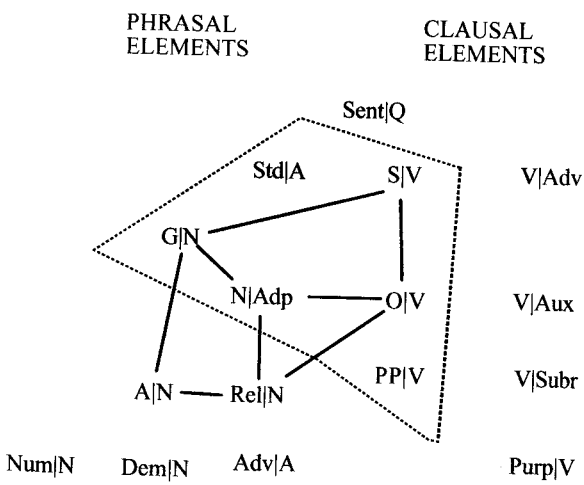


Figure 3.3 *Correlations between word orders based on log-linear analysis*

Justeson and Stephens' work suggests that global explanations such as Early Immediate Constituents and the Branching Direction Theory, which would correspond to n-way correlations, may not be necessary, and that the proper generalizations require explanations in terms of local interactions between pairs of word

orders, i.e. simple implicational universals involving just two word order types. In fact, Justeson and Stephens argue that Greenberg's original universals of word order provide an excellent fit to the log-linear analysis (Justeson and Stephens 1990:2373).

One possible explanation of the correlations between pairs of word orders is that the two word order types use the same or similar morphosyntactic construction. Greenberg cites Berber as a language in which the genitive form of the noun is the same as the subject form (provided the subject immediately follows the verb); thus, the VS construction is very close to the NG construction (Greenberg 1966a:99). In many languages, the genitive form of the noun is identical with the subject form, and/or the object form (Allen 1964; Siewierska 1998). In many more languages, the adposition construction is morphosyntactically parallel to a genitive construction, with the adposition the head. A good example of the constructional similarity of VS, PrepN, and GN can be found in K'iche' (Mondloch 1978:195, 24):

(11) šaq si š- **Ø-** aʔiʔ kān rī xun čicop
just really PST- **3SG.B-** became.sunned left the an animal
V **S**

č- **u-** či rī mār
at- **3SG.A-** edge the sea
Prep **N**

'And the animal was left sunning [= dead] at the sea shore.'

(12) **u-** ɸīʔ lē ala
3SG.A- dog the boy
N **G**

'the boy's dog'

K'iche' has two indexation prefix sets, A and B. Set B is used for intransitive subjects; set A is used for transitive subjects, prepositions and genitive constructions. The general construction is: [Prefix-Head Dependent], a construction that subsumes VS, PrepN and NG.

The examination of morphosyntactic constructions and word order can also account for anomalous word order patterns. In Mandarin Chinese, one finds prepositions and **circumpositions**, adpositional constructions with one element preceding the noun and one element following, as in (Li and Thompson 1981:400):

(13) wǒ bǎ yáng gǎn **dào** hòu yuán **li**
I OBJ sheep herd **to** back yard **in(side)**
'I herded the sheep into the backyard.'

Mandarin has a basic word order of SVO, but is GN. It turns out that the prepositions and the prepositional element in the circumpositions are verbal, and the postpositional elements in the circumpositions are nominal. In this case *dào* is

also a verb meaning 'arrive', and *li* has a nominal source not unlike English *inside*. Thus, the PrepN construction is derived from the VO construction, and the NPost construction is derived from the GN construction.

Dryer (1992a) also observes a number of cases where how the category is expressed influences word order behavior. For example, if a negative or tense/aspect marker is expressed as an auxiliary then it harmonizes with VO/OV order, but if it is expressed as a particle, it has instead an overall preverbal tendency; numerals may differ in their word order preferences depending on whether or not they are heads; and demonstratives may also differ in their word order preferences depending on whether or not they are members of the class 'determiner' or not.

It may turn out that these constructional parallels underlie many of the harmonic patterns, particularly the patterns for which an explanation based on semantic analogy is not obvious. These constructional parallels almost certainly a result of the diachronic process of grammaticalization. For example, the widely observed strong correlation between genitive and adposition order, also found in Justeson and Stephens' analysis, is most likely explained by the fact that adpositions most commonly evolve from genitive expressions. Aristar (1991) extends the diachronic hypothesis by noting that in many languages a morpheme used to link a relative clause to its head is often identical to the morpheme used to link a genitive phrase to its head, and often the morpheme used in adjectival modification is similar to either the relative morpheme, the genitive morpheme, or both. Also, finite declarative-clause constructions commonly evolve from nominalizations with genitive arguments (see Aristar 1991). Aristar argues that the correlation between adjective, genitive and relative clause order may be due to a 'binding anaphor' (i.e. indexical) strategy which is often used to express any or all three modifier relations.

The diachronic word order harmony hypothesis suggests that certain word order pairs are harmonic because one historically evolves from the other. The constructions examined by Justeson and Stephens that are linked by historical processes are given in Figure 3.4 (p.78). If we compare Figure 3.4 to Figure 3.3, we find the diachronic word order harmony hypothesis supports most of the harmonic relations produced by Justeson and Stephens' log-linear analysis, but not all of them. Hence, a diachronic explanation is probably valid for many cases of word order relationships, but probably not all of them.

In sum, the explanation for harmony is still unresolved. Part of the problem lies with the empirical generalizations themselves. A comparison of Figures 3.1–3.3 demonstrates that it is not clear what word orders are in fact harmonic with what other orders. Most word order universals have significant exceptions, though that varies from one universal to another. This situation has led to the analysis of word order correlations by statistical techniques by Dryer and by Justeson and Stephens.

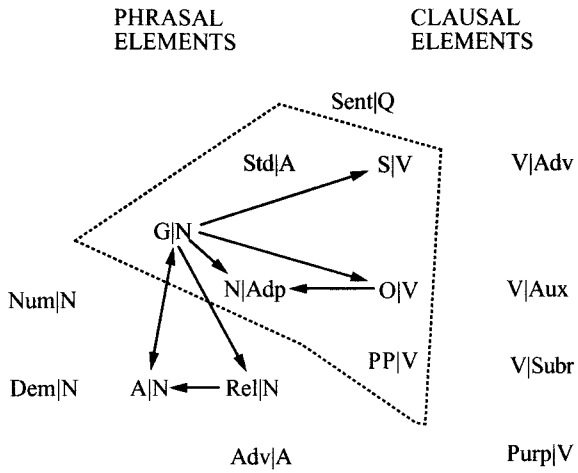


Figure 3.4 *Attested constructional changes across word orders analyzed by Justeson and Stephens 1990*

However, quantitative analyses require probability samples, and so are sensitive to the problems in such sampling procedures (see §1.5). The diachronic facts represented in Figure 3.4 at least have a firmer empirical reality. Further advances in explaining harmonic patterns will require better samples, more sophisticated statistical analyses, and cross-linguistic analyses of word order changes and the morphosyntactic constructions used for word order patterns.

All of the discussion in this section so far has assumed that implicational universals, and the deeper concepts, such as harmony, dominance/heaviness, capture only cross-linguistic variation. However, there is actually a good deal of *intra*-linguistic variation in the expression of particular constructions (§2.2), and word order is no exception to this phenomenon. Word order is particularly variable at the clause level and somewhat less so at the phrase level (in fact, one might propose the generalization that the lower the morphosyntactic level, the more rigid the word order). Of course, word order is never entirely free, and constraints on the variation can be found. Several of Greenberg's original word order universals refer to flexibility (or inflexibility) of word order. Universal 6 states that all VSO languages have at least SVO as an alternative order, while universals 7, 13 and 15 state that in SOV languages with at most OSV as an alternative order (the **rigid** SOV type), neither adverbial modifiers of the verb nor subordinate verbal forms can follow the main verb.

The most thorough study of word order variation in the declarative clause is Steele (1978). Steele discovered that certain alternative word orders are more likely to be found than others. In particular, VSO and SOV are most likely to have VOS and OSV respectively as alternative word orders. In other words, the most

likely alternative orders keep the verb in the same position and reverse the position of subject and object. SVO is also a very common alternative order to both VSO (note Universal 6) and SOV (this is the **nonrigid** SOV type). This phenomenon can be accounted for by the dominance of SV and (possibly) VO orders: nonrigid VSO languages allow subjects to shift to their dominant position and nonrigid SOV languages allow objects to shift to their (possibly) dominant position. Languages with basic SVO order are the least likely to have any alternative word orders; i.e. this is the language type that is most likely to have rigid declarative clause word order.

More detailed investigation of actual texts in many languages has revealed that word order is more flexible in more languages than was previously imagined. Close attention has been paid to so-called free word order languages, by which is meant largely discourse-determined clause constituent order and sometimes also so-called free noun phrase constituent order (Hale 1983; Heath 1986; Mithun 1987; Payne 1987; Dryer 1989b). The study of typological patterns of word order variation is a relatively new area, and will be increasingly important in typological word order research.

Processing and diachronic hypotheses have also been proposed for affix order. Hawkins and his associates (Cutler, Hawkins and Gilligan 1985; Hawkins and Cutler 1988; Hall 1992) account for the suffixing preference by a processing explanation, that the beginnings of words are processed and retained more easily than the ends of words, which in turn are more easily processed than the middles of words. This hypothesis is strongly supported by psycholinguistic evidence. Since the beginnings of words are the most salient, one is most likely to find the root there; the ends carry the affixes, and infixes (which would be in the middle) are avoided.

As with word order patterns, the affix data needs to be subjected to a log-linear analysis in order to capture precisely the cross-linguistic generalizations. However, even more than with word order, a diachronic perspective is critical, and has been persuasively presented by Bybee, Pagliuca and Perkins (1990). Bybee et al. argue that one cannot consider affix position separately from the position of nonbound morphemes expressing the same concepts. This is because the suffixing preference must be characterized not simply as a predominance of suffixes over prefixes, but a preference for postposed nonbound morphemes to become affixed (Bybee et al. 1990:3), and hence the distribution of prefixes and suffixes must be compared to the distribution of preposed and postposed nonbound morphemes that have the same function, which Hawkins et al. did not do.

Bybee et al. compare order of affixes and unbound forms for a large class of verbal affixes, comparing verb-initial, verb-medial and verb-final languages. They argue that harmony is still applicable, but question the existence of the suffixing preference. They suggest that affix position in many cases can be attributed to the likely position of the nonbound morphemes from which they evolved. For example, the anti-harmonic pattern of object indexation and object–verb order (VO suffixes,

OV prefixes; see §3.3) is probably because object indexation markers evolve from object pronouns (§2.1.3) and retain object position.

Bybee et al. also test the processing explanation for the suffixing preference by examining patterns of phonological decay, that is, susceptibility to phonological alternation and allomorphy, and find the typological evidence does not appear to support the processing model. Bybee et al. also argue that the distribution of prefixes and suffixes is also influenced by semantic factors: affixes expressing concepts that are more 'relevant' to verbal meaning (see chapter 7) are more likely to fuse to the root.

As in the case of diachronic explanations for word order patterns, more evidence demonstrating actual diachronic grammaticalization relations between nonbound morphemes and affixes is needed to confirm the hypothesis. Currently we may conclude that diachrony and processing both play a role in determining word order and affix order.

3.5 Typology, universals and generative grammar revisited

The description of typological universals and how they are instantiated in the grammars of particular languages given in this chapter bears some resemblance to the notion of parameters and their settings, introduced into generative theory two decades after Greenberg's original work in this area (Chomsky 1981:3–4). This is another locus of comparison between formal and functional–typological approaches to grammar. In principle, any correlation between two syntactic properties that generative grammar explains by an absolute universal or a universal parameter may be formulated as a typological universal and tested. However, formal parameter-based analyses rarely address data in more than a few languages, and typological analyses rarely examine the same syntactic interactions that generativists and other formalists do. This is an area in which more interaction between generative theory and typological theory might be fruitful. Generative syntactic argumentation has produced a large number of cross-construction correlations in English and other languages which could be surveyed more systematically in the world's languages by typologists. (Conversely, much typological research has concentrated on the cross-linguistic patterns of single constructions, which in turn could be taken into consideration by generative linguists.)

Gilligan (1987) bridges this gap to some extent, and demonstrates both the opportunities and difficulties of such a comparison. Gilligan conducted a typological study of the pro-drop parameter, a major topic of study in generative grammar in the 1980s and early 1990s. The pro-drop parameter differentiates languages requiring non-null thematic subjects (unstressed pronoun subjects that are not

impersonal) and those permitting null thematic subjects; compare the grammatical Spanish sentence to the ungrammatical English translation (Gilligan 1987:74):

Null thematic subjects

(14) Hemos trabajado todo el día
have:1PL.PRS work:part all the day
'*Worked all day.'

A number of proposals in the literature have correlated this distinction with three other binary distinctions (Gilligan 1987:72–96): null/non-null nonthematic (impersonal or expletive) subjects, as in 15; (p.74); presence/absence of subject inversion, as in 16; and presence/absence of *that*-trace violations, as in 17, all illustrated again with Spanish vs. English (Gilligan 1987:74–75, 77):

Null nonthematic subjects

(15) Llueve
rain.3SG.PRS
'*Is raining.'

Subject inversion

(16) Salió María
leave:3SG.PRT Mary
'*Left Mary.'

that-trace violation

(17) Quién dijiste que ___ salió temprano?
who say:2SG.PRT that leave:3SG.PRT early
'*Who did you say that ___ left early?'

In all cases, the Spanish sentences are grammatical and the English equivalents ungrammatical.

Gilligan tests the pro-drop correlations in an areally and genetically balanced 100-language sample (Gilligan 1987:131–33). Taking all four properties together, there are sixteen possible types. The chief proposals in the literature discussed by Gilligan are Rizzi (1982), which predicts three types (see also Taraldsen 1980), and Safir (1985), which employs three parameters and predicts two additional types. Gilligan's 100-language sample contains ten languages with data for all four properties. Gilligan adds three more types not in his sample from a survey conducted by van der Auwera (1984). A comparison of the predictions to the actual data for all four properties is given in Table 3.3 (p.82). As can be seen from the table, there is only a partial match between the types predicted by Rizzi and Safir and the attested types where data for all four properties are available: although most of the predicted types are attested (except for one predicted by Safir), many other types are attested as well.

Table 3.3 *Predicted and attested language types for the pro-drop parameter*

Language types				Predictions and attestations		
Null thematic subjects	Null nonthematic subjects	Subject inversion	*that*-trace filter violations	Predicted	Number in Gilligan's 100-language sample	Additional Number in literature
+	+	+	+	Rizzi, Safir	3	4
+	+	+	−	no	1	3
+	+	−	+	no	2	4
+	+	−	−	Safir	2	0
−	+	+	+	Rizzi, Safir	1	0
−	+	−	+	no	1	1
−	+	−	−	no	0	1
−	−	+	+	Safir	0	0
−	−	−	+	no	0	3
−	−	−	−	Rizzi, Safir	0	3

Notes: Language types that are neither predicted nor attested are not listed in the table. Attested languages include only those languages with data for all four syntactic properties.
Source: from Gilligan 1987:131–33, 148–49

Gilligan also examines the pro-drop correlations pairwise, which tests the specific correlations predicted by the theories of Rizzi and Taraldsen (for the theoretical details, see Gilligan 1987:78–96; Gilligan did not test Safir's predictions). Table 3.4 shows the hypothesized universals, the strongest valid universals generalizable from Gilligan's sample, and the number of languages for which data for the universal was available.

None of the biconditional predictions are borne out by the data, but the one simple implicational universal is, with many languages confirming the implicational universal that the existence of null thematic subjects implies the existence of nonthematic null subjects. Gilligan finds simple conditionals instead of the three biconditional universals proposed by Rizzi/Taraldsen; but Gilligan's conditionals are all problematic. Gilligan argues that exceptions in the literature to SI ⊃ THAT and THAT ⊃ EXE are superficial, but admits that there is a genuine exception to SI ⊃ EXE. Since SI ⊃ EXE is a logical deduction from SI ⊃ THAT and THAT ⊃ EXE, it may be that lack of data in Gilligan's sample (particularly for *that*-trace violations) is hiding more exceptions. It is quite possible that further investigation may demonstrate that SI ⊃ THAT and THAT ⊃ EXE are due to chance and exceptions to SI ⊃ EXE may be more numerous.

Gilligan's analysis makes it appear that the main generative accounts make wrong predictions for even the data found in the literature. However, alternative

Table 3.4 *Universals and evidence for universals pairs of pro-drop properties*

Source	Prediction	Strongest universal	Languages supporting	Exceptions [source]
Rizzi, Taraldsen	pro ⊃ EXE	pro ⊃ EXE	41	none
Rizzi	EXE ↔ SI	SI ⊃ EXE	41	1 [sample]
Rizzi	SI ↔ THAT	SI ⊃ THAT	10	2 [literature]
Taraldsen, Rizzi*	EXE ↔ THAT	THAT ⊃ EXE	11	2 [literature]

Notes: *by logical deduction from Rizzi's EXE ↔ SI and SI ↔ THAT; Abbreviations: pro = null thematic subject; SI = subject inversion; EXE = null nonthematic subject; THAT = *that*-trace filter violations. 'Languages Supporting' represents the number of languages in Gilligan's 100-language sample with information on the two properties linked by the universal in question.
Source: from Gilligan 1987:136–53

syntactic analyses can be made to eliminate the counterexamples; and the superficial anomalies are said to mask the 'deep' universals. Regarding the problematic cases of Brazilian Portuguese and Mandarin, Gilligan writes, 'perhaps the Rizzi hypothesis is correct but its effects are obscured in these languages because of some as yet unanalyzed aspect of these languages' (Gilligan 1987:90).

However, to test such an analysis empirically, one must identify the additional syntactic factor and then test *its* correlation with the pro-drop properties cross-linguistically. But if that correlation fails, then other syntactic factors can be proposed by the generative analyst, which must then be tested cross-linguistically, and so on: 'as is frequently stated in generative grammar, it is impossible to prove an analysis incorrect; rather, it is only possible to improve upon an existent analysis' (Gilligan 1987:92; a similar point is made by Matthews 1993:249–52). For example, it is essentially impossible to compare the head-ordering word order parameter in generative grammar (or the roughly equivalent directionality of theta-marking parameter), which is superficially invalid, to the typological word order analyses presented in §§3.2–3.4, for this reason. (Nevertheless, the pro-drop parameter has been abandoned by at least some generative grammarians, partly as a result of Gilligan's typological study; Haider 1994:372–73.)

We may make some general observations about comparing typological universals and parameter-setting accounts. From a typological perspective, the main problem appears to be that not enough variation is accommodated by generative analyses. Counterexamples are too easy to find cross-linguistically, even when additional parameters are proposed to allow more variation. For example, the data collected by Gilligan suggests that although the empirical connection between

thematic and nonthematic null subjects is strong, the connection between those and the other two properties is tenuous at best. The appearance of spurious connections is precisely the statistical effect that one would expect from the small biased sample that usually emerges from studies in the generative literature. A small sample means that it is highly likely that other possible types exist outside the sample. Also, the additional syntactic parameters proposed to accommodate the types inside the sample are highly unlikely to correctly capture the range of variants attested in a truly representative sample. For example, for pro-drop, a heavily-studied phenomenon, 'of the twenty-two languages which have been analyzed for Pro-drop within the generative framework [as of 1987] ... fifteen are Indo-European, four more are Afroasiatic, and only three fall outside Europe or northern Africa' (Gilligan 1987:97).

Another important observation is that biconditional universals fare more poorly than simple conditionals, as can be seen in Table 3.3. The predominance of implicational universals over biconditional universals is widely found in typological research: few biconditional universals survive the examination of a large, balanced sample.

Formal approaches have incorporated competing motivations into a recent theory, Optimality Theory (OT; Prince and Smolensky 1993; Kager 1999). In OT an input (underlying) phonological or syntactic structure is allowed to generate an indefinite number of output (surface) structures, i.e. actual phonological word forms or syntactic constructions in the language, through any sort of formal derivational process. The output structures are compared to the input structures in terms of a range of potentially competing principles or constraints, analogous to competing motivations in typological analyses. The constraints are ranked in a specific order in a language, but the order can vary from language to language. The correct output structure is predicted to be the one that violates the fewest and lowest-ranked constraints. Cross-linguistic variation is the result of the different rankings of the same, universal constraints.

A simple phonological example of an OT analysis contrasts the expression of /bɛd/ 'bed' in English as [bɛd] and in Dutch as [bɛt] (Kager 1999:14–17). Kager employs two universal constraints, given in 18:

(18a) *Voiced-Coda: obstruents must not be voiced in coda position.
(18b) Ident-IO: The specification for the feature [voice] of an input segment must be preserved in its output correspondent.

Two relevant outputs are generated for both Dutch and English, [bɛd] and [bɛt]. (In fact, all possible output structures are generated, but only these two are relevant for the constraints in 18.) In Dutch, *Voiced-Coda outranks Ident-IO, so the output /bɛt/ is valued more highly than output /bɛd/. In English on the other hand, Ident-IO outranks *Voiced-Coda, so the output /bɛd/ is valued more highly than

output /bɛt/. Thus, the difference in the phonological systems of the two languages is attributed to the difference in the language-specific ranking of the two universal constraints.

OT introduces competing motivations into generative grammar. However, the model of grammatical structure, and the way competing constraints operate in OT is quite different from competing motivations in typology. In OT the constraints relate an underlying input phonological or syntactic structure with an output phonological or syntactic structure. Formal derivational processes (subsumed under a general operation called *Gen*) derive the output structure from the input structure. In typology, the motivations relate the external functional or phonetic structure to the internal morphosyntactic or phonological structure. No derivational processes are found in typological analyses, only a direct mapping between linguistic form and external function or phonetic substance.

In OT the constraints are ranked, and the ranking varies from language to language. The ranking determines which forms actually occur in the language. Thus, in OT the ranking makes the constraints part of the grammatical conventions of the language. In typology, the motivations are not ranked, although they may be weighted. Motivation has only an indirect relationship to grammatical convention. The motivations are functional in origin, and hence are present to an equal degree for all speakers at all times; there is no difference in ranking of motivations from one language to another. Actually occurring forms are conventionally specified in the language, and cross-linguistic variation represents the range of at least partially motivated structures. Convention is partially arbitrary as well as partially motivated.

The typological model allows for greater cross-linguistic variation than the OT model. However, the OT model is forced to accommodate more variation than its apparently restrictive model allows. It does so by adding further complexity to the ranking relationship: allowing different ranking of constraints depending on which features or segments they apply to (Kager 1999:18); allowing equally-ranked constraints (p.406); allowing degrees of violations of constraints (p.41); allowing conjunctions of constraints that are ranked separately from the individual constraints (Local Conjunction; pp.392–400). Also, there are no restrictions on how to formulate constraints: this leads to overlapping constraint definitions for individual derivations. For example, Kager gives a more detailed analysis of Dutch [bɛt] using *Voiced-Coda, as in 18a, and an overlapping constraint VOP, 'no obstruent must be voiced' (p.40), which are independently ranked in the same derivation.

The typological model makes an additional prediction: language types that satisfy more competing motivations (or more heavily weighted competing motivations) will be cross-linguistically more frequent (e.g. Hawkins' EIC predictions). OT, at least in the form described in Kager (1999), cannot make such predictions, because grammatical structures are determined by a language-specific ranking of

constraints, and not a universal procedure of counting (or weighting) constraints. Hence, OT in its present form does not account for the skewed distribution of structural types in the world's languages.

3.6 Conclusion

The concept of an implicational universal has had its greatest impact in the area of word order. Although broader theoretical concepts have been invoked to account for typological patterns of word order, implicational universals remain a basic unit of typological analysis. Implicational universals of word order illustrate the basic elements of the typological method in their simplest form. The first step is the enumeration of logically possible language types by the structural parameters involved, illustrated by the tetrachoric table. The second step is the discovery of the empirical distribution of attested and unattested types, illustrated by the pattern of gaps in a tetrachoric (or larger) table. The third step is developing a generalization that (1) restricts variation in language types without eliminating it – i.e. allows for the various attested types while excluding the unattested types – and (2) reveals a relationship between otherwise logically independent grammatical parameters, in this case the implicational relationship.

Typologists from Greenberg onward have observed more far-reaching relationships between the word order parameters, such as harmony and dominance, than could be captured by simple implicational universals. The final step in the analysis is to seek a deeper (possibly external) explanation for the relationship. Here a central element of typological theory are competing motivation analyses. Competing motivations are deeper factors that motivate grammatical structures but which compete with each other. Much cross-linguistic variation is the result of competing motivations. Competing motivations can explain not only the distribution of attested and unattested types across the world's languages, but also the proportional distribution of different attested types, as well as the relatively rare exceptions to the typological universals.

4

Grammatical categories: typological markedness, economy and iconicity

The concept of markedness was first developed in the Prague School of linguistic theory. The notion of marked and unmarked values of a category was first developed for phonological systems by Trubetzkoy (1931; 1939/1969) and first applied to morphosyntactic categories and semantics by Jakobson (1932/1984; 1939/1984; see Greenberg 1966b:11). Markedness has since been adopted by both the generative and the typological approaches to linguistic theory, not surprisingly in rather different ways. As a consequence, markedness in generative grammar is considerably different from markedness in typology (compare Battistella 1996). In fact, in adapting the concept of markedness to cross-linguistic universals, Greenberg (1966b) introduces significant theoretical innovations to markedness (Croft 1996). For this reason, we will use the rather cumbersome locution **typological markedness** in this book.

Like implicational universals, typological markedness is a fundamental concept underlying much contemporary work in typology, even though it is not overtly referred to very often. Much current typological work is supported by typological markedness (see chapters 5–7). Also, the phenomena described as typological markedness represent an important manifestation of the interplay between two major competing motivations, economy and iconicity, in linguistic expressions. Finally, typological markedness plays a significant role in an influential model of morphological representation, that of Bybee and her associates, which in turn is closely associated with recent developments in syntactic representation, particularly construction grammar (see, for example, Bybee and Thompson 1997; Croft 2001).

4.1 Typological markedness

The essential notion behind typological markedness is the fact of asymmetrical or unequal grammatical properties of otherwise equal linguistic elements: inflections, words in word classes and even paradigms of syntactic constructions. Typological markedness is a network of apparent causal relationships among a

subtype of cross-linguistic asymmetries, all of which have to do with how function is encoded into grammatical form. The general theme of asymmetry also suggests a link to asymmetrical patterns in word order and phonology, which differ from typological markedness in significant ways (see §4.4).

Typological markedness is a universal property of a *conceptual* category, not a language-particular property of a language-particular grammatical category as it is in Prague School markedness. When we say that a category such as singular is typologically unmarked, a hypothesis is being put forward about how the conceptual category of a singular referent is encoded in the world's languages, not the grammatical category labeled 'singular' in English or any other particular language.

Typological markedness is an important tool for the typologist because it provides a means to directly link formal (structural) linguistic properties across languages. In chapter 1 it was argued that it is difficult to compare formal categories of natural languages discovered by internal structural analysis because of incommensurability: structural variation from one language to another in, for example, the category adjective or the genitive construction is simply too great. Typological markedness demonstrates that certain properties of linguistic structure are basic and general enough to be directly compared across languages. Moreover, these formal properties display significant cross-linguistic patterns. In particular, typological markedness can account for phonological, morphological and syntactic irregularities. One need not succumb to the temptation to regularize irregular grammatical patterns in linguistic analysis, because the irregularities themselves are manifestations of typological universals.

We will introduce the concept of typological markedness with the category of number. The simplest distinction that can be made in the category of number is between singular and plural. In many languages, such as English and Tatar (Comrie 1981:86), the singular form is expressed without any inflection (indicated by the zero symbol -Ø), while the plural is expressed by an overt inflection:

(1) a. imän-**Ø** b. botak-**lar**
oak (**SG**) branch-**PL**

Not all languages are the same as English and Tatar in the expression of singular and plural, however. Some languages express both singular and plural with overt inflection such as the Zulu prefixes in 2 (Doke 1930:36; the prefixes also code noun class; see §4.1.1):

(2) a. **umu**-ntu b. **aba**-ntu
SG-person **PL**-person

Other languages, such as Minor Mlabri in 3 (Rischel 1995:136), make no singular–plural distinction, or to put it another way, express both the concepts of singular

and plural without any overt inflection:

(3) ʔɛɛw 'child/children'

However, very few languages express the plural without an overt inflection and the singular with an overt inflection. (In the case of languages that do, the plural is designated a collective and the singular is a special singulative form, and this pattern is typically associated with nouns for objects occurring in groups.)

This typological pattern can be described in terms of a tetrachoric table and can be formulated as the implicational universal in 4:

	Overt plural inflection	No plural inflection
No singular inflection	√	√
Overt singular inflection	√	–

(4) If a language uses an overt inflection for the singular, then it also uses an overt inflection for the plural.

This cross-linguistic pattern is an instance of typological markedness. Typological markedness is a relationship between values of conceptual categories – e.g. singular and plural reference – or, more precisely, how those conceptual categories are expressed in the world's languages. For number, the singular is typologically unmarked and the plural is marked.

Typologically unmarked status does not imply that the unmarked value is always left unexpressed and the marked value is always expressed by an overt morpheme. Calling the singular (typologically) unmarked is like calling the word order NA dominant. It does not mean that the singular is always expressed without an inflection in every language, any more than all languages have NA order. It simply means that the singular is expressed by no more morphemes than the plural is, in any particular language. Languages such as Zulu and Minor Mlabri conform to the universal in 4 just as much as English and Tatar do. To say that the singular is typologically unmarked and the plural is typologically marked is to say that these categories conform to an implicational universal of cross-linguistic variation.

We can offer a more general implicational statement capturing the marked–unmarked relationship in typological markedness: if the marked category value is expressed by the absence of a morpheme, then so is the unmarked value. This can also be expressed in the contrapositive form: if the unmarked category value is expressed by a nonzero morpheme, then so is the marked category value.

In chapter 3, it was stated that an implicational universal describes a relationship between two otherwise logically independent types. For example, the main word order type VSO exhibits a relationship to the otherwise logically independent adpositional word order type Prep so that one can construct the implicational

universal VSO ⊃ Prep. In the number example, the two types are the singular and the plural, or more precisely the form of expression of the singular and the form of expression of the plural. These two types are independent in that there is no logical constraint on the number of morphemes used to express the singular that is imposed by the form of expression of the plural or vice versa. Hence, these two types can be treated as the implicans and the implicatum of an implicational universal, even though they are both values in the same grammatical category, i.e. number.

This immediately raises the question, however, of what combinations of two values can be related in such a way. It does not make sense to ask which is the typologically marked value, passive or glottalized. The two values that can be related by a typological markedness pattern must be **paradigmatic alternatives** in some sense. Singular and plural are an example of a pair of paradigmatic alternatives for the higher category of number. Paradigmatic alternatives exist at higher levels of abstraction in the grammar: for example, noun, verb and adjective are comparable members of the higher category 'part of speech'. We will describe the paradigmatic alternatives as **values** of a category. Hence, it is values of a category that are typologically marked or unmarked.

If we examine more closely the distribution of attested and unattested language types, we find that typological markedness involves relative asymmetries between the formal expression of values. Consider, for example, the markedness relationship between the predication of a simple adjective and the predication of a comparative adjective, that is, between *John is tall* and *John is taller **than** Fred.* One would want to say that the English data supports the markedness of the comparative degree and the unmarkedness of the simple degree. However, the comparative degree involves the presence of not one but two nonzero morphemes over and above the simple degree (the suffix *-er* and the particle *than*). This contrasts with the Yoruba construction in which only one additional morpheme, *jù*, is involved (Rowlands 1969:124):

(5) ó tóbi **jù** mí
he big **exceed** me
'He is bigger than me.'

One might propose that there are now three different language types: those in which the grammatical category is expressed by no morphemes, those in which it is expressed by one morpheme and those in which it is expressed by two morphemes. However, there is theoretically no end to the number of language types that could be described in this way: one would have to add a type for constructions expressed by three morphemes, four morphemes, etc. A better way of classifying language types for the purpose of markedness patterns is necessary. (Incidentally,

this also demonstrates that the first step in typological analysis, defining the logically possible language types, is not a mechanical process.) The intuition behind typological markedness is that what is relevant is whether or not the plural, the comparative degree, etc., are expressed by *more* morphemes than the singular, the simple degree, etc. The relevant logically possible language types therefore number three:

(i) The number of morphemes for the marked value exceeds that for the unmarked value.
(ii) The number of morphemes for the marked and unmarked values are the same.
(iii) The number of morphemes for the unmarked value exceeds that for the marked value.

Type (iii) is the type excluded by a typological markedness relationship.

In this formulation of typological markedness, the basic resemblance to implicational universals still remains. That is, although more than one language type is possible, at least one type is not attested. As with implicational universals, this fact can be confirmed only by cross-linguistic comparison. Nothing about the expression of English singular and plural tells us that the expression of singular and plural by the same number of morphemes is possible but expression of the plural by fewer morphemes than the singular is not. In fact, however, the simpler formulation in terms of an implicational relationship between the presence vs. the absence of a relevant morpheme will suffice for most morphological categories, and it will only be in the case of complex syntactic constructions that use of the more complex but more accurate formulation will be necessary.

4.1.1 Structural coding

The preceding section illustrated some basic characteristics of typological markedness: the cross-linguistic basis of typological markedness in conceptual categories, and the constraint on attested language types. The cross-linguistic variation represents a relationship between the conceptual values singular and plural in the category of number, and the relative number of morphemes used to express those values. Markedness – like harmony and dominance in word order universals – is a much broader and deeper pattern than the one implicational universal we have used suggests. First, the same constraint applies to many more categories than that of number. The marked–unmarked relationship holding for any grammatical category, say active vs. passive, is of the same type as that holding for singular vs. plural; that is to say, we are dealing with the same typological phenomenon in

every grammatical category in which it is manifested. More important, markedness is a broader concept, because it links together several other cross-linguistic patterns in addition to the relative number of morphemes. To say that one value in a grammatical category is marked and the other is unmarked subsumes a set of cross-linguistic patterns which (should) all behave in the same way, that is every pattern is expected to select the same value as the unmarked value. These patterns are the **criteria** of markedness.

The pattern illustrated in 1–4 above is **structural coding**: how the conceptual value is expressed in grammatical structure. The definition of structural coding is quite straightforward and has already been provided in the discussion of the relationship between typological markedness and implicational universals:

(6) *Structural coding*: the marked value of a grammatical category will be expressed by at least as many morphemes as is the unmarked value of that category.

This definition has a structure which will recur in the definitions of behavioral potential (§4.1.2) and text frequency (§4.3). First, typological markedness is defined as a relation between the two values, marked and unmarked. One cannot determine the markedness status of, for example, the singular in English without also examining the plural. Second, the actual linguistic phenomenon which is used to identify markedness is a relative measure of quantity. The actual process of determining the markedness patterns of values of a given category involves counting morphemes of the two values and comparing how many morphemes are involved.

Structural coding represents a pattern in the formal expression of category values in particular languages. Some values are **zero coded**, that is, no overt morpheme expresses the value. For example, singular in English is zero coded, and both singular and plural – in fact, all number values – are zero coded in Minor Mlabri. Other values are **overtly coded**, that is, some overt morpheme expresses the value. Plural in English is overtly coded, as are both singular and plural in Zulu. Zero and overt coding are properties of language-particular grammatical categories, unlike typological markedness, which is a phenomenon associated with a conceptual category.

The important and sometimes difficult question that must be answered in finding evidence for structural coding is whether or not the morphemes being counted really are there to encode the value whose markedness is at issue. For example, in comparing the simple and comparative degrees of adjectives, we counted the suffix *-er* and the particle *than* but not the copula verb, thus arriving at the total number of morphemes signaling the comparative construction as two. The decision regarding the comparative suffix should be uncontroversial, but the choices for the other two morphemes require some additional argument. The copula is not a signal of the comparative construction, but rather a signal of the predicative function of

the adjective (see §6.4). The comparative construction can occur with a modifying adjective, and in that case the copula is of course absent but both of the other morphemes are present: *a man taller than John*, *a taller man than John*.

The argument for including the particle *than* depends on the status of the additional noun phrase governed by *than* which is added by the meaning of the comparative. The Yoruba example in 5, in which a verb expresses the comparative relation, shows that it is not necessary to have a particle or adposition when the additional noun phrase is introduced; hence, I take the particle as helping to signify the comparative construction rather than (or as well as) introducing the additional noun phrase.

It should be clear that fairly sophisticated argumentation is required to determine exactly what a morpheme signifies in many cases, and in a number of cases the answer is controversial, or perhaps simply indeterminate. (For example, does the auxiliary verb in the English passive help to signal the passive construction, or is it just a copula verb as with adjectives?)

In addition to the problem of determining what the functions of the morphemes in a construction actually are, there are also difficulties in counting how many morphemes are involved due to processes that have obscured or eliminated morpheme boundaries. These processes are cumulation, suppletion, ablaut and reduplication.

Cumulation occurs when a single morpheme denotes several different values from several different categories. For example, in the Spanish form *habló* 'he, she spoke', the suffix *-ó* indicates third person (vs., for example, first person *hablé* 'I spoke'), singular (vs. plural *hablaron* 'they spoke'), past (vs. present *habla* 'he speaks'), aorist (vs. imperfect *hablaba* 'he was speaking') and indicative (vs. [past] subjunctive *hablara* '(if) he had spoken'). If one were, for instance, attempting to determine the markedness of past as opposed to present, how many morphemes would be counted here?

The solution is to count one morpheme, because one is evaluating the markedness of just one category, that of tense, and the other values associated with the morpheme in question are not relevant to that category. In the Spanish example, all of the contrasting forms involve nonzero morphemes. Frequently, however, there is zero coding which involves more than one category. For example, in Ngalakan, there is zero coding of third person singular animate (masculine or feminine) subject (Merlan 1983:82):

(7) ŋugu- jawoŋ -ŋowi Ø- ṛabo guṇmaṇ? yukaji?
M- friend -his 3SGM- went.PST.PNCT maybe forever
'Maybe his friend went away forever.'

Should this be taken as evidence for the unmarked status of third person, singular, animate, or all of the above? The answer is all of the above: when evaluating one

category, the other categories are not relevant to the one in question. In fact, in the Ngalakan case the only opportunity for absence of overt expression is when all three of the categories cumulated in the morpheme have their unmarked values;[1] this is a common phenomenon (see §6.2).

Suppletion occurs when there is no formal relation between the two forms in a morphological paradigm. For example, the comparative degree of the English adjective *bad*, *worse*, cannot be related synchronically to the simple degree form. Hence, it cannot be treated as a combination of the simple degree form plus some additional morpheme. Both the comparative and simple forms involve one morpheme. There is a temptation to subsume this instance of suppletion under those English adjectives in which a second morpheme indicating comparison is added to the adjective (either a suffix *-er* or the particle *more*). However, this kind of one-for-one suppletion cannot be used to add to the evidence provided by regular forms, since the number of morphemes in both positive and comparative forms is the same: one (but see §4.3 for a different role for suppletion in typological markedness).

In ablaut, as in suppletion, one cannot identify an additional morpheme: *sing* and *sang* each consist of one morpheme. However, the two forms are formally related in that one is the same as the other except for some internal phonological alternation. The question that must be answered is whether or not one can say that a morpheme was *added* to one form to yield another form. In the case of ablaut, this cannot generally be asserted: synchronically, it is impossible to say that *sang* involves the addition of something to *sing*, or that *mice* involves the addition of something to *mouse.*

One cannot appeal to abstract 'underlying' analyses here. Typological markedness patterns are based on 'surface' morphosyntax, and it would be circular to selectively utilize abstract underlying forms in markedness arguments only when we need or want to. (In fact, adherents of the functional–typological approach eschew such analyses, since their goal is to account for universal patterns of surface structure in terms of a direct mapping between form and function, not abstract structural terms.) This is not to exclude the possibility of a nonlinear phonological representation that might actually allow us to state that a linearly represented ablaut relationship is actually the addition of a morpheme on a different tier. Until we have a principled means for a nonlinear phonetic representation, however, we will be conservative and treat ablaut in the same way as suppletion.

[1] As usual, a few qualifications are in order. The 'animate' classes – masculine and feminine – are somewhat arbitrary in their classification. Also, the inanimate classes – usually characterized by the prefixes *gu-* and *mu-* – can sometimes allow zero verb indexation (in the third person singular, of course).

Reduplication involves the addition of phonological material to a morpheme, but by copying some or all of the original morpheme in a more or less predictable manner. Reduplication shares some features with independent morphemes, namely that it represents a continuous piece of phonological material that is outside the root. For that reason, a reduplicated form may be considered to involve two morphemes, the root and the reduplicand. On the other hand, the reduplicand is by no means an independent morpheme from the root, and it does not occur separated from the root by any other morpheme. Finally, it may be that the phenomenon of reduplication ought to be given a direct external explanation in iconic terms (see §4.2), not related to the phenomenon of markedness at all.

4.1.2 Behavioral potential

The second criterion for typological markedness is behavioral potential. **Behavioral potential** is any sort of evidence from the linguistic behavior of the elements in question that would demonstrate that one value of a conceptual category is grammatically more 'versatile' than the other, and hence is typologically unmarked compared to the other value. The universal applicability of behavioral potential follows from the fact that any linguistic element has a linguistic behavior; in fact, at a very general level the goal of linguistics is to characterize the behavior of linguistic elements.

Behavioral potential can be divided into two general types, roughly the morphological criteria and the syntactic ones. The morphological type, which I will call **inflectional** potential, pertains to the number of morphological distinctions that a particular grammatical category possesses. The syntactic criterion, which I will call **distributional** potential, pertains to the number of syntactic contexts in which a grammatical element can occur.

Inflectional potential can be illustrated for the categories singular and plural with the third person pronouns of English:

	Singular	*Plural*
Masculine	he	they
Feminine	she	they
Neuter	it	they

This chart represents the expression of particular combinations of features of number and gender, and lists all of the logical possibilities. There is a clear asymmetry in the chart in that the singular has three distinct forms for the three genders, whereas the plural has only one form covering all three genders. In other words, the value singular manifests a three-way morphological distinction of gender but

the value plural does not. The singular has a greater number of distinctions than the plural, and hence is typologically unmarked; conversely, the plural has fewer morphological distinctions and is therefore marked.

There are a number of observations that can be made about behavioral potential. First, the facts about English pronouns given above are not evidence under the structural criterion, since the plural form is suppletive with respect to the singular forms. This demonstrates the greater power and applicability of behavioral potential. Second, this pattern is only one of the language types allowed by inflectional potential. Inflectional potential allows for languages in which the same gender distinctions are found in both singular and plural. The language type predicted not to occur is a language with gender distinctions in the plural but not in the singular.[2] Third, this evidence agrees with the structural coding evidence for the typological markedness of the plural. The concord between structural coding and behavioral potential illustrates the pervasive nature of typological markedness in grammar.

Finally, the evidence here does not tell us anything about the typological markedness of gender, only of number. In order to discover the behavioral potential of the values of the gender category, one must compare the rows, not the columns. However, in every row there are two distinct forms, the singular and the plural form. Each gender has the same number of singular–plural distinctions (namely two), hence the inflectional potential of each gender value is equal. In addition, the singular gender forms are all suppletive, and so one cannot use the structural criteria to determine typological markedness of gender values either.

If one is looking for structural coding of two (or more) values in a grammatical category, one must compare the values to each other and count morphemes. If one is looking for the inflectional potential of values in a grammatical category, one must look at other categories orthogonal to the category in question and count morphological distinctions for each value.

Identifying inflectional potential involves the comparison of the number of morphological distinctions found for two related categories; for example, singular and plural. Given that many morphological categories are multivalued – for example, the many case or tense inflections found in natural languages – the definition of inflectional potential will require the relative quantitative language that we used

[2] This is not without its exceptions. In some dialects of Spanish, gender distinctions are found in the first and second plural forms but not in the singular: *nosotros/nosotras* 'we.M/we.F,' *vosotros/vosotras* 'you.M/you.F', but *yo* 'I' and *tú* 'you (SG).' This phenomenon has a historical explanation: the plural forms were originally *nos* and *vos*, but the adjective *otros/otras* 'others,' with its masculine and feminine forms, was added to the plural, reinforcing it. Nevertheless, it is surprising that the historical process did not follow markedness constraints in this case.

in defining structural coding:

(8) *Inflectional potential*: if the marked value has a certain number of formal distinctions in an inflectional paradigm, then the unmarked value will have at least as many formal distinctions in the same paradigm.

Inflectional potential is described in terms of inflectional word forms. In many cases there is a distinction between a morphological and a syntactic expression of the category. For example, one may contrast the inflectional (morphological) passive of Latin, found in the present system of tenses, to the periphrastic (syntactic) passive, found in the perfect system, as in the first person singular indicative forms of the first conjugation verb *amāre* (Gildersleeve and Lodge 1895:74–75):

Present system		*Perfect system*	
Present	amo-**r**	*Perfect*	amātus **sum**
Imperfect	amāba-**r**	*Pluperfect*	amātus **eram**
Future	amābo-**r**	*Future Perfect*	amātus **erō**

In this case, the same grammatical distinction is made (active vs. passive), but in the present system it is made morphologically and in the perfect system it is made syntactically. The distinction between morphological and syntactic expression of a relevant construction can be taken as evidence in favor of the greater inflectional potential of the form taking the inflection, because the form taking the periphrastic elements can be considered to be inflectionally defective (i.e. the perfect tenses do not inflect themselves for passive, instead they take an auxiliary; Greenberg 1966b:30). Hence the Latin paradigms give evidence that the present is typologically unmarked compared to the perfect.

A similar argument may be used to consider a root that has suppletive inflectional forms to have greater inflectional potential than a root which takes regular inflections. For example, one can state that the English pronouns (other than *you*, which is an exceptional case) have greater inflectional potential than the nouns, since their plurals are suppletive. (The pronouns also have case distinctions, except for *you* and *it*, while common nouns do not, another example of the greater inflectional potential of pronouns.) The suppletion criterion can be generalized to the assertion that greater allomorphy or morphological irregularity of any type, not just suppletion, is evidence for the greater inflectional potential of the category in question (Greenberg 1966b:29; see §4.3).

The second type of behavioral potential is distributional potential (see also Gundel, Houlihan and Sanders 1986). This involves determining the number of environments in which the linguistic elements in question occur. The element which occurs in a larger number of syntactic environments or constructions has the

greater distributional potential. We can illustrate this with a well-known example concerning the category of voice in English. Most transitive verbs occur in both the active and the passive voice. However, there are a number of verbs which occur in the active voice but do not occur (at least not without some degree of unacceptability) in the passive voice; and there are certain constructions which occur with the active voice but not with the passive voice:

(9a) My brother **bought** this cabin.
(9b) This cabin **was bought** by my brother.

(10a) That cloud **resembles** a fish.
(10b) *A fish **is resembled** by that cloud.

(11a) Fred **killed himself**.
(11b) ***Himself was killed** by Fred.

If we consider co-occurrence with *buy*, co-occurrence with *resemble* and co-occurrence with a reflexive object as three contexts for the active and passive voice, then we find that the active voice occurs in all three contexts while the passive voice occurs in only one. On this evidence, the active voice has the greater distributional potential.

However, there do exist examples of passives in English without obvious active counterparts (e.g. *be rumored*). These examples suggest weakening the distributional criterion to merely 'no more contexts than' instead of 'a subset of'. This renders the criterion too weak in at least one important respect. Let us say that we allow this weaker version. The extreme case of that would be complementary distribution. The major difficulty is determining how to count distributional contexts so that we could say that the number of contexts in which one element is found is more than the number of contexts in which another element was found. Some independent means for individuating and counting morphosyntactic contexts is required. This may be possible, though it does not yet exist. On the other hand, if one set of contexts is a proper subset of the other, then it is clear that the former set of contexts is smaller in number than the latter, no matter how one counts contexts.

The strong version of distributional potential is as follows:

(12) *Distributional potential*: if the marked value occurs in a certain number of distinct grammatical environments (construction types), then the unmarked value will also occur in at least those environments that the marked value occurs in.

There are two basic reasons why the distribution of a typologically marked value would be more limited (or 'defective') in comparison with the corresponding unmarked value. The first reason is that there is some semantic incompatibility between the grammatical category in question and the construction in which it is not found. In English, for instance, process predicates occur in both the simple

present and the present progressive, while stative predicates are found in the simple present only:

(13a) She **sings** madrigals.
(13b) She **is singing** a madrigal.

(14a) She **has** red hair.
(14b) *She **is having** red hair.

The limited distribution of stative predicates is due to the fact that the semantic distinction underlying the simple present/present progressive contrast is relevant only to process predicates. Indeed, the only way in which stative predicates can occur in the progressive in English is if they are reinterpreted as process predicates: *She is resembling her mother more and more* (= she is coming to resemble her mother more and more); *He is being a boor* (= he is acting like a boor).

This is an example of an asymmetry in distribution due to semantic factors. Nevertheless, this type of evidence still supports the typological markedness of stative predicates in predication (see §6.4). Typological markedness represents constraints on the expression of conceptual categories, and so semantic restrictions are relevant. In fact, the constructional distinctions found with predications – such as simple present vs. present progressive – are so to speak 'designed' for the typologically unmarked value of the categories, in this case processual predicates. The cases of semantic incompatibility are therefore simply another manifestation of typological markedness.

The second reason why the distribution of a typologically marked value would be more limited is simply that it appears to be an arbitrary fact about the language. For example, in Autuw, predicated action words ('verbs') inflect for tense, factivity (determined by tense and mood) and aspect (Feldman 1986:60):

(15) rey **di-** **k->ik<-iy** **-e**
3SG **FACT-** **<IMPF->sit** **PST**
'He was sitting/used to sit.'

Predicated property words ('adjectives', often called 'stative verbs') do not inflect for any of these categories (Feldman 1986:136):

(16) wan- wan -ke yæn mede
1SG- 1SG -POSS child good
'My own child is good.'

While aspect is arguably incompatible with property words (the latter are stative; see above), tense and factivity are not. It is simply a grammatical fact regarding the predication of stative property words in Autuw. As such, it provides strong evidence for the typological markedness of stative predications compared to process predications (see §6.5).

4.1.3 *Neutral value: not a criterion for typological markedness*

Certain other grammatical criteria have been proposed as manifestations of markedness, at least in the Prague School sense. We may describe them as neutral value criteria: the unmarked value is the one found in neutral contexts, where the contrast between paradigmatic alternatives does not apply for one reason or another. However, we will demonstrate in this section that there is no cross-linguistic consistency as to which value is chosen. Hence, the neutral value criterion is not apparently associated with typological markedness.

Greenberg describes one candidate criterion as the facultative use: the form that normally refers to the unmarked value will refer to either value in certain contexts. The common example is the use of English *man* to indicate either the male of the species or the species as a whole, including females. The facultative use does not always follow the markedness pattern, however. For example, English *they* is used to refer to unidentified individuals regardless of number, so that *They told me to sit down* can be used when only one individual told me to sit down. This suggests that the plural is the neutral (unmarked) value, although lack of inflectional potential (lack of gender distinctions) suggests that it is the marked value.

In the category of gender, a variety of contexts can be considered facultative, but no single gender is consistently used across languages for these contexts. For example, in Maasai feminine gender is used for referents of unknown gender (Corbett 1991:220):

(17) Aiŋai **na-** ewno?
it.is.who **who.F-** has.come
'Who has come?'

Another facultative context is when the referent does not have a gender, either because the referent is not denoted by a noun but instead by another part of speech, or because the referent is denoted by a nonlinguistic expression. In Menomini, if the referent is denoted by a clause, then the inanimate singular gender is used (Corbett 1991:206):

(18) **eneh** sa se:hkas -e -yan
that.INAN.SG PTCL hate -1SG.OBJ -1/2SG
'the fact that you hate me'

In Chichewa, on the other hand, the human singular Class 1 gender is used when the referent is not a word but a sound (Corbett 1991:209):

(19) a- na- **mu-** mva 'mayo'
CL1.SBJ- PST- **CL1.OBJ-** hear crying.sound
'He heard a crying sound.'

Another neutral value context is gender resolution (Corbett 1991), where the form for the unmarked value is used in the plural to refer to collections consisting of objects of both the unmarked and marked type (usually two distinct genders). An example of gender resolution is the use of the Spanish masculine plural pronoun *ellos* to indicate groups consisting of both men and women. This is another example of a form being employed for an intermediate category (e.g. masculine + feminine) for which there is no separate form.

However, gender resolution is just as inconsistent cross-linguistically as other neutral value contexts. For example, in Swahili, if two nouns of different genders are conjoined, the gender value taken is simply that of the nearest noun (Corbett 1991:265):

(20) **ki-** ti na **m-** guu wa meza **u-** mevunjuka
CL7- chair and **CL3-** leg of table **CL3-** be.broken
'The chair and the leg of the table are broken.'

In Rumanian, a more complicated pattern is found for gender resolution of anaphoric pronouns. If one conjunct denotes a male animate then the masculine is used; if all conjuncts are masculine, the masculine is used; otherwise the feminine is used. An example of feminine gender is given in this example (Corbett 1991:288):

(21) uşa şi peretele ... **ele** ...
door.**F** and wall.**M**.the ... **they.FPL** ...
'the door and the wall ... they ... '

In sum, neutral value contexts do not have any consistent cross-linguistic pattern that can be linked to structural coding or behavioral potential. This conclusion is not entirely surprising. The neutral value criteria differ from structural coding and behavioral potential in nature. The latter two involve a relative quantitative measure of the grammatical properties of the marked and unmarked value: the unmarked value of the category has relatively fewer morphemes and relatively greater inflectional and distributional potential than the marked value. The neutral value criteria, on the other hand, cannot be so relativized. Either the neutral value is the unmarked one or not. These differences in theoretical structure suggest that these neutralization phenomena are not associated with typological markedness phenomena.

4.2 Economy and iconicity

Structural coding restricts the possibilities of zero vs. overt coding of the value of a conceptual category of grammatical expression in languages. The underlying concept of structural coding is a typological generalization that characterizes

the asymmetric distribution of zero vs. overt coding across languages. However, one must still explain why languages such as Zulu, which express both singular and plural with inflections, and Minor Mlabri, which express neither category, are also found. The solution is a competing motivation analysis of the variation in the expression of concepts in language.

The asymmetry underlying structural coding is described as **economic motivation** or more simply, **economy**. Economy is the principle that the expressions should be minimized where possible. The concept extends far back in linguistic theory, and is manifested in a number of different theories. For example, it is part of Grice's Maxim of Quantity in his theory of cooperative behavior in conversation: 'do not make your contribution more informative than is required [for the current purposes of the exchange]' (Grice 1967/1989:26).

The Zulu case demonstrates that another factor is involved in the expression of meaning in form. This underlying factor is most broadly called **iconic motivation** or **iconicity**. The intuition behind iconicity is that the structure of language reflects in some way the structure of experience, that is to say, the structure of the world including the perspective imposed on the world by the speaker. The structure of language is therefore motivated or explained by the structure of experience to the extent that the two match. In the Zulu example, for instance, each conceptual category, both singular and plural, is overtly encoded in the word form. Iconicity motivates symmetry in grammatical expression, in both structural coding and behavioral potential. (The Minor Mlabri case is also symmetric in its own way, in that it expresses neither value for number, leaving that to be inferred in the conversational context.) Iconicity can probably be linked to the other part of Grice's Maxim of Quantity: 'make your contribution as informative as is required (for the current purposes of the exchange)' (Grice 1967/1989:26).

Thus, the cross-linguistic pattern which we have described as typological markedness, or more specifically structural coding, is the result of the competing motivations of economy and iconicity, and not merely of economy (as it is sometimes described). The more general theoretical concepts are economic and iconic motivation, not typological markedness (let alone structural coding). In the rest of this section, we will discuss more broadly the competing motivations of economy and iconicity in the encoding of individual concepts in grammatical morphemes.

4.2.1 *Structural coding, economy and syntagmatic isomorphism*

The subtype of iconicity that is relevant to the encoding of individual concepts in grammar is called **isomorphism** (Haiman 1980). There are two ways

in which isomorphism between meaning and form occur in human languages. The first way is in the correspondence of forms and meanings found in the combination of words and inflections in a sentence. This sort of isomorphism is called **syntagmatic isomorphism**. Structural coding is partially motivated by syntagmatic isomorphism. We can illustrate syntagmatic isomorphism by observing the form–meaning correspondence in the English sentence *This car runs* in Figure 4.1.

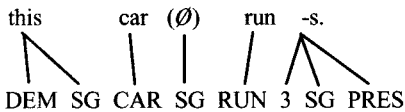


Figure 4.1 *Form–meaning correspondence in* This car runs

Economy and syntagmatic isomorphism compete to produce the range of attested and unattested (or rare) correspondences between form and meaning. There are three predicted patterns (compare §4.1). Overt expression of each meaning by a single form, as with *car* and *run*, is iconically motivated: there is a one-to-one correspondence between meanings and forms. However, it is only moderately economically motivated: it is more economical than expressing a meaning with more than one word or morpheme, but less economical than not expressing the meaning at all. Non-expression of a particular meaning, such as the singular of an English noun like *car-Ø* (vs. plural *car-s*), is economically motivated but not iconically motivated: zero expression breaks the neat one-to-one correspondence between forms and meanings. The third possible option, zero coding of both singular and plural, corresponds to the absence of expression of the category, e.g. absence of the expression of number in Minor Mlabri nouns. This option is economically motivated: either the meaning can be inferred from context, or it is not relevant to the communication.

There is another economically motivated pattern of expressing meaning in form that is commonly found in the world's languages, in particular in European languages: the cumulation of discrete meanings in a single form (see §4.1.1). For example, the suffix *-s* in English *run-s* indicates third person subject, singular subject and present tense, all in a single suffix. In other languages, inflectional categories (when expressed) are found in separate suffixes, as in Turkish *gel-e-sin-iz* (come-SUBJ-2-PL) 'you may come'.

Another case of combination of meanings is found in suppletion, that is, the expression of root meaning and inflectional category in a single form: English *this* combines proximal (near speaker) demonstrative meaning and singular number (compare *these*), in contrast to most English nouns which express (plural) number in a separate suffix.

The Turkish forms are iconic, but not very economic. The English cumulated *-s* and suppletive *this* do not express a combination of meanings iconically, but they are economically motivated, packing multiple meanings in one form, either word or affix. Cumulation and suppletion are particularly common among highly frequent forms in a language; we will explain this fact in §4.3.

The real test for an explanation based on competing motivations such as iconicity and economy is the rarity or absence of patterns that are not accounted for by either motivation. For example, a form that had no meaning associated with it would be neither iconic – it doesn't express any conceptual category – nor economic – it is superfluous. The same is true of a meaning expressed through two or more forms. Such forms, called **empty morphemes**, are in fact extremely rare, and when they occur, they are historically unstable.

The most common example is the double marking of a value, with the loss of the second form. In the historical development of French, the negative was originally indicated by a particle *ne* before the verb: *jeo* ***ne*** *di* 'I do not say'. Later, *ne* was reinforced by particles after the verb. The particles used dwindled to one, *pas*, which lost its emphatic meaning, so that in Modern Standard French, negation is expressed with two fixed forms, *ne* and *pas: Il* ***ne*** *parle* ***pas*** 'he isn't speaking'. In colloquial French, *ne* is analyzed as meaningless and dropped: *il parle* ***pas***.

An alternative fate for empty morphemes is fusion onto the root. In French, *de l'eau* means 'water': *de* indicates a partitive meaning (the water is a subpart of the general mass of water) and *l'* indicates definiteness. In Haitian Creole, derived from French, partitive and definiteness are not part of the grammar any more; but instead of dropping *de* and *l'*, Haitian Creole speakers reanalyzed them as part of the word root: *dlo* 'water' (Hall 1953:307). Still another fate of empty morphemes is that they will be reinterpreted as having a new meaning; this process has been called regrammaticalization (Greenberg 1991) and exaptation (Lass 1990); see §8.3.3 for examples.

The full range of logical possibilities for expressing meaning in form in syntagmatic isomorphism, and how they are (or are not) motivated, is given in Table 4.1.

Table 4.1 *Possible form–meaning correspondences in syntagmatic isomorphism*

Form(s)	Meaning(s)	Iconic	Economic	
1	1	yes	no	classic iconic structure
0	1	no	yes	zero expression of category
0	0	no	yes	absence of category
1	>1	no	yes	cumulation/suppletion
1	0	no	no	empty morphemes

All of the syntagmatic form–meaning mappings that are motivated by either economy or iconicity (isomorphism) are widely found in the world's languages; the one type that is motivated by neither is rare and diachronically unstable.

4.2.2 Economy, paradigmatic isomorphism and polysemy

The second type of isomorphism is the correspondence between form and meaning in the inventory of words stored in the mind; this is called **paradigmatic isomorphism**. Again, the possible means of expression of meanings in words are limited by economy and iconicity.

Here we will begin with the unmotivated possibility: the existence of more than one word with the same meaning, that is, **synonymy**. It is not iconically motivated – there isn't a one-to-one match between the inventory of words and the inventory of meanings – nor is it economically motivated – the synonymy is superfluous for communication. And in fact true synonyms are extremely rare, if they exist at all: there is almost always some subtle difference in denotation, connotation, stylistic register, dialect, etc. that distinguishes two words (see Bolinger 1977; Cruse 1986; Clark 1993).

A one-to-one match between a word and a meaning is called **monosemy**. It is iconically motivated but not economically motivated: we would need very many words to express each discrete meaning. Monosemy is probably most clearly found in specialized vocabulary dealing with technical topics. **Homonymy**, the grouping of several unrelated meanings under a single form, represents the converse pattern of motivation to monosemy. Homonymy is economically motivated (there is only one word with several meanings, such as English *bank* 'financial institution; edge of a river' or *to/two/too*, pronounced the same), but it is not iconically motivated (many unrelated meanings are expressed by a single form). Homonymy is also common, especially among frequent word forms; this will be explained in §4.8.

By far the most common state of affairs in languages, however, is **polysemy**: the grouping of related meanings under a single form. For example, the English morpheme *to* is used to indicate direction toward some location, the recipient of a verb of possession or transfer, and the hearer in verbs of speaking:

(22a) I drove **to** Chicago.
(22b) I gave/sent the package **to** you yesterday.
(22c) I told the story **to** my brother.

There is a clear metaphorical relationship between transfer of possession of an object and transfer of information, and a frequent associational relationship between change in location and transfer of possession (the link is provided by verbs of physical transfer: *I took the sofa to the Salvation Army*).

Polysemy is both economically and iconically motivated: '*recurrent similarity of form must reflect similarity in meaning*' (Haiman 1985:26; italics original). Polysemy is economically motivated because it subsumes several meanings under a single form, as with homonymy. It is iconically motivated, unlike homonymy, because the meanings are related. The set of related meanings can be thought of as a connected region in a conceptual space mapping out linguistic meanings (see §5.3). The actual iconic correspondence between meaning and form is between a single form and a single region in conceptual space. Polysemy is therefore similar to monosemy. Monosemy represents a correspondence between a form and a precisely defined 'point' in conceptual space. Polysemy represents a correspondence between a form and a larger region in conceptual space; the larger the region, the fewer total words necessary to cover the conceptual space, and the more economically motivated the form–meaning correspondence.

The full range of logical possibilities for expressing meaning in form in paradigmatic isomorphism, and how they are (or are not) motivated, is given in Table 4.2.

Table 4.2 *Possible form–meaning correspondences in paradigmatic isomorphism*

Form(s)	Meaning(s)	Iconic	Economic	
>1	1	no	no	synonymy
1	1	yes	no	monosemy
1	>1 (unrelated)	no	yes	homonymy
1	>1 (related)	yes	yes	polysemy

The question is, how do we distinguish accidental homonymy, such as *two*, *to* and *too*, from iconically motivated polysemy, such as the directional and recipient meanings of *to*? The answer in most cases is provided by cross-linguistic – typological – comparison: if many diverse languages independently have the same pattern of 'homonymy', then the meanings are closely related. Haiman has used this typological method to demonstrate the semantic relatedness of grammatical categories that have otherwise been thought to be widely separated (Haiman 1974; 1976; 1977; 1978a; 1978b; 1985). We will present one example of his work here.

Much of Haiman's work has been devoted to complex sentences, particularly conditional sentences and their relationships to other complex-sentence types (Haiman 1978a; 1978b; 1985). The dominant English conditional construction uses the conjunction *if*, while a construction involving subject–verb inversion is more restricted (usually to counterfactual conditionals):

(23) **If** it had been otherwise, I would have told you.
(24) **Had it** been otherwise, I would have told you.

Both of these constructions are also used with polar questions: *if* with polar question complements, and inversion with standard polar questions (Haiman 1985:27):

(25) Mary doesn't know **if** it will rain today.
(26) **Will it** rain today?

This coincidence in itself suggests some functional (semantic–pragmatic) connection between conditionals and polar questions. But it is the typological evidence that confirms this suggestion beyond a reasonable doubt. Haiman provides a number of examples that illustrate this recurrent polysemy: Russian *esli* 'if' is derived from *est'* 'be (3SG)' and *li* 'whether', the polar-question marker; the Turkish conditional suffix *-se* can be replaced in colloquial registers by *-mi*, the polar-question marker; and the Hua conditional suffix can be replaced in certain contexts by *-ve*, a highly polysemous morpheme whose typical use is with polar questions (Haiman 1985:28–29). Haiman also demonstrates that the concessive conditional and the nonhypothetical conditional (in which the protasis, or antecedent, is factual) are also closely related to the causal and hypothetical conditional.

Haiman argues that the protasis of a conditional functions more like a topic or background state of affairs against which the apodosis (consequent) is evaluated (Haiman 1985:33–34; see also Haiman 1978b). This functional argument is in turn supported by typological evidence that conditional markers are polysemous with topic markers, evidence that we have alluded to in chapter 1. For example, in Turkish, the aforementioned conditional marker *-se* is used for contrastive topics; in Tagalog, the conditional morpheme *kung* is also used for contrastive topics; in Korean, the conditional copula *-(i)myen* can replace the topic marker-*(n)un*; in Vietnamese, the topic particle *thì* is also used to indicate the protasis, and so on (Haiman 1985:34–35). Haiman concludes his analysis by arguing (following Otto Jespersen and other linguists) that topics, and also conditionals *qua* topics can be introduced by questions (Haiman 1985:38, examples 36 and 37):

(27) A: You know Max, the barber?
B: (silence = 'yes')
A: Well, he died yesterday.
(compare 'Max died yesterday.')

(28) A: Is he coming?
B: (silence = 'yes')
A: Then I'll stay
(compare 'If he's coming, then I'll stay.')

The recurrent polysemy of polar question, topic and conditional protasis reflects the abbreviation of this pragmatic strategy by taking B's assent for granted (or not allowing B to object), and linking the two turns of A.

Another example of typological polysemy leading to analyses of functional similarity is the relationship between focus of a noun phrase, relativization, information (*wh*) questions and constituent negation. The typological similarity between focus constructions and (restrictive) relative clauses is discussed by Schachter (1973). The following examples illustrate ordinary declaratives, relative clauses and focus constructions:

Akan

(29) mìhúù àbòfr̀á/nò
I.saw child/him
'I saw a child/him.'

(30) àbòfr̀á áà míhúù **nó**
child that I.saw **him**
'a child that I saw'

(31) àbòfr̀á nà míhúù **nó**
child that I.saw **him**
'It's a child that I saw.'

Hausa

(32) sū gayà wà yārò̄
they told IO child
'They told the child.'

(33) yārò̄ dà **sukà** gayà wà/masà
child REL **they.REL** told IO/IO.3SG
'the child that they told'

(34) yārò̄ nē **sukà** gayà wà/masà
child REL **they.REL** told IO/IO.3SG
'It was the child that they told.'

Ilonggo

(35) nag- dala ang babayi sang bata
AG.TOP- bring TOP woman NTOP child
'The woman brought a child.'

(36) babayi nga **nag-** dala sang bata
woman that **AG.TOP-** bring NTOP child
'the woman that brought a child'

(37) ang babayi ang **nag-** dala sang bata
TOP woman TOP **AG.TOP-** bring NONTOP child
'It was the woman who brought a child.'

In Akan, the relative clause and the focus construction are similar in that both involve positioning the relativized/focused NP before the verb and the use of a special anaphoric pronoun form *nó* (high tone instead of low tone). In Hausa,

both relative clause and focus constructions use a special subject pronoun form (*suka*); the position in the relative clause/focus is occupied by either the indirect object marker *wà* alone or the indirect object marker fused with a third person pronoun (*masà*). In Ilonggo, the agent topic construction (with the prefix *nag-*), one of several constructions available in the ordinary declarative, is required in the relative clause and focus constructions, and the relativized/focused NP is placed before the verb.

Schachter argues that since there is a parallelism in form between focus constructions and relative clauses, there must be some semantic or pragmatic similarity between the two forms. Schachter proposes that the out-of-focus/relative-clause construction has the effect of backgrounding the information contained therein. In a focus construction, the focused NP, rather than the predicate, is the prominent or foregrounded piece of information that the speaker is communicating; the information in the out-of-focus clause is secondary (in fact, usually already given in the discourse). Likewise, the head of the relative clause is the prominent piece of information, that is the participant in the main clause, while the description in the relative clause is functionally as well as syntactically subordinate to the assertion in the main clause.

Information questions and constituent negation also commonly use the same construction as focus and/or relativization; in fact all of these constructions are commonly called **extraction** constructions. For example, in Makua all the extraction constructions share a distinct set of aspect suffixes, and all but the relative clause have in common the postverbal position of, and low tones on, the foregrounded NP (Stucky 1979:362–64; Stucky 1981:186):

Ordinary declarative

(38) híñ-sepété áhó- han -á níváka
Sepete SBJ.TNS- forge -ASP spear
'Sepete forged a spear.'

Focus

(39) híñ-sepété aa- han **-ílé** nivaka
Sepete SBJ.TNS- forge **-PRF** spear
'It's a spear that Sepete forged, . . .'

Constituent negation

(40) kʰáá- han **-ílé** ihipa
NEG.SBJ.TNS- forge **-PRF** hoe
'. . . it wasn't a hoe that he forged.'

Question

(41) híñ-sepété aa- han **-ílé** -ni
Sepete SBJ.TNS- forge **-PRF** -what
'What did Sepete forge?'

Relative clause

(42) niváká aa- han **-flé** hín-Sepété -(ńné)
spear SBJ.TNS- forge **-PRF** Sepete -DEM
'the spear that Sepete forged...'

In K'iche', like other Mayan languages, the focus, *wh*-question, negation and relative-clause constructions all have in common the fronting of the foregrounded NP (in a normally verb-initial language), a special verbal voice form for transitive verbs (the focus antipassive form) and an indexation pattern based on animacy for the same verb forms (see §5.2).

The polysemy of Makua and K'iche' is compatible with Schachter's foreground–background analysis. In information questions, the questioned element is the foregrounded piece of information by virtue of its being the focus of the question, and the other information is frequently presupposed. Likewise, answers to information questions are generally focus constructions as well (and indeed are preferred or required in Makua and K'iche'). In constituent negation, the negated element is the most prominent piece of information, while the rest of the clause is frequently presupposed. In addition, focus or foregrounding constructions across languages have common structural characteristics: the foregrounded element, usually an NP, is structurally separated from the backgrounded rest of the clause, and the rest of the clause is distinctively marked (special verb form, complementizer, special pronominal/indexation forms). Thus, the focus sentence structure mirrors the sentence function, by separating the foregrounded element and marking the backgrounded clause. This is an example of iconic motivation: grammatical structure reflects conceptual structure (see §7.2.1).

4.3 Frequency and deeper explanations for economy and iconicity

The two preceding sections demonstrate that the asymmetric patterns underlying typological markedness are motivated by economy as well as iconicity. There is a third asymmetric pattern that is associated with typological markedness, and this pattern offers an explanation for why economic motivation is found where it is. This is the relative **text** or **token frequency** of the values of the category.

(43) *Text (token) frequency*: if tokens of a typologically marked value of a category occur at a certain frequency in a given text sample, then tokens of the unmarked value will occur at least as frequently in the text sample.

Like behavioral potential, text frequency is of universal applicability: the frequency of any linguistic element can be counted. Unlike behavior, however, frequency

is not found in language structure. The text frequency criterion, in particular, demonstrates the important role of quantitative text analysis in providing evidence for linguistic analysis and in corroborating (or questioning) linguistic patterns that can be arrived at by internal structural means. The text frequency criterion shows a direct connection between properties of language structure and properties of language use (or, as some put it, competence and performance), and strongly suggests that these two should not be separated as much as they are in most current theories (§9.4).

Greenberg's monograph on typological markedness (1966b) contains many text counts of morphosyntactic categories to corroborate the markedness patterns of those categories found by structural coding and behavioral potential. For example, text counts of Russian and Latin singular and plural forms of nouns and verbs indicate that the singular is of far greater frequency than the plural (Greenberg 1966b:32, 37):

		Singular	Plural
Latin (Terence)	Nouns	85.2%	14.8%
	Verbs	91.0%	9.0%
Russian (conversational)	Nouns	77.7%	22.3%
	Verbs	77.1%	22.9%

Since typological markedness is a property of conceptual values, text frequency counts for typological markedness must count conceptual values, not linguistic forms. What matters for singular is singular reference, not singular form. For example, mass nouns are often singular in form, and in many languages forms for singular reference can also be used for plural reference. But what must be counted is singular reference. On the other hand, text frequency is not the same as frequency of the entity in the real world. For example, the number of singular referents of any type of entity, such as chairs, in the real world is much smaller than the number of plural referents. The total possible referents of singular *chair* are singleton sets of the set of all chairs; but the total possible referents of plural *chairs* is the set of all sets of chairs other than singleton sets, a far greater number. Yet the text counts in Latin and Russian given above clearly indicate that singular noun phrases are far more frequent than plural noun phrases. Hence, text frequency reflects a combination of real world facts and human choices in talking about the real world: for whatever reason, human beings talk more about singleton sets of entities than plural sets of entities. That is, text frequency reflects characteristics of human cognition and communicative choices.

There are some precautions that must be heeded in establishing relative text frequency. A text sample must be obtained that is large and representative of the textual styles used in the language. Ideally, the most frequent text style – that is,

conversation or oral narrative, rather than written genres – should be used. Studies have indicated that the textual frequencies for certain otherwise marked values increase in formal and written styles and, hence, they are not such reliable indicators of correlations between text frequency and other typological markedness criteria (e.g. Greenberg and O'Sullivan 1974). (Actually, this indicates that there is a correlation between informal, oral style and some, if not all, unmarked categories.)

Unfortunately, most available text frequency counts are not adequate for the purpose. One problem is that they are generally based on written rather than oral language. Their main problem is, however, that they give the frequencies of forms but not of functions. For example, one will not be able to distinguish the passive as opposed to the predicative uses of English *be* since the same form is used. Some frequency counts do not give the different inflectional forms of words, rendering them useless for studying the markedness of those inflectional categories. Also, if a formal category such as plural is optional, as it frequently is, then a count of plural forms will underestimate the frequency of plural reference. These shortcomings limit the usefulness of form-based text counts but do not entirely eliminate them as tools, depending on what phenomenon is under examination (see Schwartz 1980). Corpora tagged with syntactic information goes part way to solving this problem, and it is clear that the current intensive research in corpus analysis (e.g. Edwards and Lampert 1993) will produce tools of considerable value to typology.

Finally, it should go without saying that the relative frequencies of forms should be demonstrated to be statistically significant. In the case of simple markedness patterns within a single grammatical category this is fairly straightforward; but in the case of the cross-categorial correlations described in chapter 6 the statistical tests will be more complex. (For a particularly sophisticated analysis of the relationship between different measures of text frequency and morphological irregularity, see Corbett et al. 2001.)

Greenberg (1966b:65–69) argues that text frequency is the underlying motivation for the asymmetry in structural coding and behavioral potential. The most frequent grammatical value has zero or minimal expression (structural coding), because it is the most common form, and the uncommon form (marked value) is given a distinctive, overt mark. The connection between frequency and zero expression is the principle that people will shorten the linguistic expressions that are used most commonly for economy, that is to simplify their linguistic utterances. This principle is sometimes called Zipf's Law, after the linguist who popularized it: 'High frequency is the cause of small magnitude' (Zipf 1935:29). Text frequency is economic motivation (Haiman 1985).

High text frequency is also associated with the form–function mappings described in §4.2 that are economically motivated, as we would predict. Cumulation and suppletion (§4.2.1) and homonymy and polysemy (§4.2.2) are found in the

most frequently occurring forms in the grammar. If cumulated or suppletive forms are found in less frequently occurring forms, they are eventually regularized (see below).

Since there is a causal connection between frequency and zero expression via economic motivation, then one should be able to account for behavioral potential via economy as well. Inflectional potential states that the unmarked value will express at least as many cross-cutting inflectional categories as the marked value. That would appear to be uneconomical, since the language user has to retain more forms. (It is, however, iconic: the values of the cross-cutting category are overtly expressed.) However, we may turn the definition of inflectional potential around by saying that the marked value will express *fewer* cross-cutting inflectional categories. One must begin by assuming that speakers of a language have chosen to express a certain number of inflectional categories. It will be more difficult for the speakers to retain cross-cutting distinctions in marked categories since the forms are used less often, and so those forms will be regularized, disappear or never arise in the first place.

This reasoning may be illustrated by a hypothetical example. In a typical language, the singular will be much more frequent in discourse than the plural. The frequency of the singular may be so great that singular nominatives and singular accusatives are each as frequent as plural nominatives and accusatives put together, as the following imaginary figures illustrate:

	Nominative	Accusative	Total
Singular	40%	25%	65%
Plural	20%	15%	35%
Total	60%	40%	100%

If this is the correct state of affairs, as the markedness patterns of case and number suggest, then it would be just as economical to have distinct nominative singular and accusative singular forms as to have a single plural form. In fact, when combinations of unmarked features are taken into consideration, much greater differences in frequency occur, and 'such enormous disparities must surely have an effect in that such a highly infrequent formation must follow analogically other parts of the system, while only a fairly frequent form can preserve irregularities' (Greenberg 1966b:68–69; see also Bybee 1985a). However, an alternative explanation for behavioral potential will be offered in §6.1.2.

Haiman, following Meillet (Haiman 1985:157), offers another suggestion for the origin of cross-cutting categories in unmarked rather than marked values. Frequent combinations of inflectional affixes tend to be 'run together' and eventually phonologically fused; that is, frequent expression is economized by being physically shortened. This may occur only for the most frequent – that is, typologically

unmarked – values in a paradigm. Hence, the typologically unmarked values will display greater inflectional versatility, in particular cumulation and suppletion.

The fundamental phenomenon with behavioral potential is asymmetry in the expression of a *combination* of values from two different conceptual categories: the values of the category in question and the values of the cross-cutting category. In chapter 6, we will see that the interactions of values from different conceptual categories is more complex than the picture presented here.

Bybee (1985a) discusses two additional phenomena associated with typological markedness and proposes a psychological model to explain all the typological markedness phenomena. The two additional phenomena are the restructuring of paradigms using the least marked form as the basic form, and the survival of irregularity in the least marked form(s) of a paradigm. Both of these phenomena have been associated with markedness patterns, but have not figured prominently in typological discussions of markedness.

Both phenomena can be illustrated here with a single example, the development of the preterit in Provençal (Bybee 1985a:55; compare Bybee and Brewer 1980). The Old Provençal preterit has the following forms:

1SG	améi	1PL	amém	'love'
2SG	amést	2PL	amétz	
3SG	amét	3PL	améren	

These forms, as with most Romance verb forms, involve cumulation of subject person and number with verbal tense/aspect, and have overt coding of the third singular form.

One restructuring of the Old Provençal preterit that illustrates Bybee's analysis is the modern Charente dialect:

1SG	cantí	1PL	**cantét**em	'sing'
2SG	**cantét**ei	2PL	**cantét**ei	
3SG	**cantét**	3PL	**cantét**en	

The Charente dialect altered the second person singular and all the plural forms so that the base form on which they were formed is the third person singular; only the first person singular is distinct, and hence irregular. By text frequency, the third person singular verb form is the least marked, followed by first person singular (see also §6.1.2). In the Charente dialect, the restructuring of the preterit paradigm has made not only the third person singular form the least marked form; the third person singular is now the base form for the other inflections. Thus, the third singular is now the zero coded value of the paradigm. The one form that resisted restructuring was the first person singular, which is the next least marked form, that is, the form next highest in text frequency after the third person singular.

Bybee explains the relationship between economy, structural coding, locus of irregularity and base in analogical change in terms of a psychological model of storing word forms based on frequency. The higher frequency/less marked a form is, the more deeply **entrenched** the form will be in memory. The higher frequency forms will thus be represented independently of other members of the paradigm; other members of the paradigm will if anything be dependent on the higher frequency member. Since the higher frequency form is more entrenched, the more likely it is to remain irregular (i.e. resist restructuring). Instead, it will itself be used as the base – i.e. zero coded – form for the restructuring of related but less frequent/more marked forms (Bybee 1985a; 1995; 2001).

Bybee's model gives a psychological account of frequency effects and also of analogical restructuring and irregularity, and provides an important link between the natural salience explanations of frequency discussed above and the specific grammatical manifestations of markedness. Bybee's model is one of a family of models of the mental representation of knowledge called **activation network** models (see Elman and McClelland 1984; Elman et al. 1996, among others). In activation network models, knowledge is represented as patterns of activation over nodes in a network, hypothetically based ultimately on the electrochemical activation in the network of neurons in the brain. The use of knowledge in perception and motor activity involves dynamic activation of these nodes. Different levels of activation of individual nodes (or patterns of nodes) represent different degrees of entrenchment of category values. Another characteristic of activation network models is that activation patterns from different nodes can compete in activating certain nodes, according to the number and weighting of the activation of nodes. This corresponds exactly to the competing motivations model as it is used in typology (§3.5). The activation network model is thus consistent with the model of linguistic knowledge developed in typology.

Of course one must still ask why some situations are talked about more frequently than others. Such situations are presumably more perceptually or culturally normal or salient. Comrie suggests that 'those constructions that involve less formal markedness [structural coding] linguistically correspond to those extralinguistic situations which – in fact or in our conceptualizations – are more expected' (Comrie 1986:104; compare Witkowski and Brown 1983:570). The psychological properties of the storage of grammatical structures are ultimately a consequence of their function in discourse, that is, communicative interaction.

If Bybee's model is a valid explanation for typological markedness in structural coding, then one would also predict that structural coding would be sensitive to phonological length as well as morphological length (Matthew Dryer, pers. comm.). Structural coding was defined in §4.1.1 in terms of the number of morphemes encoding the value of the conceptual category. If structural coding is

economically motivated, then the phonological length of overtly coded values of a category should also vary such that typologically unmarked values are coded by phonologically shorter forms. A study of the phonological length of overt expressions of number values in nouns, verbal indexation and adjectival indexation in thirty languages (Brunner 2002) bears out this prediction.

However, it could be that salience or expectedness directly motivates structural coding, rather than via frequency and entrenchment. Often, a typologically unmarked value is zero coded not because it has been reduced through frequent use, but rather because the counterpart marked value acquired overt marking in order to avoid misunderstanding because it is less expected or salient. For example, zero present tense forms typically arise when an overt marker for nonpresent (e.g. past) becomes obligatory (Bybee 1994:248). Hence the motivation for acquisition of the overt structural coding of a typologically marked value, and therefore the zero coding of the unmarked value, is not high frequency but (un)expectedness directly. Nevertheless, the loss of overt coding of a typologically unmarked category value is likely to be due to erosion or loss via higher frequency of use (see §8.1).

We conclude by examining why languages should encode concepts economically and/or iconically. Economy and iconicity appear to be fundamentally adaptive, having evolved for communication in a maximally efficient manner, given the constraints imposed by the structural medium and the environment. In linguistics, efficient adaptation goes under the name of **processing** considerations.

Economy is transparently a processing phenomenon. Syntagmatic economy is most straightforwardly a processing consideration. Processing efficiency for both speaker and hearer is increased by shortening the most common forms (structural coding) and simplifying the less-used forms (behavioral potential). Paradigmatic economy also reflects processing efficiency, by minimizing the number of distinct linguistic forms that must be acquired and retained in use.

Iconicity is also ultimately a processing consideration. Assuming that human beings must master the structure of experience, it is more efficient that language parallel that structure as much as possible. First, it minimizes the kinds of information structures a human being must acquire by not requiring a completely different information structure for language than for the world. Second, it minimizes the conversion process from the structure of information as we perceive and use it nonlinguistically to the structure of information as we comprehend and express it linguistically. Givón calls this the iconicity meta-principle: 'All other things being equal, a coded experience is easier to *store, retrieve* and *communicate* if the code is maximally isomorphic to the experience' (Givón 1985:189; emphasis original).

Without this processing consideration, and its adaptive function, there is no a priori reason for language structure to be maximally iconic rather than not so: 'the whole raison d'être for iconicity in language is thus grounded in the need to

facilitate processing within real time' (Givón 1985:198). Nor is there any a priori reason for it to be economic, for the same reason. Thus, both economy and iconicity are basically different manifestations of processing efficiency. Explanations cannot cease with economic and iconic motivation, but must be based ultimately on the hypothesis of language structure as an adaptive response to functional pressures, in particular functional adequacy and functional efficiency. As DuBois puts it, 'grammars code best what speakers do most' (DuBois 1985:363). The best coding is that which is iconically and/or economically most motivated; and those structures are used for the situation types that are most salient and most often communicated.

4.4 Typological asymmetries in word order and phonology

Typological asymmetries that are reminiscent of typological markedness are found in word (and affix) order and in phonology. (Indeed, they were subsumed under typological markedness in the first edition of this book.) However, they differ from typological markedness in significant ways.

In word/affix order, typological asymmetry is described by dominance. Dominance is a factor underlying two asymmetric typological patterns. The first is the implicatum of an implicational universal such as NDem ⊃ NA: the dominant type (NA) occurs in languages of both types of the antecedent of the implication (NDem and DemN languages). The second is the cross-linguistic frequency of the phenomenon: the dominant type is more frequent than the recessive type across the world's languages.

However, none of the typological patterns associated with typological markedness are found in word order. Constructions with NA word order are not generally coded by more morphemes than those with AN order; nor does it generally have greater behavioral potential; nor is it generally syntactically more irregular; nor is it generally the base for analogical change; nor does it have greater text frequency. This is because most languages have either NA order or AN order but not both. The two orders are two types of formal expression, not two values of a conceptual category. Conversely, since the two values of a conceptual category are expressible in any language, the two values occur in all languages, and so the cross-linguistic patterns of occurrence determined by dominance do not apply to typological markedness. Finally, typological markedness is explained by economy, having to do with the frequency of expression of a value of a conceptual category, while dominance is (possibly) explained by heaviness, having to do with the processing of a formal structure.

Phonological asymmetries display some of the properties of word/affix order dominance and some of the properties of typological markedness, or so it appears. Phonemes, like word order, are formal structures, not conceptual values, and so they

may occur or not occur in languages. But phonemes, like grammatical categories and constructions, are related to an external phenomenon, that is, phonetic reality, not conceptual structure.

Since phonemes may or may not occur, we may examine their frequency of occurrence across languages, just as we do with word order. And indeed there are asymmetries such that some phonemes are found in more languages than others. For example, languages with plain voiced trills, taps or flaps far outnumber languages with voiceless or laryngealized trills, taps or flaps (Maddieson 1984:79). Likewise, we may formulate implicational universals of the occurrence of phonemes. For example, Maddieson includes the following implicational universals for nasals: 'the presence of /m/ implies the presence of /*n/ [i.e. dental or alveolar nasal]', true for 197 out of 200 languages (Maddieson 1984:69). Note that the phonological universals generally link two segments sharing a single feature, in this case [nasal], unlike word order universals that link two independent word order types.

Some typological asymmetries in phonology resemble those found for values of conceptual categories. For example, there are major differences in text frequency between different segments that occur in the same language. Greenberg's monograph on typological markedness (1966b) contains many text counts of phonological categories. For example, in 1,000-phoneme text counts of glottalized vs. unglottalized consonants in Hausa, Klamath, Coos, Yurok, Chiricahua and Maidu, Greenberg found that the percentage of glottalized consonants ranged from 7.8% to 19%. Greenberg takes that as clear textual evidence for the 'markedness' of glottalized consonants (Greenberg 1966b:15–17).

There are also typological asymmetries in phonology that correspond to behavioral potential. An apparent phonological analog to inflectional potential is the occurrence of gaps in segment inventories at the phonemic or allophonic level. Here the cross-cutting categories are the different features. A typical example of this is that the number of nasal vowels is always smaller than the number of oral vowels (Ferguson 1966:58). That is, there are more vowel height/backness distinctions among oral vowels than nasal vowels, hence nasal vowels are 'marked'. A brief glance through Maddieson's catalogue of segment inventories (Maddieson 1984) strongly suggests that the number of nasal consonant phonemes is always smaller than the number of oral consonants, yielding the hypothesis that nasality is 'marked' overall in comparison to orality.

The greatest problem in determining markedness patterns by gaps or irregularities in segment inventories is determining what type of segment to include. For example, in a number of languages the velar nasal /ŋ/ is considered to be absent from a segment inventory because it is not a phoneme of the language, but it may actually be present in the language as an allophone. A plausible solution to this problem is

to carefully separate phonemic from allophonic inventories in evaluating gaps in segment inventories. Presumably phoneme inventories will display more gaps than allophone inventories but those gaps that do exist in allophone inventories will not contradict the markedness evidence from phoneme inventories. This, of course, requires that we can distinguish phonemes from allophones, that is separate the 'basic' allophonic forms that will be used in the phoneme inventories from the 'nonbasic' ones that will be discarded (see §7.1).

The phonological counterpart to distributional potential is the distribution of sounds in phonological environments. This is a syntagmatic property, concerning the collocations of sounds, in contrast to the paradigmatic one of gaps in segment inventories. Phonotactics is an important source of data for distributional phonological markedness. For example, in Wintu plain (unglottalized) stops occur in word and syllable initial and final positions, but glottalized stops and fricatives occur only in word initial and syllable initial, prevocalic position (Pitkin 1984:26–27), supporting the general pattern that stops are less marked than fricatives, and that unglottalized consonants are less marked than glottalized ones.

Cases of phonological neutralization may be reducible to distributional potential. In neutralized contexts, only one of two possible feature values is realized. The oft-repeated example is that of German word final devoicing, in which *Bund* 'bundle' is pronounced the same as *bunt* 'colorful', namely, [bʊnt]. Essentially, the 'unmarked' phonological feature is realized in more environments than the marked features, namely the contexts of neutralization. This is essentially distributional potential (see also Gundel, Houlihan and Sanders 1986:114–16).

However, there is no equivalent to structural coding typological patterns in phonology:

> Zero expression involves the relation between content, the grammatical or semantic category involved, and expression, in this case the lack of overt sound sequences. At this point the fundamental difference between the phonological and grammatical level asserts itself, the sound–meaning relationship which is absent in the former and present in the latter. (Greenberg 1966b:62–63)

The nearest analog would be in terms of the external phonetic reality, namely that a marked phoneme involves more articulatory gestures than the production of their unmarked counterparts. The difficulty here has been that to argue that a phonetic feature has been 'added' means decomposing the articulation of a phoneme and its acoustic structure in such a way that one can assert that an articulation and/or an acoustic feature is really *not there*, rather than simply being different. This seems to be possible, since producing a phoneme clearly involves many articulatory gestures, but considerably more phonetic research is necessary to establish this fact for specific phonemes.

Nevertheless, the various asymmetric typological patterns in phonology do tend to point to the same phonetic values as 'marked' vs. 'unmarked', such as glottalized vs. nonglottalized and oral vs. nasal. Hence, there are significant typological universals that must be explained. However, the explanation for all of them, text frequency included, is likely to be found in articulatory and acoustic phonetics, as Ohala and others have argued (e.g. Ohala 1983).

4.5 Conclusion

Table 4.3 summarizes the types of universal asymmetries across languages that are found in morphosyntax (typological markedness), word order (dominance) and phonology.

Table 4.3 *Asymmetric cross-linguistic patterns among paradigmatic alternatives*

	Morphosyntax	Word order	Phonology
Structural coding	√	×	n/a
Inflectional potential	√	×	√ (number of phonemes with feature)
Distributional potential	√	×	√ (occurrence in phonotactic environments)
Token frequency	√	×	√ (if language has the phoneme)
Irregularity	√	n/a	n/a
Base for analogy	√	n/a	n/a
Cross-linguistic frequency	n/a	√	√
Cross-linguistic implicatum	n/a	√ (dominance)	√ (marked value ⊃ unmarked value)
Neutral value	×	×	√ (distributional potential)

Notes: √ = cross-linguistically valid; × = cross-linguistically invalid; n/a = not applicable

Typological markedness represents an asymmetry in the coding of function in grammatical form. For typological markedness, structural coding, behavioral potential (inflectional and distributional) and text frequency are phrased in terms of relative quantitative values. The cross-linguistic variation that is captured by the implicational universals of typological markedness represent the competition of economy with syntagmatic isomorphism in the coding of concepts in linguistic expressions. Economy and isomorphism also compete paradigmatically, leading

to variation in the form–meaning mapping in inventories of words and morphemes. Finally, economy itself represents the interplay of high frequency and shortening (economizing) on verbal expression.

Cross-linguistically valid asymmetric patterns are also found in word order and phonology. The word order patterns are those identified with dominance, and represent universals of the occurrence of alternative word orders – formal structures – in the world's languages. The phonological patterns are varied, and seem to be similar to word order asymmetries and to typological markedness. Like word order, phonology is purely formal, i.e. not referring to the encoding of meaning by form. Like morphosyntax, however, phonology is relatable to an external phenomenon, namely phonetic reality. Presumably the phonological patterns are ultimately to be explained in terms of phonetic motivations.

Most, if not all, of these patterns are strikingly common and consistent in human languages. Every language has irregularities or asymmetries in phonology, word order and morphosyntax, and most of these irregularities instantiate typological universals of asymmetry. Significant exceptions do occur, but many of these can be accounted for by correlations across categories (see chapter 6).

5

Grammatical hierarchies and the semantic map model

5.1 Grammatical hierarchies and implicational universals

In §3.3, we observed that the implicational universals for noun–adjective order were all of the form 'X ⊃ NA', and that this pattern of implicational universals represents the phenomenon of dominance of NA order. There is another even more frequent pattern found in implicational universals, which is taken to represent another type of deeper phenomenon, a grammatical hierarchy.

If one examines languages with prepositions, the following pattern in implicational universals for noun modifiers are found (Hawkins 1983:75; Dryer 1992b):

(1) Prep ⊃:
(1a) NNum ⊃ NDem
(1b) NDem ⊃ NA
(1c) NA ⊃ NG
(1d) NG ⊃ NRel

The series of implicational universals in 1a–d represents a chain in which the implicatum of each universal is the implicans of the subsequent universal in the list. This pattern leads to a sequence of grammatical types ranked by their position in the chain of implicational universals. This sequence is called a grammatical **hierarchy**. Hawkins christened this particular hierarchy the Prepositional Noun Modifier Hierarchy, represented as follows (the > symbol is oriented in the same direction as the implication ⊃ in 1a–d):

(2) *Prepositional Noun Modifier Hierarchy*: NNum > NDem > NA > NG > NRel

The chain of implicational universals in 1a–d can be reformulated to make direct reference to the Prepositional Noun Modifier Hierarchy in 2:

(3) If a modifier–noun order on the Prepositional Noun Modifier Hierarchy occurs in a prepositional language, then any order to the right also occurs in the language. If the opposite order to one on the Prepositional Noun Modifier Hierarchy occurs in a prepositional language, then any order to the left also occurs in the language.

A grammatical hierarchy is an ordered ranking of grammatical types which constrains possible language types (or at least the relative cross-linguistic frequency of actual language types) with respect to one or more grammatical phenomenon. For example, the Prepositional Noun Modifier Hierarchy constrains the possible configurations of noun modifier orders in prepositional languages to just those types given in 4:

	Following the head noun	Preceding the head noun
(4a)	NNum & NDem & NA & NG & NRel	–
(4b)	NDem & NA & NG & NRel	NumN
(4c)	NA & NG & NRel	NumN & DemN
(4d)	NG & NRel	NumN & DemN & AN
(4e)	NRel	NumN & DemN & AN & GN
(4f)	–	NumN & DemN & AN & GN & RelN

Hierarchical patterns of implicational universals are pervasive in grammar. For example, grammatical hierarchies supported by typological evidence occur in phonology as well. Most of the typological evidence regarding patterns as complex as hierarchies is in the form of **segment inventories**, an enumeration of the phonemes of the language. An example of the segment inventory of stop consonants is given here for Tigre (Maddieson 1984:311):

	Bilabial	Dental	Velar	Glottal
Voiceless plosive		*t*	*k*	*ʔ*
Voiced plosive	*b*	*d*	*g*	
Voiceless ejective		*t'*	*k'*	

The major source of typological patterns are in the so-called gaps in segment inventories. Based on the pattern of features (in this case, place and manner of articulation) one can identify expected segments that in fact are not found in the language. For example, one would expect bilabial voiceless plosives (*p*) and ejectives (*p'*) in Tigre, but they do not exist. A typological survey of segment inventory gaps can reveal asymmetric patterns of cross-linguistic distribution (§4.5).

The Tigre voiceless bilabial ejective gap illustrates one of the better explored patterns. Maddieson (1984), in a survey of the segment inventories of 317 languages found in the UCLA Phonological Segment Inventory Database (UPSID), proposes the following implicational universals (the numbering is Maddieson's) regarding gaps in the place of articulation of ejective consonants; the numbers following the generalizations refer to the proportion of verifying cases, in numerical and percentage terms (Maddieson's numbering; see also Greenberg 1970; [*t] refers to a stop with either dental or alveolar place of articulation):

(iii) If a language has /p'/ it also has /*t'/. 33/34 97.1%

(iv) If a language has /*t'/ it also has /k'/. 33/34 97.8%
(v) If a language has only one ejective stop, it is /k'/. 5/5 100% (Maddieson 1984:120)

From these universals, one can derive a hierarchy of place of articulation, at least for the three most common places of articulation (the < again follows the orientation of what the implicational symbol would be, which is reversed due to the common convention of placing the 'highest' element on the left):

(5) *Place of articulation*: velar < dental/alveolar < bilabial

This hierarchy can also be applied to other consonant series: voiced implosives, voiced and voiceless plosives and nasals. However, complications arise in these cases; they will be discussed in §6.1.1.

There are also universal patterns of the linear order of segments in a syllable. It has been proposed that segments can be ordered in a **sonority** hierarchy from the edge of the syllable to its core. The formulation below is from Hooper (1976:196); however, this hierarchy dates back at least to the early part of the twentieth century (Lass 1984:263–64):

(6) *Sonority (first version)*: obstruent < nasal < liquid < glide < vowel

That is, the universal (or at least, most frequent) order of segments in a syllable is:

obstruent – nasal – liquid – glide – vowel – glide – liquid – nasal – obstruent
SYLLABLE
PEAK

so that the order from the beginning of the syllable to the syllable peak is reversed from the peak to the end of the syllable. The relative order of the sonority hierarchy is the same; the only difference is which end of the hierarchy is 'highest' with respect to initial and final position.

A typological study of word initial and word final consonant clusters (Greenberg 1978a) provides support for some, but not all, of the sonority hierarchy. The patterns in the data are somewhat obscured by other typological patterns of cluster dissimilation and voicing patterns. The universals that are relevant are as follows:

17. In initial systems [word initial consonant clusters], the existence of at least one sequence containing a liquid, whether voiced or unvoiced, immediately followed by an obstruent implies the existence of at least one sequence containing an obstruent immediately followed by a liquid.
18. In final systems [word final consonant clusters], the existence of at least one sequence containing a stop immediately followed by a liquid

implies the presence of at least one sequence containing a liquid followed by a stop.

19. Voiced semivowels [glides] are not followed by obstruents in initial systems or preceded by obstruents in final systems [some exceptions noted].

20. Two successive voiced sonants [liquids, nasals and glides] are always followed by a vowel in initial systems and preceded by a vowel in final systems.

24. In initial systems the existence of at least one sequence consisting of a voiced liquid followed by a nasal implies the existence of at least one combination consisting of a nasal followed by a liquid.

25. In final systems, the existence of at least one sequence consisting of a nasal followed by a liquid... implies the existence of at least one sequence consisting of a liquid followed by a nasal. (Greenberg 1978a:257–59, 261–62)

Universal 17 (and its mirror image, 18) demonstrate that the sequence liquid–obstruent at the beginning of a syllable, disallowed by the sonority hierarchy, does indeed occur, but only if the acceptable sequence obstruent–liquid is also present. The implicational universal indicates that the initial sequence obstruent–liquid is the dominant order (in the sense in §3.3), which is basically in keeping with the sonority hierarchy. Universal 19 demonstrates that the sonority ranking obstruent < glide has few exceptions in word initial and word final clusters, and Universal 20 lends support to the minimal sonority of obstruents and the maximal sonority of vowels. Universals 24 and 25 provide evidence that the ranking nasal < liquid is dominant, as one would expect, though not absolute. This places nasals between obstruents and liquids in the sonority hierarchy, and since liquids can precede obstruents, it might be expected that nasals can precede obstruents. In fact, they often do, and Greenberg does not report any universals that would suggest that the combination nasal–obstruent is typologically more marked than the combination obstruent–nasal (or vice versa for final clusters). Finally, Greenberg notes (1978a:258) that glides very rarely precede nasals or liquids, though without constructing any unrestricted or implicational universals.

Thus, the typological data based on the distribution of initial and final obstruent clusters supports the following version of the sonority hierarchy (a comma separating values means that no implicational universal provides a relative ranking of the two values, < means the order is absolute; ?< that the order is dominant):

(7) *Sonority (revised)*: obstruents, nasals ?< liquids < glides < vowels

Hierarchies are also manifested in structural coding, behavioral potential and text frequency (see chapter 4). The existence of these hierarchies will require us to modify the universals of typological markedness given there.

For example, typological evidence overwhelmingly indicates that the plural is typologically marked while the singular is unmarked. However, the category of number has more than two values in many languages. In addition to singular and plural, some languages also have a dual, a trial or paucal (a small number) and perhaps even a quadral or larger paucal (Corbett 2000:26–30). A language with four number distinctions, including a paucal, is Manam (Lichtenberk 1983b:267; the *-a-* morpheme in the dual and paucal is a morphophonological buffer):

(8a) áine ŋara **-Ø**
woman that **-3SG**
'that woman'

(8b) áine ŋara **-di**
woman that **-3PL**
'those women'

(8c) áine ŋara -di -a **-ru**
woman that -3PL -BUFF **-DU**
'those (two) women'

(8d) áine ŋara -di -a **-to**
woman that -3PL -BUFF **-PAU**
'those (few) women'

If we compare the additional values of dual, etc. to singular and plural, we can formulate chains of implicational universals that represent hierarchies. For example, with respect to structural coding, the following implicational universals hold:

(9) a. If the dual is coded with a certain number of morphemes, then the plural is coded with at least as many morphemes.
b. If the plural is coded with a certain number of morphemes, then the singular is coded with at least as many morphemes.

The pair of implicational universals in 8 supports the first three positions in the hierarchy in 10 (for evidence supporting the position of trial/paucal, see Corbett 2000: chapter 2):

(10) *Number*: singular < plural < dual < trial/paucal

In many singular–dual–plural systems, there is structural evidence of the markedness of the dual relative to the singular, i.e. singular < dual as well as singular < plural. Structurally, the dual forms are frequently marked with a nonzero morpheme just as the plural is. One also finds examples of dual forms which consist of a morpheme added to the plural form, which in turn consists of a morpheme added to the zero-marked singular noun form. For example, in Kharia animate nouns have a plural in *-ki* and a dual in *-ki-yar*: e.g. *biloi-ki* 'cats' / *biloi-ki-yar* 'two cats' (Biligiri 1965:36); see also the Manam examples in 7b and 7c above.

Another example of the dual added to the plural form is found in the Chumash verbal indexation system (Kroeber 1904:33):

	Singular	Plural	Dual
First person	*k-*	*k-i-*	*k-i-s*
Second person	*p-*	*p-i-*	*p-i-s*
Third person	*s-*	*s-i-*	*s-i-s*

The markedness of the dual is also manifested in its inflectional potential compared to the plural. For example, in Classical (Attic) Greek (Goodwin 1892:36–37), the singular forms of nouns distinguish the following cases: nominative, genitive, dative, accusative and vocative (the number of case distinctions varies with declension to some extent). The plural forms do not distinguish the nominative and the vocative, thus demonstrating the lesser inflectional potential of the plural with respect to the singular. The dual distinguishes only two forms, collapsing the nominative, accusative and vocative into one form, and the genitive and dative into the other form. Thus, the dual has even less inflectional potential than the plural (and, of course, the singular).

Most commonly, the dual is marked with respect to distributional potential. Frequently dual forms are found only with personal and demonstrative pronouns, as in Wikchamni *ma?/ma?an/ma?ak* 'you (singular/dual/plural)' vs. *pusun/pusunhat* 'granary/granaries' (Gamble 1978:94, 101). Also, in many of the languages with trial or paucal forms, those forms are generally found only with pronouns, while nouns have only singular, plural and dual forms.

Greenberg's frequency counts include counts of Sanskrit noun forms and verb indexation forms that demonstrate the much greater frequency of plural forms compared to dual forms, and of singular forms compared to either (Greenberg 1966b:32, 37; this is presumably a count of forms not functions – see §4.3 – but in this case the result is likely to be same):

	Singular	Plural	Dual	Total number
Noun inflection	70.3%	25.1%	4.6%	93,277
Verb indexation	71.0%	23.4%	5.6%	29,370

How do we extend typological markedness to categories with more than two values? Instead of treating markedness as an *absolute* property of a value in a grammatical category, it is taken to be a *relative* property. The plural is marked relative to the singular, but unmarked relative to the dual; or as it is usually stated, the plural is more marked than the singular but less marked than the dual. Thus, the evidence for markedness implies the existence of a hierarchy of markedness, not a set of two absolute values, 'marked' and 'unmarked'. The definitions of structural coding, behavioral potential and text frequency in chapter 4 anticipated

this extension of typological markedness to relative markedness. All of the criteria are defined in terms of relative quantity: relative number of morphemes, inflectional distinctions, distributional environments, and text frequency.

The various manifestations of grammatical hierarchies in typology can all be cast into the form of a chained set of implicational universals. Thus, a hierarchy-like dominance, harmony and typological markedness – can be thought of as a typological generalization over sets of implicational universals, that is, as a deeper typological generalization than simple implicational universals.

In the remainder of this chapter, we will describe some of the best known grammatical hierarchies. We will also introduce a model that has been proposed to account for hierarchies and more general relationships among functions, the semantic map model, in §§5.3–5.4, and illustrate its application in greater detail in the analysis of grammatical relations in §5.5.

5.2 The animacy and definiteness hierarchies

Number distinctions in nouns, pronouns and other grammatical categories are often restricted to a subset of forms. A typological survey of the restrictions on number in nouns and pronouns reveals the following types.

(i) First and second person pronouns have a number distinction not found in third person pronouns or common nouns. This is the case in Guaraní (Gregores and Suárez 1967:141), in which the pronouns are 1SG *še* vs. 1PL.IN *yané*, 1PL.EX *oré* and 2SG *né* vs. 2PL *peẽ*, but 3SG/PL *haʔé*.

In Chrau, this is a matter of discretion: a plural marker *khây/kha-* is not required for any of the personal pronouns, but the third person pronoun is the most likely one to be used in the (zero coded) singular form with plural meaning (Thomas 1971:138). This example reveals an important methodological point regarding asymmetries in typological patterns: even if the grammatical distinction is not categorical, it supports the typological asymmetry if the relative proportions shift in the right direction. Hierarchies, including typological markedness hierarchies, are a matter of relative degree.

(ii) Pronouns (including third person) have a number distinction not found among common nouns. An example is Usan: *wo* 'he/she' vs. *wuri* 'they' but *qâb-turin* 'Pinon imperial pigeon(s)' (Reesink 1980:53, 48; see Corbett 2000:63).

(iii) Pronouns and nouns referring to human beings have a number distinction not found among common nouns referring to nonhuman entities; for example, Tiwi has *wuɻalaka* 'young girl' vs. *wawuɻalakawi* 'young

girls', but *waliwalini* 'ant/ants' (Osborne 1974:52). (However, the animals *pəlaŋəmwani* 'dog', *tajamini* 'dingo' and *muani* 'goanna' are included in the human class.)

(iv) Pronouns and nouns referring to animate beings (including human beings) have a number distinction not found among common nouns referring to inanimate things. For example, Kharia *biloi* 'cat' vs. *biloi-ki* 'cats' contrasts with *soreŋ* 'stone/stones' (Biligiri 1965:36).

The same phenomenon is found in verb indexation patterns. For example, in Takelma (Sapir 1922:160–61), there is a number distinction for first (and second) person indexation that is lacking in third person indexation: *yowo'ṭ'e$^{\varepsilon}$* 'I run (aorist)'/ *yowoy`k'* 'we run', but *yowo'$^{\varepsilon}$* 'he, she, it, they run'. In K'iche', the verb displays number distinctions only for animate subjects and objects (more precisely, ergatives and absolutives; see §5.5). Examples of absolutive indexation prefix usage are given below (Mondloch 1978:42; note that nonhuman nouns do not indicate number):

(11) š- Ø- in- ¢uku -x lē ¢i?
PST- **3SG.ABS**- 1SG.ERG- look.for -TR the dog
'I looked for the dog.'

(12) š- ē- n- ¢uku -x lē ¢'i?
PST- **3PL.ABS**- 1SG.ERG- look.for -TR the dog
'I looked for the dogs.'

(13) š Ø- in- ¢uku -x lē laq
PST- **3SG.ABS**- 1SG.ERG- look.for- TR the clay.dish
'I looked for the clay dish/dishes.'

Examples 11–12 illustrate singular and plural indexation of an animate object argument. Example 13 shows that the third person singular index is used for both singular and plural inanimate objects.

The plural number marking pattern illustrated above can be represented in a series of implicational universals:

(14a) If there is a number distinction in the coding of nominal number and for third person pronouns, there will be a number distinction in the coding of first/second person pronouns.

(14b) If there is a number distinction in the coding of nominal number for common nouns, there will be a number distinction in the coding of pronouns.

(14c) If there is a number distinction in the coding of nominal number for (nonhuman) animate common nouns, there will be a number distinction in the coding of human common nouns.

(14d) If there is a number distinction in the coding of nominal number for inanimate common nouns, there will be a number distinction in the coding of animate common nouns.

These universals form a chain; each one can be appended to the preceding to form the following hierarchy:

(15) *Extended Animacy Hierarchy*: first/second person pronouns < third person pronoun < proper names < human common noun < nonhuman animate common noun < inanimate common noun

This combination of features has been named the 'animacy hierarchy'. Since semantic animacy is only part of the hierarchy, we will call it the **extended animacy hierarchy**. The most common representation of the extended animacy hierarchy is the one given above, found in Dixon (1979:85), though its first modern description is found in Silverstein (1976). The extended animacy hierarchy actually involves three distinct but related functional dimensions:

(16a) *Person*: first, second < third
(16b) *Referentiality*: pronoun < proper name < common noun
(16c) *Animacy*: human < animate < inanimate

The first is a **person hierarchy**, in which first and second person outrank third person. The second is a **referentiality hierarchy**, in which pronouns outrank common nouns (there is some evidence that proper names occupy an intermediate position on this hierarchy). Finally there is the **animacy hierarchy** proper, in which humans outrank nonhuman animates, which in turn outrank inanimates.

The dual and paucal noun forms (also used for verb indexation) in Manam, described at the beginning of this chapter, represent an intermediate category between human and nonhuman animate on the animacy hierarchy; they are used only for humans and higher animals:

> The category of higher animals traditionally consists of human beings, pigs, dogs and birds (including fowls), and now also goats, horses and other large animals, which are of relatively recent introduction in New Guinea. However, while humans are always considered higher animals, there is some variation with the other members of the category: the latter are always considered higher animals when domesticated but only optionally so when wild. Although the Manam may derogatively speak of certain mainlanders as 'wild', grammatically they nevertheless always treat them as higher animals. (Lichtenberk 1983b:110)

This example demonstrates that the extended animacy hierarchy (and other hierarchies) is not an ordering of discrete categories, but rather a more or less continuous category ranging from most animate to least animate.

The extended animacy hierarchy, and its component person, referentiality and animacy hierarchies, play a role in other grammatical phenomena than coding of nominal number and indexation of number. The person hierarchy plays an important role in the expression of subject and object in many languages. In a

number of languages found scattered around the world, the transitive verb agrees not with the subject, or the object, but with whichever is higher on the person hierarchy. An example of this system is found in Tangut (DeLancey 1981:631):

(17) ni pha ngi- mbɪn ndɪ- siei **-na**
you other wife choose **-2**
'Choose another wife!'

(18) mei-swen manə na khe **-na**
Mei-swen formerly you hate **-2**
'Mei-swen formerly hated you.'

K'iche' has a complex pattern of indexation in its focus antipassive voice (Mondloch 1978:71–75). This voice form is used for focusing a transitive subject (unless the subject and object are first person and second person familiar, in which case the active voice is used). In the focus antipassive voice, the verb indexes only one argument (second person formal, which is a postposed particle, is ignored here). The verb indexes first or second familiar over third person:

(19) la: at k- **at-** kun -an le: yawa:p'
INT 2SG PRS- **2SG-** cure -FOCUS the sick.one
'Are you the one who cures the sick person?'

(20) le: in- ta:t š- **in-** kun -an -ik
the 1SG.POSS- father PST- **1SG-** cure -FOC -INTR
'It was my father who cured me.'

The verb also indexes third person plural over third person singular:

(21) a're: le: šip'inelap' k- **e:-** šib -in le: winaq pa taq p'e
3PL the ghosts PRS- **3PL-** frighten -FOC the people in all road
'It is the ghosts that frighten people on every road.'

The ranking of third person plural over third person singular is an implicit animacy ranking, because the third person plural in K'iche' is always animate, while the singular may be animate or inanimate.

Animacy also determines the overt coding of the direct object in some languages. For example, in Russian, masculine singular nouns typically do not have a separate accusative case (and the nominative case is typically zero coded). However, if the masculine singular noun denotes a human or animate, then it has an overtly coded accusative case (Comrie 1989:132):

(22) Ja videl mal'čik-**a**/begemot-**a**/dub/stol
I see:PST:SG boy-**ACC**/hippopotamus-**ACC**/oak/table
'I saw the boy/hippopotamus/oak/table.'

For Polish masculine plural nouns, however, the cut-off point for the overtly coded accusative is (male) human nouns (p. 132):

(23) Widziałem chłopc-**ów**/psy/dęby/stoły
see:PST:1SG boys-**ACC**/dogs/oaks/tables
'I saw the boys/dogs/oaks/tables.'

Another hierarchy that turns out to be closely associated with animacy, particularly with the coding of objects, is the **definiteness** hierarchy:

(24) *Definiteness*: definite < specific < nonspecific

Definite referents (i.e. those whose identity is known to both speaker and hearer) outrank specific indefinite referents (a specific instance or token whose identity is unknown to the hearer and possibly also the speaker), which in turn outrank nonspecific referents (those identifiable only as a type, not as a specific instance or token).

Definiteness plays a role by itself in the overt coding of direct objects. In Turkish and Persian, definite direct objects take the overt accusative case affix (Comrie 1989:132–33):

Turkish

(25a) Hasan öküz **-ü** aldı
Hasan ox **-ACC** bought
'Hasan bought the ox.'

(25b) Hasan bir öküz aldı
Hasan a ox bought
'Hasan bought an ox.'

Persian

(26a) Hasan ketāb **-rā** did
Hasan book -ACC saw
'Hasan saw the book.'

(26b) Hasan yek ketāb did
Hasan a book saw
'Hasan saw a book.'

In fact, the animacy hierarchy and definiteness hierarchy interact in the coding of direct objects, as will be seen in §6.3.1 (and the facts in Turkish and Persian are more complex than indicated here; see Comrie 1989:134–35).

These are only a few examples of the many construction types whose distribution patterns within and across languages are sensitive to the extended animacy and definiteness hierarchies. We now turn to the question of how these hierarchies should be represented.

5.3 A deeper explanation for hierarchies and categories: the semantic map model

A question that often arises is: what is the relationship between language universals and the grammars of particular languages, that is, the grammatical knowledge of individual speakers? This problem has not generally been focused on by typologists, who have been chiefly concerned with discovering and representing language universals. In this respect, typology contrasts with generative grammar. Generative grammar has focused on the knowledge of an individual speaker, for reasons having to do with its motivation for studying language universals (§1.2). For this reason the representation of language-specific grammatical knowledge as well as language universals has played a major role in generative grammar.

More recently, typologists have developed a representation of both language universals and language-specific grammatical knowledge (see Anderson 1974; 1982; 1986; 1987; Croft, Shyldkrot and Kemmer 1987; Croft 1991a; 2001; Kemmer 1993; Haspelmath 1997a; 1997b; to appear; Stassen 1997; Kortmann 1997; van der Auwera and Plungian 1998). This representation goes under various names. We will call it the **semantic map model**, using the most common description for it.

Consider the phenomenon of the coding of singular/plural number on different types of nouns and pronouns in various languages, described in §5.2. The grammatical difference between the two classes of words in each language is whether the word takes a plural inflection (or takes a plural index) when reference is being made to more than one entity. The plural inflection or index is a construction that defines a category in each language, namely the nouns/pronouns that occur with the plural inflection. This category is also called the distribution of the plural inflection or plural indexation construction in each language (see §1.3).

We can compare the distribution of the plural inflection in the languages illustrated in §5.2 by means of the diagrams in Figure 5.1 (p.134). The diagram for each language in Figure 5.1 captures what all of the languages have in common in their distribution patterns, namely the extended animacy hierarchy. The diagram represents the extended animacy hierarchy: the ranking on the extended animacy hierarchy is represented by the links between the values in the diagram. The only difference across the languages is the range of values on the hierarchy for which the plural inflection is used in that language, represented by the boxed area.

These diagrams are effective ways of representing what is universal about the grammars of languages and what is language specific. What is language specific is the distribution of the particular construction of the language. This is the **semantic map** of the language-specific construction, represented as a bounded region on the diagram. What is universal across languages is the structure of the underlying

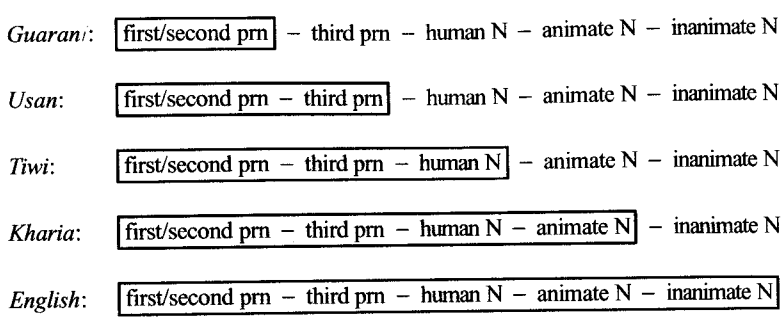


Figure 5.1 *Semantic maps of plural inflection in various languages*

diagram itself: the values and the links between the values. The values are externally defined as is necessary for cross-linguistic comparison (§1.4), in this case by the semantic types of entities, and the discourse–pragmatic properties of referentiality (pronominal vs. nominal reference; see Ariel 1990) and the speech act status of the referents (speaker/addressee vs. nonparticipant). We will call the underlying diagram a **conceptual space** (Croft 2001:92–94), to differentiate it from the language-specific semantic maps (compare also Kemmer 1993:201; van der Auwera and Plungian 1998:86, who use 'semantic space' instead of 'conceptual space').

The conceptual space is more than a convenient diagram to allow for the comparison of language-particular categories in some functional domain. The conceptual space constrains possible distribution patterns for the relevant language-specific constructions and the categories defined by those constructions. Languages are predicted to group together only the conceptual values that are linked by links in the conceptual space representation. For example, the mapping of the plural inflections onto noun and pronoun categories are limited to the types illustrated in Figure 5.1. These are of course the attested language types described in §5.2. The pattern of links thus represents the following universal for how grammatical categories are mapped onto conceptual space (Croft 2001:96):

(27) *Semantic Map Connectivity Hypothesis*: any relevant language-specific and/or construction-specific category should map onto a *connected region* in conceptual space.

If the extended animacy hierarchy is a valid constraint on the expression of plural number (in contrast to singular), then one would not expect to find a language whose plural number inflection can be used for third person pronouns and inanimate nouns, but not human and animate common nouns. This constraint is represented by the structure of the conceptual space, namely the links between values in the

space. To put it another way: 'the underlying hypothesis is that it will be possible to draw up such a map [a conceptual space] in a way that is consistent with any grammatical system' (Haspelmath 1997a:62; compare Anderson 1982:228; 1986:279).

The values in the extended animacy hierarchy are represented as labeled 'points' in the conceptual space. However, this is chiefly a matter of convenience. Each point represents in fact a **region** of conceptual space: for example different categories of humans, animates and inanimates, expressed by different nouns in a language.

The conceptual space representation of a hierarchy such as the extended animacy hierarchy is a simple, one-dimensional affair. In fact, even for the extended animacy hierarchy, this is too simple a representation, since it is made up of three interconnected hierarchies (§5.2). But the conceptual space representation can be used to describe multidimensional distribution patterns of language-particular categories (and in fact this is why they were first developed). A grammatical hierarchy is only a simple case of a conceptual space.

One detailed example is Haspelmath's study of the encoding of indefinite pronouns (Haspelmath 1997a). Haspelmath surveys the expression of a wide range of indefinite pronoun functions, and by comparing the semantic maps of forty languages in detail, identifies the conceptual space given in Figure 5.2 (Haspelmath 1997a:64).

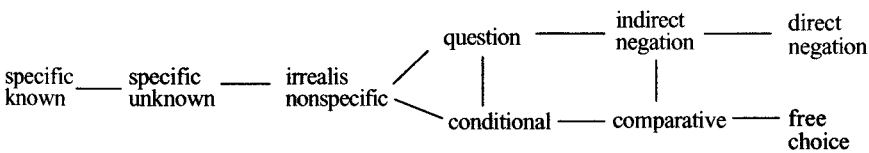


Figure 5.2 *Conceptual space for indefinite pronouns*

The conceptual space in Figure 5.2 conforms to the Semantic Map Connectivity Hypothesis. We illustrate this with examples of the indefinite pronouns used for different functions in Hungarian (Haspelmath 1997a:291–92), defining each point in the conceptual space on the way (page references to Haspelmath 1997a):

Specific known: a specific referent whose identity is known to the speaker (but not the hearer; 45)

(28) lát -ánk **vala-** ki -t aki a te nev -ed -del
see -1PL INDF- who -ACC who ART you name -2SG -INST

ördög -ök -et üz
devil -PL ACC drive
'We saw one casting out devils in thy name' (NT, Mark 9:38)

Specific unknown: a specific referent whose identity is unknown to both hearer and speaker (45)

(29) **vala-** hol már tolál -koz -t -unk
INDF- where already meet -REFL -PST 1PL
'We have met somewhere before.'

Irrealis nonspecific: a referent (a manner in this example) which does not have a specific identity and exists only in a nonreal context (37–38)

(30) majd csak meglesz -ünk **vala** -hogy
later only manage -1PL INDF- how
'We'll manage somehow.'

Question: an unspecified referent in the scope of interrogation (especially polar interrogatives; 34)

(31) hall -ott -ál **vala-** mi -t?
hear -PST -2SG INDF- what -ACC
'Did you hear anything?'

Conditional: an unspecified referent in the protasis in a conditional construction (34)

(32) ha **bár-/akár-/vala-** mi -t hal -asz ébressz fel
if INDF- what -ACC hear -2SG wake up
'If you hear anything (at all), wake me up.'

Indirect negation: an unspecified referent which is in a clause embedded in a negated clause (32)

(33) nem hisz -em hogy **vala-/bár-/akár-** ki lát -t -a volna
NEG think -1SG that INDF- who see -PST -3SG SUBJ
'I don't think that anybody has seen it.'

Comparative: an unspecified referent occurring in the standard of comparison in a comparative construction (35)

(34) itt jobb a klíma mint **akár-/bár-** hol Európá -ban
here better ART climate than INDF- where Europe -INESS
'Here the climate is better than anywhere in Europe.'

Free choice: an unspecified referent in certain contexts whose identity can be freely chosen without affecting the truth value of the utterance (48)

(35) **akár-** ki tanul -hat -ott
INDF- who learn -POT PST(3SG)
'Anybody could learn.'

Direct negation: an unspecified referent which is in the scope of negation in the same clause (31)

(36) nem lát -t -am **sem-** mi -t
NEG see -PST -1SG INDF- what -ACC
'I did not see anything.'

Hungarian has four different indefinite pronoun series, formed from the interrogative pronoun prefixed by *vala-*, *akár-*, *bár-* or *sem-*. The examples illustrate the distribution of the four types, and Figure 5.3 presents the semantic map of the Hungarian indefinite pronouns on the conceptual space of Figure 5.2.

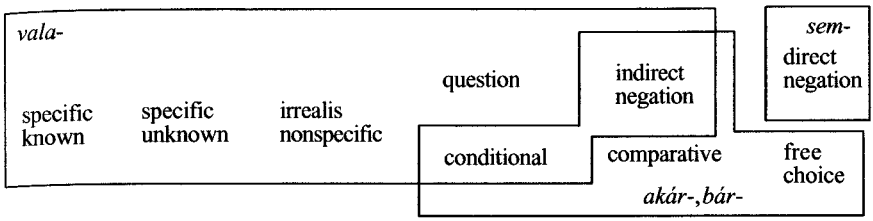


Figure 5.3 *Semantic map of Hungarian indefinite pronouns*

Hungarian conforms to the Semantic Map Connectivity Hypothesis. The semantic maps for Hungarian and other languages allow us to construct the conceptual space for indefinite pronouns.

A conceptual space can itself be given a deeper explanation. The structure of the conceptual space is empirically constructed, on cross-linguistic facts combined with the Semantic Map Connectivity Hypothesis. However, in those cases where conceptual spaces have been proposed, similarity in form – the linking of conceptual categories in conceptual space – reflects in turn similarity in function. For example, the structure of the extended animacy hierarchy reflects degree of similarity to the speech act participants: other humans are the most similar to the speaker and addressee, other animates are the next most similar, and inanimates are the least similar.

Haspelmath argues that the structure of the conceptual space for indefinite pronouns is motivated by the semantic relationships among the functions in Figure 5.2. He identifies five semantic features which structure the conceptual space: definiteness, specificity, presence of a pragmatic scale, scale reversal and scope of negation. Only the leftmost function describes a referent known to the speaker, and only the two leftmost describe specific referents (§5.2). The functions to the right of the three leftmost all define pragmatic scales. Very briefly, these can be illustrated by the following sentences (Haspelmath 1997a:112–13):

(37) The weakest cow can swim through this river.

(38) The weakest cow cannot swim through this river.

(39) The strongest cow cannot swim through this river.

Sentence 37 has a reading which can be paraphrased as 'even the weakest cow can swim through this river' or 'any cow can swim through this river'. This reading

puts cows on a scale of ability to swim through the river, and the weakest cow is the end of the scale about which river-crossing ability is asserted. Sentence 38, the negative of 37, does not have the scalar reading. Sentence 39 does have a scalar reading but now the scale is reversed: the (negative) assertion is about the strongest cow, not the weakest one (i.e. no cow can swim through this river).

All of the functions to the right of 'irrealis nonspecific' in Figure 5.2 are scalar, and all except the free choice function involve scale reversal; so free choice is set off. Finally, direct and indirect negation are set off from the rest (constituting the upper branch of the space) because they are the only functions describing referents under the scope of negation. Thus, the structure of the conceptual space reflects semantic/pragmatic properties shared by neighboring points in the conceptual space. The discovery of the semantic and pragmatic properties of the conceptual space constitutes a deeper explanation for the structure of the conceptual space, and hence the cross-linguistic patterns which defined the conceptual space in the first place.

One important feature of conceptual spaces and semantic maps is that they do not require typological theories to posit a fixed set of universal grammatical categories for languages (Dryer 1997c; Croft 2001). The conceptual space constrains the range of possible grammatical categories to those mapped onto a connected region in the conceptual space. However, it does not exclude any possible mapping of language-particular grammatical categories onto connected regions of conceptual space. Above all, the semantic map model allows us to do cross-linguistic comparison of languages with different categorizations (Anderson 1982:227–28).

It may be that there are stronger constraints on the mapping of language-particular categories than merely connectedness. We will discuss two such constraints in §5.4 pertaining to structural coding and behavioral potential. The formulation of further constraints awaits further typological research. But the semantic map model demonstrates an important and distinctive property of typological analysis: cross-linguistic variation and cross-linguistic generalizations can be captured without positing universal grammatical categories.

Finally, we may ask what the conceptual space itself is. Most typologists have not offered an explanation of a conceptual space, except as a convenient way to represent similarity of meaning, derived inductively from cross-linguistic variation in categorization (Anderson 1982:228; Croft, Shyldkrot and Kemmer 1987:186; Kemmer 1993:201; van der Auwera and Plungian 1998:86). Anderson (1986:280) uses the term 'mental map', which implies a cognitive basis for conceptual space, but does not elaborate. I have taken the position that 'conceptual space represents a universal structure of conceptual knowledge for communication in human beings'

Croft (2001:105). In this view, the categories defined by constructions in human languages may vary from one language to the next, but they are mapped onto a common conceptual space, which represents a common human cognitive heritage, indeed the geography of the human mind.

Language-particular phonological categories and cross-linguistic phonological hierarchies can be analyzed in the same way as grammatical categories. Phonological categories, like grammatical categories, require an external basis for cross-linguistic comparison. In the case of phonology, the external basis is phonetic (§1.4). Phonemes, like morphosyntactic categories, can also be represented as linguistic categories that are mapped onto an external phonetic space. Likewise, language universals that are defined in terms of phonological categories can also be interpreted as establishing a structure in phonetic space.

The deeper explanation for phonetic space is more straightforward than for conceptual space. Phonetic space is grounded in perceptual–motor properties of the human articulatory and auditory apparatus. In some sense, phonetic space is not really necessary as a theoretical construct because we can directly map cross-linguistic phonological patterns onto articulatory and auditory/acoustic properties. For example, the place of articulation hierarchy in example 5 in §5.1 represents the spatial dimension in the mouth from the back to the front,[1] and the sonority hierarchy corresponds to a dimension of phonetic space, namely the degree of aperture of the oral articulators.

The conceptual space represents the basis for cross-linguistic comparison, namely external definitions based on meaning or function (§1.4). Language universals are formulated in terms of the mapping between external function and grammatical form. Thus, language universals should be represented as constraints defined on the structure of the conceptual space and on the mapping from external function to grammatical form. Language-specific grammatical categories are the actual specific mappings of grammatical categories onto the conceptual space. Part of the representation of a speaker's knowledge, then, is a set of semantic maps onto a conceptual space whose structure is largely universal. The structure of the conceptual space, represented by the links, constrains possible language types to exclude languages with grammatical categories or distributions that are not connected in the conceptual space.

[1] Maddieson also notes:

> (vi) If a language has c or q it also has p, *t and k. 15/19 78.9% (Maddieson 1984:120)

(The numbers following the generalizations refer to the proportion of verifying cases in numerical and percentage terms.) This ordering seems to be based on the rarity of palatal and uvular consonants in general (compare Lindblom and Maddieson's [1988] concept of basic vs. elaborated articulations in their analysis of consonant segment inventories).

5.4 Conceptual spaces, structural coding and behavioral potential

In §5.3, it was argued that the Semantic Map Connectivity Hypothesis constrains possible mappings of language-particular plural inflections on classes of nouns/pronouns, limiting them to connected regions in the extended animacy conceptual space. There is a further constraint on the language-particular plural inflections on the conceptual space: the plural inflection must include the leftmost 'point' in the conceptual space in Figure 5.1. The occurrence of plural inflection (and also plural indexation; see §5.5) is an instance of behavioral potential, one of the manifestations of typological markedness. This observation suggests that there is an asymmetry in the structure of the conceptual space such that the leftmost end – the 'higher' end of the extended animacy hierarchy – has the greatest behavioral potential, and behavioral potential declines toward the right end of the space. This asymmetry is not explicitly represented in the conceptual space: the links represent only similarity in function (Haspelmath 1997a:62, footnote 3). However, we should expect that conceptual space will have to be given more structure in order to represent other details of language universals (see, for example, the proposals in Croft 2001:161, 163–64).

The asymmetry in the semantic maps for plural number in Figure 5.1 gives the impression that there is a direct relationship between behavioral potential and conceptual space, and also between structural coding and conceptual space. This direct relationship was expressed in the following hypotheses in Croft (2001:98):

(40) *Behavioral Potential Map Hypothesis*: Constructions expressing the behavioral potential of a category should be found in at least the typologically unmarked points in conceptual space.

(41) *Structural Coding Map Hypothesis*: Constructions encoding a function should code that function in at least as many morphemes in typologically marked points in conceptual space as in typologically unmarked points in conceptual space.

The Behavioral Potential Map Hypothesis is illustrated in Figure 5.1: the potential for plural marking is restricted to a region including the left-hand side of the extended animacy conceptual space. The Structural Coding Map Hypothesis can be illustrated by the overt coding of plural number in English (the box indicates overt coding of number):

(42) *English*: singular – plural

However, the relationship between structural coding and behavioral potential and the structure of conceptual space is not direct. In §4.3, it was argued that

structural coding and behavioral potential are consequences of the text frequency of a category. But text frequency of the category depends on the region of conceptual space included in the category, not its position in the structure of the conceptual space. The difference between conceptual space structure, defined by the Semantic Map Connectivity Hypothesis, and structural coding/behavioral potential, defined by text frequency, can be observed in the category of number.

In language with a dual, such as Sanskrit, the category 'plural' is not the same as the category 'plural' in a language without a dual, as in English. In Sanskrit, 'plural' means 'more than two' (leaving aside facultative use for now), but in English 'plural' means 'more than one'. The most plausible structure of the conceptual number space is in terms of the cardinal number sequence (§3.1). Hence, the mapping of a language with a dual number category such as Sanskrit would be as in 43, in conformity with the Semantic Map Connectivity Hypothesis (here the boxes indicate the distribution of singular, dual and plural forms over the cardinality conceptual space):

(43) *Sanskrit:* [1] – [2] – [3 – 4 – 5 – · · ·]

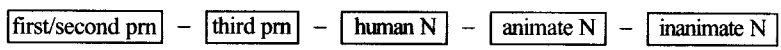
There are also further constraints on the semantic maps on this domain that conform to the conceptual space structure in 43. According to Greenberg's Universal 34, the first boundary between semantic maps in number is always between cardinalities 1 and 2 (i.e. singular vs. plural), the second between 2 and 3, and the third between 3 and 4 (actually, this boundary is fuzzy, leading to trials almost always being paucals, referring to a few referents not just three; Corbett 2000:21–26). This is an example of a yet another constraint on semantic maps in conceptual space that must be captured in the semantic map model.

Yet the number hierarchy implied by structural coding and behavioral potential is singular < dual < plural (see §5.1), which is not the left-to-right ordering of categories in 43. This is because the plural category (more than two) has a higher text frequency than the dual category. Text counts of individual numerals demonstrate that the points in the conceptual space in 43 go from most frequent to least frequent from left to right: each number has a slightly lower text frequency. Greenberg's counts of numerals, both cardinal and ordinal, exhibit a strict hierarchy (except for numeral bases like 'ten'), with the lower numbers less marked (Greenberg 1966b:42–44). However, a category such as plural, since it combines all higher numbers, has a greater text frequency than the dual. Nevertheless, the singular category (and the numeral 'one') has a higher text frequency than the plural category, whether that category is 'more than two' or 'more than one' (see the text counts in §5.1).

Another example that illustrates the same sort of phenomenon has to do with an apparent paradox in the person hierarchy. The data for number inflection given in

§5.2 suggests a hierarchy 1, 2 < 3 (or perhaps even 1 < 2 < 3; Corbett 2000:64–66). However, Greenberg's text counts for the category of person (Greenberg 1966b:45) indicate a frequency ranking of 3 < 1 < 2. However, number inflection is a property of noun/pronoun classes, or perhaps even individual nouns/pronouns, while Greenberg's count reflects verb indexation. These are two different constructions with two different semantic maps, as indicated in Figure 5.4.

Noun/pronoun inflection:



Verb indexation:

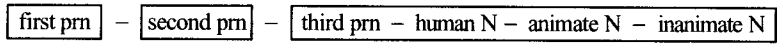


Figure 5.4 *Semantic maps of plural inflection and plural indexation*

The semantic maps for noun/pronoun inflection may indicate a higher text frequency of the categories at the higher end of the extended animacy hierarchy. But the semantic maps for verb indexation yield a different text frequency ranking, as Greenberg's text counts indicate; moreover, the structural coding pattern for verb indexation does follow the text frequency ranking 3 < 1 < 2 (e.g. Bybee 1985:54, 71), because third-person verb indexation includes all nonpronominal categories.

In other words, text frequency of grammatical categories defines hierarchies with respect to universals of structural coding and behavioral potential, but they do not map directly onto conceptual space. In many cases, grammatical categories are similar enough across languages that a hierarchy based on text frequency will be reflected directly in the structure of conceptual space, and the hypotheses in 40 and 41 will apply; in other cases, however, the hierarchy is only indirectly reflected in the structure of the conceptual space. This will turn out to be the case in the relationship between the grammatical relations hierarchy and the conceptual space of grammatical relations, the topic of the next section.

5.5 The grammatical relations hierarchies

5.5.1 The external definition of grammatical relations

The **grammatical relations (GR) hierarchy** plays an important role in the organization of grammatical structure, since it is a ranking of grammatical relations between a main verb or predicate and its dependent arguments. Grammatical relations represent the syntactic encoding of **participant roles**, that is,

semantic roles of participants in situations encoded by the predicate. The three means of encoding participant roles are case marking, indexation and word order (see §2.1). The patterns of encoding participant roles vary significantly across languages.

In traditional grammatical terms, **intransitive** clauses have only a single argument, the **subject**. **Transitive** clauses have two arguments, the subject and the **(direct) object**; and **ditransitive** clauses have three arguments, the subject, the direct object and the **indirect object**. Examples of each clause type in English are given below:

Intransitive

(44a) Marie slept.
S

Transitive

(44b) Wally tickled Sandy.
A P

Ditransitive

(44c) Joan sent a package to Paul.
A T G

Essentially, the cross-linguistic variation in encoding participant roles is found in the relationship between the expression of grammatical relations in intransitive, transitive and ditransitive clauses. In order to talk about these distinctions clearly, it is necessary to introduce some distinctions not found in the traditional terminology, indicated by the letter abbreviations below the argument phrases in 44a–c. The definitions of the abbreviation are as follows:[2]

S: intransitive subject participant role cluster
A: transitive or ditransitive subject participant role cluster
P: transitive direct object participant role cluster
T: ditransitive direct object participant role cluster
G: ditransitive indirect object participant role cluster

The status of these concepts in typological analysis is not always made clear. Cross-linguistic comparison must be made on the basis of external categories, such as semantic participant roles (§1.4). When we compare how languages categorize grammatical relations, it is on the basis of external, conceptual categories. However, the set of participant roles that constitute the usual examples of S, A, P and so on

[2] The terms S, A and P for intransitive and transitive verbs were first used by Comrie (1978) and Dixon (1979; Dixon uses O instead of P). The terms T and G are proposed here (the variation in object-marking for which these terms are proposed is described in detail in Dryer [1986], but he does not propose any analogous terms).

are not amenable to a simple general semantic category. Instead, S, A, P, etc. are polysemous (§4.2.2). Hence they are described here as **participant role clusters**. Of course, languages also vary in exactly which participant roles are subsumed under S, A, P and so on. We will ignore that variation in this chapter, except to note that the semantic map model can easily accommodate such variation.

5.5.2 *Subject and object, ergative and absolutive*

In most Standard Average European languages, A is expressed in the same way as S, and T is expressed the same way as P. This is illustrated in the English examples: S and A are zero coded noun phrases that precede the verb, while P and T are zero coded noun phrases that immediately follow the verb. G is expressed in 44c as a prepositional phrase (i.e. a noun phrase whose grammatical relation to the verb is marked by a preposition). This is embedded in the traditional grammatical terminology: S + A is the subject, and P + T is the direct object.

However, other patterns are attested. In many languages of the world, P (the transitive object), not A, is expressed the same way as S (the intransitive subject), and A is expressed in some other way. The case-marking associated with A is called the **ergative**, and the case-marking associated with S and P is called the **absolutive**. Languages exhibiting this pattern are often called **ergative** languages. An example of an ergative case-marking pattern is given below, for Yuwaalaraay (Williams 1980:36):

(45) ḍuyu -gu ṇama **ḍayn** -Ø yi: -y
snake -ERG that **man** -**ABS** bite -N/F
'The snake [A] bit **the man** [P].'

(46) wa:l ṇama **yinar** -Ø banaga -ṇi
NEG that **woman** -**ABS** run -NFUT
'**The woman** [S] didn't run.'

This pattern in the case-marking of A, S and P is quite widespread: it is common in the languages of Oceania (including Australia and New Guinea), the South Asian subcontinent, the Caucasus, Siberia and the Americas.

We would like to capture how the English and Yuwaalaraay patterns of encoding participant roles are similar and are different, in a fashion that describes the variation in encoding participant roles across languages in general. We can do this with the semantic map model. The conceptual space for the most common participant roles in intransitive and transitive events is given in Figure 5.5.

The conceptual categories defined by S, A and P are points in the conceptual space. More precisely (see §5.3), they are regions in conceptual space that represent each participant role cluster. The links between S and A and S and P represent

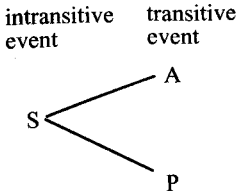


Figure 5.5 *Conceptual space for participant roles in transitive and intransitive situations*

linguistically motivated links between those conceptual categories. The linguistic motivation for these links is found in the two types of systems of grammatical relations illustrated above, the **accusative alignment** (English) and the **ergative alignment** (Yuwaalaraay). We describe these two alignments as semantic maps on the conceptual space in Figure 5.5; see Figure 5.6 (compare Comrie 1978:332).

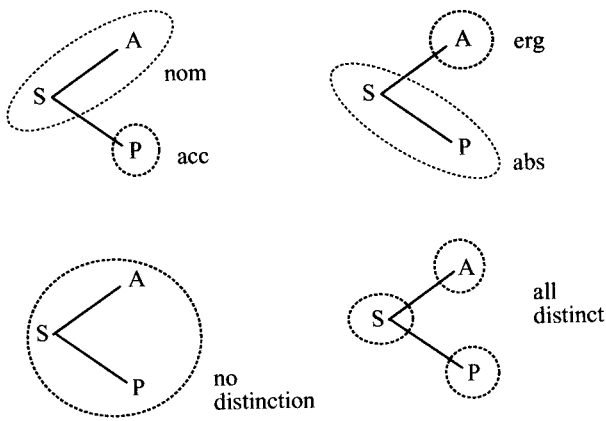


Figure 5.6 *Attested semantic maps of syntactic roles defined by case-marking*

The upper left map in Figure 5.6 shows that the nominative category in English, represented by verb indexation and word order, includes S and A, while the upper right map shows that the absolutive category in Yuwaalaraay includes S and P. The lower two maps describe the two other attested semantic maps on this conceptual space. The third semantic map in Figure 5.6 is represented by neutral structural coding of noun phrases in many languages; it is found in English nonpronominal noun phrases.

The fourth semantic map in Figure 5.6, with all three distinct, is quite rare, except with limited subclasses of S, A and P. Dixon reports several languages in which tripartite marking is found on a subset of nouns, or in a subset of contexts; the only languages in which all noun phrases are reported to be consistently marked

with distinct forms for S, A and P are some Australian languages in southeast Queensland, including Wangkumara and Galali (Dixon 1994:41).

The one unattested type is the one in which one category subsumes A and P, and another S. This type would violate the Semantic Map Connectivity Hypothesis with respect to the conceptual space in Figure 5.5, because there is no direct link between A and P. The only instance of this pattern that I know of is found in the past tense only of Rushan, an Iranian language, and is restricted to pronouns and demonstratives (Payne 1980:155; see also Dixon 1994:39, footnote 1). Moreover, the anomalous pattern is being replaced by the nominative–accusative present tense alignment by younger speakers.

Now we may turn to the typological evidence for the GR hierarchy and its interpretation in light of these patterns of variation. The GR hierarchy is normally expressed as follows:

(47) *GR Hierarchy*: subject < (direct) object < oblique

The question now arises, what happens to the GR hierarchy if the categories 'subject' (S + A) and 'object' (P, or P + T when including ditransitive clauses) are not universal? Do we lose the possibility of constructing implicational universals of grammar? The answer is no. We may exploit the properties of the conceptual space and of text frequency, and discover universals of grammatical relations without positing universal grammatical relations. We will first compare subjects to objects (Ps) and then turn to different kinds of objects.

If the case-marking of languages with accusative alignment is examined, there is considerable evidence in favor of this hierarchy. This can be illustrated by structural coding: if a grammatical relation on the hierarchy is zero coded, then the grammatical relations above it on the hierarchy are also zero coded. This is illustrated by the table of case-marking for selected languages that illustrate each predicted language type:[3]

	Subject	Object	Oblique (Dative)	
Latvian	*ruden-s*	*ruden-i*	*ruden-**im***	'autumn'
Hungarian	*ember-Ø*	*ember-t*	*ember-**nek***	'man'

(Latvian: Budiņa-Lazdiņa 1966:302; Hungarian: Whitney 1944:18–19, 22)

[3] There are a small number of exceptions to the GR hierarchy of structural coding. In some Indo-European languages, e.g. Icelandic and Old French, the subject case-ending is nonzero while the nonsubject case-ending is zero in some inflectional classes. This may be accounted for by the general breakdown of the case system in those languages: because language change is a gradual process (§8.1), the loss of case distinctions may lead to semantically unmotivated variation. However, there are language families in which overt subject-marking appears quite robust: in the Yuman languages, e.g. Hualapai (Watahomigie, Bender and Yamamoto 1982) and Maricopa (Gordon 1986), and in some Cushitic languages (Dixon 1979:77), the direct object is zero coded, but the subject – both transitive and intransitive – is overtly coded.

The GR hierarchy is also manifested in indexation. Indexation, however, does not directly code the semantic relation between participant and event. Hence it is not an instance of structural coding. Instead, indexation cross-references the argument. This can be interpreted as an instance of inflectional behavioral potential: a grammatical phenomenon triggered by the semantic role of the participant. The behavioral potential of indexation defines grammatical categories that can be mapped onto conceptual space. And the evidence from indexation in languages of the European GR type indicates that the GR hierarchy applies to indexation as well:

Indexation of nominative (A + S) argument only: Spanish

(48) Los soldado -s quebr **-aron** las ventana -s
the.M.PL soldier -PL break **-3PL.SBJ.PST** the.FPL window -PL
'The soldiers broke the windows.'

Indexation of nominative (A + S) and accusative (P) arguments: Kanuri (Hutchison 1981:135)

(49) **nzú-** rú **-kə́** -nà
2SG.OBJ- see **-1SG.SBJ** -PRF
'I saw you.'

The role that is higher (leftwards) on the GR Hierarchy triggers indexation: if a verb indexes accusative roles, then it indexes nominative roles. Indexation by the verb is part of the behavioral potential of a participant role, and behavioral potential is associated with the typologically less marked categories.

The first manifestation of the typological GR hierarchy to come to widespread attention was the **NP accessibility hierarchy** of Keenan and Comrie (1977; first presented in 1972). The NP accessibility hierarchy is based on a cross-linguistic pattern of relative clause behavior. Relative clauses come in a wide variety of forms, but can be generally characterized as a referent (noun phrase) being qualified (modified) by a proposition (clause, or verbal form plus its modifiers) in which the referent plays a role (has a grammatical relation). For example, in *the man that left the house*, the noun phrase *the man* refers to an individual who is being described or qualified by the relative clause *that left the house*, which describes an action in which the man participates. The relation that the head NP, called here the **relativized NP**, has to the relative clause is that of the subject.

English allows NPs of virtually any grammatical relation to the verb to be relativized:

(50) the man__that left the house
the book that I read__
the woman that I sent the report to__
the party that I went to__
the person that I went to the party with__
etc.

Keenan and Comrie discovered that many languages are more restricted as to which NPs could be relativized or, as they put it, which NPs were **accessible** to relativization. (More precisely, every language has a primary relativization strategy which may be restricted in this fashion; other relativization strategies might exist to relativize NPs inaccessible to the primary strategy; see §7.3.) The general pattern that they discovered for a large class of relative clause types can be described as follows:[4]

(51) *NP Accessibility Hierarchy*
subject < direct object < indirect object < oblique

If an NP on the accessibility hierarchy is accessible to relativization in a language, then all NPs higher on the hierarchy are also accessible to relativization.

This is, of course, the GR hierarchy, manifested here in another grammatical domain. The typological phenomenon on which Keenan and Comrie based the accessibility hierarchy is not a case of structural coding: the relative clause construction does not encode the participant role; it encodes a relation between a proposition and a participant. Accessibility to relative clause formation is an instance of behavioral potential, the potential of a particular participant role to be accessible to relativization. The following list gives the possible language types that Keenan and Comrie's generalization allows:

(i) Subjects only are accessible to relativization: Toba Batak (Keenan and Comrie 1977:68–69):

(52) boru-boru na manussi abit i (Subject)
woman that wash.ACT clothes the
'the woman who is washing clothes'

(53) *abit na manussi boru-boru i (Direct object)
clothes that wash.ACT woman the
'the clothes that the woman is washing'

The existence of this type hinges on the ability to define the category 'subject' in these languages, a difficult problem even given the qualifications discussed in this section (see, for instance, Schachter 1976; 1977; Lawler 1977; Durie 1988). However, many languages including English have nonfinite forms (participles) that function as relative clauses which allow only subject NP heads, as in *the child playing in the bedroom.*

(ii) Subjects and direct objects are accessible to relativization: Persian (Keenan and Comrie 1979:343):

[4] Keenan and Comrie also include NPs that are not directly related to the verb, such as the possessor of the subject, in their hierarchy. Lehmann (1986:668) argues that although NP types other than verbal grammatical relations also belong in the accessibility hierarchy, the other NP types form special subhierarchies.

(54) John mard -i râ ke zan zad mišenâsad (Direct object)
John man -the DO that woman hit knows
'John knows the man whom the woman hit'

(55) Man zan -i râ ke John be *(u) sibe zamini
I woman -the DO that John to potato
dâd mišenâsam (Indirect object)
gave know
'I know the woman to whom John gave the potato.'

The construction in 54 cannot be used for indirect objects as in 55. Example 55 is grammatical only with the addition of the pronoun *u*. The relative clause construction with *u* is an example of what Keenan and Comrie call a secondary relative clause formation strategy, used in the lower end of the GR hierarchy. For languages with a secondary relative clause strategy for the lower end of the GR hierarchy, which are quite common, we may characterize relative clauses at the lower end of the GR hierarchy as typologically marked compared to relative clauses at the higher end, since the lower end strategies always involve the presence of a morpheme (anaphoric or relative pronoun) indicating the case relation of the relativized argument to the verb in the relative clause; for further discussion of this point, see §7.3.

Subjects, direct objects and indirect objects are accessible to relativization. Basque uses a nominalizing strategy for relative clause formation at the upper end of the hierarchy, including dative arguments (Keenan and Comrie 1977/1987:14):

(56) gizon -a -k liburu -a eman dio -n emakume -a
man the -ERG book -the give has -REL woman -the
'the woman that the man has given the book to' (Indirect object)

However, (literary) Basque uses a construction with an anaphoric pronoun combined with the oblique case suffix for relative clauses formed on an oblique, a syntactically more complex construction (Saltarelli 1988:38–39; glosses simplified to match Keenan and Comrie's example):

(57) poltsiko -an dut giltz -a **zein** -etaz ate -a ireki -ko bait dut
pocket -LOC has key -the **which** -MOD door -the open -FUT REL has
'I have the key in my pocket with which I will open the door.'
(Oblique)

(iv) Subjects, direct objects, indirect objects and obliques are accessible to relativization: English (example 50).

The NP accessibility hierarchy is subject to numerous qualifications and has some exceptions (see Keenan and Comrie 1977; Maxwell 1979; Comrie and

Keenan 1979; Comrie 1989: chapter 7; and Lehmann 1984; 1986). Nevertheless, it is broadly valid and provides further evidence for the GR hierarchy.

Thus, languages with accusative alignment conform to the GR Hierarchy in 47 and 51. What about languages with ergative alignment? They also display consistent cross-linguistic patterns, which conform to the following hierarchy:

(58) absolutive < ergative ...

In case marking, the absolutive is the typologically unmarked category:

	Absolutive S + P	Ergative A	Gloss
Tongan	*'a he talavou*	*'e ha talavou*	'a young man'
Yup'ik	*nuna-Ø*	*nuna-**m***	'land'

(Tongan: Churchward 1953:66, 68; Yup'ik: Reed et al. 1977:41)

In indexation, the absolutive is also the typologically unmarked category:

No indexation: Tongan (Chung 1976:34)

(59) 'E 'omi 'e Sione 'a e siaine kiate au
UNSP bring ERG John ABS the banana to me
'John will bring me some bananas.'

Indexation of absolutive only: Chechen-Ingush (Nichols 1984:186)

(60) bier -Ø **d**- ielxa
child -ABS **CL**- cries (CL indexes 'child')
'The child is crying.'

(61) a:z yz kiniška -Ø **d**- ieš
1SG.ERG this book -ABS **CL**- read (CL indexes 'book')
'I'm reading this book.'

Indexation of absolutive and ergative: K'iche' (Mondloch 1978:46)

(62) k- **at**- **in**- tzuku:j
PRS- **2SG.ABS**- **1SG.ERG**- look.for
'I look for you.'

Not surprisingly, accessibility to relativization follows an ergative alignment in some languages, and in those languages the absolutive role is the least marked role (i.e. the only one accessible to relativization). This phenomenon is found in the Mayan languages (Larsen and Norman 1979) and Dyirbal (Dixon 1979:127–28). Dyirbal, which uses a nonfinite verb form for relative clauses, is illustrated here (relative clauses in square brackets):

(63) ŋuma -ŋgu yabu -Ø [duŋgara -ŋu -Ø] buṛa -n
father -ERG mother -ABS [cry -REL -ABS] see -PST (S argument)
'Father saw mother, who was crying.'

(64) ŋuma -Ø [yabu -ŋgu buṛa -ŋu -Ø] duŋgara -n^{y}u (P argument)
father -ABS [mother -ERG see -REL -ABS] cry -PST
'Father, who mother saw, was crying.'

(65) ŋuma -Ø [bural -ŋa -ŋu -Ø yabu -gu]
father -ABS [see -ANTI -REL -ABS mother -DAT]
duŋara -n^{y}u
cry -PST (A argument)
'Father, who saw mother, was crying.'

In order to make the A argument accessible to relative clause formation, the verb must be marked by the antipassive voice suffix. The antipassive places the A argument in the absolutive case, and overtly codes the construction.

These examples demonstrate that the non-universality of a grammatical category does not preclude the category from conforming to typological generalizations. Moreover, different grammatical categories (nominative/accusative, ergative/absolutive) conform to the same general principles, namely those described in chapter 4. Finally, despite the non-universality of the categories, the explanation for the universals of typological markedness in both cases is the same: the relative token frequency of one category over another. The nominative category, A + S, is higher in token frequency than the accusative category P, because the former category is found in both transitive and intransitive clauses, while the latter is found in transitive clauses only. Likewise, the absolutive category, S + P, is higher in token frequency than the ergative category A, because the former category is found in both transitive and intransitive clauses, while the latter is found in transitive clauses only.

The argument in the preceding paragraph applies to indexation, because indexation occurs on all clauses, whether or not there is an independent A, S or P noun phrase in the clause. It arguably does not apply to case marking, which normally occurs on noun phrases (lexical or pronominal) and hence simply is not present when no noun phrase argument is present. Two available counts of S, A and P noun phrases, in Papago (Payne 1987:794, Figure 5) and Sacapultec (DuBois 1987:822, Table 2), indicate that even for independent noun phrases, the same pattern applies:

	A	S	P	A+S	S+P
Papago	37	169	152	216	321
Sacapultec	24	138	83	162	221

In both languages, the text counts indicate that A + S outnumbers P and S + P outnumbers A.

5.5.3 *Objects: direct and indirect, primary and secondary*

The same variation and the same universals are also found in the coding of P, T and G. Many languages have the same object categories as Standard Average European: the **direct object** is defined as P + T, and the **indirect object** as G. Structural coding indicates that direct and indirect objects conform to the hierarchy in 66:

	Direct object	Indirect object	
Hungarian	*ember-t*	*ember-nek*	'man'
Big Nambas	*Ø dui*	*a dui*	'person'

(Hungarian: Whitney 1944:18–19; Big Nambas: Fox 1979:41, 125–26)

(66) direct object < indirect object

It is difficult to find cases of languages that index indirect objects. In the vast majority of cases, T is third person, which is conveniently zero-coded, so that three affixes never appear at once, for example in Georgian (Comrie 1981:216) or Chickasaw (Munro and Gordon 1982). A number of languages (e.g. Maltese; Borg and Comrie 1984) use pronominal affixes indicating G on the verb if a G argument NP is absent, but not if it is present.

Indexation of more than two pronominal arguments is found in some Bantu languages, e.g. Kinyarwanda, and some Northwest Caucasian languages, such as Abaza. The maximum number of indexed arguments found is four: A, T, G and either a benefactive (as in 67) or a causer in a causative construction (as in 68):

Kinyarwanda (Dryer 1983:137)

(67) Umugóre **a-** ra- **bi-** **yí-** **mu-** **he** -er -a
woman she- PRS- **it** (T)- **it** (G)- **him** (BEN)- give -BEN -ASP
'The woman is giving it [food] to it [the dog] for him.'

Abaza (Allen 1956:139)

(68) alɔ́gaʒ^{w} ác^{j}'k^{w}'ənc^{w}ak^{w}a llá aph^{w}ɔ́spa **y-** **g^{j}-** **y-** z-
boys old.man dog girl **3SG.NHUM-** NEG- **3PL-** POT-

d- m- **l-** r- ətxd
3SG.HUM- NEG- **3SGF-** CAUS- gave
'The old man couldn't make the boys give the girl her dog back.'

In many languages, G (the ditransitive indirect object) rather than T is expressed in the same way as P (the transitive direct object), and T is expressed differently from the English example in 31c. The combination of G + P is referred to as the **primary object**, and T is the **secondary object**; Dryer 1986 describes this phenomenon in detail.

The primary/secondary object distinction is most commonly manifested in indexation patterns, but it is also found, rarely, in case marking, as in Yoruba and Yokuts:

Yoruba (Rowlands 1969:21; secondary object marked by locative preposition)

(69) a fẹ́ ówó
we want money
'We want money.'

(70) nwọ́n kọ́ wa **ní** yorùbá
3PL.SBJ teach 1PL.PO **SO** Yoruba
'They taught us Yoruba.'

Yokuts (Newman 1944:198, 201; secondary object marked by -ni*)*

(71) ka:y'u' te:w **-a** 'amin xatta
Coyote rabbit **-PO** 3SG.POSS ate
'Coyote ate his cottontail rabbit.'

(72) 'ama' ṭan kay'iw wana: -'an heẋa: **-ni** 'amin
and DEM.**PO** Coyote give -DUR.PRS fat **-SO** 3SG.POSS
'And Coyote gives him his fat.'

Finally, English constructions of the form *I gave/sent her the book* suggest that English uses the primary–secondary object distinction as well as the direct–indirect object distinction found in *I gave/sent the book to her.*

The Yoruba and Yokuts examples give structural coding evidence that the primary object is typologically unmarked compared to the secondary object:

	Primary object (P + G)	Secondary object (T)	Gloss
Yokuts	*heẋa:-**in***	*heẋa:-**ni***	'fat'
Yoruba	*Ø yorùbá*	***ní** yorùbá*	'Yoruba'

The case-marking data provide evidence for the hierarchy of object roles in 70:

(73) primary object < secondary object

However, there are quite a number of exceptions to this pattern as well (Dryer 1986; pers. comm.); some of these are discussed in §6.3.1.

Verb indexation in a primary–secondary object distribution pattern is much more frequent across languages. The one widely attested type is given in 74–75:

Indexation of primary object only: Huichol (Comrie 1982:99, 108)

(74) uukaraawiciizɨ tɨɨri me- **wa-** zeiya
women children 3PL.SBJ- **3PL.PO-** see
'The women see the children.'

(75) nee uuki uukari ne- **wa-** puuzeiyastɨa
I man girls 1SG.SBJ- **3PL.PO-** show
'I showed the man to the girls.'

The indexation pattern supports the hierarchy in 70 as well. (As with indirect objects, it is difficult to find clear cases of languages that index secondary objects.)

The cross-linguistic patterns support the typological markedness hierarchies direct object < indirect object and primary object < secondary object. These hierarchies can also be explained by the token frequency of the categories. The direct object category (P + T) has a higher token frequency than the indirect object category (G) because the former occurs in both transitive and ditransitive clauses while the latter does not. The primary object category (P + G) has a higher token frequency than the secondary object category (T) because the former occurs in both transitive and ditransitive clauses while the latter does not. Again, this argument applies only for indexation. For case marking, one must examine the occurrence of overt P, T and G noun phrases. The following represents a count of overt P, T and G noun phrases in the first three texts of Wardaman in Merlan (1994), totaling 893 intonation units:

	P	T	G	P+T	P+G
without 'say'	72	13	20	85	92
with 'say'	72	17	40	89	112

Two counts are given, since 'say' includes occurrences of G with direct speech complements. In either case, P + T outnumbers G and P + G outnumbers T.

5.5.4 *The conceptual space for grammatical relations*

If we put together all of the patterns of encoding participant roles given above, we have the conceptual space for participant roles in Figure 5.7.

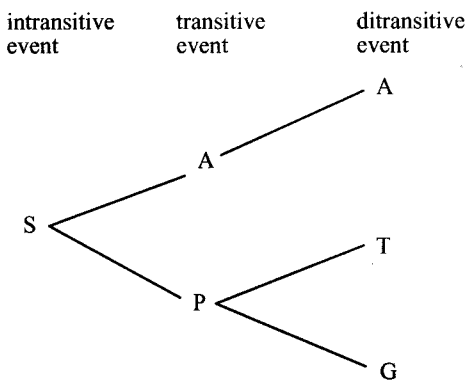


Figure 5.7 *Conceptual space for intransitive, transitive and ditransitive participant roles*

The generalizations described here demonstrate that typological hierarchies can be discovered and explained without resort to a universal inventory of grammatical relations. Different categories of grammatical relations lead to cross-linguistic hierarchical universals. Yet underlying all the different hierarchical universals is a single conceptual space; and the semantic maps underlying the space conform to the same general principles.

5.6 Conclusion

This chapter has described several major grammatical, phonological and word order hierarchies found in the world's languages, including number, grammatical relations, animacy, definiteness, place of articulation and sonority. Although these are certainly not the only grammatical hierarchies to be found in cross-linguistic study, they play a major role in structuring clauses, noun phrases, segment inventories and syllables in the world's languages.

In addition, we have observed that neither the evidence for a hierarchy nor the values in a hierarchy need be discrete. In some cases (as in animacy in Chrau), markedness is expressed by the more frequent use of, say, a plural form for first and second person pronouns than for third person pronouns, rather than a sharp boundary between mandatory use and prohibited use. In other cases, the category itself may describe an intermediate category in the hierarchy, such as the higher animal category in Manam. In both the definition of the hierarchy of values and the typological evidence for the hierarchy, a continuum is necessary to account for the data. This is part of the reason for the relativized, quantitative definitions of the typological markedness criteria in chapter 4.

We have presented a recently developed model, the semantic map model, for representing both the typological universals and the language-specific facts that must be part of a speaker's grammatical knowledge. A conceptual space defines the external conceptual (or phonetic) structure that is encoded by linguistic categories. Language-specific categories are semantic maps on conceptual space, or phonological maps on phonetic space.

The semantic map model not only represents grammatical hierarchies and more complex conceptual space structures. It also provides a means for representing language-specific categories, that is, distribution patterns in particular languages, without positing universal grammatical categories such as 'subject' or 'indefinite pronoun'. It also provides a means for clearly differentiating the universal from the language-specific, and yet integrates the two in a plausible model of the representation of grammatical knowledge. Language universals regarding possible grammatical categories can be formulated as highly general constraints on the mapping

from conceptual space to linguistic form, such as the Semantic Map Connectivity Hypothesis. Nevertheless, typological universals such as those for structural coding and behavioral potential described in chapter 4 can be formulated even without universal grammatical categories.

In chapter 5, we will examine how grammatical hierarchies and other typological patterns interact with each other, resulting in typological patterns of still greater complexity.

Appendix: typological markedness patterns in grammatical categories

This appendix summarizes the basic markedness patterns of various grammatical categories enumerated by Greenberg, including hierarchies discussed by him but not correlations across categories:

Morphosyntactic features
- *Number* (noun, pronoun, adjective, verb)
  - singular < plural < dual < trial/paucal (31–37; U33–U35, U37, U45)
- *Gender* (noun, adjective)
  - masculine < feminine < neuter (38–40)
- *Grammatical relation* (noun, adjective)
  - subject < direct object < oblique (37–38, U38; see §5.5.1)
- *Degree* (adjective)
  - positive < comparative, superlative (40–41)
- *Size* (adjective, noun)
  - normal < augmentative, diminutive (41)
- *Numeral type* (numerals)
  - cardinal < ordinal (41; this is a simplification)
- *Numerals*
  - one < two < three < . . . (42–44; excluding bases)
- *Person* (verbal indexation)
  - 3 < 1 < 2 (42–44)
- *Person* (extended animacy)
  - 1, 2 < 3
- *Tense* (verbs)[5]
  - present < preterit < future (47–48; preterit status uncertain)
- *Mood* (verbs or sentences)
  - indicative < hypothetical (excluding imperative) (46–47)
- *Voice* (verbs or verb phrases)
  - active < passive, mediopassive (45–46)
- *Derivation* (verbs)
  - base < causative < other derivational forms (49–50)

[5] The category of aspect (perfective vs. imperfective) does not have any clear typological asymmetry in structural coding.

Polarity (sentences or verbs)
positive < negative
Direct speech act type (sentences)
declarative < interrogative
Affix type (words in general)
derivation < inflection (U29)
Inflectional categories (words in general)
number < gender (U32, U36)
Inflectional categories (verbs only)
tense-aspect-mood < person-number, gender indexation (U30)
Referentiality
pronoun < proper name < common noun (51, U43)

Phonological features
Nasality (vowels)
oral < nasal (18)
Length (vowels)
short < long (19–20, but see 22 for exceptions)
Glottalization (consonants)
unglottalized < glottalized (15–17)
Aspiration (consonants)
unaspirated < aspirated (15–17)
Palatalization (consonants)
unpalatalized < palatalized (20)

Notes: Page numbers refer to Greenberg (1966b); 'U . . .' to universals contained in Greenberg (1966a). The categories of case and person (indexation) will be discussed further in chapter 6. The phonological patterns are more tentative; for instance, a number of categories that Greenberg treats as binary are phonetically scalar. For evidence supporting these patterns, the reader is referred to Greenberg (1966a; 1966b).

6

Prototypes and the interaction of typological patterns

The conceptual categories that we have seen to be organized into typological markedness and hierarchy patterns do not occur in isolation. Any given noun phrase has values for number, case and animacy/gender, for example, and any given verb has values for tense, aspect, modality and so on. In other words, conceptual categories always occur in combination in utterances. Hence, it is reasonable to examine the possibility of grammatical interactions between conceptual categories, and to seek typological patterns in those interactions. This chapter will explore some of these patterns.

In fact, we have already seen one instance of interaction of categories. Behavioral potential was described in §4.1.2 as the potential for a category value to inflect for values of other categories, or to have a distribution in a wider range of syntactic contexts. It was assumed that the typological markedness ranking of values of a category would be the same no matter what potential is examined. But in fact the rankings can and do vary depending on what other category is being used for measuring behavioral potential. These are illustrated in §6.1.

This is not the only type of interaction between categories, however. The second type is an interaction of values in two cross-cutting categories. Here, a value in one category is typologically unmarked only if it co-occurs with a particular value of another category. The values on the two categories form a cluster or typological prototype. In many grammatical domains, there are two opposed, complementary typological prototypes (see §6.2). These patterns are illustrated in §§6.3–6.4.

6.1 Interactions of categories

6.1.1 Place of articulation

An example of the complex interaction of typological patterns is found in the typology of place of articulation. Gaps in segment inventories have been used to propose a hierarchy for voiceless ejectives of velar < dental/alveolar < bilabial (§5.1), so that the highest place of articulation on the implicational hierarchy is the most back one (velar) and the lowest is the most front one (bilabial).

Examining segment inventory gaps for voiced implosives, one observes almost the opposite effect (the number of the universals is Maddieson's):

(xiii) A language with any implosives or laryngealized stops has /ɓ/ and /ɗ/. 36/42 85.7%

(xiv) If a language has /ɠ/ it has /ʄ/. 3/4 75.0% (Maddieson 1984:121)

The opposite hierarchy is found: the most front positions are the highest on the implicational hierarchy, and the most back position is the lowest. This represents the same sequence of places of articulation, but reversed, not unlike the segment orderings for initial vs. final consonants described in §5.1.

Examining the same evidence for plosives and nasals, however, leads to rather different hierarchies. Voiceless plosives might be expected to behave like ejectives, and voiced plosives like implosives. But Maddieson's evidence reveals a slightly different pattern:

(xiii) If a language has /p/ then it has /k/, and if it has /k/ then it has /*t/ (4 counterexamples in the UPSID sample).

(xiv) If a language has /g/ then it has /*d/, and if it has /*d/ then it has /b/ (3 counterexamples in the UPSID sample). (Maddieson 1984:40)

The data supports the presence of the place hierarchy velar < dental/alveolar < labial for voiced stops, but not for voiceless stops, which supports a ranking dental/alveolar < velar < labial. If we turn now to (voiced) nasals, we find the following generalizations:

(vi) A language with any nasals has /*n/. 304/307 99.0%

(vii) The presence of /m/ implies the presence of /*n/. 297/299 99.3%

(viii) The presence of either /ŋ/ or /*ɲ/ in a language implies the presence of both /m/ and /*n/. 197/200 98.5% (Maddieson 1984:69)

These universals, which are very strongly confirmed in the UPSID sample, suggest a place of articulation hierarchy for nasals of dental/alveolar < labial < velar. (Gamkrelidze [1978:14–17] claims that a place hierarchy exists for fricatives also, which is not generally confirmed in the UPSID sample; Maddieson 1984: 47–49.)

Thus, the place hierarchy that applies for ejectives and voiced plosives does not apply to voiceless plosives or nasals. However, it is not the case that the voiceless plosives and nasals do not display any hierarchical pattern with respect to place of articulation. There are hierarchical patterns for the latter two consonant types; but they are not the same as the place hierarchy that is found with the other consonant types and that basically reflects the front-to-back order of place of articulation. These data do not invalidate the front-to-back place hierarchy. They indicate that

the ranking of places of articulation on the hierarchy is related to the manner of articulation of the consonant, and that there is a phonetic relationship between labial and velar (§7.1).

To summarize, the following patterns are found:

(1a)	*Voiced implosives/plosives*:	bilabial < dental/alveolar < velar
(1b)	*Voiceless ejectives*:	velar < dental/alveolar < bilabial
(1c)	*Voiceless plosives*:	dental/alveolar < velar < bilabial
(1d)	*Nasals*:	dental/alveolar < labial < velar

Instead of a global hierarchy of place of articulation, there are purely local hierarchies relating to specific cross-cutting phonetic features. This means that any explanation for the existence of the phonological hierarchy (presumably phonetic) will have to be specific to the particular manner of articulation in question. For example, there is evidence that the correct feature controlling the reversal of the place of articulation hierarchy among glottalized consonants from (1a) to (1b) is voicing, not airflow (ingressive for implosives, egressive for ejectives). It is possible to articulate voiceless implosives, and they are found in Mayan languages (Pinkerton 1986); but the voiceless implosives appear to pattern like the voiceless ejectives, not like the voiced implosives.

A simple phonetic space structure corresponding to the position of the place of articulation in the vocal tract will be an insufficient representation. The phonetic space will have to describe complex interactions between place and manner of articulation, presumably reflecting articulatory neuromuscular relationships and also the structure of acoustic phonetic space (§7.1).

6.1.2 Person

The person hierarchy was described in §5.2 as 1, 2 < 3. However, it was pointed out in §5.4 that frequency counts for subject verb forms indicated a person hierarchy of 3 < 1 < 2 (Greenberg 1966b:44–45), and zero coded verb forms (including zero verb-indexation forms) support this hierarchy.[1] Also, in hortative and imperative verb forms, second person is the least marked: 2 < 1, 3 (Greenberg 1966b:44).

[1] One must distinguish between zero coded verb indexation and absence of indexation. For example, in K'iche', the verb indexes the absolutive (S + P + T), but the third person singular form is zero; on the other hand, the verb does not index the indirect object (G), period. The ability to index is a behavioral property, and so inability of a verb to index an argument indicates typological markedness. Zero coded indexation, on the other hand, is a structural indicator of typological unmarkedness. This is a subtle but important distinction. Absence of indexation of a direct object indicates the typological markedness of the direct object relative to the subject; but zero-marking of third person singular subjects indicates the typological unmarkedness of third person and singular number.

A glance at pronominal systems as well as verb inflections reveals that different hierarchies result depending on which cross-cutting parameter is used to determine the inflectional potential of person. With respect to the category of number, the first person is least marked, followed by second and third person; that is 1 < 2 < 3 (see Cysouw 2001:181–85; there are a number of exceptions, including Modern English). With respect to the category of gender, the third person is generally the least marked, followed by second and first person; that is 3 < 2 < 1. Again, there are some exceptions in which second person but not third has gender distinctions; Greenberg's Universal 44 (1966a:96) gives the more cautious 3, 2 < 1. Finally, an informal survey of politeness distinctions suggests a hierarchy 2 < 3 < 1. We may summarize the typological patterns as follows:

(2a)	*Extended animacy*:	1, 2 < 3
(2b)	*Number*:	1 < 2 < 3
(2c)	*Gender*:	3 ? < 2 < 1
(2d)	*Politeness*:	2 < 3 < 1
(2e)	*Imperative/Hortative*:	2 < 1, 3

Each of these patterns is typologically consistent. One does not find one set of languages treating first person as typologically marked with respect to number and another set treating first person as unmarked with respect to number. Instead, the hierarchy varies consistently depending on the cross-cutting category involved in the inflectional potential of person: case, number, gender or politeness.

The example of person raises a serious question about the relationship between behavioral potential and structural coding. There is only one ranking of person based on text frequency (leaving aside genre variation). Presumably, structural coding patterns are motivated by text frequency fairly directly, for the reasons given in §4.3. But behavioral potential cannot be directly motivated by text frequency. Instead, it may be directly motivated by certain aspects of the relationship between the two categories, as in the case of the place of articulation hierarchies. For example, the clear gender identity of the interlocutors is probably the reason for the absence of marking gender in first and second person; and universals of politeness (Brown and Levinson 1987) suggest the presence of deferential forms for the addressee first and for the speaker last. In this case, it may be the case that behavioral potential is directly motivated by perceptual/cultural salience or expectedness, and not mediated by frequency. It may be the case that some behavioral potential is connected to frequency, for instance number inflection. However, even number inflection may be explained directly in terms of salience: individual speech act participants, then humans, may be more salient to the speaker and hence expression of their cardinality is more relevant to the speaker. As with structural coding, though, while salience or (un)expectedness motivates the rise of behavioral

potential, frequency of use motivates the loss of behavioral potential. That is, lower frequency of use leads to the loss of cross-cutting distinctions in typologically less marked values, because the distinct forms are insufficiently entrenched, following Bybee's model.

6.2 Interactions of values: typological prototypes

In §6.1, we showed that the relation between values on one category and the grammatical (or phonological) expression of a cross-cutting category depends on the cross-cutting category and its relationship to the values of the category in question. In this section, we will examine interactions between values of one category and values of another co-occurring category.

The simplest pattern is one in which a certain combination of values from different conceptual categories will result in the typologically least marked form of a word or grammatical construction. This is most easily illustrated with the inflectional categories of nouns and verbs. For example, in Classical Mongolian (Poppe 1974:76), the unmarked form of a noun is the singular nominative form (there is no inflection for gender), such as *aqa* 'elder brother'; contrast the structurally marked forms *aqa-nar* (nominative plural), *aqa-yi* (accusative singular) and *aqa-nar-yi* (accusative plural). Likewise, the unmarked verb form in Ngalakan is present-tense positive, with a third person singular animate gender subject, such as *rabo* 'he/she goes'; contrast *yiri-rabo* 'we (inclusive) go', *rabo-gon* 'he/she went (subordinate form)' (Merlan 1983:154–55). This is a widespread typological pattern: the zero coded noun form is nominative (or absolutive), singular, masculine (or animate) gender, normal size (i.e. not diminutive or augmentative); the zero coded verb form is third person singular, present, positive, realis modality and active voice.

In other words, we may treat the typologically unmarked word form in an utterance as representing a **cluster** of grammatical values on different parameters. Such a cluster evokes the idea of a **prototype** category (e.g. Rosch 1978). A prototype category, loosely defined, is a category with a clear core or central members of the category, but variable or even fuzzy boundaries. The core members have a cluster of properties, but the peripheral members of the category lack some of the core properties. To use an often-cited example: the category 'bird' is said to be a prototype category (cognitively, not biologically), because there are central members of the category such as robins, and less central members, such as ostriches and penguins. Among the properties that define prototypical birds are that they have feathers, wings, two legs and can fly. Robins satisfy all of those properties, but neither ostriches nor penguins can fly, and penguins' feathers do not

resemble prototypical bird feathers. Hence, ostriches and penguins are peripheral members of the category. Properties such as being able to fly for 'bird' are what distinguish prototype categories from **classical** category definitions. Being able to fly is neither a necessary nor a sufficient condition for being a bird: some birds cannot fly, and some things that can fly are not birds (e.g. flies). Nevertheless, psychological experiments indicate that these prototypical properties do play a role in categorization by human beings.

Since prototypes are a characteristic of human categorization, and human language involves categorization, prototypes have a potential explanatory value in linguistics. The prototype concept is applied to grammar in the following way. As noted above, any particular word form or syntactic construction involves the co-occurrence of many grammatical categories at once. Some particular combination of those category values may represent the core members of the category defined by the word paradigm or syntactic construction schema. If a word or construction lacks some of the category values of central members, then it is a peripheral member of the category.

Typological evidence is used to determine that a particular member of a category is grammatically central or peripheral. First, the most frequently mentioned forms are commonly the central members of the category. Core members, that is, members that have all of the prototypical properties, are typical members. To be typical, they must be commonly perceived and attended to by human beings. A textually frequent category member will satisfy the definition of (proto)typicality. For example, Greenberg (1966b:68) cites a study of the Rigvedic verb in which the prototypical verb form, third person singular present active indicative, occurred 1,404 times, whereas a highly marked verb form, second person dual mediopassive perfect optative, did not occur at all. This criterion is text frequency in typological markedness.

Another important piece of typological evidence used to support prototypicality in grammatical categories is the common zero (or minimal) coding of the core members of the categories. We have already observed this in the examples of inflectionally zero coded noun and verb forms, and we will see more examples of this below with regard to grammatical relations and parts of speech. This is of course structural coding, which we have already argued is related to text frequency.

A third kind of typological evidence is loss of behavioral potential. A peripheral member of a category is not expected to display the full behavioral potential that a central member displays. This is, of course, another characteristic of typological markedness. Behavioral potential determines the status of an individual value (e.g. singular number) by using variation on cross-cutting categories (e.g. person), and so cannot be used to identify the typologically unmarked cluster of grammatical values (number and person). Instead, one must rely on behavioral potential with

respect to still other cross-cutting categories not included in the cluster. For example, the third person singular pronoun category in English displays the largest number of gender distinctions – *he*, *she*, *it* – and so the cluster of values <third, singular> is least marked, at least with respect to gender distinctions. Also, as pointed out in §6.1.2, behavioral potential must be evaluated with respect to each relevant cross-cutting category (for an example, see the analysis of parts of speech in §6.4).

One of the more important or distinctive criteria for typological prototypes is outright **exclusion** of nonprototypical members from the prototypical category. For example, constructions missing one or more properties (e.g. completive aspect) of the transitive prototype (see §6.3.2) appear as intransitives in many languages. That is to say, constructions lacking some prototypical transitive features no longer display transitive clause behavior at all, hence they are classified as intransitive constructions. This is behavioral potential taken to its logical extreme: the peripheral member displays no behavioral potential of the prototype category, and is instead classified as belonging to some other category. Thus, we see that the evidence for typological prototypes is essentially the same as evidence for typological markedness (and, hence, we expect typological prototypes to be explained also by token frequency).

The examples of inflectionally zero coded nouns and verbs are not really ideal cases of prototypically organized categories. Lack of inflectional marking of nominative singular masculine nouns may simply result from the intersection of the most frequent values of nominative case, singular number and animate (or masculine) gender. This is particularly obvious in a language like Classical Mongolian, in which each grammatical category is expressed in a separate morpheme. In this case, one need not hypothesize any special interaction between case, number and gender to produce the unmarked combination nominative singular masculine. This is because the combination nominative singular masculine is the *only* unmarked noun form.

In many cases, however, there is more than one unmarked combination of values. Frequently there are two prototypes which complement each other in their combinations of values. In other words, not only does a combination of values form a prototype, but the combination of exactly the opposite values also forms a prototype. In this case, there is clearly an interaction between values from different categories that has linguistic consequences. We give a simple example of this pattern from phonology.

In the first mention of this phenomenon in the typological literature, Greenberg writes, 'It should be noted that in some cases we have what might be called conditional categories for marked and unmarked. For example, whereas for obstruents, voicing seems clearly the marked characteristic, for sonants [nasals, liquids,

glides, vowels] the unvoiced feature has many of the qualities of a marked category' (Greenberg 1966b:24). The phenomenon that Greenberg describes can be displayed as follows:

	Voiced	Voiceless
Obstruents	marked	unmarked
Sonants	unmarked	marked

The markedness pattern of voicing for obstruents is reversed for sonants. The phenomenon has been called **markedness reversal** for this reason (e.g. Witkowski and Brown 1983); it has also been called local markedness (Tiersma 1982) and markedness assimilation (Andersen 1968, 1972), because the markedness is assimilated to, or determined locally by, the cross-cutting category. Again, markedness reversal is not random, but is consistent across languages: languages in general treat voiceless obstruents as unmarked but voiceless sonants and vowels as marked.

Instead of representing voicing as typologically marked or unmarked relative to the manner of articulation, one can represent the correlation of unmarked values directly, as follows:

	Unmarked cluster	Unmarked cluster
Voicing	voiced	voiceless
Manner	sonants	obstruents

Markedness reversals represent two unmarked clusters or prototype categories that are organized around the opposite values of the same grammatical parameters (in the last example, voicing and manner of articulation). Reversals in grammatical hierarchies are, if anything, more orderly than simple markedness reversals. The ranking of values is the same in both cases; what differs is which end constitutes the least marked value, as in the sonority hierarchy. Nor is the phenomenon of complementary prototypes unique to linguistic typology. Rosch notes that prototypes tend to be as contrastive as possible with adjacent prototypes (Rosch 1978:37).

We now turn to a typological prototype analysis of perhaps the two most fundamental grammatical phenomena, grammatical relations and parts of speech.

6.3 Grammatical relations

One of the most complex aspects of the mapping of participant roles onto grammatical relations (§5.5) is the interaction of this mapping with the animacy and definiteness of the participant referent. Some of the typological variation in animacy, definiteness and participant roles is analyzed in §6.3.1. Animacy and

definiteness are not the only relevant parameters, however. In §6.3.2, we describe the typological prototype for transitivity, which includes many other conceptual category values. Finally in §6.3.3 we review the explanations that have been offered for these universals of grammatical relations.

6.3.1 *Animacy, definiteness and participant roles*

Animacy and definiteness interact most frequently in the case marking of P (object) roles. In §5.2, we presented examples of languages in which animacy and definiteness individually exhibit structural coding effects in P roles. In other languages, however, both animacy and definiteness interact in determining the coding of P roles. The implicational universal describing the cross-linguistic pattern is: If a language uses a nonzero case marking for a P argument on the animacy/definiteness hierarchies, then it uses a nonzero case marking for P arguments higher on the hierarchies.[2]

For example, in Punjabi the object pronouns are overtly coded using the dative suffix *-nũ* (Shackle 1972:69):

(3) mɛ̃ tɛɛ-**nũ** pəṛàvaŋga
1SG 2SG.**OBJ** will.teach
'I will teach you.'

An animate common noun object also uses *nũ* (as a postposition). But an inanimate direct object uses *nũ* only if it is definite (Shackle 1972:69–70):

(4) ó nili kitāb **nũ** mez te rakkho
that blue book **to** table on put
'Put that blue book on the table.'

(5) koi kitāb mez te rakkho
some book table on put
'Put some book on the table.'

In other words, extended animacy alone and definiteness alone cannot specify the distribution of overt P coding; only the combination can.

[2] There are, however, several exceptions to this pattern, in which low-definiteness objects are overtly marked. For example, in West Greenlandic Eskimo indefinite objects take the instrumental case (Sadock 1980:306):

(i) Angut -Ø arna **-mik** untaavoq
man -ABS woman -INST beat.ANTI.IND.3SG
'The man beat a woman.'

However, this may be an instance of overt T marking; Quebec Inuktitut uses a special T case affix instead of the instrumental in this construction (Matthew Dryer, pers. comm.).

The Punjabi examples illustrate a case where the overtly coded P argument is either animate or definite or both. In Spanish, we have a case in which P is overtly coded only if it is human *and* specific. The P argument takes the preposition *a* if it is human and specific, but not nonspecific (Comrie 1989:134):

(6) El director busca el carro/**al** empleado/**a** un empleado/un empleado.
'The director is looking for the car/the clerk/a (certain) clerk/a clerk (any clerk).'

Comrie (1979) examines a number of systems, including Turkish, Finnish, Persian, Southern Tati and Hindi, in which some combination of definiteness and animacy triggers case marking of the direct object.

The explanation for the clustering of definiteness and animacy is relatively straightforward. The extended animacy hierarchy actually consists of three hierarchies: person, referentiality and animacy proper (§5.2). The first and second person pronouns are at the top of the extended hierarchy, because they are by definition human and pronominal. The first and second person pronouns are also definite by definition. In other words, there is actually a cluster of four hierarchies – person, referentiality, animacy and definiteness – linked together by virtue of the fact that first and second person are inherently human, pronominal and definite, and third person is inherently pronominal and definite.

The unusual aspect of this typological generalization is that relative rank is not absolutely predictable, since there are four only partly related hierarchies. For instance, is a pronoun referring to an inanimate object higher than a common noun referring to a human? Neither is actually higher, and in fact there is typological variation as to the treatment of inanimate pronouns and human common nouns. For instance, in English the inanimate (singular) pronoun *it* does not have a distinct object form, unlike all of the other pronouns which have animate reference (except for the anomalous *you*); but nor do human common nouns. In Punjabi, on the other hand, both inanimate pronouns and human common nouns require the object marking *nũ*. In general, it is a prediction of prototype analysis that nonprototypical combinations of values such as <inanimate, pronominal> and <human, common noun> will be the most variable cross-linguistically.

The prototype pattern can be illustrated by the semantic maps of the case-marking patterns for the languages described above and in §5.2, mapped onto a simplified two-dimensional conceptual space of the extended animacy and definiteness hierarchies, as in Figure 6.1 (p.168). The semantic maps indicate that the overt coding of P is prototypically found in the upper left region of the conceptual space, and zero coding of P is prototypically found in the lower right region. The semantic maps of overt P marking always include the upper left region, and exclude the lower right region. Hence, the cline of typological prototypicality for P coding is diagonal in this conceptual space. These extreme points in the conceptual

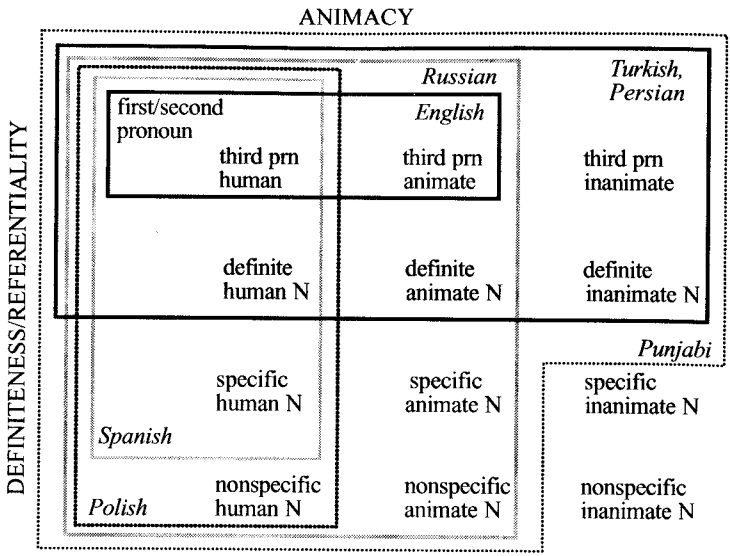


Figure 6.1 *Semantic maps for animate/definite direct objects*

space, unlike the intermediate nonprototypical points, are predicted to be the least variable across languages in how they are encoded.

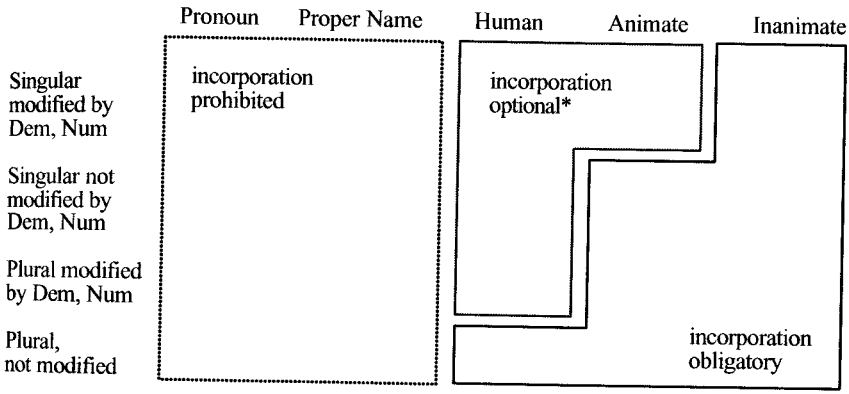
The prototype pattern for the structural coding of direct objects may account for anomalous examples of the zero vs. overt coding of primary objects referred to in §5.5.3. Dryer (1986:816–17) gives a number of cases (Khasi, Lahu, Kokborok) in which the primary object has a nonzero case marking but the secondary object is zero marked. However, the original sources for Khasi (Rabel 1961:76) and Lahu (Matisoff 1973:155–58) make it clear that the nonzero form is highly variable in its distribution, a fact which Dryer describes in another language, Kham (Dryer 1986:817). It may be the case that these examples can be attributed to the fact that more animate and definite objects, whether P or G, tend to be overtly case-marked: all of Dryer's examples are of animate Ps, and this pattern is common in languages of the South Asian area. In particular, the marker of high animacy/definiteness Ps is often the dative case marker used for Gs; this is true of Punjabi *nũ*, for example. In other words, the dative case marker is becoming a generalized P + T + G marker, starting with high animacy/definiteness P + T referents.

Noun incorporation and verb indexation interact with animacy and definiteness in a way that can be mapped onto the same conceptual space. Noun incorporation is the phenomenon by which a noun is so closely bound to a verb grammatically that it is considered to be a part of it. It resembles noun–verb compounding, such

as English *birdwatching*, but it is also found with finite verb forms, as in Ngandi (Heath 1978:262):

(7) barba- ga- **miṛ**?- ñil? -bo -m
3PL/3PL- SUBR- **jail**- confine -AUX -PST.PNCT
'they locked them up in jail'

The least marked direct objects (with respect to case marking) are the least definite and least animate objects; these are also the ones that are most likely to be incorporated. Sadock (1985), using data based on Allen, Gardiner and Frantz (1984), describes a set of incorporation options for direct objects in Southern Tiwa, which is displayed as semantic maps in Figure 6.2.[3]



Note: *for human singular direct objects, only if subject is first/second person

Figure 6.2 *Semantic maps for incorporation in Southern Tiwa*

If we take singular number and modification (by demonstrative or numeral) to indicate a greater degree of definiteness of the direct object, the data here agree with the extended animacy and definiteness hierarchies: the more properties the direct object shares with the upper end of the extended animacy/definiteness hierarchies, the less likely incorporation will occur. This is illustrated by the obligatory incorporation found in the lower right part of the conceptual space and the optional incorporation found in the upper left. This is part of a typological pattern in which incorporation of direct objects (and also of intransitive subjects) is found at the lower end of the animacy–definiteness cluster (for more discussion of incorporation, see Mithun 1984; 1986; Sadock 1980; 1986).

[3] Intransitive subjects (S in the terminology of §5.5.1) also incorporate. Incorporation is obligatory if S is an inanimate common noun, and prohibited if S is animate or a proper name. Thus, low animacy/definiteness Ss are prone to incorporation; this pattern is common in other languages as well.

On the other hand, direct objects that are the most animate and definite are those that the verb will most likely index typologically.[4] For example, languages exist in which verbs index definite direct objects but not with indefinite ones, as in Amharic (Givón 1976:161–62; see Moravcsik 1974):

(8) Kassa borsa -w -in -wässädä -**w**
Kassa wallet -the -OBJ took-he -**it**
'Kassa took the wallet.'

(9) Kassa borsa -wässädä
Kassa wallet took
'Kassa took the wallet.'

Givón also cites the example of Swahili, in which the verb indexes all human and definite nonhuman objects (Givón 1976:159):

(10) ni- li- **mw**- ona yula mtu
1SG- PST **OBJ**- see.IND the person
'I saw the person.'

(11) ni- li- **mw**- ona mtu mmoja
1SG- PST **OBJ**- see.IND person one
'I saw the person.'

(12) si- **mw**- oni mtu yeyote
1SG.NEG- **OBJ** -see.IND person any
'I don't see any person.'

(13) ni- li- **ki**- soma kitabu
1SG- PST **OBJ**- read book
'I read the book.'

(14) ni- li- soma kitabu
1SG- PST- read book
'I read a book.'

In addition, as Givón and Moravcsik note, indexation is frequently of the primary object, that is, with the G argument of ditransitive verbs instead of with the T argument (see §5.5.1). Givón points out that the G argument, playing a semantic role of recipient or experiencer, is almost always human (in fact, by semantic necessity) and frequently definite, while the T argument, a possessed item or physical object, is almost always nonhuman. Thus, primary-object indexation

[4] An exception to this pattern is Hindi. In Hindi, definite/animate direct objects are marked with a postposition *ko*. In the past tense, the verb will agree with the direct object in gender if it is not marked with *ko*. This appears to be due to an independent factor: NPs marked with postpositions are oblique, and Hindi verbs do not index oblique arguments. It is possible that the generalization just stated should be narrowed to person indexation, which would exclude Hindi. (I am grateful to Martin Haspelmath for this suggestion.)

has the effect of allowing indexation of the object that is generally higher in animacy.

This argument is supported by languages such as Manam. In Manam, the verb may index the **beneficiary**, a person for whom the action is being performed, as well as the direct object (P argument). However, if the P argument is first or second person (a very rare circumstance), the verb will index it instead (Lichtenberk 1983b:165–66):

(15) nátu go- ruʔu **-í** -a -n **-a**
child 2SG.IRR- wash **-3SG.OBJ** -BUFF -BEN **-1SG.OBJ**
'Wash the child for me!'

(16) ŋáu -lo da-´ uŋ **-ʔo**
1SG -for 3PL.IRR- beat **-2SG.OBJ**
'They will beat you up for me.'

The animacy hierarchy also interacts with the marking of A. In this case, the cross-linguistically most common pattern is an interaction between animacy of A and P in the coding of indexation and voice on the verb. In these languages, the verb possesses indexation affixes for both the A and P arguments of the verb, but the indexation affixes by themselves do not indicate who is doing what to whom. Thus, an affix such as Cree *ki- . . . -in* 'second person singular and first person singular' is used for both 'you did it to me' and 'I did it to you'. Instead, some other verbal affix indicates who did what to whom. This affix is called **direct** if the animacy ranking matches the case ranking, so that the higher animacy argument is A; and **inverse** if the opposite ranking is found. This system is found in Algonquian languages such as Cree, where the person ranking is 2 < 1 < 3 (Wolfart and Carroll 1981:69–70):

(17) ni- pēh **-ā** -nānak
1EX- wait.for **-DIR** -1PL/3PL
'We (exclusive) wait for them.'

(18) ni- pēh **-iko** -nānak
1EX- wait.for **-INV** -1PL/3PL
'They wait for us (exclusive).'

(19) ki- wāpam **-Ø** -in
2- see **-(DIR)** -2SG/1SG
'You (SG) see me.'

(20) ki- wāpam **-it** -in
2- see **-INV** -2SG/1SG
'I see you (SG).'

This system is also found in Nocte, in which the verb indexes only the higher animacy argument, and the inverse suffix *-h-* indicates that the higher animacy argument is P, not A (DeLancey 1981:641):

(21) nga -ma ate hetho -ang
1SG -ERG 3SG teach -1
'I will teach him.'

(22) ate -ma nga -nang hetho **-h** -ang
3SG -ERG 1SG -ACC teach **-INV** -1
'He will teach me.'

(23) nang -ma nga hetho **-h** -ang
2SG -ERG 1SG teach **-INV** -1
'You will teach me.'

(24) nga -ma nang hetho **-e**
1SG -ERG 2SG teach **-1PL**
'I will teach you.'

In the Nocte version of the person hierarchy, unlike in Cree, first person outranks second person (the first person plural in 24 represents indexation of both if A is first and P is second). This demonstrates that there is no universal typological ranking of first person relative to second person, and in fact many languages avoid the 'problem' of ranking first and second person by using separate verb forms entirely.[5]

The direct–inverse constructions differs from the passive. The voice alternation active–passive allows a potential mismatch between morphosyntactic subject–object and semantic agent–patient. In direct–inverse systems, however, there is a direct correlation between animacy and agent–patient. Of course, the passive voice of English and other languages involves something more than a violation of morphosyntactic and semantic ranking: passive forms focus on the process undergone by the patient, and the agent is actually not one of the verb's arguments. Support for this analysis is lent by the absence of agents in most passive sentences and the outright prohibition against agents in passive constructions in many languages (see Shibatani 1985).

The inverse form is typologically marked and the direct form is unmarked. In Nocte, for example, the direct form is zero coded, and one of the direct form allomorphs in Cree is also zero. There are, thus, two complementary prototypes here:

	Subject prototype	Object prototype
Participant role	A	P
Person	1, 2	3

[5] The question remains as to what happens when both A and P are third person. In Nocte, there is no third person indexation. In Cree, either direct or inverse marking is found, depending on whether the A is **proximate** (direct) or P is proximate (inverse), a category associated with topicality (Wolfart and Carroll 1981:25–31; compare §6.3.3).

DeLancey links the relatively rare (though geographically and genetically widespread) direct–inverse patterns with another, equally widespread and somewhat more common pattern of so-called **split ergativity**, analyzed by Silverstein (1976). In many languages, some pronominal and nominal arguments display an accusative alignment, while others display an ergative alignment, for instance in Dyirbal (Dixon 1979:87):

(i) *First/second person pronouns*: nominative *-Ø*, accusative *-na*
(ii) *Third person pronouns*: ergative *-ŋgu*, absolutive *-Ø*

Other languages display more complex splits in the case-marking of arguments; for example, Cashinawa (Dixon 1979:87):

(i) *First person singular/second person pronouns*: nominative *-Ø*, accusative *-a*
(ii) *Third person pronouns*: 'ergative' *habũ*, intransitive subject *habu*, 'accusative' *haa*
(iii) *Proper names and common nouns*: ergative formed by nasalization (compare *habũ*), absolutive *-Ø*

The typological pattern manifested in these two languages can be more easily observed if the data is displayed as semantic maps on a conceptual space of extended animacy and participant role cluster, as in Figure 6.3 (compare Dixon 1979:87). The same complementary prototypes are found in these split ergative case patterns:

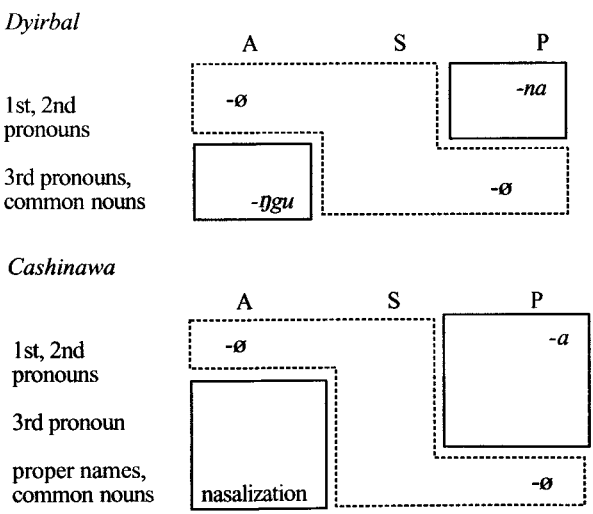


Figure 6.3 *Semantic maps of Dyirbal and Cashinawa split ergativity*

A is less typologically marked, the higher in animacy it is, but P is more marked the higher in animacy it is. In fact, the P half of this typological markedness reversal is basically identical to the high animacy–definite P cluster described above.

DeLancey also links the markedness reversal to certain constraints on passive voice forms. DeLancey notes that the second of the following two English passives is less acceptable (DeLancey 1981:638):

(25) I was flunked by Prof. Summers.
(26) ?Mary Summers was flunked by me.

The passive is questionable precisely when the person of A and P are in the typologically most prototypical combination (first/second person acting on third person): the context in which the zero coded active is most expected. Many other languages exhibit animacy constraints on actives and passives, such that low-animacy As and/or high-animacy Ps are favored in passives. For example, Lummi has active and passive voice constructions, illustrated in 27 and 28 respectively (Jelinek and Demers 1983:168):

(27) x̣či -t - sx^{w} cə swəyʔqəʔ
know -TR -2 the man
'You know the man.'

(28) x̣či -t **-ŋ** -sx^{w} **ə** cə swəyʔqəʔ
know -TR **-PASS** -2 **by** the man
'You are known by the man.'

The Lummi passive codes A as an oblique (with ə 'by') and P as a subject (triggering verb indexation), like the English passive; but it retains the suffix *-t* otherwise associated with transitive verbs in the language. However, there is near complementary distribution of the active and passive forms. The active voice is required if A is first or second person, and may be used if P is a common noun or if both A and P are third person pronouns. The passive is always possible if A is third person, and is required if in addition P is first or second person, and if P is a third person pronoun and A is a common noun.

This pattern is represented by the semantic map in Figure 6.4 (Croft 2001:289). The typologically least marked combination of animacy and participant role is the upper right part of the conceptual space, where only the active is found, and the most marked combination is the lower left part, where only the passive is found. This pattern is repeated in many other voice systems (Croft 2001: chapter 8).

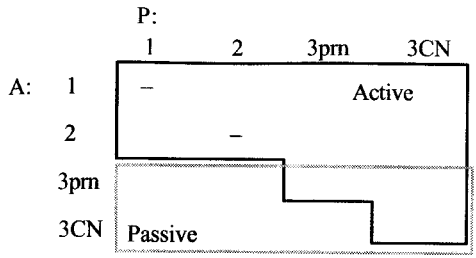


Figure 6.4 *Semantic map for Lummi active and passive constructions*

6.3.2 *Transitivity*

The best known application of prototype analysis to grammatical categories is Hopper and Thompson's (1980) study of transitivity. This analysis has spawned intensive research on cross-linguistic manifestations of the transitivity prototype and the search for other grammatical prototypes (see the collection of essays in Hopper and Thompson 1982).

The criterion that Hopper and Thompson use to define grammatical transitivity is the ability of the clause to display morphosyntactic transitive behavior. The following grammatical criteria were taken by them to define transitive behavior:

(i) A morpheme, usually a verbal affix, that explicitly codes the transitivity of the clause.

(ii) Evidence of the direct-object status of the P argument of the verb:

- (a) the P argument does not have an oblique (dative, instrumental, locative, etc.) case marker;
- (b) the P argument has a special direct-object (accusative) case marker, if such exists in the language;
- (c) the verb has object indexation of the P argument, if object indexation exists in the language.

In languages with ergative case-marking or indexation alignment, the criteria listed under (ii) appear not to apply, since the language does not have a direct object category (§5.4). However, many of these languages have an **antipassive** construction which differs from the standard ergative construction in one or more of the following ways:

(a′) the P argument of the verb is marked as an oblique;

(b′) the verb does not index the P argument, if such indexation exists in the language;

(c′) the A argument is coded in the same way as the S argument in intransitive verbs (i.e. it has absolutive rather than ergative case marking and/or verb indexation).

All of these properties indicate that the standard ergative construction is the analog to the prototypically transitive construction in non-ergative languages, and the antipassive construction is the analog to an intransitive construction in those languages.

For each of the prototypical properties of transitivity, there exist languages in which clauses possessing that property display transitive behavior; but clauses that differ only in lacking that property do not display transitive behavior, even if they possess other properties in the transitive prototype cluster (e.g. the verb has a P argument). The cluster of prototypically transitive properties is shown in Table 6.1 (the terminology is theirs).

Table 6.1 *Prototypical transitivity (after Hopper and Thompson 1980:252)*

Grammatical category	Prototypical transitive feature
Participants	two or more
Kinesis	action (process)
Aspect	telic (bounded)
Punctuality	punctual
Volitionality	volitional
Affirmation	affirmative (positive polarity)
Mode	realis
Agency	highly agentive
Affectedness of object	totally affected object
Individuation of object	highly individuated

A highly individuated object is defined by Hopper and Thompson as itself constituting a cluster of grammatical properties (Hopper and Thompson 1980:253): proper name (vs. common noun), human or animate, concrete, singular, definite or referential and count (vs. mass). The concept of individuated object is essentially identical to the cluster of highly animate/definite direct objects described in §6.3.1, with the addition of the values singular, concrete and count.

We will illustrate examples of the effects of presence/absence of the prototypically transitive properties, using examples of the different sorts of transitive constructions found in the world's languages. In Samoan, a transitive clause uses the ergative preposition for A and the absolutive (zero) for P. If a stative verb instead

of a process verb is used, the construction is intransitive: A takes the absolutive and P is expressed with an oblique preposition (Hopper and Thompson 1980:270):

(29) Na fasi **e** le tama Ø le teine
TNS hit **ERG** the boy (ABS) the girl
'The boy hit the girl.'

(30) Na va'ai Ø le tama **i** le teine
TNS see (ABS) the boy **OBL** the girl
'The boy saw the girl.'

The clause with the stative verb *va'ai* 'see' can be made transitive by using a transitive suffix; but then the verb is in the perfective (telic) aspect, and is better translated as 'spot' (Hopper and Thompson 1980:272):

(31) Na va'ai **-a** **e** le tama Ø le i'a
TNS see **-TR** **ERG** the boy (ABS) the fish
'The boy spotted the fish.'

In Finnish, there is a special nonzero accusative case. In the telic (completed action) aspect, the P argument is expressed in the accusative. In the atelic (incompleted action) aspect, however, the P argument is expressed using the partitive case (Hopper and Thompson 1980:271):

(32) Liikemies kirjoitti kirjee **-n** valiokunnalle
businessman wrote letter **-ACC** committee.to
'The businessman wrote a letter to the committee.'

(33) Liikemies kirjoitti kirjet **-tä** valiokunnalle
businessman wrote letter **-PART** committee.to
'The businessman was writing a letter to the committee.'

Yucatec Maya uses ergative indexation affixes for A and absolutive affixes for S. If the P does not refer to a specific entity, then the object noun is incorporated, an antipassive suffix is added and the subject argument is expressed with the absolutive affix (Mithun 1984:857):

(34) t- **in-** č'ak -Ø -ah če?
comp- **1SG.ERG-** chop -3SG.ABS -PRF tree
'I chopped a tree.'

(35) č'ak **-če?** **-n** -ah -en
chop **-tree** **-ANTI** -PRF -1SG.ABS
'I wood-chopped' ['I chopped wood']

In general, one can summarize the typological pattern found by Hopper and Thompson as follows: if clauses lacking a prototypical transitive value on a semantic parameter can exhibit transitive grammatical behavior in a language, then

the clauses possessing that value can also exhibit transitive grammatical behavior in the language.

This represents the classic prototype pattern: there is a set of grammatical properties which is associated with transitivity such that the absence of one or more of those properties in a clause may lead to the loss of transitivity of that clause. No single property is a *necessary* characteristic of transitivity, but every property *contributes* to the transitivity of the clause. This is true typologically, of course: within a particular language, the grammar has conventionalized the prototype so that some grammatical properties affect the transitivity of a clause and others do not.

6.3.3 *Deeper explanations for the typology of grammatical relations*

In describing the interaction of animacy and definiteness with P coding in §6.3.1, we noted that indexation and case marking gave conflicting markedness assignments to direct objects. Direct objects that are high on the animacy and/or definiteness hierarchies are case-marked, and therefore marked; but the same direct objects trigger indexation, which should indicate unmarked status. This conflict can be resolved by developing separate functional accounts for indexation and case marking (Croft 1988; see also Siewierska 1997:201).

In addition to being associated with high animacy and definiteness, indexation is also associated with high rank on the grammatical relations hierarchy (§5.4). All of these facts point to indexation as an indicator of high salience or topicality (Givón 1976). Topics are associated with definite noun phrases, as is indexation. Highly animate (especially human) referents are the most topical, other things being equal, so it is not surprising to see the topicality of animates conventionalized by rules of indexation. The central arguments of a clause, representing the central participants of an event, are also highly topical. Givón supplements this circumstantial evidence with examples of languages in which topicalization of an argument (by shifting it to the front of the sentence) triggers indexation in case when the untopicalized argument would not (examples from Givón 1976:157, 162, 165):

Swahili

(38) ni- li- vunja kikopo
1SG.SBJ- TNS- break cup
'I broke a cup.'

(39) kikopo ni- li- **ki-** vunja
cup 1SG.SBJ- TNS- **3SG.OBJ-** break
'The cup, I broke it.'

Amharic

(40) Almaz bet -u -n bä- mäträgiya -w tärräga -cc
Almaz house -the -OBJ with- broom -the swept -she
'Almaz swept the house with the broom.'

(41) bet -u -n Almaz büa- mäträgiya -w tüarrüaga -cc **-iw**
house -the -OBJ Almaz with- broom -the swept -she **-it**
'The house, Almaz swept it with the broom.'

Zakho dialect of Eastern Neo-Aramaic

(42) baxta qam yaw -a -le aw hammash ta dan gure
woman PST gave -she -it that book to those men
'The woman gave the book to those men.'

(43) an gure baxta qam yaw -a **-lu** aw hammash
these men woman PST gave -she **-them** that book
'The men, the woman gave them the book.'

The correlation of high extended animacy and definiteness also reflects the historical origin of indexation markers in personal and demonstrative pronouns (§2.1.3). Both personal and demonstrative pronouns are definite, and personal pronouns are typically human (necessarily so for first and second person pronouns). Pronouns code a high degree of accessibility to human cognition (Ariel 1990), which is essentially the same concept as high salience/topicality.

These constructions with left-dislocated arguments can evolve into basic clausal constructions with verb indexation (Givón 1976:154–59; Harris and Campbell 1995:249–50).

Case marking, in contrast to indexation, suggests complementary prototypes for subjects and objects, roughly as follows:

Subject prototype	Object prototype
A	P
high animacy	low animacy
high definiteness	low definiteness

This pattern has attracted much attention in the literature, and several explanations have been put forward. No single explanation is complete, and it is likely that different explanations may contribute to the overall typological pattern, or offer complementary explanations of parts of the pattern.

The association of the extended animacy hierarchy with case marking – high animacy with subjects and low animacy with objects – was first explained in terms of natural agency: 'This hierarchy [the animacy hierarchy] expresses the semantic naturalness for a lexically-specified noun phrase to function as agent of

a true transitive verb, and inversely the naturalness of functioning as patient of such' (Silverstein 1976:113; compare Dixon 1979:86). Silverstein accounts for the typological universals in terms of natural agency: humans are more likely to be natural agents (and conversely, nonhumans or inanimates are more likely to be natural patients; Silverstein, 1976:123). The less natural agents are marked ergative, and the less likely patients are marked accusative. (The proposal in Croft [1988] is essentially the same as Silverstein's.)

The typological prototype pattern also lends itself to Comrie's explanation in terms of efficiency (Comrie 1978): only mark an argument overtly for its grammatical relation if it might be mistakenly assigned the opposite grammatical relation by the listener (e.g. an agent low in animacy might be interpreted as a patient unless overtly marked otherwise). This is certainly true for the human–nonhuman distinction on the animacy hierarchy, and is borne out by frequency data (Greenberg 1974b:25). However, neither the natural agency nor the efficient-distinguishing theory accounts for differences in the person hierarchy, particularly for personal pronouns. It is common for third person pronouns to refer to humans, just as first and second person pronouns do, and humans do not differ from each other in natural agentivity. Perhaps the fact that third person pronouns do not *always* do so will suffice to explain the ranking 1, 2 < 3.

Wierzbicka (1981) argues against the efficient-distinguishing and natural-agency theories of split ergativity, and proposes that topicality, along with semantic role, is the primary determinant of the presence of case marking. Split ergativity between first/second and third person represent the natural topicality of the speaker and addressee, rather than their natural agency. Wierzbicka's analysis works best when the split is between first/second person and third person, but not for splits on the animacy hierarchy.

DuBois offers a slightly different topicality-based analysis of person-based splits (DuBois 1985; 1987). DuBois argues that accusative languages represent the conventionalization of the prototypical agent–topic type, manifested by categorizing together S and A. DuBois notes that the vast majority of clauses in naturally occurring language have zero or one nominal argument only, and very few clauses have two nominal arguments (compare Payne 1987; Lambrecht 1987; Mithun 1987; and also Haiman 1985:244, citing Behrens 1982:161). More specifically, DuBois observes that the one nominal argument usually found with transitive verbs is almost always P. The reason for this, DuBois hypothesizes, is that transitive subjects are almost always the continued topic and are therefore pronominal. New participants, that is nominal arguments, are almost always introduced as S or P participants. DuBois proposes a **preferred argument structure** of verb + absolutive NP. This structure is the motivation for the existence of ergative alignment: the NPs that occur most commonly, that is, the absolutive NPs, are zero coded.

This analysis leaves DuBois with motivations for ergative and accusative alignments. DuBois further refines his analysis to account for split-ergative patterns. He notes that accusative–ergative splits divide speech-act participants (first and second person) from nonparticipants (third person), and the speech-act participants are aligned accusatively, nonparticipants ergatively (see §6.3.1). DuBois argues that speech-act participants are inherently given, and so can never be new participants. Therefore his discourse motivation for ergative alignment does not apply, and instead the accusative alignment always applies.

DuBois' analysis predicts that no languages exist in which a split-ergative pattern occurs so that first and second person follow ergative alignment, and third person accusative alignment. This is confirmed empirically. More precisely, DuBois' analysis makes the stronger claim that in all languages, first and second person follow accusative alignment, while third person can possess either ergative or accusative alignment. This stronger claim is false, however: for example, first/second person A argument NPs are marked with ergative case in Basque and Eskimo, and trigger ergative indexation in Tzotzil and in the perfect in Hindi. Also, some languages split case marking on the animacy hierarchy rather than the person hierarchy.

In addition to splits in coding participant roles based on the animacy and definiteness of the participants, there are systems in which only the perfective aspect (or sometimes past tense, which historically is derived from perfective aspect) has an ergative alignment, while the imperfective/present has an accusative alignment. This is illustrated here for Gujarati (DeLancey 1981:628–69; see also DeLancey 1982):

(44) Ramesh pen khərid -t -o hə -t -o
Ramesh.**M** pen.F buy -IMPF -**M** AUX -IMPF -**M**
'Ramesh was buying the pen.'

(45) Ramesh -e pen khərid -y -**i**
Ramesh.M -ERG pen.**F** buy -PRF -**F**
'Ramesh bought the pen.'

Since the nominative is the typologically unmarked value in the accusative alignment, the imperfective aspect is therefore associated with an unmarked A argument, and since the absolutive is the typologically unmarked value in the ergative alignment, the perfective aspect is associated with an unmarked P argument. Combining this pattern with the previous ones yields a participant role–animacy–aspect correlation (DeLancey 1981):

Participant role:	A	→	P
Animacy:	1, 2	→	3
Aspect:	imperfective	→	perfective

This pattern cannot obviously be accounted for in terms of natural agency, or even topicality. DeLancey, focusing on the person hierarchy in case marking and on the interaction of aspect with case marking, proposes an account based on deixis and a spatial metaphor. The distinction between first/second person and third person is one of spatial orientation: toward (or at) the speech event vs. away from the speech event. The agent–patient relation and imperfective-perfective distinction can be represented metaphorically as motion from the agent to the patient (i.e. transmission of force from the agent to the patient; see Lichtenberk 1985; Langacker 1987; Croft 1991a). DeLancey (1981) draws these three correlations together by identifying the correlation as representing the speaker's viewpoint on the event: moving from agent to patient in the event is metaphorically interpreted as moving away from the speech situation.

No single analysis explains all of the complex data surrounding animacy and case marking. It is quite likely that expressive efficiency, natural/expected filler of a semantic role, topicality and a deictic metaphor are all factors determining the typology of predicate–argument encoding.

The transitivity prototype is somewhat different. It is sensitive to a situation with two highly salient participants.[6] Hopper and Thompson (1980) examine narrative texts for the distribution of transitive and intransitive clauses. They argue that the presence of transitive clauses correlates with **foregrounding**, the presentation of information that carries the narrative along. The presence of intransitive clauses correlates with **backgrounding**, the presentation of information that elaborates or modifies the basic narrative line without carrying it forward. Hopper and Thompson then argue that the foregrounding–backgrounding distinction is the explanation for the grammatical transitive prototype. That is, transitive encodes the foregrounding of information, and intransitive encodes the backgrounding of information. The remaining correlations follow because foregrounded information tends to be telic, punctual, volitional, etc., and backgrounded information tends to be stative, durative, nonvolitional, etc.

However, the correlation of foreground with high transitivity and background with low transitivity is not complete (DeLancey 1987:55), and there appears to be no reason to posit the foreground–background distinction as causally prior to

[6] There is also an empirical problem with the transitivity definition, because the 'special accusative case marker', e.g. *ko* in Hindi, is often identical to an oblique marker (in this case, the dative). This can lead to paradoxes if the special accusative case for a high-transitivity object is also used to make a low-transitivity object into an oblique. For example, in Russian, human masculine P's take a special accusative marker, e.g. *Marija ubila Ivan-**a*** (Mary killed Ivan-ACC) 'Mary killed Ivan', and therefore are indicators of high transitivity. Also, objects that are only partly affected are placed into an oblique case: *Ivan s''el xleb-**a*** (Ivan ate bread-GEN) 'Ivan ate some bread', and therefore are indicators of low transitivity. But the 'accusative' case is actually the genitive, and the 'oblique' case is also the genitive (for many nouns; some nouns take a special partitive case in *-u*).

e other properties that make up the transitivity prototype. Hopper and Thompson argue that the discourse function of foregrounding–backgrounding is causally prior to the cluster of semantic properties. DeLancey, on the other hand, argues that neither the clustering of semantic grammatical properties nor the correlation of the prototype with discourse properties is causally prior: both are derived from human cognition. The semantic properties cluster together because they represent a cognitively salient type, à la Rosch: 'the various transitivity parameters cohere in the way that they do because they code aspects of a coherent semantic prototype' (DeLancey 1987:55). The correlation with foregrounding can be explained by cognitive salience: 'transitivity in morphosyntax is associated with foregrounding in discourse because events which approximate the transitive prototype are more likely to be of interest, and thus inherently more likely to constitute foregrounded information' (DeLancey 1987:55). Of course, cognitive salience must be defined and psychologically confirmed. However, as DeLancey correctly points out, one cannot assert the causal priority of discourse function over semantic structure without a virtually perfect correlation (DeLancey 1987:55, citing an unpublished paper by Russell Tomlin).

6.4 Parts of speech

In §3.2, it was mentioned that one of the relatively few unrestricted universals is that all languages have nouns and verbs. However, it is not entirely clear how one can define the categories noun or verb in a universal sense. The methods of typological analysis presented so far allow one to make significant steps both in verifying the universality of nouns and verbs and in defining the two categories.

The first typological analysis of relevance to this problem was of a part of speech whose universality has been repeatedly contested: adjectives. Cross-linguistically, the category identified with the label 'adjective' varies much more than those labeled 'noun' and 'verb'. In some languages, such as English, there is a large class of adjectives which can be added to quite easily; adjectives form an **open class**. In a number of other languages, such as Hausa, there is a small **closed class** of words, defined on internal grammatical criteria, which is generally identified with the adjective category. In yet other languages, such as Chinese, it is claimed that adjectives do not exist (e.g. McCawley 1992), and the translation equivalents of English adjectives are assigned to the categories noun or verb, depending on their grammatical behavior.

Dixon (1977, first circulated 1970) conducted a typological study of languages with closed classes of adjectives, and compares them to languages with open classes and languages without adjectives. Dixon observes that languages with a

small closed adjective class tend to include words referring to a specific set of concepts. An example of such a system is Igbo (Welmers 1973:259):

úkwú	'large'	ńtà	'small'
ọ́hụ́'rụ́	'new'	ócyè	'old'
ójí'í	'black, dark'	ọ́cá	'white, light'
ọ́má	'good'	ọ́jọ́'ọ́	'bad'

The basic adjective concepts include dimension, age, color and value ('good'/'bad'). Dixon formulates the following generalizations: If a language has an adjective class, it will include words referring to the basic adjective concepts (dimension, age, color, value) in that class. If a language includes nonbasic adjective concepts in the adjective class, then it will include basic adjective concepts in that class (Dixon 1977:56, generalization (a)).

Evaluating these universals as typological distributional statements, it can be seen that concepts referring to dimension, age, color and value are typologically unmarked as adjectives. Dixon provides additional evidence that suggests this is a typological markedness pattern. Rotuman has an open adjective class, but only the following have distinct singular and plural forms (Churchward 1940:39):

ti'u	'big'	mea'mea'	'small'
roa	'long'	luka	'short'
hepa	'broad'	jiakjika	'narrow, thin'
'atakoa	'whole, complete'		
		mafua	'old'
kele	'black'	fisi	'white'
		mi'a	'red'
		hani	'female'

In Acooli, there is a closed class of about forty adjectives, only seven of which inflect for number (Dixon 1977:23, citing Crazzolara 1955):

dîît	'great, big, old (persons)	tëdi	'small, little'
dwóò	'big, large (volume)		
boòr	'long, high, distant'	ceèk	'short'
bɛ̀ɛ̀r	'good, kind, nice, beautiful'	raàc	'bad, bad tasting, ugly'

Dixon's analysis provides an external basis for the comparison of lexical categories, the semantic class of the lexical items. However, semantic class alone is an insufficient external basis to identify parts of speech. In addition, propositional act functions are required (Croft 1991a; 2001; see Searle 1969). The propositional acts are **reference**, **predication** and **modification**, the latter being a secondary propositional act which can aid to establish reference (restrictive

modification) or assert a secondary predication (nonrestrictive modification). If we then examine combinations of values of semantic class and propositional acts, there is cross-linguistic evidence for three typological prototypes, corresponding to the traditional parts of speech. The typological prototypes, and the traditional names of constructions overtly coding nonprototypical combinations of semantic class and propositional act, are given in Table 6.2 (see Croft 1991a:67, Table 2.6).

Table 6.2 *Overtly marked structural coding constructions for parts of speech*

	Reference	Modification	Predication
Objects	UNMARKED NOUNS	genitive, adjectivalizations, PPs on nouns	predicate nominals, copulas
Properties	deadjectival nouns	UNMARKED ADJECTIVES	predicate adjectives, copulas
Actions	action nominals, complements, infinitives, gerunds	participles, relative clauses	UNMARKED VERBS

The typological prototypes for parts of speech are given in 46 (see Croft 1991a, chapters 2–3 for precise semantic/pragmatic definitions of semantic class and propositional act):

(46) noun = <object, reference>
verb = <action, predication>
adjective = <property, modification>

English illustrates most of the structural coding asymmetries in its syntax. Property reference requires a nominalizing suffix on the property word: e.g. *leng-**th***, *red-**ness***. Property and object predications require a copula: *Emma **is** tall*, *Emma **is a** student.* Reference to actions involves overt nominalization or complementation; action modification involves overt coding as participles or relative clauses. In sum, structural coding is manifested by the typological distribution of derivational morphology that does not also involve a major semantic change, across classes of concepts and grammatical functions (see Table 6.2).

This is a typological markedness pattern, which implies that languages may exist that use zero coding to indicate the typologically marked combinations of semantic class and propositional act. For example, Lakhota inflects predicate nominals and adjectives directly (Rood and Taylor 1976):

(47) ni- wašte
2SG.STAT- good
'You are good.'

(48) ma- lakhota šni
1SG.STAT- Lakhota NEG
'I am not a Lakhota.'

Genitive constructions may also involve zero coding, as was illustrated in §2.1 with Kobon:

(49) Dumnab ram
Dumnab house
'Dumnab's house'

In addition to overt verb nominalizations, English has a large number of zero nominalizations, such as *march, fall* and *split*. The typological pattern, however, predicts only that one will not find examples of languages in which words denoting actions require a derivational affix in order to be predicated, but words denoting objects or properties will not.

Behavioral potential also distinguishes the prototypes for parts of speech from other combinations of semantic class and propositional act, across languages. For example, a predicate nominal in K'iche' (i.e. object predication) indexes its subjects just as verbs do, but it may not take the tense/aspect prefixes (Mondloch 1978; see Croft 1991a:82):

(50) ?in (*k)- in- ačih
I (*PRS)- 1SG.ABS- man
'I am a man.'

The infinitive verbal noun in Turkish (i.e. action reference) does not allow subjects, while a verb functioning as a predicate does, of course; but as a noun the infinitive has less behavioral potential than prototypical nouns as well, since it does not allow the possessive personal suffixes or the genitive case. The infinitive does allow the accusative suffix (for definite direct objects), like nouns, and may govern direct objects, like verbs (Lewis 1967:167–68):

(51) ekmek al- mağ -ı unuttu
bread buy -INF -ACC he.forgot
'He forgot to buy bread.'

As with the case of person in §6.1.2, the cross-cutting categories relevant for behavioral potential vary with the value of the propositional act category. The relevant behavioral potential for reference are the traditional nominal inflectional categories of number, gender and case; for predication they are the traditional

verbal categories of tense, aspect, mood and person indexation; and for modification they are the traditional adjectival categories of degree and nonperson indexation.

The typological analysis of parts of speech demonstrates the existence of a large set of related implicational universals specifying constraints on the structural coding and behavioral potential of the logically possible combinations of semantic class and propositional act. These universals point to typological prototypes that correspond to the intuition behind traditional parts of speech (compare Sapir 1921:119).

Combining these two external functional parameters produces the conceptual space for parts of speech in Figure 6.5 (Croft 2001:92).

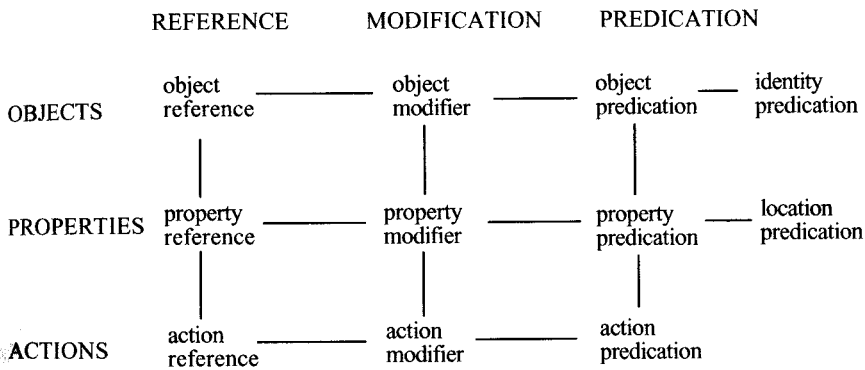


Figure 6.5 *Conceptual space for parts of speech*

Stassen (1997), a major study of predication, exploits the semantic map model in detail in order to identify universals of categorization of the predication of different semantic types and how they are encoded. His analysis, covering 410 languages, firmly establishes the predication dimension of the conceptual space in Figure 6.5, in particular the implicational hierarchy of predication action < property < object (Stassen 1997:127; see also Croft 1991a:130). Stassen also adds further points and links to the conceptual space, namely location predication (*Jenny is in the bedroom*) and identity predication (*The girl in the red dress is Sarah*). Stassen also discovered a biconditional universal governing the coding of predication (his Tensedness Parameter): if there is an obligatory affix on a predicated action that codes the past/nonpast tense distinction, then property predication is 'nouny' (i.e. grammatically the same as object predication); if not, the property predication is 'verby' (i.e. grammatically the same as action predication). Stassen suggests

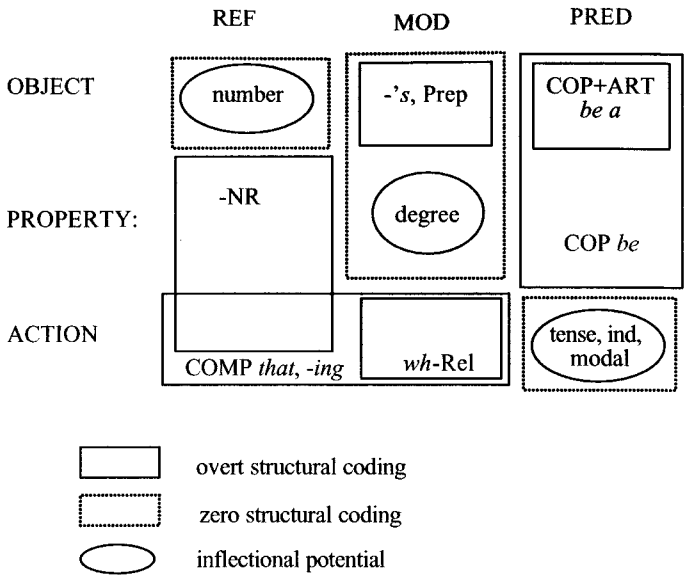


Figure 6.6 *Semantic map of English parts of speech constructions*

that the explanation for this universal is that prototypical properties are generally inherent properties of the referent, and hence temporal distinctions are not relevant to their predication. Hence, if temporal expression is obligatory in predication, then property predication will not be categorized in the same way as action predication; if it is not, then it will be.

Since there is such a large number of constructions involved in defining parts of speech, some of the typological hierarchies can even be observed in the relevant semantic maps for a single language. Figure 6.6 gives the semantic map for English (adapted from Croft 2001:99, Figure 2.3). English is relatively generous with overt structural coding of nonprototypical points in this conceptual space (indicated by solid square maps), and relatively stingy with behavioral potential in the same points (indicated by solid ovals; however, finite relative clauses and complements do inflect for tense, mood and indexation, not indicated in the figure). Hence, the prototypes for parts of speech, and the nonprototypical regions, are clearly apparent in the semantic maps. Moreover, English requires not only a copula but the indefinite article (overt *a* in the singular) in object predication. Hence, one can even observe the hierarchy of predication in English alone. More generally, cross-constructional variation within a language is expected to conform to the same universals as cross-linguistic variation (Croft 2001:105–08).

6.5 Other prototypes and markedness reversals

The relationships among animacy, definiteness, case and verbal aspect have received the greatest amount of attention in the typological literature, because they play such a dominant role in determining the structure of clauses. Nevertheless, there are a number of other typological patterns of interaction among parameters, and certainly many more that have yet to be discovered.

In addition to the typological prototypes for A and P described in §6.3.1, one also finds typological prototypes for certain oblique phrases (Croft 1988:171; compare Tiersma 1982:843, Principle 2). Deictic terms, proper names and common nouns referring to places and times are often zero coded when occurring as locative or temporal expressions; compare Yoruba to English and Malay:

Yoruba (Rowlands 1969:29)

(52) mo rí i **l-** óní
I see him LOC- today
'I saw him today.'

English

(53a) George Washington slept Ø here.

(53b) George Washington slept **in** this bed.

Malay (Dodds 1977:13)

(54) ke-Ø 'to'/dari-Ø 'from' + noun phrase denoting a place
ke-**pada** 'to'/dari-**pada** 'from' + noun phrase denoting a person

The typological unmarkedness of the combination of place terms and locative relations is further supported by frequency data collected by Greenberg for Russian (1974b). Russian uses a construction of preposition + accusative case for directional phrases and preposition + prepositional (locative) case for locative phrases (see examples in §1.4). Greenberg computes frequencies for nouns of various classes in each case and states: 'The place names . . . may be characterized as having a low nominative, a high accusative and, as would be expected, a very high prepositional [case frequency], far higher than that in any other category' (Greenberg 1974b:26).

It has also been observed (e.g. Tiersma 1982) that certain noun classes tend to be zero coded in the plural instead of in the singular. Tiersma provides examples from diachronic processes in Frisian (his Principle 1; see chapter 8 for discussion of the relationship between diachronic process and typological markedness). Evidence for the typologically unmarked combination of certain semantic classes with plural number is found in synchronic alternations as well, in which the zero

coded plural is generally called a **collective** and the marked singular a **singulative**, a pattern particularly common among Semitic and Nilo-Saharan languages. The typological generalization is that the same semantic classes tend to have zero coded collective forms and overtly coded singulative forms (the prefixes in Turkana are fused gender-number markers):

(i) small objects that tend to occur together, yet are distinct to the naked eye (especially foodstuffs):

Russian:	soloma/solom**inka**	'straw/a straw'
(Wierzbicka 1985:324)	krupa/krup**inka**	'groats, grain/a grain'
	gorox/goroš**ina**	'peas/a pea'
Turkana	ŋɪ-ɲa`/ɛɲa-**ɪt**	'grass/a blade of grass'
(Dimmendaal 1983:228)	ŋɪ-màrɛ̀/ɛ-màr-**ɛt**	'beans/a bean'
Syrian Arabic	šaʕᵊr/šaʕr-**a**	'hair/a hair'
(Cowell 1964:297)	xass/xass-**e**	'lettuce/head of lettuce'

(ii) animals, birds and people, which also tend to occur in groups:

Turkana	ŋi-tùrkanà/e-turkàna-**ɪt**	'the Turkana/a Turkana [person]'
	ŋi-tyaŋ̀/e-tyàŋ-**ɪt**	'wild animals/a wild animal'
Syrian Arabic	baʔar/baʔar-**a**	'cattle/a cow'
	badu/badaw-**i**	'Bedouin/a Bedouin'

In some languages, the only collective–singulative alternation found is with the word for 'person', e.g. Kanuri (Hutchison 1981) and Amharic (Leslau 1968). Finally, the zero coded English plurals for some wild creatures (*deer*, *moose*, *fish*, *trout*, *salmon*) and for tribes (*the Turkana/Mohawk/Tiwi*) is probably an instance of this same typological phenomenon;

(iii) body parts and other items that occur in pairs:

Turkana	ŋa-kì/a-k-**it`**	'ears/an ear'
	ŋa-muk`/a-muk-**àt**	'shoes/a shoe'

Thus, one finds a typological prototype combining plural number and nouns referring to objects that normally come in groups (or pairs). Presumably, these nouns are those whose referents are most likely to occur more frequently in the plural than in the singular, although the relevant evidence for the frequency criterion of typological markedness has not been gathered for this correlation.

Tiersma (1982) provides another example, this time between verb class and person indexation. In contrast to the general pattern of zero-marked indexation in the third person (see §§4.3 and 6.3.1), Tiersma suggests that for verbs of perception

and emotion (**mental verbs**), the first person is the least marked value for the experiencer of the mental state (1982:846, Principle 3). Japanese also supports this pattern. Certain mental verbs allow basic forms in the affirmative for first person, but forms with *garu* for second or third person (Kuno 1973:83–84):

(55) Boku wa eiga ga mi -tai
I TOP movie NOM see -want.PRS
'I am anxious to see movies.'

(56) John wa eiga o mi -ta **-gatta**
John TOP movie H see -want **-show.sign.of:PST**
'John is anxious to see movies.' [literally 'John showed a sign of being anxious to see movies']

The motivation for this pattern is presumably that reference to one's own mental state is more expected than to another's, because one can have direct access to one's own mental states, but not to another's.

Another example of a third person / first person markedness reversal that has some typological support is the possession of kin terms. In Lakhota, possession is usually expressed with a zero coded third person singular form (Boas and Deloria 1941:131):

(57) **mi-** t'a- woyuha
1SG- AL- household.goods
'my household goods'

(58) Ø- t'a- šųke
(3SG) AL- horse
'his/her horse'

However, with many kin terms, the first person form is zero and a nonzero third person possessive suffix found only with these terms is used (Boas and Deloria 1941:129):

(59) Ø- lekši
(1SG-) MoEldBro
'my mother's elder brother'

(60) lekši **-tku**
MoEldBro **-3SG.POSS.KIN**
'his/her mother's elder brother'

A similar phenomenon is found in Ngandi. A special set of possessive prefixes is used for kin possession; the first person form of this set is zero (Heath 1978:38):[7]

[7] As in Lakhota, the inflection of kin terms for possession is morphologically somewhat irregular. Also, the regular possessive suffixes may also be used, and the kin term possessive prefixes for second and third person may be dropped, especially when those suffixes are used (Heath 1978:38).

(61) ṇa- Ø- guṛač
F.SG- (1-) Eld.Si
'my/our elder sister'

(62) ṇa- **maɽ-** guṛač
F.SG- **2.POSS.KIN-** EldSi
'your elder sister'

(63) **ɽoŋ-** guṛač F.SG-
3.POSS.KIN- EldSi
'his/her/their elder sister'

Finally, it is worth noting in this regard the use of the unmarked kin terms *mother, father*, etc. in English to refer to 'my mother', 'my father', etc. Here, the motivation is presumably that reference to one's own kin is more expected than to another's.

The typological universals of structural coding for collective nouns, (possibly) mental verbs and kin-term possession can be described in implicational universal form: if a language has any zero plural / overt singular forms, they will be found on collective nouns; if a language has any zero first person / overt third person inflections, they will be found with mental verbs or with kin term possession.

6.6 Conclusion

This chapter has presented typological universals constraining the interaction of a wide range of semantic (and phonetic) parameters in grammatical (and phonological) expression. These universals touch on some of the most fundamental categories of syntactic structure, parts of speech and grammatical relations. The patterns are extremely complex, because they involve a large number of interacting dimensions. Nevertheless, these dimensions can be represented in conceptual space, and the constraints on their interaction and encoding can be described using the same principles of the mapping of function onto grammatical form that were described in the preceding chapters.

The analysis of the interaction of values requires a revision to the theory of typological markedness presented in §4.3. Combinations of values from different categories, as well as individual values, exhibit structural coding and behavioral potential. More significantly, behavioral potential varies depending on which potential cross-cutting category is combined with the value/combination of values in question. It was suggested in §6.1.2 that salience of the cross-cutting category with respect to the value(s) in question directly gives rise to behavioral potential, while text frequency motivates the loss of behavioral potential.

The causal relations holding between the properties of typological markedness and their postulated motivations are diagrammed in Figure 6.7.

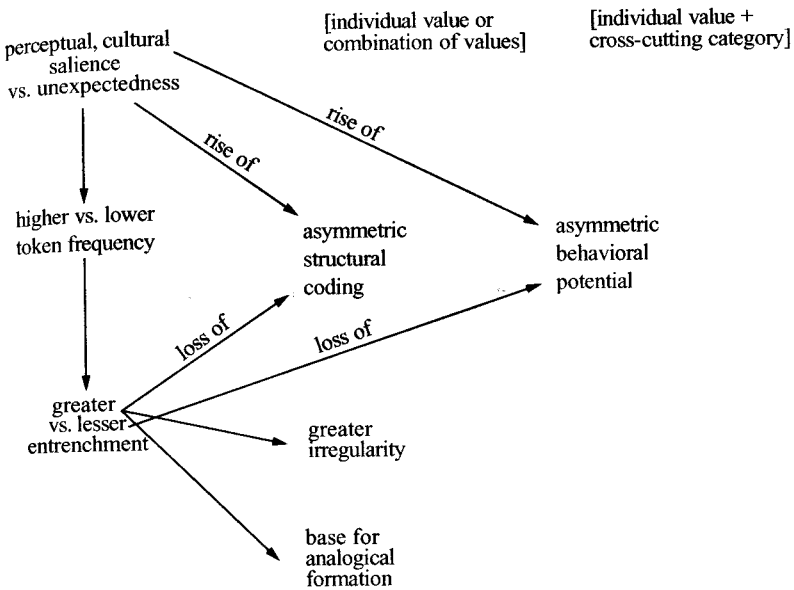


Figure 6.7 *The causal structure of typological markedness*

The next chapter will turn to the consequences of the typological approach for syntactic argumentation and the analysis of syntactic structure.

7

Syntactic argumentation and syntactic structure in typology

In chapter 1, we described the three types of typological analysis – typological classification, typological generalization and (functional–)typological explanation – as the three stages in the process of doing empirical science. We also noted that these three stages are interleaved in all scientific practice, typology included. In the subsequent chapters, we made use of this by discussing explanations along with the typological universals (generalizations) that were described in those chapters.

Typological generalization presupposes a basis of cross-linguistic comparison, and in §1.4 we argued that the basis for cross-linguistic comparison is ultimately external, that is, semantic and discourse function for morphosyntax, and phonetic reality for phonology. Thus, the types of universals that one can identify through cross-linguistic comparison are universals of the relationship between linguistic form (morphosyntactic or phonological) and external function or reality. This is the sense in which the typological approach to grammar is functionalist.

The functional–typological approach does not eliminate linguistic form from analysis; far from it. The functional–typological approach does not deny the existence of arbitrariness in grammar (Croft 1995a:504–09). It takes the existence of variation across and within languages as evidence that grammatical structures result from an interplay of convention (which is arbitrary; Lewis 1969) and functional motivation. In fact, typology is more inclined to accept the existence of arbitrariness in language than formalist approaches which seek to explain virtually every idiosyncratic fact, or (nontypological) functionalist approaches that attempt to do the same thing (see §§1.3, 9.2). Nor does the functional–typological approach eliminate linguistic form from explanation. The explanations described in the preceding chapters lies in the *relationship* between linguistic form and external function.

The kinds of generalizations and deeper principles found in typology are quite different from those found in other approaches to grammar. This is presumably a consequence of the inductive typological method and the issues it raises, particularly the need for an external basis for cross-linguistic comparison. In this chapter, we will discuss the consequences of the typological approach for syntactic argumentation and the representation and explanation of syntactic structure.

7.1 Typology and syntactic argumentation

In §1.3, the method of syntactic argumentation in structuralist and generative analysis was illustrated by a set of English sentences, repeated here:

Case marking:	He congratulated him/*he.
Verb indexation:	Teresa likes/*like horses.
Null argument:	
in nonfinite forms:	Jack$_i$ wants Ø$_i$ to leave.
in imperatives:	Ø Take out the garbage.
in co-ordination:	John$_i$ found a ring and Ø$_i$ took it home with him.

As noted there, this method is called distributional analysis and was first codified by American structuralists (e.g. Bloomfield 1933; Harris 1946; 1951). In distributional analysis, one identifies a range of syntactic contexts, that is constructions or sentence types in which the grammatical phenomenon under study might or might not occur, and identifies the pattern of occurrence or non-occurrence; this is its distribution.

All syntactic approaches, including the typological approach, use distributional analysis. For example, in typology the comparison of which values occur in zero coding and overt coding constructions is distributional analysis. The exploration of behavioral potential (inflectional and distributional) is distributional analysis. However, the way distributional analysis is used in other syntactic approaches differs from the way it is used in typology. In other syntactic approaches, the strategy is to construct as many **arguments** as possible to support one's formal structural analysis. For example, the sentences above represent five independent arguments (also known as tests or criteria) for establishing the immediately preverbal NP in English as the formal category subject of the sentence (see the discussion of examples 3–7 in §1.3).

However, this strategy runs into serious problems across languages and also within a single language (the usual domain of syntactic argumentation in other approaches). From a cross-linguistic perspective, one problem that arises is that the criteria or constructions typically used to identify a category may not exist in another language. For example, some languages lack case marking of A and P, or their verbs do not index A or P. Other languages, such as Wardaman, lack infinitival complements and verb phrase coordination, the constructions used above to define subject in English (Croft 2001:29–34).

A second problem with this strategy for syntactic argumentation is that when the constructions do exist in the other language, they establish categories that are so different from the categories established in Standard Average European languages that one does not know how to compare them to the familiar European languages. A classic example of this problem is that of ergativity. In ergative

languages, case-marking and/or indexation patterns splits English-type subjects (S + A) and instead combines S with English-type objects (P), leaving A as a distinct category. The question is, which category, if either, in an ergative language should be identified with the English category subject? Is the subject category in fact universal?

The semantic map model developed in typology offers a solution to this problem. The semantic map model does not assume that categories are universal across languages. It only assumes that conceptual space (and phonetic space) and certain relations between points (categories) in conceptual space are universal. Linguistic categories are language-particular. In fact, the degree of cross-linguistic variation in categories suggests that the semantic map model will be more successful in representing linguistic categories than an approach which assumes the existence of a set of universal categories (see Dryer 1997c; Croft 2001). Moreover, as was argued in chapters 5 and 6, there are language universals that can be captured if one accepts that languages differ in their grammatical categories (e.g. ergative vs. accusative alignment). In fact, there are general principles of the relationship between form and function which can be identified no matter what the language-specific categories are, such as structural coding, behavioral potential, text frequency, and the Semantic Map Connectivity Hypothesis.

This solution does mean that the typological approach will not produce a model of syntactic representation consisting of an inventory of universal categories that are to be applied to all languages, which is the chief feature of the model of syntactic representation found in other approaches. Other approaches use a different strategy to deal with the problem of cross-linguistic variation. This strategy can be illustrated again with the phenomenon of ergativity. It turns out that in many ergative languages, only case-marking and/or indexation patterns have an ergative alignment (A vs. S + P). In those languages, the null argument constructions described above (imperative, infinitive, coordination) have accusative alignment: the null argument is A + S, not S + P. For example, in Basque, a language which displays ergative-absolutive case marking and verb indexation, the null argument in nonfinite complements is A + S (Anderson 1976a:12, examples corrected by Iraide Palacios, pers. comm.):

(1) joan nahi dut Ø
go.INF desire I.have.it (I)
'I want to go.'

(2) egin nahi dut Ø
do.INF desire I.have.it (I)
'I want to do it.'

Anderson then argues that languages like Basque display 'surface' or 'morphological' ergativity, but 'deep' (or 'syntactic') accusativity: 'most . . . morphologically

ergative languages are ergative only superficially: in syntactic terms, they are accusative' (Anderson 1976a:18). Thus, Basque is essentially an accusative language, with the same notion of subject that English has, and therefore the universality of the subject category as A + S is preserved (almost; see below). Anderson's terms also represent an implicit valuation of some constructions over others in determining categories in a language.

This strategy is the standard approach when faced with conflicting or variable grammatical evidence in a language or across languages: set aside the constructions whose distribution conflicts with the posited universal category, and use only the constructions whose distribution fits the category posited. For example, a textbook case of conflicting evidence in English is the evidence for the category of (direct) object. Direct objects are the zero coded noun phrase that immediately follows the verb in the active voice, and also occur as the subject of the corresponding passive voice construction:

(3) Jack ate all the brownies.
(4) All the brownies were eaten by Jack.

However, not all direct objects in the active construction can occur as subjects of a corresponding passive construction:

(5) Jack weighs two hundred pounds.
(6) *Two hundred pounds is weighed by Jack.

In this case, it is generally argued that the ability to occur as the passive subject is the 'real' argument or test for direct objecthood, and so the postverbal noun phrase of *weigh* is not a direct object.

This strategy has a serious weakness from an empirical point of view. It does not account for the distribution patterns that do not fit the assumed universal category. Nor does it offer a principled reason why certain distribution patterns define universal categories and others do not; or why a distribution pattern defines a universal category in one language but the same pattern does not in another language (Croft 2001:30–31). As Corbett puts it with regard to a different example, 'It will not do to play "fast and loose" with the criteria, choosing whichever suits us in a particular case' (Corbett 2000:66).

But from a typological point of view, perhaps the most serious weakness is that this strategy overlooks significant language universals that can be discovered by looking at the discarded distribution contexts. Corbett continues: 'We should rather investigate the criteria, and see what the relations between them are' (2000:66). For example, the patterns that Anderson essentially ignores as 'superficial', case marking and indexation, participate in a wide range of typological universals, a number of which have been described in the preceding chapters.

Moreover, even deeper language universals can be discovered by examining all the distributional contexts at once, whether they match in a particular language or not. For instance, it is well known that case-marking is the most highly variable grammatical phenomenon associated with the core participant roles S, A and P. Indexation tends to follow an accusative alignment more frequently. For example, in Georgian, an accusative indexation alignment is found in the aorist tense series (traditionally described as Series II) combined with an active case-marking alignment that splits S into two subcategories (Harris 1982:293):

(7) vano -m gamozarda ʒma
Vano -ACT **3SBJ/3OBJ**.grow.II brother.**NOM**
'Vano raised his brother.'

(8) rezo gamoizarda
Rezo.**NOM** **3SBJ**.grow.II
'Rezo grew up.'

(9) bavšv -ma iṭira
child -ACT **3SBJ**.cry.II
'The child cried.'

Such languages demonstrate that 'morphological' constructions can be split in the way they categorize A, S and P. But from a typological perspective, it turns out that almost all languages conform to the following implicational universal (Croft 2001:153):

(10) If the case-marking pattern in a language has an accusative alignment (where case-marking of S, A and P exists), then verb indexation also follows an accusative alignment in that language, if indexation exists.

Likewise, 'syntactic' constructions in a single language can be split in the way they categorize A, S and P. For example, in Aguacatec, as in English, cleft constructions are formed with a relative clause. If the S or P argument is clefted (focused), the verb remains in the zero coded active voice (Larsen 1981:137; a vertical stroke separates the clefted element from the relative clause):

(11) yaaj | m- Ø- **u?l**
man NEAR.PST- 3SG.ABS- **arrive.here**
'It was the man [S] that arrived'

(12) b'u?y | n- Ø- x- **tx'aj** xna?n
rag NEAR.PST- 3SG.ABS- 3SG.ERG- **wash** woman
'It was the rag [P] that the woman washed.'

If the A argument is clefted, the verb must be put into the overtly coded focus antipassive voice (1981:137; compare example 31 above):

(13) xna?n | n- Ø- **tx'aj** **-oon** b'u?y
woman NEAR.PST- 3SG.ABS- **wash** **-ANTI** rag
'It was the woman who washed the rag.'

In other words, cleft constructions follow an ergative alignment.

On the other hand, coordination with the particle *-tz* in Aguacatec follows an accusative alignment. The particle *-tz* is used to indicate coreference of the A or S participant with an A or S participant in an earlier clause. This alignment is illustrated with the following passage from a narrative (Larsen 1981:141; note that *-tz* need not be suffixed to the coreferential noun phrase):

(14) b'een tilool Lu? ye teele?n tzaaj chichoojo?n kob'ox ajpayaaj
he.saw.it Pedro the its.leaving hither their.pay some merchant
'Pedro [A] saw some merchants receiving their pay,...

niin tzun b'een ii? **-tz** tan k'otle?n juun jul tzi b'ee?
and then he.went he to its.being.dug one hole at.edge road
'he [S] went to dig a hole at the side of the road,...'

niin kyaaj kyeen tq'ol q'aaq' **-tz** tk'u?l jul
and he.left.it fire in.it hole
'and **he** [A] left a fire inside the hole;...'

In other words, coordination with *-tz* follows an accusative alignment.

In a very few languages, such as Dyirbal (Dixon 1972), virtually all syntactic constructions appear to have an ergative alignment, and so the problem of how to define subjects universally arises anyway. But, in fact, the occurrence of ergative alignment in relative clauses, purpose clauses and coordination form a hierarchy (Kazenin 1994). This hierarchy can be combined with the ranking of case-marking and indexation above to form the Subject Construction Hierarchy (Croft 2001:155; see Cole et al. 1980 for diachronic evidence supporting a simplified version of the hierarchy):

(15) *The Subject Construction Hierarchy*:
coordination < purposive < relativization < verb indexation < case marking

The Subject Construction Hierarchy is related to the cross-linguistic patterns described above as follows:

(16a) If a language has an ergative alignment for a construction on the Subject Construction Hierarchy, then it has an ergative alignment for all constructions to the right of it on the hierarchy.

(16b) If a language has an accusative alignment for a construction on the Subject Construction Hierarchy, then it has an accusative alignment for all constructions to the left of it on the hierarchy.

The Subject Construction Hierarchy is a language universal that can only be described by abandoning the strategy of marshaling as many arguments as possible

in favor of a grammatical category, and discarding the ones that do not support the category. Instead, by looking at all the relevant distributional contexts at once and across languages, one can discover universals such as the Subject Construction Hierarchy.

For this reason, the method of syntactic argumentation used in typology is different from that used in other approaches to syntax. A typologist examines a set of constructions (distributional contexts) within and across languages, and seeks patterns which are almost always patterns of cross-linguistic variation. Those patterns are typological universals that typically must be formulated as implicational universals (or sets of implicational universals defining hierarchies or typological prototypes).

The difference in method of argumentation is associated with a difference in goals. The standard method of argumentation is used because of the assumption of the existence of universal grammatical primitives that make up formal syntactic theories. In typology, it is argued that such a goal is futile because of the degree of variation across and also within languages in the expression of grammatical fundamentals such as parts of speech and grammatical relations. Instead, the goal of typology is to uncover universals of language, most of which are universals of grammatical variation. The value of this approach is that, as suggested in §6.4, universals of variation across constructions within languages conform to the same general principles as universals of variation across languages.

The method of phonological argumentation in typology differs from that in formal phonological theories in exactly the same way. Phonological argumentation is based on establishing phonological categories, that is, phonemes, across a range of phonetic realizations, that is, allophones, in different phonological contexts, that is, positions in a syllabic and prosodic template. Across languages, phonological categories (phonemes) are not phonetically identical; it is accepted that phonemes are not universal. However, phonological features are assumed to be universal. Phonological features are assumed to capture natural categories, which are phonetically based.

However, there are instances in which there are similarities in phonological behavior which are not fully captured by the distinctive-feature system. For example, a typological survey of phonological processes involving labiovelars such as [w], [gb], [k^w], etc. reveals that [w] has both labial and velar relationships. Some linguists have argued for a phonological analysis in which labiovelars are either labial or velar depending on the language's phonological system (Ladefoged 1964; Chomsky and Halle 1968; Anderson 1976b). But Ohala and Lorentz (1977:581) argue that to describe labiovelars as either one or the other is misleading, noting among others the following [w]–labial–velar relationships (no further details are given in the source):

(i) morphophonemic alternations between [w] and either labial or velar obstruents or both (Nguna, Berber, Mende, Vai, Loma, Fulani, Zuni, Hausa, Nunggubuyu, Esako, and Chamorro, among others);

(ii) historical processes by which labial or velar obstruents developed labial offglides and then changed to [w] (Indo-European, Solomon Islands Melanesian languages);

(iii) allophonic labial offglides after labial and velar consonants (Berber);

(iv) greater frequency of labialization on velar, uvular and labial consonants, as opposed to dental, alveolar and palatal consonants (a study of 706 languages by Ruhlen 1976).

The typological survey thus reveals a pattern of similarity between labials, velars and [w] that would not be evident from a single language such as English. Moreover, these patterns represent a single phenomenon:

> the allophonic variations arise from constraints on the vocal tract . . . Some of these allophonic variations become sound changes. If a sound change affects words in one linguistic community but not another, dialect variation results. If the sound change affects a given morpheme in one phonetic environment but not another, then morphophonemic variation results. If one consequence of the sound change is to eliminate a segment from or introduce a segment into the language, then it would influence the language's total segment inventory. (Ohala 1983:190)

The typological facts imply a certain structure of phonetic space such that phonological maps conform to a Phonological Map Connectivity Hypothesis. Ohala and Lorentz argue that there is a natural acoustic phonetic explanation for the phonological relationship between labials and velars: both have low second formants, which in turn is accounted for by patterns of resonant frequencies of the vocal tract (Ohala and Lorentz 1977:581–84). In other words, language-specific phonological categories should be mapped onto a phonetic space which represents the close phonetic relationship between labials, velars and labiovelars. A phonetic space structure is a richer and phonetically more motivated structure than a set of phonological features for describing phonological categories across languages. The phonetic space is one step closer to the external phonetic reality underlying phonological patterns across languages.

7.2 Iconicity, economy and syntactic structure

Most of the analyses in the preceding chapters and in §7.1 have had to do with morphological and syntactic categories, such as ergative, subject or adjective. In this section, we will examine proposals for the analysis of syntactic structure in typology.

As with all other facets of grammar, the typological analysis of syntactic structure begins with the basis for cross-linguistic comparison, namely the semantic structure conventionally denoted by the syntactic structure under study. Again, universals of syntactic structure are expected to be found in its relation to semantic structure. The same motivations that underlie typological markedness play a role in universals of syntactic structure, namely economy and iconicity. Differences in the structural coding of whole syntactic constructions can be analyzed in the same way as differences in the structural coding of individual word forms. For example, in English the (non-emphatic) positive declarative construction is zero coded while the negative declarative is overtly coded with the auxiliary *do* and the negator *not*:

(17a) I bought the book.
(17b) I **did not** buy the book.

The syntactic contrast here is one piece of structural coding evidence supporting the typological markedness of negative constructions compared to positive constructions.

The analysis of iconic motivation in syntactic structure is more complex than the simple examples of syntagmatic isomorphism discussed in chapter 4. Syntagmatic isomorphism motivates simply the one-to-one mapping between concepts and linguistic units in constructions. We are now faced with accounting for a complex syntactic structure and its relation to a complex semantic structure. In this case, the iconic motivation is **diagrammatic iconicity** (Bybee 1985b; the term is from C. S. Peirce): the structure of the syntactic construction is iconic with the semantic structure it denotes. That is, the parts of the syntactic structure correspond to the parts of the semantic structure, and relations between the parts of the syntactic structure correspond to relations between parts of the semantic structure (Haiman 1985:11). (Mathematicians use the term 'isomorphism' for what is diagrammatic iconicity; but we will follow typological usage here.)

A simple example of diagrammatic iconic motivation are the principles motivating word order described in §3.3, and repeated below:

1 What is old information comes first, what is new information comes later, in an utterance.
2 Ideas that are closely connected tend to be placed together.
3 What is at the moment uppermost in the speaker's mind tends to be first expressed.

Principle 1 is iconic: the temporal order of elements in the utterance reflects the temporal order of the introduction of information into the discourse. Principle 2 is also iconic; it forms the topic of §7.2.1. Principle 3 appears also to be iconic, though in a metaphorical rather than direct fashion: the order of elements in the utterance reflects the order of importance in the speaker's mind.

The primary difficulty in evaluating arguments in favor of iconicity is that the structure of what is signified, experience as we put it in §4.2, is not well established. The first question that comes to mind is, should the structure of language be compared to the structure of physical reality or the structure of human conceptualization of that reality? Since language is a human faculty, the general assumption on the part of functional linguists has been that the structure of language should be compared to human conceptualization of the world (see, for example, Langacker 1987: chapter 1). Thus, the iconically minded typologist should turn his or her attention to psychology.

At this point, one faces the primary difficulty in evaluating hypotheses of iconic motivation in language: the shortage of firm evidence for the structure of experience outside of language itself. Although we have many powerful intuitions about the organization of experience, the functional linguist cannot turn to a large body of psychological evidence giving us theories of the cognition of events, for example, that are justified independently of language. In fact, psychological and especially philosophical models of the world and experience are very strongly influenced by the structure of language, and so iconicity may be a self-fulfilling hypothesis unless (or until) nonlinguistic means of obtaining psychological evidence are developed and refined.

However, this argument can be turned on its head. The iconicity of human language is a hypothesis that can be used to propose hypotheses of cognitive structure that can be tested and confirmed or rejected by cognitive psychological research. This is actually a reasonable way to proceed, because language provides the most explicit and most easily observed facet of cognitive behavior, and therefore is better suited to be the producer rather than the verifier of hypotheses regarding cognitive structure. The adoption of iconicity as a working hypothesis need not be self-fulfilling, because the effect of doing so is to study some aspect of language that would not otherwise be studied. If the study yields interesting cross-linguistic generalizations, then the working hypothesis will have been useful – at least to typology – even if it turns out to be ultimately an unsatisfactory explanation.

Current typological research has investigated very basic questions of grammatical structure. These investigations have produced a number of cross-linguistic patterns that are interesting in themselves and are worth investigating from a cognitive perspective.

There are three very general aspects of grammatical structure that can be, and have been, studied from a typological perspective:

(i) Simple vs. complex expressions: One can study what concepts are expressed cross-linguistically by simple grammatical structures – single morphemes, single words, single clauses – as opposed to what concepts

are expressed by complex structures – multiple morphemes, compound words, complex sentences. One also finds concepts that are expressed sometimes by simple morphemes, sometimes by complex ones (this is where attention has been focused so far). This represents a typological prototype hypothesis of iconic motivation: prototypically simple concepts are universally expressed as single morphemes, prototypically complex concepts are universally expressed as complex linguistic structures, and intermediate concepts vary cross-linguistically. Ideally, one would also find typological dependencies among the intermediate concepts that would yield implicational relations or hierarchies.

The iconicity hypothesis proposes that the concepts which are always, or frequently, expressed by simple grammatical structures are cognitively primitive and those expressed by complex structures are cognitively complex. However, it could also be the case that the simple vs. complex expression pattern is motivated by economy (see §4.3).

(ii) Categorization: One can study what concepts are placed into the same grammatical category. This is essentially paradigmatic isomorphism extended to more general grammatical categories. Two general classifications will concern us here. The first is the classification of concepts into specific grammatical categories noun, verb, adverb, etc. The iconicity hypothesis proposes that the concepts that fall into the same grammatical category are cognitively similar in some respects. The second question is the more general classification of concepts into two types of grammatical categories: either a closed class, usually bound morpheme 'function word' category or an open class, usually free morpheme 'content word' category. The iconicity hypothesis would propose not only that the concepts falling into each of these two categories are cognitively similar but that the distinction in grammatical structure and behavior corresponds to some cognitive distinction.

(iii) Structural isomorphism: One can study the range of structures (types or strategies) used for the expression of complex concepts across languages, looking for similarities and regularities in the types used. The iconicity hypothesis proposes that the structure of a grammatical construction will reflect the structure of the complex concept it expresses. In some cases, it might be argued that economy, rather than iconicity (or perhaps combined with iconicity) motivates syntactic structure.

The study of any one grammatical structure frequently involves more than one of these aspects. The examples used in the following sections will therefore sometimes illustrate two or three of these aspects at once.

7.2.1 Conceptual distance and constituent structure

Haiman's primary example of iconic motivation is that linguistic distance between constituents implies conceptual distance between the concepts signified by those constituents. As expected, the definition of linguistic distance is considerably easier to come by than a definition of conceptual distance (Haiman 1985:105; compare Bybee 1985a:12):

Diminishing linguistic distance between X and Y

a. X # A # B # Y
b. X # A # Y
c. X + A # Y
d. X # Y
e. X + Y
f. Z [= fusion of X and Y into single form]

Haiman describes conceptual distance in terms of conceptual closeness:

> Two ideas are conceptually close to the extent that they
>
> (a) share semantic features, properties or parts;
> (b) affect each other;
> (c) are factually inseparable;
> (d) are perceived as a unit, whether factually inseparable or not.
> (Haiman 1985: 106–07)

The following implicational universal characterizes the typological facts that would support the iconic motivation of linguistic distance:

(18) If a language has two near-synonymous constructions which differ structurally in linguistic distance, they will differ semantically in (among other things) conceptual distance in a parallel fashion.

Haiman proceeds to give examples from coordination, causation, transitivity, possession and other domains to demonstrate that across languages this implicational universal holds (Haiman 1985: section 2.2; see also Haiman 1983). We will discuss one example here, the distinction between alienable and inalienable possession.

Inalienable possession refers to a permanent relationship between two entities. The most conspicuous examples are parts, such as body parts ('head', 'hand' and sometimes abstract attributes like 'name', 'spirit') and kinship relations ('mother', 'son' and sometimes social relations like 'chief', 'enemy'). Alienable possession refers to a relationship that can be temporary, such as personal belongings. It is intuitively clear that inalienable possession is a conceptually closer relation than

Table 7.1 *Linguistic distance among expressions of possession*

Language	Alienable possession	Inalienable possession
Mekeo (Austronesian)	eʔu ngaanga	aki-u
	my canoe	brother-my
	X # Y	X + Y
Warrgamay (Australian)	ŋulmburu-ŋu mindi	ŋulmburu bingany
	woman-GEN dilly-bag	woman foot
	X + A # Y	X # Y
Kpelle (Niger-Kordofanian)	ŋá pérɛi	ḿ-pôlu
	my house	my-back
	X # Y	X + Y
	`kâloŋ̄ ŋɔ̀ pérɛi	`kâloŋ pôlu
	chief POSS house	chief back
	X # A # Y	X # Y

Source: Haiman 1985:131–32

alienable possession, and Haiman lists a large number of languages in which the linguistic expression of inalienable possession is lower on the scale of linguistic distance than the expression of alienable possession (see Table 7.1).

For example, compare the patterns of relationships in Mekeo and Warrgamay (Haiman 1985:131). Although Mekeo expresses alienable possession in the same way as Warrgamay expresses inalienable possession, each language supports the universal because the contrast within the language conforms to the universal. A more interesting example also provided by Haiman is Kpelle. In Kpelle, the possessive constructions differ for pronominal vs. nominal possessors (Welmers 1973:280). The construction X # Y is used for inalienable possession for nominal possessors, but alienable possession for pronominal possessors. This apparent anomaly renders it impossible to generalize over the linguistic expression of the alienable–inalienable distinction in Kpelle except in terms of relative linguistic distance (Haiman 1985:132). The correct generalization here is that in each subclass of possessors, the linguistically more distant construction is used for the conceptually more distant possession relation (alienable possession).

Martin Haspelmath (pers. comm.) suggests that the difference in structure between alienable and inalienable possessive constructions may be due to economy rather than iconicity: inalienable nouns are possessed more frequently than alienable nouns. This explanation depends on a higher relative frequency of possessed over unpossessed nouns in the constructional paradigm for inalienable compared to alienable possession. That is, it assumes that relative frequency rather than absolute frequency can be the driving factor in economic motivation. The only evidence

that may shed light on this issue is Corbett et al.'s (2001) teasing apart of absolute and relative frequency of number forms and their relation to irregularity (a symptom of typological markedness) in the Russian nominal morphological paradigm. They found that while absolute frequency was a strongly significant factor, relative frequency was only weakly significant. Corbett et al.'s result suggests that iconic motivation is probably in operation in the expression of possession.

The iconicity of distance has also been applied to the ordering of affixes within the noun and verb complexes. Bybee (1985a:24–25) argues that the linguistic distance inside the word corresponds iconically to the degree that the semantics of the affix affects the meaning of the word and does not refer to any other constituent (i.e. any other component of the described situation). Bybee's model can account for two of Greenberg's universals in his original paper on universals. Greenberg's Universal 28 states that 'If both the derivation and inflection follow the root, or they both precede the root, the derivation is always between the root and the inflection' (Greenberg 1966b:93). This generalization seems to be very largely correct, synchronically and even diachronically: if diachronic processes lead to the attachment of a derivational morpheme outside an inflection, the inflection may be moved outside the derivation (Haspelmath 1993:291). Universal 28 also supports Haiman's conceptual-distance hypothesis. Derivational morphology alters the lexical meaning of the root, sometimes drastically, whereas inflectional morphology only adds semantic properties or embeds the concept denoted by the root into the larger linguistic context.

Greenberg's Universal 39 states, 'Where morphemes of both number and case are present and both follow or both precede the noun base, the expression of number almost always comes between the noun base and the expression of case' (Greenberg 1966a:95). In other words, the linguistic distance between the noun and case affix is greater than the linguistic distance between the noun and number. In this case, application of the number affix affects the semantics of the referent because it determines the cardinality (number) of the group of entities referred to. However, the addition of the case affix does not affect the semantics of the referent, because the meaning of the case affix (to the extent that it has meaning) describes the relationship between the noun referent and the verbal event, not anything about the noun referent itself. Hence, Greenberg's universal can be accounted for by the iconic distance hypothesis, using Bybee's criterion.

The paper of Bybee's just referred to is a typological investigation of the iconic distance hypothesis for verbal affixes indicating valence, voice, aspect, tense, modality, person and number. Bybee considers linguistic distance to be defined in terms of the ordering of affixes, as with the Greenberg universals, and in terms of the lexical, derivational or inflectional expression of the category (compare the lower end of Haiman's scale of conceptual distance). Lexical expression involves

suppletive forms for the category involved, as with intransitive *die* vs. causative *kill*. Derivational expression involves an affix that is not as widely applicable or as obligatory as an inflectional category, as with intransitive adjective *pure* and causative *pur-ify*. Inflectional expression is generally obligatory and applicable to most if not all members of the root's category, as with present tense *walk-s* vs. past *walk-ed*.

As with nominal affixes, conceptual distance is defined as the degree to which the meaning of the affix affects the meaning of the verb and does not affect the meaning of the rest of the sentence (what Bybee calls relevance to the verb). Bybee argues that the ranking of conceptual closeness of inflectional affixes to the verb is as follows (leftmost = conceptually closest):

(19) valence < voice < aspect < tense < mood < person/number indexation

Bybee's arguments for conceptual distance are summarized here. Valence (that is, transitivity) alternations clearly affect the meaning of the verb quite drastically, and determine other syntactic properties of the clause, and so may be considered the most relevant to the verb. Voice, in Bybee's definition, characterizes the perspective taken on the event, and so combines deictic differences such as *buy/sell* with active, passive and middle voice. Bybee states 'It is not surprising, then, that voice may be morphologically coded on the NPs of the sentence, on the verb or both' (Bybee 1985a:14), but then appears to conclude that voice is highly relevant to the verb.

The grammatical category of aspect subsumes a wide range of semantic distinctions, including state vs. process and completive vs. durative process. An aspectual semantic alternation such as stative vs. inchoative (e.g. Latin *caleō* 'I am warm [stative]' vs. *calescō* 'I get warm [inchoative]'; Bybee 1985a:15) significantly change the meaning of a verb. Other alternations such as perfective vs. imperfective (e.g. Spanish *dormí* 'I slept [preterit]' vs. *dormía* 'I was sleeping [imperfective]') do not change the meaning of a verb as much. In fact, completive/durative aspect alters the semantic status of the direct object referent. In the latter case, aspectual semantic distinctions are often expressed in the direct object noun phrase, as in English durative/habitual *I drank wine* vs. completive *I drank the wine* (see also the Finnish partitive/accusative case distinction illustrated in §6.3.2, which serves the same purpose). This aspectual semantic distinction is less relevant to the verb because it actually applies to the verb phrase. Also, Hopper (1979) argues that some inflectional distinctions that have been labeled aspect actually signal discourse status of the utterance as a whole, and so are even less relevant to the verb. Bybee observes that the stative/inchoative aspectual type is the one type most likely to be expressed lexically rather than inflectionally (1985a:100–02).

Tense and mood semantically apply to the clause (proposition) as a whole, and so are less relevant than any of the verbal categories discussed so far. Bybee argues that tense is more relevant to the verb than mood because tense denotes a point in time (past, present, future), and verbs, unlike nouns, are generally transitory events. Therefore, tense is more likely to be associated with verbs than nouns, since the objects denoted by nouns usually exist before and after the event as well as during it. Finally, indexation categories, unlike all of the categories discussed so far, do not refer to the event at all, but to its participants, and so are the least relevant to the event.

Valence, voice and (a subset of) aspect are expressed lexically and derivationally as well as inflectionally across languages, thus confirming that part of Bybee's ranking of inflections by conceptual closeness. Number is sometimes expressed lexically and derivationally, thus apparently violating the ranking of conceptual closeness. However, in many languages derivational and lexical number alters the meaning of the verb, in particular to add distributive or collective meanings: 'when plurality is a derivational (and perhaps a lexical) category, its meaning extends beyond pure agreement with the arguments of the verb' (Bybee 1985a:36). This is true for example in Kwak'wala (Kwakiutl), in which there are several plural verb forms (Boas 1947:246):

(20a)	mɛdɛ'lqwɛla	'it is boiling (singular)'
(20b)	meʔmɛdɛ'lqwɛla	'they are boiling (plural subject)'
(20c)	maʔɛ'mdɛ'lqwɛla	'it is boiling in all its parts (plural extensive)'
(20d)	mɛdɛ'lxumɛdɛ'lqwɛla	'it is boiling repeatedly (plural action)'

Thus verbal number, like aspect, demonstrates that linguistically more close expressions entail conceptually more intimate semantic relations.

Bybee uses a fifty-language sample to determine order of inflectional affixes. After excluding cases in which the inflectional category does not exist, Bybee analyzes pairwise comparisons of the inflectional categories in which the linguistic distance from the verb differed. This results in the following ranking (for mood < person/number, there were five exceptions out of eighteen cases):

(21) (inflectional) aspect < tense < mood ?< person/number

The results confirm the majority of Bybee's conceptual rankings for the ranking from inflectional aspect onward. One anomaly is that in cases in which object indexation occurs together with subject indexation, object indexation is closer to the verb, indicating greater relevance; but object indexation is less frequent than subject indexation, indicating lesser relevance (Bybee 1985b:38). In sum, although there are some problems with both the data and the definition of conceptual

closeness for verbal affixes, it appears that the order of affixes on both nouns and verbs generally supports the iconic-distance hypothesis.

Bybee introduces the aforementioned essay with a summary of the iconic-distance hypothesis applied to syntactic constituent structure:

> It has often been observed that the proximity of elements in a clause follows some natural (iconic) principle whose result is that elements that go together semantically tend to occur close together in the clause [footnote cites Vennemann 1973 and Behaghel 1923–32]. Following this principle, we would expect that elements whose position is defined in terms of the position of the noun would have meanings that modify or relate to the meaning of the noun or noun stem, while elements whose position is defined in terms of the position of the verb would have meanings that modify or relate in some way to the meaning of the verb or verb stem. Similarly, elements whose position is determined with respect to the whole clause would have the entire proposition in their semantic scope. (Bybee 1985a:11)

If this hypothesis is valid, then the iconic-distance hypothesis could account for almost all of constituent structure (that is, constituency and contiguity, not word order) in one stroke. Indeed, under most semantic analyses of nominal and verbal modifiers and of sentence modifiers, the iconic distance hypothesis as applied to syntactic constituent structure is generally corroborated in the languages of the world.

However, there are several important exceptions, which an iconic distance hypothesis would have to accommodate in some way or another. A number of languages appear to allow so-called discontinuous noun phrases. These constructions typically have one part of the noun phrase initial in the sentence and another final (Siewierska 1984; Merlan 1994:242; Croft 2001:187), and these parts have distinct information status from the rest of the sentence. For example, in Polish the initial and final elements have the function of contrastive focus and contrastive topic, as in the following double-contrastive sentence (as a response to a remark like 'Apparently they have a beautiful house'; Siewierska 1984:60):

(22) Nie! **[Piękny]** mają **[ogród]**. **[Dom]** mają **[kiepski]**
no **beautiful** have **garden** **house** have **crummy**
'No! They have a beautiful garden. Their house is crummy.'

In Wardaman, the two constituents are almost always found at the beginning and end of intonation units (Merlan 1994:241):

(23) **[lege** **walanja]** nga -ga -ndi go **[yidinen** **-bi]**
one(ABS) **goanna(ABS)** 1SG- take -PST 3SG.DAT **whole** **-ART**
'I took one goanna for him whole (i.e. one whole goanna)'

Merlan suggests that the initial element is thematic, while the final element is the information focus (e.g. it is contrastive; Merlan 1994:242).

A similar and much more common example is found in information (*wh*) questions. In a question such as ***Who*** [*did you go out* ***with*** *__ last night*]?, the semantic relationship between *with* and *who* competes (unsuccessfully) with the information structure with focus separated from presupposition.

A second issue is that there appears to be a great deal of cross-linguistic variation of certain verbal modifiers as to whether their position is defined with respect to the verb or with respect to the clause as a whole. Steele's (1975) typological survey of auxiliary elements, which usually incorporate modal and aspectual concepts, shows that in some languages the auxiliary is located next to the verb, while in other languages it is located in first, second or final positions in the clause (the usual positions for elements syntactically defined by the clause). Nevertheless, tense and modality are generally agreed to modify the proposition as a whole, and aspect and even voice are considered by some to apply to the verb phrase, not the verb (see above, and also Keenan 1979; Bach 1980). It appears that, on the whole, semantic modifiers of propositions occur in a position defined by the sentence. However, in many cases, elements denoting modifiers of larger syntactic units (the phrase or the clause) are attracted to the semantic head of the syntactic unit (see §8.3.2 and Croft 2001:257–68).

It should not be assumed that all syntactic structure is iconically motivated. In fact, there are numerous exceptions to diagrammatic iconicity. One example arises from competing motivations for semantic relations in a construction. There is a construction called **external possession** (also known as possessor ascension), in which the possessor of an argument is expressed as having a direct syntactic relation to the predicate, as in Tzotzil (Aissen 1980:95):

(24) l- **i-** k'as -b -at **j-** k'ob
PRF- **1SG.ABS-** break -IND.OBJ -PASS **1SG.POSS-** hand
'My hand was broken.'

In 24, the first person semantic possessor is encoded as the (passive) subject of the verb, with the indexation prefix *i-*. It is also encoded as a morphosyntactic possessor of the NP denoting the possessum (*j-*).

External possession with verbs of this type is common across languages. It can plausibly be argued that there is a semantic relation between the first person referent and the action in 24: the breaking of my hand affects me. In other words, there is iconic motivation to relate the possessor to the verb as well as to the possessum. In Tzotzil, both semantic relations are expressed.

Such an iconic analysis is plausible for many such examples in many languages. But in some languages, including Tzotzil, one can find an indirect object/semantic possessor of a verb for which a verb–possessor semantic relationship is much less plausible (Aissen 1987:130; third person singular absolutive marking is zero,

but the indirect object suffix *-be* indicates that this is an example of Possessor Ascension):

(25) ta **Ø-** j- nujan **-be** s- p'in -al
IMPF (**3SG.ABS**)- 1SG.ERG- turn.face.down **-IO** 3SG.POSS- pot -POSS
'I'll turn its [the soup's] pot face down.' [i.e. the pot that the soup was cooked in]

Since the soup is already cooked and out of the pot, it is implausible to assume that the soup is affected by someone turning face down the pot it was cooked in. The syntactic relation between the indexation of soup and the verb *nujan* 'turn face down' in 25 – namely that the index is prefixed to the verb – is not iconically motivated.

This is just one unmotivated syntactic relation among many others in 25 that *are* iconically motivated. In particular, the iconic isomorphism of conceptual units to linguistic units is preserved (see Croft 2001: chapter 6). Also, the diagrammatically unmotivated syntactic relation is motivated in another way. All languages that allow unmotivated external possessors also allow semantically motivated or 'prototypical' external possessors (König and Haspelmath 1998:567). The use of the external possessor construction in 25 probably represents a diachronic extension of the structure in 24 to the situation type in 25, by virtue of their both encoding possessed P arguments. Hence it is a case of constructional polysemy, which is motivated in terms of paradigmatic isomorphism (§4.2.2).

On the whole, the general cross-linguistic support for iconic distance is very strong. Isomorphism is strongly confirmed across languages. Diagrammatic iconicity of morphosyntactic structure is also strongly confirmed, although there are a number of anomalous cases. Some of these apparent exceptions are clearly accounted for by the competing motivations of semantic structure and information structure, or of two different semantic structures. Others can be accounted for in terms of historical processes which themselves are paradigmatically motivated.

If the iconic-distance principle motivates unrestricted universals of constituent structure, then it should also reveal intermediate cases in which there is cross-linguistic variation. One such example of a conceptually intermediate category are directional phrases, found in sentences that express motion along a path relative to an object. In these sentences, the path is conceptually linked to the action, because motion involves change in location; but it is also conceptually linked to the object, since the path is defined relative to the object ('in', 'out of', 'to', etc.). Typologically, this is manifested in variation as to whether the directional phrase forms a prepositional phrase with the object noun, or an adverb or directional affix with the verb:

Directional # NP: English

(26) Minnie walked slowly **into** the room.

Directional + NP: Hungarian (Whitney 1944:20)

(27) Szabó úr kiszáll a vonat **-ból**
Szabo Mr. get.out the train **-out.of**
'Szabo got out of the train.'

Directional # V: Mandarin (Li and Thompson 1981:400)

(28) wǒ bǎ tā tuī **dǎo** zài shāfa shang
1SG ACC 3SG push **down** at sofa on
'I pushed her/him down onto the sofa.'

Directional + V: Kinyarwanda (Kimenyi 1980:89)

(29) Umugóre y- oohere -jé **-ho** isóko umubooyi
woman 3SGF- send -ASP **-LOC** market cook
'The woman sent the cook to the market.'

In sum, the iconicity of constituent structure hypothesis, combined with the typological principles of word order described in chapter 3 (see also chapter 8), provide the basis for a functional–typological theory of syntactic structure.

7.2.2 Syntactic and conceptual independence

Iconicity of distance is not the only type of iconicity of syntactic structure that is found across languages. A second type of iconicity is best illustrated by Hopper and Thompson's typological analysis of the syntactic categories noun and verb (Hopper and Thompson 1984). A number of Hopper and Thompson's criteria for their analysis of universals for the noun–verb distinction are identical to those described in §6.4, and therefore support the typological markedness analysis of parts of speech (seel also Croft 1991:46–50). However, most of the cross-linguistic criteria presented by Hopper and Thompson, and almost all of their theoretical discussion, actually define the concept of **categoriality**, that is, the concept of a lexical root as an independent syntactic unit.

Hopper and Thompson's criterion for categorialilty is the degree to which a lexical stem is presenting a new, salient piece of information in the discourse (participants in the case of nouns, events in the case of verbs). The less that a root is presenting new or salient information, the more likely it is to appear both without any structural coding and without any inflectional behavior. In fact, a low categoriality unit may be attracted to a higher categoriality unit and lose its separate syntactic status, becoming incorporated with that unit. Myhill (1988) calls this loss of independent syntactic status **clustering**.

For example, as noted in §6.3.1, less referential and lower animacy nouns tend to lack characteristic nominal inflections and to be incorporated into the predicate. Hopper and Thompson also argue that high-topicality NPs, that is, anaphoric pronouns, are also less salient, and that is why they often become phonologically reduced and attached to predicates as indexation markers (Hopper and Thompson

1984:718–24; Myhill 1988:269–70; see §§2.1.3, 6.3.3). In contrast, existential verbs are of low salience compared to the referent being presented in the discourse. In many languages, the existential 'verb' is uninflected and phonologically reduced, as in Turkish (Hopper and Thompson 1984:729):

(30) Oda -da iskemle **var**
room -LOC chair **EXIST**
'There is a chair in the room.'

Examples of low categoriality 'nouns' and 'verbs' are given in Table 7.2, taken mostly from Hopper and Thompson (1984) and Myhill (1988).

Table 7.2 *Low categoriality 'noun' and 'verb' types, and their clustering patterns*

	Low categoriality unit	Unit with which it clusters
'Noun'	low referentiality NP	foregrounded verb
	attached body part noun	foregrounded verb
	anaphoric NP	foregrounded verb, emphasized element
'Verb'	tense/aspect/mood auxiliary	foregrounded verb
	process verb	result verb (serial/complement verb)
	existential	presentative NP
	copula	predicative noun/adjective
	equational verb in cleft	focused NP

In low categoriality 'nouns' and 'verbs', the nominal or verbal root is losing its independent syntactic status as an iconic reflection of its loss of discourse informativeness, leading to its morphological combination with an associated high categoriality unit. This phenomenon is not the same as iconic distance. In iconic distance, the linguistic and conceptual distance between two entities is reduced in parallel. In this case of categoriality, it is linguistic and conceptual independence that are reduced in parallel; loss of linguistic distance is a side effect of loss of linguistic independence. Newmeyer describes this phenomenon as **iconicity of independence** (Newmeyer 1992:762–63; see also Givón 1980b; Haiman 1983:783; Cristofaro 2003, §9.3). Iconicity of independence is the iconic reflection of conceptual independence.

Another significant typological universal that appears to be motivated at least in part by iconicity of independence is the typology of sentential complement types (Givón 1980b, 1991; Cristofaro 2003). Givón (1980b) provides grammatical evidence for a **binding hierarchy** of verbal complement types. He ranks complement types on a semantic scale in terms of three semantic criteria:

(i) Binding: The stronger the influence exerted over the agent of the complement clause by the agent of the main-clause verb, by whatever means, the higher is the main-clause verb on the binding scale.

(ii) Independence: The higher a verb is on the binding scale, the less is the agent of its complement clause capable of acting independently.

(iii) Success: The less independence possessed by the embedded-clause agent, and the higher the main-clause verb on the binding scale, the more is the intended manipulation likely to succeed. (Givón 1980b:335)

Givón's semantic criteria lead to the following rough scale of complement types, from most distant to least: direct speech; indirect speech; verbs of belief, knowledge and doubt; emotive verbs; verbs of attempt or of manipulation of others (commands, requests, etc.); and causative or successful outcome verbs ('finish', 'succeed', etc.).

Givón also ranks complement types on a grammatical (syntactic) scale, based on the degree to which a complement clause is syntactically coded as an independent/main clause (Givón 1980b:337):

(a) The higher a verb is on the binding scale, the less is the agent in its complement/embedded clause likely to exhibit the case-marking characteristics of subjects/agents/topics.

(b) The higher a verb is on the binding scale, the less is the verb of its complement clause likely to exhibit the tense–aspect–modality markings characteristic of main clauses.

(c) The higher a verb is on the binding scale, the more is the verb in its complement clause likely to be predicate-raised, i.e. lexicalized as one word with the main verb. (Givón 1980b:338)

The implicational universal for binding is given below:

> If a point on the semantic hierarchy of binding is coded by a certain syntactic coding device, then a semantically higher point cannot be coded by a syntactically lower point. Rather, it will be coded either by the same coding point, or by a higher coding point on the syntactic coding scale. (Givón 1980b:370)

Givón then proceeds to demonstrate a correlation between the semantic scale and the syntactic scale, for English, Krio, Bemba, Spanish, Finnish, Hebrew, Palestinian Arabic, Ute, Persian and Sherpa. For example, in Sherpa, verbs of saying require finite clause complements, whereas all other verbs require nominalized complements, lacking syntactic properties (a) and (b) (Givón 1980b:367):

(31) ti -la nyee wa -up -**ti** ca -no
he -DAT my.POSS come -INF -**NOM** know -PRF
'He knew that I came/He knew of my having come.'

(32) ti -gi ŋ lagha kyaa **-yin** si -no
he -ERG I work do **-PRF** say -PRF
'He said: "I have worked."'

Modern Hebrew displays a broad range of morphosyntactic complements that divide the semantic binding scale fairly evenly (Givón 1980b:353–34). The causative complement is fully fused with the causal form, which is a causative prefix:

(33) Miryam **he-** exil -a et Yoram
Miriam **CAUS-** eat -PST-she ACC.DEF Yorma
'Miriam fed Yoram/Miriam made Yoram eat.'

Strong emotive verbs, which entail the truth of the complement, use an infinitive form:

(34) Miryam hixrixa et Yoav **le-** exol
Miriam force.PST.she ACC.DEF Yoav **INF-** eat
'Miriam forced Yoav to eat.'

Verbs of suggestion, summons, etc. allow either an infinitive complement or a finite subjunctive complement that encodes the subject; not surprisingly, the latter is less 'strong' than the former (note also the difference in the English glosses):

(35) Miryam amra lo **le-** exol
Miriam tell.PST.she to.him **INF-** eat
'Miriam told him to eat.'

(36) Miryam amra lo **she-** yoxal
Miriam tell.PST.she to.him **COMP-** **he**.eat.**SUBJ**
'Miriam told him that he should eat.'

Finally, verbs that merely express emotions allow only the subjunctive complement, but in addition require the subject to be in the complement clause instead of in the main clause:

(37) Miriam ratsta **she-** Yoav yoxal
Miriam want.PST.she **COMP-** Yoav **he**.eat.**SUBJ**
'Miriam wished that Yoav would eat.'

In more recent investigations of complex sentence structure, verb forms found in complex sentences are compared to verb forms found in simple main clauses across all subordinate clause types, not simply complements (Stassen 1985:77; Croft 1991a:83; Koptjevskaja-Tamm 1993:23–24). Verb forms in complex sentences are found to differ from those in main clauses in a limited number of ways, listed in 38:

(38) a. elimination of tense, modality and aspect markings, or use of special forms distinct from those used on simple main clause verbs;

b. elimination of indexation markings used on simple main clause verbs, or use of special forms distinct from those used on simple main clause verbs;
c. overt morpheme attached to verb form.

The phenomena in 38a–c define what has been called **deranking** (Stassen 1985:77; see also Koptjevskaja-Tamm 1993; Cristofaro 2003), desententialization (Lehmann 1988:193–200) and deverbalization (Croft 1991a:83). Clauses containing verb forms that possess one or more of the properties in 38 are **deranked**. Clauses containing verb forms that are identical to main clause verb forms, that is, that lack all of the properties in 38, are **balanced** (Stassen 1985). Example 39 from Pirahã (Everett 1986:269) is balanced, and example 40 from Tamil (Asher 1985:21) is deranked:

(39) hi gái -sai xahóápátí [ti xi aagá **-hóóg -a**]
3 say -NR X. 1SG hunger have **-INGR -REMPST**
'Xahóápátí said that I have hunger.'

(40) [ava viz̲unt **-atu -n** -aale] az̲utaa
she fall:PST **-NR -AG.NR** -INST weep:PST:3SG.F
'Because she fell, she cried.'

The Pirahã complement clause in 39 is balanced: the verb is inflected just like a main clause verb, with ingressive aspect and remote past tense suffixes; and no overt morpheme coding deranked status is found. The Tamil adverbial clause in 40 is deranked: it lacks indexation, it has a special form to indicate past time reference, and it has two overt nominalizing morphemes coding deranked status.

Cristofaro (2003) surveys a slightly different range of complement types than Givón in a variety sample of eighty languages. She also surveys adverbial clauses and relative clauses. She discovered that complement and adverbial relations form a single implicational hierarchy, while relative clause relations form a separate hierarchy (first described in Lehmann 1984; 1986), which is no more deranked than temporal adverbial relations:

(41) *Subordinate Clause Deranking Hierarchy*

modal, phasal < purpose < manipulative, desiderative < perception < before <

{ after, when < reason, reality conditional < knowledge, prop. attitude < utterance
S/A rel. < P/T rel. < G rel. < oblique rel.

We now turn to explanations for the universals presented by Givón and Cristofaro. Deranking looks very much like increased structural coding – an overt

deranking morpheme – and lower behavioral potential – elimination of main clause verbal inflections. It is also certainly the case that subordinate clauses are less frequent than main clauses, since subordinate clause constructions almost always are found with main clauses but many main clauses lack subordinate clauses. Deranking may be due to the typologically marked status of actions when they are not predications (see §6.4); this analysis is supported by the fact that subordinate clauses may take on properties of nominal constructions such as case-marking. If deranking represents typological markedness, it is economically motivated.

Economic motivation may account for the morphosyntactic asymmetry between main clauses and subordinate clauses, but it cannot explain the specific ranking of semantic complex event relations in 41. For that, we must turn to other explanations.

Cristofaro argues that a number of semantic properties determine the hierarchy in 41 (Cristofaro 2003; compare Givón 1980b:335). The first three steps in the hierarchy (up to perception complements) are ranked in terms of degree of semantic integration. Cristofaro defines semantic integration as the degree of interconnectedness of the two situations; that is, the degree to which two events cannot be conceptualized as entirely distinct. Modals and phasals do not denote distinct events. Manipulative, desiderative and perception events do not exist without presupposing the existence of the associated event expressed in the subordinate clause.

For situation types lower in the hierarchy, semantic integration is absent. The semantic factor that appears to determine their ranking is predetermination of the time reference and/or the modal status of the subordinate clause event. Temporal adverbials (*before*, *after*, *when*) predetermine the time reference of the subordinate clause event. In reason, reality conditional, knowledge and propositional attitude constructions, but not utterance complements, the modal status of the subordinate clause state of affairs is predetermined.

Semantic integration and predetermination both appear to be symptoms of the iconicity of independence. Although linguistic distance may sometimes be involved, it cannot account for the loss of main verb inflections. The main verb suffers a loss of independent syntactic status: it loses its verbal inflections and may be ultimately fused onto the (former subordinate verb, as with the causative affix in example 33 above. The main clause denotes the 'event' that is less independent: phasal, modal, causative, desiderative. Thus, the process appears to be a manifestation of the iconicity of independence. Knowledge and propositional attitude predicates also presuppose the subordinate clause state of affairs; but that state of affairs is a proposition and is therefore less closely linked to the main clause event than a subordinate event is. If so, then iconicity of distance motivates that part of the Deranking Hierarchy. Predetermination

of the tense–aspect–mood and participants of the event encoded by the subordinate clause leads to it being conceived of as less of an independent event. Predetermination may result in the loss of syntactic independence of the subordinate clause, and hence is probably also a manifestation of the iconicity of independence.

7.2.3 The encoding of objects and events

For nouns and adjectives, the question of simple vs. complex expression (§7.2) can be studied in terms of simple roots vs. compounds. Cross-linguistic research pertaining to this question can be found in ethnobotany and ethnozoology, the cultural classification of living things. Berlin (1978) summarizes the cross-cultural study of taxonomic classification and observes that there are generally three (sometimes more) distinct levels of classification that are linguistically expressed. Berlin calls the highest level the **life-form**, the most important intermediate level **generic** and the usual lowest level the **specific** level. Life forms in English include *tree, grass, fish, bird, animal* and *bug*. The generic level of classification for trees includes *oak, pine, cedar* and *maple*. Specific level terms in the same domain include *tan oak, blue oak, sugar pine, incense cedar, red cedar, bigleaf maple, vine maple*. In English, the specific level terms are very commonly compounds of the generic level term and some modifier. This pattern is quite common cross-linguistically; the following examples are from Aguaruna (Berlin 1978:20):

Generic	*ipák*	'achiote (*Bixa orellana*)'
Specific	*beeŋ ipák*	'kidney-achiote'
	čamíŋ ipák	'yellow achiote'
	hémpe ipák	'hummingbird achiote'
	šiŋ ipák	'genuine achiote'

Interpreted iconically, this pattern suggests two things: first, the generic level concepts are more basic than the specific level concepts, since the latter are expressed by compounds; second, the structure of the compound used for the specific level term mirrors the structure of the classification: each species is a special case of the genus. This assumes that the modifier–head structure reflects a daughter–parent structure of the taxonomy. Not surprisingly, the simple–compound distinction in folk taxonomies is rather complex. Generic forms are sometimes themselves compounds headed by a higher level form (e.g. *pine tree*). Specific level entities are sometimes named by the same name as the generic entity. For example, in Aguaruna, *datém* is a higher level category subsuming various species of *Banisteropsis*, but also refers to a particular species of *Banisteropsis* (Berlin 1978:21). Berlin notes 'the monomials [simple forms] will invariably refer to a

taxon of major cultural importance' (p.21); i.e. the simpler lexical form corresponds to a more salient object.

Berlin's results represent one of the few cases in which there exists psychological research that fills in the other side of the equation between linguistic structure and cognitive structure. Rosch has demonstrated that there is a **basic level** of categorization that corresponds to Berlin's generic level, and that the higher (life form) and lower (specific) levels are conceptually more complex (Rosch 1978). Rosch argues that the basicness of the generic level is due to perceptual characteristics of that taxonomic level. Rosch and Berlin both argue that the distinction between two objects belonging to different generic categories is perceptually greater than the distinction between two objects belonging to different specific categories of the same genus. Conversely, the similarity between two objects in the same generic level category is perceptually much greater than the similarity between two objects in the same life form (higher) level category but different generic level categories. Hence, the generic level has a high perceptual **cue validity**: a generic level category has high internal homogeneity but is also highly distinct from other generic level categories.

Linguistically, the compounds used for the specific level terms can be argued to reflect both the derived nature of the specific category (the compound) and the lack of interspecific distinguishability (the specific terms all share the same head noun). The linguistic features of the higher level terms are somewhat more difficult to explain in iconic terms. The higher level terms are usually simple roots, but they are frequently missing in languages; perhaps that can be explained by the lack of internal homogeneity of a category leading to its lack of explicit categorization by the granting of a name. The cross-linguistic pattern of simple vs. compound nouns illustrates a domain in which both linguistic and nonlinguistic cognitive evidence can be compared to each other.

It is also possible that economic motivation accounts for typological universals in the encoding of objects rather than iconic motivation, or perhaps in addition to it. The basic level category is the most salient to speakers and is coded with the fewest number of morphemes. The absence of life-form categories may be attributable to the relative lack of salience of such broad categories. It is likely that basic level categories have the highest text frequency as well, which would further support an explanation in terms of economy.

The domain of verbs and verblike words is more complex. With verbs, cross-linguistic variation has been emphasized more than universals. A pioneering typological analysis of the structure of events and its relation to verbs and verb phrases is Talmy's typological classification of the encoding of motion events (Talmy 1972; 1974; 1985; all revised in Talmy 2000a; 2000b). Talmy analyzes motion events as having two chief components: manner (the contentful component) and

path (direction). Languages vary as to which of these two conceptual components is expressed as the head of the verb phrase, and which is expressed as a verbal dependent, which Talmy calls a **satellite**:

English

(42) He **ran** into the cave. Manner = Head

Spanish (Talmy 1985:111)

(43) **Entró** corriendo a la cueva Path = Head
enter.3SG.PST run-PART to the cave
'He ran into the cave.'

Talmy describes English as a manner-incorporating language and Spanish as a path-incorporating language. Talmy has more recently generalized this typological classification into a distinction between **verb-framing** and **satellite-framing** languages (Talmy 1991; 2000b). Framing refers to concepts such as path, aspect, etc. that delimit or otherwise frame the verbal event. Talmy argues that some languages systematically encode framing concepts in the verb (verb-framing) or a satellite (satellite-framing). Spanish serves as an example of a verb-framing language, and English of a satellite-framing language. Some examples of the contrast are given in 44–46 (Talmy 2000b:234, 243, 258); compare the Spanish examples to their English translations:

Aspect

(44) **Acabo** de com -er
JUST:1SG.PRS of eat -INF
'I **just** ate.'

Existence

(45) **Apagué** la vela soplándo -la
extinguish:1SG.PST the candle blowing.on -it
'I blew **out** the candle.'

Action correlating

(46) Yo lo **acompañé** tocando la melodía
I him **accompany:1SG.PST** play-CONV the melody
'I played the melody **along with** him.' [only I played the melody]

Talmy's classification of motion events has been quite influential (see, for example, Berman and Slobin 1994). However, it requires expansion in several directions (Croft et al. 2002). First, motion events may also have a deictic semantic component. In English, the deictic component is the head:

(47) Harriet **came** running out. (deixis = head; manner, path = satellites)

Thus a simple binary classification of event structure will not suffice for the typological classification of languages.

Also, there is some variation as to which types of paths require verb-framing. Aske (1989) notes that in Spanish, only paths which are telic (i.e. involve crossing a boundary), such as 'into', require verb framing; compare 43 above to 48 below (Aske 1989:3):

(48) El libro **deslizó** **hasta** el suelo
the book **slide:3SG.PST** **towards** the floor
'The book slid down to the floor.'

Talmy's typological classification of event structures is also incomplete. Verb-framing and satellite-framing are both asymmetric strategies for encoding the components of events: one component is head, and the other is a satellite, encoded in a form that cannot function as a head. But there are a range of symmetric strategies found in the world's languages as well. Mandarin Chinese and Lahu exhibit a **serial** strategy for encoding events, in which manner, path and deixis (Mandarin) and aspect (Lahu) are expressed in a form which can independently function as a head:

Mandarin Chinese (Li and Thompson 1981:58)

(49) tāmen **pǎo chū lái** le
3PL **run exit come** PF
'They came running out.'

Lahu (Matisoff 1969:82, 70)

(50) ŋà-hɨ ɡ̈a **qɔ̀ʔ** **chî tɔ̂ʔ** pî ve
we get **return lift come.out** give NR
'We had to lift (it) out again ['return'] for (them).'

Kiowa and Nez Perce exhibit a **compounding** strategy, morphologically binding the manner and deixis or path components in the following examples (Watkins 1984:179; Talmy 1985:110):

(51) ɔ̀:pàl sép **cándé -ą̀:** nɔ̀ pàhį́: bà-th:į́dáy
nearer rain **reach -come** and.DS clearly get=wet.PF
The rain is coming closer and it is clear we will get wet.'

(52) /hi- quqú.- **láhsa** -e / (= hiqqoláhsaya)
3SG- **galloping- go.up** -PST
'He galloped uphill.'

Russian and other Slavic languages use a **double coding** strategy for the path component, expressing the path as both a prefix compounded with the manner verb and as a (satellite) preposition (Talmy 1985:105):

(53) Ja **vy-** bežal **iz** doma
I **out-** ran **from** house.GEN
'I ran out of the house.'

Aske notes that Spanish (54) and French (55) favor a double coding strategy, though a verb framing strategy is not excluded (Aske 1989:11, 14):

(54) Juan **subió** **arriba/** **bajó** **abajo/** etc.
Juan **go.up:3SG.PST** **above** **go.down:3SG/PST** **below**
'Juan went up (above)/went down (below)/etc.'

(55) **monter** **en haut/** **descendre** **en bas**
go.up **above** **descend** **below**
'go up (above)/go down (below)'

Finally, in some languages, certain combinations of event components that are expressed in one clause in the languages illustrated above can only be expressed by a **coordinate** strategy, such as the Amele medial verb coordination construction in 56 (Roberts 1987:102):

(56) Cois hina gad **cesel** -i **nu** -ug -a
OK 2SG may **return** -PRED(SS) **go** -2SG -IMP
'Alright you can go home [back] now.'

The predicate form *cesel-i* is a so-called stripped same-subject form with zero marking, which is used for coordination of any two events with the same subject in an appropriate context (Roberts 1987:236, 273).

In the examples we have discussed so far, the primitive components that have made up events have been relatively uniform across languages, though they are categorized differently in different languages. There are also more radical decompositions of events found in some languages; the examples here are from Kalam (Pawley 1987:329, 340):

(57) Mnek **am** mon **pk d** **ap** **ay-a-k**
next.morning **go** wood **hit get** **come** he-**placed**
'Next morning he gathered firewood.'

(58) Kab añañ **ap** **yap** **pk-e-k** **pag-p** ok
stone glass **come** **fall** it.**having.hit**.DS it.has.**broken** that
'A stone broke the glass.'

(59) kty **am** kmn **pak** **dad** **apl** nb okok **ad**
they **go** game **kill** **carry** **having.come**.SS there around **bake**

ñbelgpal
they.**used.to.eat**
'... they used to cook (and eat) in places around there the game they killed/... they used to hunt game.'

In this dimension, Kalam appears to represent the opposite extreme to English, in which such actions are described by single roots: *gather*, *break* and *hunt*. However, looking at other examples reveals a pattern that applies at least to English and Kalam. There are a number of actions that are expressed by single clauses in both Kalam and English, representing what Pawley calls 'a core of conceptual events', including concepts such as 'take', 'cut', 'split', 'go' and 'give'. We might suggest speculatively that concepts representing actions could be divided into three types with respect to expression in a single clause: (1) those that are always expressed in single clauses; (2) those that sometimes are expressed in single clauses; and (3) those that never are expressed in single clauses. This is the simple vs. complex expression phenomenon manifested at the clause level rather than the lexical level. A typological analysis based on this distribution can be used to propose a ranking of event types by conceptual complexity that could be tested for cognitive generality.

The relationship between verbal structures and the conceptual structure of events is perhaps the most thoroughly explored area of the typology of grammatical structure. However, most of the studies do not have the necessary breadth of a typological sample, and, as we have indicated, there are important gaps in our knowledge. We have only been able to note what appears to be universal and what appears to be variable. This is only the first step in the typology of form–function relations for verbs.

7.2.4 *Other universals of linguistic structure*

There is a further way to categorize grammatical morphemes other than by syntactic and inflectional category: a general distinction between lexical and grammatical (function) morphemes. The precise definition of this distinction has eluded linguists, chiefly because lexical and grammatical are both prototype concepts. Three structural criteria have been proposed to distinguish the two:

(i) Lexical morphemes are prototypically **free**, while grammatical morphemes are prototypically **bound** (affixed to another word). A possible intermediate category is that of a clitic: an unstressed morpheme whose position is syntactically rather than lexically determined (e.g. suffixed to the first constituent in a clause).

(ii) Lexical categories are **open class**, that is they may absorb new elements easily. The standard examples are nouns, verbs and adjectives. Grammatical categories are **closed class**, that is they rarely absorb new members, and that only slowly. For example, English only slowly has gained a number of prepositions, and even those (*inside (of)*, *outside (of)*, *on top of*,

notwithstanding) have not yet been fully integrated into the preposition category. Openness of class is a matter of degree; for example, the English preposition category is being expanded, while the category of nominal number does not appear to be about to admit any new members.

(iii) Lexical modifiers are optional, while grammatical inflections or modifiers are obligatory (heads of constructions, usually obligatory for other reasons, are excluded from this criterion). Of course, obligatoriness can be conditional; for instance, noun phrases except for subjects and objects require prepositions in English, so the category preposition in English is conditionally obligatory.

As we mentioned above, these three criteria do not entirely coincide, and the two syntactic criteria appear to be gradient. Prepositions in English are a fairly closed class, but they are free morphemes. Nouns in noun incorporating languages are open class, but they can appear as bound forms (e.g. indefinite objects). However, in the majority of cases, these three criteria cluster, so that the prototypical grammatical element is bound, relatively closed class and obligatory, and the prototypical lexical element is free, relatively open class and potentially optional.

There is a functional–typological pattern to the lexical–grammatical distinction. Grammatical morphemes (closed class and/or bound morphemes) tend to express the same concepts across the world's languages. These are, of course, the standard inflectional and 'function word' categories, including comparison and degree for adjectives; number, size, gender (including classifiers), and spatial and grammatical relations for nouns; tense, aspect, modality, evidentiality, politeness, transitivity, and speech-act type for verbs and/or clauses. To put it in implicational terms: if a language expresses a concept as a member of a bound, closed class and/or obligatory (nonhead) category, then that concept will belong to the aforementioned small set, which we will call **grammatical concepts**.

There are a number of questions that this pattern raises for the functionally-oriented typologist. The first question is whether or not there is something conceptually in common among grammatical concepts. This is the question that has occupied most linguists interested in the problem. A non-answer to this problem is to say that grammatical concepts are 'abstract'. Some cognitive linguists (Talmy 1978; 1988a; Morrow 1986) have suggested that the grammatical elements function to structure or conceptualize human experience for the purpose of linguistic expression. For example, categories such as number and aspect provide the individuation (or not) of experience (Talmy 2000a), and categories such as voice and grammatical relations structure the force–dynamic relationships among events (Talmy 1988b; Croft 1991a; 1998b).

If grammatical concepts are used to structure or conceptualize human experience for the purpose of communication, one might suggest the following explanation for the prototypical characteristics of grammatical vs. lexical morphemes. Grammatical concepts are expressed obligatorily, since any time one utters a sentence, one must use those concepts to organize the content of the sentence. Also, grammatical concepts make up tightly integrated sets (i.e. closed classes or paradigms), since the structuring of experience necessarily involves the simplification and ordering of indefinitely complex phenomena (see Lakoff 1977). Finally, the fact that grammatical concepts are bound may follow from syntagmatic economy, since they would be used in virtually every sentence. Although this is quite speculative, it is nevertheless worth investigating.

Another question regards which conceptual categories are likely to be expressed grammatically. It would seem that some concepts are more likely to be expressed grammatically than others. Greenberg (1966a) proposes several universals that reveal that one is not dealing with a simple dichotomy between lexical and grammatical elements. Universal 30 ('If the verb has categories of person–number or if it has categories of gender, it always has tense–mode categories') indicates that tense–aspect and modality are more basic grammatical categories than indexation in person–number and gender. Universals 32 ('Whenever the verb agrees with [indexes] a nominal subject or nominal object in gender, it also agrees in number') and 36 ('If a language has the category of gender, it always has the category of number') indicate that number is a more basic grammatical category than gender. Finally, Universal 29 ('If a language has inflection, it always has derivation') indicates that the various concepts expressed in derivational categories are more basic grammatical elements than concepts expressed in inflectional categories. These universals alone suggest the following hierarchy of grammatical concepts (tense–aspect–modality, number and gender are all inflectional concepts):

(60) derivational concepts < tense–aspect–modality < number < gender

In addition to such universals, which certainly could be added to, there might be relationships between the specific structural criteria and particular subclasses of grammatical concepts. As with many other grammatical questions, the typology of the phenomenon remains to be explored.

There are many other aspects of syntactic structure that remain to be explored with respect to a typology of form–function relations. For example, little research has been done on the typology of how various modification relations (demonstrative, numeral, possessive, adjectival, etc.) in the noun phrase are expressed in the world's languages. A more thorough examination of grammatical structure from the perspective of how that structure expresses conceptual structure would result

in considerably more typological generalizations and also shed light on the iconic motivation hypothesis.

7.3 Typological conspiracies and communicative motivation

The typological universals of syntactic structure in §7.2 mostly pertain to syntagmatic structure: how the syntactic structure of utterances is motivated by the semantic structure they conventionally denote. In this section, we describe an example of a different motivation that plays a role in paradigmatic patterns of syntactic constructions. This is essentially the typological version of a rule conspiracy, in which two logically independent typologies are related. The example we will present here is of a conspiracy between accessibility in relative clause formation and so-called promotion of oblique noun phrases to direct object and direct object to subject (Givón 1975b; 1979: chapter 4).

In §5.4, we pointed out the discovery by Keenan and Comrie that accessibility in relative clause formation obeys the grammatical relations hierarchy. That is, we may construct a typological classification of languages as follows:

(i) Languages that allow relativization of subjects only.
(ii) Languages that allow relativization of subjects and direct objects only.
(iii) Languages that allow relativization of subjects, objects and oblique NPs.

The second typological classification, that of **promotion**, involves the existence of verbal derivations that have the effect of encoding as direct objects noun phrases that are normally encoded as obliques. (In transformational grammar, this was described as the promotion of an oblique noun phrase to direct object status.) The term that is used for this type of derived verbal construction is **applicative**. Promotion also involves the existence of verbal derivations that have the effect of expressing as subjects noun phrases that are normally direct objects or obliques. This category includes, of course, the passive; it also includes the verbal derivational forms found in some Austronesian languages (notably the Philippine languages) that have the effect of coding as subjects noun phrases that are normally encoded as obliques. Thus, we may propose a typological classification based on promotion, that is whether a language has **object-creating** applicative verbal derivatives and whether a language has **subject-creating** verbal derivatives.

Givón (1979) discovered the following relationship between relativization types and promotion types:

(61) If a language allows relativization of subjects only, then it has subject-creating verbal derivatives. If a language allows relativization of subjects and direct objects only, then it has applicative verbal derivatives.

The aforementioned Austronesian languages all have the subject-creating verbal derivatives (Givón 1979:152). The same phenomenon occurs in English. English participles, which are nonfinite relative clause constructions, are restricted to subjects: *the boy eating a pizza*/**the pizza a boy eating*. But English also has a subject-creating verb derivation, namely the passive. In a participial relative clause such as *the cat given a new home*, the passive participle form creates a subject out of the P argument and thus allows P to be accessible to the participial relative clause construction.

Givón uses Indonesian and various Bantu languages to illustrate type 2; all of these languages have applicative (object-creating) verbal derivatives. Givón also observed additional constraints on languages of type 2, summarized in his Typological Condition IV:

> Only languages in which (a) the accusative object is unmarked [zero coded], (b) the promotion of non-accusative objects results in loss of their case-marking, and (c) that promotion results in verb-coding of the semantic case of the nonaccusative, will have the direct-object-only constraint on the relativization of object arguments. (Givón 1979:181)

The explanation for the conspiracy between relativization type and promotion type of a language is twofold. First, the conspiracy satisfies the functional communicative requirement that it be possible to relativize any noun phrase argument of a relative clause. If there is a restriction on relativization such that a direct object and/or an oblique cannot be relativized directly, then the language has a verbal derivation that allows the direct object or oblique to be promoted to a higher position on the case hierarchy that *can* be relativized (see Keenan and Comrie 1977:88–89). In the Philippine languages, nonsubject noun phrases can be promoted to subject position and then be relativized. In the Bantu languages, oblique noun phrases can be promoted to direct object and then be relativized.

This typological pattern does not represent the operation of economic or iconic motivation; the interactions involved do not make utterances more economical or more iconic. Their functional motivation is more basic: they make the communication of certain combinations of concepts possible, period. We will call this **communicative motivation**, the need to provide some grammatical means to express virtually any concept or complex structure of concepts. Given a typological pattern that constrains expression of certain conceptual combinations in certain languages, such as the accessibility (GR) hierarchy, the examination of the alternative grammatical structure for the excluded conceptual type will frequently yield typological conspiracies due to communicative motivation. Communicative motivation, like economic and iconic motivation, also limits the range of possible language types. For example, it excludes languages in which relativization is restricted to subjects only but there are no subject-creating verbal derivations.

Verbal derivation also satisfies the hearer's communicative functional requirement to figure out what grammatical relation the relativized noun phrase originally had in the relative clause. That is, the presence of a verbal derivational affix and its meaning will indicate the original grammatical relation that the relativized noun had in the relative clause. Givón calls this condition **case recoverability**. The operation of this second functional requirement is supported by evidence from languages that do not satisfy Givón's Typological Condition IV, or do not have restrictions on relativization. Typological Condition IV states in essence that if the language does not code the original grammatical relation of a promoted oblique by an overt verbal derivation, then the language will not have the direct object constraint on relativization, because one cannot recover the original grammatical relation that the direct object had from the verbal form. Languages of this type discussed by Givón are English, Hebrew and Sherpa. All of these languages use different relativization strategies from the ones illustrated by languages of types 1 and 2. Significantly, the relativization strategies allow case recoverability by different means than verbal derivational affixes.

For example, Hebrew uses an anaphoric pronoun strategy, in which the anaphoric pronoun retains its original position and case marking in the relative clause (Givón 1979:183):

(62) ha- ish she- raiti et- ha- isha **shel** **-o**
the- man that- I.saw ACC- the- wife **of** **-him**
'the man whose wife I saw'

English uses two strategies. One is a relative pronoun strategy, in which the grammatical relation is indicated by the prepositions associated with the relative pronoun:

(63) the student **to whom** I offered the book

English also uses a gap strategy in which the original position is left empty, except for a stranded preposition (if required) that, along with the empty position, indicates the original grammatical relation of the relativized noun phrase:

(64) the student who I offered the book **to** _

Case recoverability is not an absolute communicative functional requirement. Keenan and Comrie distinguish what they call [+case] and [–case] strategies (Keenan and Comrie 1977:65). A [+case] relative clause strategy indicates the case relation of the relativized NP, via anaphoric pronouns or relative pronouns marked for case; a [–case] strategy does not indicate the case relation in this way. A language such as English that uses a [–case] strategy for more than one position on the GR hierarchy and therefore does not allow perfect case recoverability (*the man*

Table 7.3 *Distribution of [–case] and [+case] relativization strategies*

	SBJ	DO	IO	OBL	GEN	Ocmpr
Kera						
–case	+	–	–	–	–	
+case	–	+	+	+	+	+
Welsh						
–case	+	+				
+case	–	–	+	+	+	+
Roviana						
–case	+	+	+	–	–	
+case	–	–	–	+	+	
Turkish						
–case	+	+	+	+		
+case	–	–	–	–	+	+?

that Mary met, the man that met Mary). However, a survey of Keenan and Comrie's data demonstrates some striking facts. The primary relativization strategy tends to be a [–case] strategy, and is restricted to the upper end of the GR hierarchy since case recoverability is greater for roles at the higher end of the hierarchy. However, many languages have a secondary relativization strategy that is used for those case relations that the primary strategy cannot apply to, and they are [+case] strategies. This was illustrated in §5.4 for Toba Batak and Tamil; in Table 7.3 we present some of Keenan and Comrie's data (1977:77–79; + = applies; – = does not apply).

These examples suggest that secondary, [+case] relativization strategies are associated with the lower end of the GR hierarchy (here extended to nonverbal case relations of genitive and object of comparison). The significant fact is that the secondary [+case] relativization strategies fill in the communicative gap, namely relative clauses, that the primary strategy is prohibited from expressing.[1]

Thus, different relative clause strategies, and the interaction of constraints of accessibility with derived verb forms, anaphoric pronouns and relative pronouns, all have the effect of allowing relativization of virtually any NP, and (to a lesser extent) of maintaining case recoverability. Givón (1979: chapter 4) also argues that case recoverability also governs passivization in those languages that allow passivization of obliques via promotion to direct object.

[1] This description necessarily involves a considerable simplification of the facts; for fuller details, see Givón 1975b; Keenan and Comrie 1977; Comrie and Keenan 1979; Maxwell 1979. In particular, it is worth noting that there are cases of 'overlap', in which the case relation at the changeover point from primary to secondary relativization strategy actually can use either strategy for relative clause formation.

Of course, communicative motivation also excludes an enormous range of possible language types that grossly violate communicative function, for example languages in which there are fewer than one hundred lexical items or languages without constructions that serve the function of questions. Typological conspiracies represent more subtle and complex examples of communicative motivation, pertaining to relatively specific typological classifications of human languages. Communicative motivation certainly plays a fundamental role in constraints of form–function relations across languages.

7.4 Conclusion

In this chapter, we have examined how typology addresses questions of syntactic argumentation and the representation of syntactic structure. Typology, like other approaches to grammar, uses distributional analysis in its argumentation. Unlike other approaches to grammar, however, typology does not seek a universal inventory of syntactic primitives and categories. Instead, grammatical categories are language specific, and can be mapped in different ways onto conceptual space. Universals of grammatical categories are limits on the possible mappings of language- specific categories onto conceptual space. Typology also examines the variation in different tests or constructions defining the distribution of categories, in order to discover universals in that variation as well.

Typological analyses of syntactic structure begin from the external basis for cross-linguistic comparison of syntactic structures. Universals of syntactic structure are found in their economic and iconic motivation. Iconic motivation of syntactic structure takes the form of diagrammatic iconicity. At this point, only very basic properties of syntactic structure have been investigated in typological research. However, there is also some reason to believe that only very basic properties of syntactic structure are genuinely universal across languages (Croft 2001). Grammatical categories are language-specific semantic maps on conceptual space (§7.1). The same is true of syntactic structures as well. For example, arguments for constituent structures have the same problems with cross-linguistic validity and mismatches within languages that arguments for grammatical categories do (Croft 2001:185–97, 199–201). However, at this stage not enough research has been done on the variation in constituency in order to establish typological universals of constituent structure of the same sort that have been established for grammatical categories.

8 Diachronic typology

Languages do not occur in static or stable states. All languages exhibit some degree of grammatical variation, and they change over time; in fact, much synchronic variation represents language change in progress. Changes in linguistic structure are changes in the grammatical properties that enter into one or more of the cross-linguistic patterns described in the preceding chapters. This fact suggests two extensions of typology. First, if language types fall into universal cross-linguistic patterns, then it is worth investigating if the cross-linguistic patterns also govern changes in language type. Second, it should be possible to classify typologically the linguistic changes themselves, and look for relationships among linguistic processes in the same way that typologists seek relationships among linguistic states. This latter process has been especially fruitful and has led to intensive study of a family of associated language processes called grammaticalization.

8.1 The dynamicization of synchronic typology

We may return to the foundations of synchronic typology in order to see its consequences for language change. Synchronic typology is founded on the typological classification of logically possible linguistic types (chapter 2). Once this is established, one then constructs a language sample in order to determine which of the logically possible language types are actually attested in the languages of the world, and formulates universals (implicational universals, typological markedness, prototypes, conceptual distance, formal complexity, etc.) that restrict human languages to the actually occurring types. These universals are then explained in external terms.

The first application of typology to language change was the hypothesis that a reconstructed protolanguage state has to conform to generalizations formed over attested language states. That is, one could not violate the constraints that synchronic typology imposes on current languages in the postulation of a reconstructed protolanguage. This constraint was first proposed by Jakobson (1958), with respect to the reconstructed voiced aspirate series of Indo-European. In that

reconstruction, the labial voiced aspirate /b^h/ was quite common in reconstructed forms, but the voiceless aspirate counterpart /p^h/, one of the typologically most common phonological segments according to the place of articulation hierarchy, was absent. In the past twenty years, various proposals have been made to alter the reconstructed consonant system so that the series with the labial gap in the Proto-Indo-European phoneme inventory has a manner of articulation in which a gap in the labial position is expected (for a summary of current proposals, see Collinge 1985:259–69 and Gamkrelidze and Ivanov 1995: chapter 1). In other words, the Proto-Indo-European stop system was overhauled in order to accommodate this typological constraint and render the system more typologically natural.

The typological naturalness constraint proposed by Jakobson, like all of the constraints that synchronic typology imposes on language change, is actually a byproduct of a hypothesis of diachronic typology. In this case, the hypothesis is **uniformitarianism** (§3.1; this term is adapted from geology and biology). That is, languages of the past – at least, those that we can reconstruct or find records of – are not different in nature from languages of the present. Therefore, the typological universals discovered in contemporary languages should also apply to ancient and reconstructed languages. The uniformitarian hypothesis, like other hypotheses of diachronic typology, is a general assumption about the nature of language and language change that can be considered a defining characteristic of diachronic typological theory, in the same way that the innateness hypothesis of generative grammar – that most linguistic competence is biologically innate – is a general assumption that can be only quite indirectly verified or falsified (see §9.1).

The observation of ancient languages such as Latin and their modern descendants illustrates another commonplace fact about language change, namely that languages can change type. For example, Latin's highly flexible SOV word order changed to French's rigid SVO order, and the inflectional morphological structure of Old English changed to the isolating structure of modern English. This fact points to a fundamental shift in the view of language types from synchronic to diachronic typology. Instead of viewing language types as *states* that languages are *in*, in the diachronic view language types are viewed as **stages** that languages *pass through*. In diachronic typology, synchronic language states are reanalyzed as stages in the process of language change. The focus of attention, as a consequence, shifts from the language states themselves to the transitions from one state to another.

The reinterpretation of language states as stages leads to another set of hypotheses of diachronic typology. The first hypothesis is **connectivity**: within a set of attested language states defined by a given typological classification, a language can (eventually, and possibly indirectly) shift from any state to any other state.

For example, consider the typological classification covered by the implicational universal AN ⊃ NumN:

(i) AN & NumN
(ii) NA & NumN
(iii) NA & NNum

The connectivity hypothesis asserts that a language can change from any one of these three types to any other of the types. The connection need not be direct; for example, it probably is the case that AN & NumN languages do not change directly into NA & NNum languages, but must go through an intermediate NA & NumN stage (see below).

What would the state of affairs be if the connectivity hypothesis were false? If it were false, there would exist linguistic types that could not change to certain other types, including perhaps eternal types that never changed. Demonstration of the genetic relatedness of languages of different types partially supports connectivity. If two languages of different types are genetically related, then they would have a common ancestor; the common ancestor's type would be connected to both daughter languages' types, and so the three types would be partially connected.

The argument from genetic relatedness demonstrates that there is a one-way historical connection between the ancestor's linguistic type and the daughter languages' types. However, it does not show that any linguistic type can change into any other type. For example, consider the hypothesis that Proto-Indo-European was SOV (one of the major competing hypotheses for the word order of Proto-Indo-European). The existence of daughter languages that are SVO and VSO demonstrates that SOV can change to SVO and VSO, which we will notate SOV > SVO and SOV > VSO, following historical linguistic practice. However, it does not demonstrate the opposite direction of change, namely SVO > SOV and VSO > SOV. Thus, it does not demonstrate that there exists a way to change from SVO to VSO or vice versa. Nor does it demonstrate a connection between daughter language types, in this case SVO to VSO or vice versa.

However, let us consider what would be the case if it were indeed true that the only changes in word order type are the one-way changes SOV > SVO and SOV > VSO. Over time, there would be an increase in the number of SVO and VSO languages, leading to the gradual extinction of the SOV type. (And, of course, the SVO and VSO types would be eternal language states.) This state of affairs is not generally accepted to occur by diachronic typologists (though see Givón 1979:275–76). The connectivity hypothesis as we have phrased it has as a corollary that a language can both enter any language state and exit any language state.

The connectivity hypothesis was suggested by Greenberg (1978b) in a discussion of the diachronic interpretation of synchronic universals, or, as he calls it,

the **dynamicization** of typology.[1] In the same paper, Greenberg introduced two additional concepts that are relevant for the dynamic interpretation of language states as stages: stability and frequency (Greenberg 1978b:75).

Stability represents the likelihood that a language will exit a language state, that is, change out of a language state once it is in it. An example of a principle based on stability is Hawkins' (1983) mobility principle for word order universals. Hawkins introduces the concept of **mobility** to account for a number of exceptions in which neither harmony nor heaviness could be the operating factors in his 1983 model (Hawkins 1983:92–94). The notion of mobility is that certain modifiers are less stable in their word order within single languages, and so are more likely to switch from a harmonic order to a disharmonic one. Specifically, Dem, Num and Adj are more mobile than Gen and Rel. Hawkins uses this principle to explain why some lighter modifiers such as Dem, Num and Adj are very occasionally found to follow the head noun while heavier modifiers such as Rel precede. The assumption here is that the original harmonic order was modifier-head, including RelN and AdjN, but historically the adjective shifted to NA order while the relative clause did not.

Thus, the mobility principle, unlike the heaviness principle, has an essentially diachronic dimension to it, as Hawkins notes: 'We are, in effect, claiming that constraints on diachrony are an important part of the explanation for synchronic universals' (Hawkins 1983:108). Another example of an unstable linguistic type is nasal vowels: they tend to change to oral vowels (losing the nasal feature) quite rapidly relative to other phonological changes.

Frequency, on the other hand, represents the likelihood that the language type is to occur, that is how likely a language will enter a state involving that type. Nasal vowels can be used to illustrate a frequent type: languages tend to evolve nasal vowels quite rapidly relative to other phonological features.

Areal–genetic distribution could be a clue to the frequency and stability of linguistic phenomena. Frequency corresponds to how widespread the phenomenon is, both genetically and geographically: if it arises frequently, then it can arise in any genetic group in any geographical region. Stability corresponds to how concentrated in genetic groups or geographic areas the type is: if it is stable, then it is likely to have been a property of the parent language of a genetic group, or to have diffused and persisted in geographically contiguous languages.

However, there are two problems in inferring stability and frequency from geographic and genetic distribution. The first is that there has to be a stationary distribution for any inference to be valid, that is, the current state of the world's

[1] Greenberg's phrasing of the hypothesis permitted certain autonomous language types, and has been corrected here, reflecting his original intention (Joseph Greenberg, pers. comm.).

languages must not reflect accidental facts of the historical origin of language (Maslova 2000:312–13), or dramatic changes in language birth and death (Dryer 2000). Neither of these is likely to be the case for many grammatical features, although the latter factor can be partially accommodated by examining genera rather than languages.

The second problem is that frequency of a language state depends on the language state that it arises from (I am grateful to Elena Maslova for pointing this out to me). For example, it is generally believed that SVO order is more likely to arise from a verb-initial language than from a verb-final language, hence its geographic and genetic distribution depends on the distribution of verb-initial and verb-final languages. Stability, however, does not suffer from this problem, since what state the language enters is a matter of the future, not of past events whose distribution would affect the distribution of the current language states.

If we set aside these problems, the following examples of irregular distributions of language states may imply differences in frequency and stability (the phonological examples in this paragraph are from Greenberg 1978b:76). Linguistic phenomena that are areally widespread, and common in genetically closely related languages may be frequent and stable. Examples include front unrounded vowels, adpositions and possibly the major word orders SVO and SOV (although basic word order has changed significantly in Indo-European, a wider examination of language families suggests that SOV and SVO orders are quite stable). Phenomena that are widespread but relatively sporadic within genetic groups may be frequent but unstable; examples include nasal vowels and definite articles. Phenomena that are relatively scarce in the world's languages, but common in the genetic groups in which they occur, may be stable and infrequent. Examples include vowel harmony and verb-initial word order (though the latter tends to shift to SVO word order). Finally, phenomena that are both scarce and sporadic may be unstable and infrequent; examples include velar implosives and object-initial word orders OVS and OSV (if the latter exists).

Stability and frequency can have a significant role in typological analysis. Stability and frequency combine with other typological concepts to produce a diachronic typological analysis that accommodates apparent exceptions to synchronic universals (see Givón 1979: chapter 6), and may even be used to account for the frequency distribution of linguistic types across languages. This implies that synchronic universals, exceptionless or not, are a byproduct of general diachronic principles. Implicational universals and markedness patterns (including, of course, hierarchies and prototypes) have a dynamic interpretation in which the synchronic typological patterns are attributable to deeper diachronic patterns.

Let us return to the example of the implicational word order universal, AN $\supset$ NumN. In §3.2, we pointed out that this implicational universal is a

generalization over the pattern of attested word order types such that the type AN & NNum does not exist. Following the Greenberg analysis, one would account for this pattern by means of the concepts of dominance (heaviness) and (two-way) harmony. Greenberg proposes a competing motivation analysis relating dominance and harmony so that dominant word orders may occur in any language, but recessive word orders occur only if they are harmonic with some other (dominant) order (§3.3). This analysis can be **dynamicized** for word order universals as follows: The dominant order can shift away from a harmonic word order, but a recessive order can shift only in harmony with some existing (dominant) order. Now let us examine the word order types predicted by the synchronic universal:

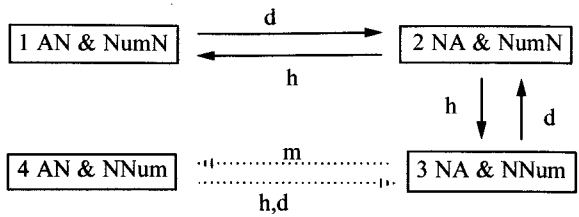
1	AN & NumN
2	NA & NumN
3	NA & NNum
4	*AN & NNum

Types 1 and 3 are harmonic patterns, while type 2 has the dominant word order for both adjective–noun and numeral–noun orders. Type 4, the type with both of the recessive word orders, is theoretically excluded (but in fact attested; see below).

The dynamic rule says essentially that a language can shift from one harmonic order to the other only through the dominant orders. That is, a language can go from type 1 to type 3 only by a shift of the adjective to its dominant NA order, that is by passing through type 2. Conversely, a language can go from type 3 to type 1 only by a shift of the numeral to its dominant NumN order, that is by passing through type 2. A language theoretically could not get into type 4, because that would imply that in moving from type 1, the numeral shifted to its recessive order without there being a harmonic order for it to follow. A similar line of reasoning excludes the transition from type 3 to type 4. Thus, type 4 can never come to exist, and so we have the synchronic distribution of language types that led linguists to the synchronic universal to begin with. The dynamicization of the implicational universal is represented in Figure 8.1 on p. 238 (see below for the discussion of the changes to and from type 4).

This argument contains an implicit assumption about language change. Why couldn't a language shift directly from type 1 to type 3? The assumption that prohibits this possibility is that language change is (more or less) **gradual**. Languages do not change several grammatical features at once, overnight.

The term 'gradual' must be taken with a grain of salt in the example in Figure 8.1. In this example there are three discrete linguistic types that are attested. In this example, which is a simplification of the facts in many ways, a gradual change is



Note: d = change motivated by dominance; h = change motivated by harmony; m = change motivated by mobility

Figure 8.1 *Dynamicization of a word order universal*

a change of one word order at a time, instead of both at once. In fact, word order change can be even more gradual than that: for example, a language may change from AN to NA order by going through a stage in which both AN and NA orders are grammatical alternatives, or a stage in which AN order is used for one construction and NA order is used for another construction. In fact, the gradualness of language change forces us to abandon the view of language processes as a sequence of discrete stages (see §8.2). However, this does not invalidate the basic concepts of the dynamicization of typologies presented in this section.

The actual frequency distribution of NA and NNum is given below (Dryer 2001; the numbers represent genera, not languages):

1 AN & NumN: 85	2 NA & NumN: 51
4 AN & NNum: 13	3 NA & NNum: 122

Type 4, the type excluded by the synchronic implicational universal, does exist, though it is of much lower frequency than the other types. The existence of these anomalies cannot be explained by dominance and harmony alone (though dominance and harmony should at least account for its very low frequency). However, it can be accounted for by the higher mobility (instability) of adjectives with respect to numerals, that is, the relative instability of adjective–noun order. The diachronic prediction is that type 4 could only arise from type 3, NA & NNum. Type 3 would either change into type 2 by the shift of the numeral to its dominant NumN position, or into type 4 by the shift of the more mobile adjective order to AN. Type 1 can shift to type 2 by the dominant and more mobile adjective shifting to its dominant NA order. However, type 1 cannot shift to type 4 since numerals are less mobile than adjectives and NNum order is recessive. The reason that type 4 is possible is that adjective–noun order is more unstable than numeral–noun order, and so the adjective might shift before the numeral does even if the adjective's shift is to

its recessive order. Presumably, the extremely low frequency of type 4 is due to its being highly unstable, since it is disharmonic and both adjective and numeral are in their recessive orders, and languages of this type either arise rarely, change rapidly or both.[2]

This prediction must be borne out by empirical investigation of languages of type 4 in order to determine that they actually have evolved from languages of type 3 and not languages of type 1. We may nevertheless note that there is other evidence that adjective–noun order is quite unstable, and that we have not invoked instability as an ad hoc explanation to account for the exception. Hawkins' mobility hierarchy, which is based on a wide range of word order patterns of noun modifiers, ranks adjective–noun order as quite mobile (i.e. unstable).

Thus, a diachronic model of the competing motivations of dominance (heaviness), harmony and stability (mobility) can account for the frequency distribution of noun–adjective and noun–numeral word order types across languages. It appears that all three of these principles have a far-ranging significance for word order patterns. This goes far beyond a simple synchronic implicational universal.

The diachronic argumentation illustrated in the preceding paragraphs presupposes an important shift in the analysis and interpretation of synchronic universals. In the preceding chapters, the focus has been on accounting for **possible** and **impossible** language states. Here, the focus has shifted to accounting for **more probable** vs. **less probable** language states (see also §§3.1, 3.3). Returning to the example of adjective–noun and numeral–noun order: types 1 and 3 are predicted to be the most probable (i.e. typologically most frequent) language states, type 4 the least probable, and type 2 in between. This shift represents a significant shift in goals in synchronic typology: no longer are we interested in simply attested vs. unattested language types; instead we rank types by degree of probability. (Of course, the two goals converge in the limiting case: if the frequency of a language type is zero, and so its probability is zero.) The crucial contribution of the diachronic typological perspective is to offer an explanation for the less probable language types: the ones that are 'exceptions' to synchronic universals constraining possible language types. The 'exceptions' represent extremely low-probability language states whose existence should be accounted for by diachronic principles. This shift in goals represents an important difference in the functional–typological

[2] Note that the term 'eventually' represents a major promissory note on the part of diachronic typology. 'Relatively unstable' language states may persist for a long time, perhaps centuries (see, for example, the case of the zero coded genitive plural in Slavic below). Stability is also controlled by nonlinguistic forces (other than the external ones described in chapter 7), such as the enforcement of a written standard. For more discussion, see Croft 2000.

and structuralist–generative approaches to explanation in grammatical theory (see chapter 9).

In the adjective–numeral word order example, the introduction of a fundamentally diachronic concept, stability, leads to a plausible account for the synchronically exceptional word order type. We now turn to another example, which illustrates how a diachronic interpretation can account for the apparent exceptions. The universal in question is the biconditional universal Prep ≡ NG (and its logically equivalent contrapositive, Post ≡ GN). The logical equivalence allows two types (the two harmonic types) but disallows the two disharmonic types:

	Predicted types	Attestation
1	Prep & NG	70
2	*Prep & GN	22
3	*Post & NG	10
4	Post & GN	150

However, as both Greenberg and Hawkins noted, there are exceptions to this universal: both types 2 and 3 exist, although they are rare compared to the other two (see the number of genera under 'Attestation', from Dryer 2001). These exceptions are actually expected in the diachronic view, under the assumption of gradualness. If only types 1 and 4 existed, then the shift of a language from type 1 to type 4 or vice versa would involve the change of both genitive order and adposition order at once. If only one order changed at a time, as the gradualist hypothesis would suppose, then types 2 and 3 would both have to exist, although they would be unstable.

Types 2 and 3 are examples of **transitory** language states: synchronically 'exceptional' language states may come to exist (and to reveal themselves in large samples) because they represent diachronic transitions from one well-attested and well-explained state to another. The reason that these transitional states, unlike the state NumN & NA in the adjective–numeral example, are synchronic 'exceptions' is because there are no clear dominance patterns for adposition and genitive orders (§3.3), and so dominance does not predict the existence of type 2 or type 3. Since only harmony and stability are operating in this example, a very high-frequency (probability) distribution for types 1 and 4, and a correspondingly very low frequency of types 2 and 3, are predicted.

The preceding examples have illustrated the dynamicization of implicational universals, or rather the dominance-harmony principles underlying them, and the addition of essentially dynamic concepts – such as stability (mobility), frequency of occurrence and transitory language states – to account for otherwise exceptional

synchronic phenomena. The grammatical criteria for typological markedness – structural coding and behavioral potential – have already been given a diachronic interpretation in §4.3 and §6.1. There it was argued that origin of asymmetrical structural coding and behavioral potential are motivated by salience (or unexpectedness), and their loss is motivated by degree of entrenchment (see Figure 6.7). Table 8.1 presents this diachronic interpretation in terms of diachronic order of occurrence.

Table 8.1 *Dynamicization of typological markedness*

Origin	Loss
Structural coding	
A nonzero morpheme to indicate a marked value (or correlation) will arise first	A nonzero morpheme to indicate a marked value (or correlation) will be lost last
Behavioral potential	
A grammatical distinction will arise in the unmarked (or correlated) value of a cross-cutting category first	A grammatical distinction will be lost in the unmarked (or correlated) value of a cross-cutting category last

For example, structural coding of singular and plural number allows only three language types.

1 zero singular & zero plural markers (i.e. no number inflection)
2 zero singular & nonzero plural markers
3 nonzero singular & nonzero plural markers
4 *nonzero singular & zero plural markers

The dynamicization of structural coding states that a language will acquire an overt plural marker before or at the same time as acquiring an overt singular marker, making the gradualist assumption that a language cannot change directly from type 1 to type 3.[3] This would prevent type 4 from arising during the development of number inflection in a language. Conversely, the criterion states that a language will lose an overt singular marker before it would lose an overt plural marker; this prevents type 4 from arising during the loss of number inflection.

With respect to behavioral potential, a cross-cutting grammatical distinction will arise in the typologically unmarked value before or at the same time as in the marked value, and be lost in the typologically marked category before or at the same time as in the unmarked value. For example, a number distinction often arises in the

[3] Of course, it may be that a language would never acquire either an overt plural or singular marker. There is no imperative to change imposed by diachronic typology, just a constraint on possible language changes. This applies to the dynamicization of implicational universals also, of course.

typologically less marked gender (masculine, human, animate) before it arises in the more marked gender, if it arises there at all. This example is very common and also very important because it explains an apparent synchronic paradox. Consider the following paradigm for number indexation in the verb for third person forms in Lakhota:

	Singular	Plural
Animate	-Ø	*-pi*
Inanimate	-Ø	-Ø

In terms of behavioral potential the animate is less marked than the inanimate, as expected. But structural coding and behavioral potential for number appear to conflict. The plural is overtly coded because it is a nonzero form for animates; it appears to have greater inflectional potential than the singular because it displays an animate–inanimate distinction.

The apparent greater inflectional potential of the plural in Lakhota is a side effect of the development of a number distinction, specifically the development of an overt plural morpheme, for animates which has not come to be used for inanimates. The clue that leads us to this interpretation is that animate singular, inanimate singular and inanimate plural are identical in form. In fact, they are just the zero coded singular form, which is still used for the plural inanimates because the grammatical distinction singular–plural does not exist for inanimates.

The same phenomenon can be found in Ngandi for the dual–plural distinction, found only in masculine forms, in which the less-marked form is expressed by a nonzero morpheme *ba-* (illustrated here with the forms for human nouns; Heath 1978:35):

	Dual	Plural
Masculine	*bari-*	*ba-*
Feminine	*ba-*	*ba-*

Here, the presumed historical scenario is that the dual morpheme *-ri-* is added to the plural *ba-* only in the typologically unmarked masculine value.

This phenomenon can also be found in situations in which the new cross-cutting distinction arises through the substitution rather than the addition of the new morpheme, as has apparently occurred with the plural *ki-* in K'iche':

	Singular	Plural
Animate	*r-*	*ki-*
Inanimate	*r-*	*r-*

The common pattern in all of these examples is that the cross-cutting grammatical distinction arises via a new overt morpheme for the typologically marked

member of the cross-cutting category (plural in Lakhota and K'iche'; dual in Ngandi) entering the unmarked value of the category in question first (animate in Lakhota and K'iche'; masculine in Ngandi). In these examples, the diachronic interpretation involves an additional prediction: the new morpheme encodes the typologically marked value of the cross-cutting category. For instance, it is assumed that in Lakhota *-pi* originated as a (nonzero) marker of the value plural that is restricted to the animate class, not a marker of the value animate that is restricted to plural number. If it were the latter case, that would violate the typological markedness pattern of both number and animacy (gender). Needless to say, this prediction would have to be confirmed by historical work on Lakhota. However, it illustrates the importance of determining what the morpheme denotes (or denoted in its evolution) in deciding how to apply the structural coding and the behavioral potential criteria of markedness.

Since language change is gradual, one would expect to be able to find the same process in an earlier stage in its evolution. In K'iche', inanimate nouns usually do not have any inflection for number, but they may be preceded by a particle *taq* that indicates plurality (with connotations of distributivity). This leads to a 'paradigm' as follows:

Singular	Plural
N	*N* or *taq N*

Again, it would appear that the plural is structurally more marked (because it has a construction with a nonzero morpheme), but behaviorally less marked (because it has two alternative plural constructions compared to one for the singular). Again, the clue that indicates the genuine state of affairs is that one of the alternative plural constructions is identical to the singular construction. The difference between this example and the earlier examples is that it represents an intermediate stage between the absence of a singular–plural distinction and the obligatory expression of a singular–plural distinction.

Another example of an apparent synchronic exception to typological markedness is the genitive plural in Slavic (Greenberg 1969/1990:185–89). Most modern Slavic languages divide nouns into gender classes and have a set of suffixes that indicate the case and number of the noun to which they are affixed. The typological universals described in chapter 4 predict that if any suffix is zero, it will be the nominative singular. In fact, many nouns have overt nominative singular affixes and zero genitive plural forms, e.g. standard Czech *žen-a* 'woman (NOM SG)' vs. *žen-Ø* 'of the women (GEN PL)'. The origin of this exception to the typological markedness of number and case is due to competing motivation from a completely independent source: the loss of the short high vowels (*jers*) of Common Slavic, including the short vowel that formerly marked the genitive plural in some declensions. In fact,

since the phonological system of a language is quite independent of the syntactic–semantic system, conflicts in externally motivated processes between the two systems are rather common in languages, and hence lead to synchronic 'exceptions'.

However, there is evidence that some of the daughter languages are restructuring the nominal declensions in such a way that the languages are shifting to the predicted markedness pattern. The overt genitive plural endings that survived in minor declensions have spread to other declensions at the expense of the zero ending in almost every Slavic language, while the zero nominative singular ending has also spread at the expense of the overt nominative ending of the feminine *a*-stems in West Slavic, particularly Upper Lusatian and Slovak (Greenberg 1969/1990: 188–89). As Greenberg puts it: 'Synchronic regularities are merely the consequence of [diachronic] forces. It is not so much again that "exceptions" are explained historically, but that the true regularity is contained in the dynamic principles themselves' (Greenberg 1969/1990:186).

8.2 From states to processes

We have reinterpreted language states – represented by language types in a synchronic typological classification – as stages of language change, in order to show how synchronic typology helps to define constraints on language changes. We assumed a model of language change in terms of transitions from one language state (stage) to another. In the process, we introduced several concepts that are essentially diachronic in character: stability, frequency of occurrence, transitory stages, the origin and loss of grammatical markers and grammatical distinctions and gradualness. A closer examination of this last assumption, the gradualness of language change, will lead us away from the state–transition view of language change to one that more directly focuses on the change itself.

Most of the implicational universals and typological markedness patterns involve binary distinctions along the grammatical parameters that are being connected: a language is either DemN or NDem; a language either uses an overt morpheme for the plural or it does not. Some implicational universals and, of course, hierarchies and prototypes involve a larger number of values on a given grammatical parameter. However, in most cases, the values are all discrete.

As anyone who has worked closely with actual languages knows well, however, languages do not fall into such discrete, well-defined types. For instance, let us take a simple binary distinction, presence vs. absence of definite articles. Since genetically closely related languages can differ in this feature (e.g. Russian and Bulgarian), it is clear that languages can go from one state to another: that is, languages can gain definite articles and lose definite articles. This is in itself not a

very useful generalization. However, closer examination suggests that one ought to distinguish intermediate stages in both the gain and the loss of definite articles. For example, many languages do not have definite articles proper, but do have what are called **anaphoric demonstratives**. Anaphoric demonstratives differ from **deictic demonstratives** in that the former may refer to an object previously mentioned in the discourse as well as an object outside the discourse; but they differ from definite articles in that they are not used to refer to uniquely identifiable objects not previously referred to (as in the definite *I found a jar and unscrewed **the** lid*). An example of an anaphoric demonstrative is found in Nguna (Schütz 1969:5; the relevant form is glossed 'before-mentioned'):

(1) maa te toropusi na-vasua ni ñaleoputo raki
but she kept piece of middle for

na-anoai p̃ota **wanogoe**
man other **before-mentioned**
'... but she kept the middle piece for the man'

Still closer examination reveals even more intermediate cases: languages in which the demonstrative has both deictic and anaphoric uses; languages in which there is a demonstrative with only deictic use which alternates with another demonstrative with both deictic and anaphoric uses; languages with both anaphoric demonstratives (which may or may not have deictic uses) and definite articles, so that the definite article competes with the anaphoric demonstrative in anaphoric use; and so on.

The problem is that there is no obvious end to the process of distinguishing intermediate stages. The division of a language process into discrete stages yields an apparently infinite regress. However, this is not as serious a problem as it appears. Consider again the case of definite articles. A simplified view of the relevant language states would be as follows:

(i) languages with no articles;
(ii) languages with anaphoric demonstrative;
(iii) languages with definite articles.

Typological and historical research (Greenberg 1978c; 1981) has indicated that the sequence of states for the evolution of definite articles is as follows:

(2) States: no articles → anaphoric demonstratives → definite articles

The stage-by-stage description of the process does not tell us the most important fact of this process: *what linguistic construction* in the 'no articles' stage becomes the anaphoric demonstratives in the next stage, and *what linguistic construction* becomes the definite article(s) in the last stage. In other words, the stage-by-stage

description does not indicate what has changed from one stage to the next; and that is what forms the basic data of diachronic typology (notwithstanding the value of the dynamicization of synchronic typology).

What is crucially important here is the process itself, that is, what actually changes from 'stage' to 'stage'. In the case of anaphoric demonstratives, this means looking at the historical development of the anaphoric demonstrative. The item in the 'no articles' stage that becomes an anaphoric demonstrative is in most cases a deictic demonstrative (although there are other sources as well; compare English *aforementioned*). And it is the anaphoric demonstrative itself that becomes a definite article in the 'definite articles' stage. Thus, we can replace the description of stages in 2 with the description of the process in 3:

(3) Process: deictic demonstrative > anaphoric demonstrative > definite article

The description of the process in 3 merely notes a number of significant steps in the process. But the process itself is continuous, and has an indefinite number of intermediate stages of the type described above.

In sum, the stage-by-stage view of diachronic processes cannot independently define discrete stages, especially when synchronic variation is taken into consideration; and it cannot describe the actual change in linguistic elements or constructions that leads to the change in linguistic type represented by the transition from one stage to the next. For this reason, we turn to examine the actual process itself.

Diachronic typology is closely related to certain trends in modern historical linguistics. In fact, diachronic typology is essentially typological historical linguistics. Historical linguistics involves more than the specifics of the study of ancient languages through philological materials and the reconstruction of Indo-European or other language families, just as synchronic linguistics involves more than the specifics of the study of modern languages and the grammatical analyses of those languages. In the same way that contemporary linguistics, including typology, seeks universals of language structure, historical linguistics seeks universals of processes of language change. Diachronic typology is historical linguistics using a typological method.

The marriage of typology and historical linguistics requires the mutual adaptation of different methods developed for somewhat different purposes. The dynamicization of synchronic typology discussed in §8.1 describes the adaptation of typological methods to a diachronic perspective. In the remainder of this section, we will present a brief discussion of the adaptation of historical linguistic methods for typological purposes.

A typological analysis of historical language processes involves the sampling of (more or less) independent cases of the linguistic features in question and a comparison of how those features evolve. The comparison will reveal which of the logically possible changes in the linguistic features are actually attested. Typological universals can then be constructed to limit the logically possible change, and explanations can be sought for those universals.

The simplest adaptation of the historical linguistic method to typology is the use of direct historical records for particular cases of a linguistic process such as word order change. In this case, diachronic typologists are simply using already established evidence in the same way that synchronic typologists use evidence from native consultants or grammatical descriptions for synchronic research. However, the lack of direct historical records is even more dramatic than the lack of good synchronic descriptions. One must instead extrapolate what the original protolanguage was from existing languages that are presumed to be related, and what changes led from that protolanguage to the contemporary languages.

This leads to a chicken-and-egg problem regarding the relationship between diachronic typology and historical reconstruction (or, indeed, language comparison for the purposes of genetic classification). The diachronic typologist may use reconstructed language changes to support his or her hypotheses. The historical linguist interested in reconstruction, given two genetically related languages which represent two different linguistic types – let us say type A which has anaphoric demonstratives and type B which has definite articles – has to decide which type the protolanguage is: type A, type B or some other type, C. The historical linguist makes this decision by choosing the linguistic type of the protolanguage that makes the changes of type from the protolanguage to the daughter languages 'plausible'. However, the constraints on 'plausible' language changes should, in theory, be provided by diachronic typology. This appears to be a vicious circle.

Fortunately, synchronic language states are extremely variable and include a great deal of variation that is actually language change in progress. From these variable synchronic language states, the language change itself can be extrapolated with a good degree of confidence, either for the purposes of reconstruction or for the purposes of constructing a typology of language changes.

An example of a standard sort of comparative–historical method used for typological purposes is what Greenberg calls **intragenetic comparison**, comparison of related languages in the same genetic group (Greenberg 1969/1990:104). The comparative–historical linguist interested in reconstruction of a protolanguage will examine all of the daughter languages with respect to the feature being reconstructed. The hypothesis that historical linguists (including diachronic typologists) use in this task is that the variation across daughter languages represents different stages in the evolution of the feature from the protolanguage. This may not

necessarily be the case. If one examines two closely related languages and finds them to be SVO and VSO, it may be that the protolanguage is something different, e.g. SOV, which led to the SVO and VSO daughter languages by different paths. However, this problem can be mitigated by looking at a larger number of daughter languages, when they exist, or looking at a wider language family that includes the family originally examined.

Also, not all synchronic variation represents historical change in progress. Some variation is stable, representing uniform social stratification of some type (Labov 1966). Finally, synchronic variation allows for another sort of gradualism: rather than grammatical traits changing one at a time, they may change simultaneously but through alternation of the two types. For example, adjective–noun order and numeral–noun order could change simultaneously but gradually, going through states of AN/NA & NumN/NNum. I am not aware of any synchronized quantitatively gradual simultaneous processes of this type, however.

An example of intragenetic comparison for diachronic typology is Greenberg's study of word order variation in Ethiopian Semitic and Iranian languages (Greenberg 1980). Greenberg presents evidence for the sequence of changes adjective–noun order > genitive–noun order > adposition order. Greenberg examined several Ethiopian Semitic languages that differ in their word order properties, and arranged them in an order that is presumed to represent the order of evolution of those properties (see Table 8.2).

In Ge'ez, the classical Ethiopian language, basic word order is free although VSO was the most frequent order. However, AN order also occurs as a minor alternative to NA order, and the third most frequent genitive type, using the preposition *zä*, has GN order. In Tigre, SOV and AN orders are dominant, though NG order remains dominant over GN. In Tigrinya, the prepositional genitive construction using GN order is more frequent than its NG counterpart, though overall the old NG construction is most common. Also, the prepositional genitive also comes to be used for pronominal possession as well, and there is a complementizer which brackets the clause with a prepositional and a postpositional element. In Amharic and other South Ethiopic languages, GN order for nominal possession has taken over (contrast fourteenth-century Amharic to modern Amharic), while NG order still dominates for pronominal possession; and prepositions of a more general meaning are supplemented by postpositions with a more specific meaning, producing circumfixes or circumpositions (see §3.4). Finally, in modern Harari, the preposition in the genitive and adpositional constructions has been dropped, except in two or three fossilized prepositional constructions, and in fact a new genitive construction has developed, using the possessed form of the head noun.

An important observation can be made from this example of actual language data supporting a diachronic typological generalization. Every language in the

Table 8.2 *Evolution of word order in Ethiopian Semitic languages*

Language	Major order	Adjective–noun order	Nominal genitive	Pronominal genitive	Adposition
Ge'ez	free (VSO)	NA/ an	NG/ N *zä*-G/ *zä*-G N	N–Poss	Prep
Tigre	SOV/vso	AN/ NA	NG/ N *nay*-G/ *nay*-G N	N–Poss	Prep
Tigrinya	SOV	AN (na)	NG/ *nay*-G N/ N *nay*-G	N–Poss/ *nay*–Poss N	Prep, *bə* S *məknəyat* 'because S'
Amharic (14c)	SOV	AN	N *yä* G/ *yä* G N	N–Poss/ *yä*–Poss N	Prep N Post/ *ʔə* N Post/ N Post
Amharic	SOV	AN	*yä* G N	N–Poss/ *yä*–Poss N	Prep N Post/ *ʔə* N Post/ N Post
Old Harari	SOV	AN	GN/ *zi* G N/	Prn N–Poss/ N–Poss	Prep N Post
Harari	SOV	AN	GN/ G N–Poss	Prn N–Poss/ N–Poss	Post, *ta*–N–*bah*, *takil* N, *miša* N

Notes: X/Y = X is more commonly found than Y; X/y = y is much less common than X; X,y = y is a single example of a type not represented by X. In Ge'ez, word order is free, but the commonest order is VSO. In Tigrinya, the minor order 'na' is cited in an 1871 grammar, but not in modern grammars. For fourteenth-century Amharic and Old Harari, only the significant differences from the modern languages were cited by Greenberg; I assume the other features are the same.
Source: data presented in Greenberg 1980.

sample has internal variation on at least one of the word order parameters. This is the situation that made it difficult to assign a particular language as a whole to a structural type in §2.3, and which appeared to pose potential difficulties for the synchronic generalizations of chapters 3–7. The advantage of this situation for diachronic typology is that it produces a whole host of intermediate language states for diachronic analysis. These states differ from each other in small enough ways that the actual historical process can be perceived, just as motion is perceived in a sequence of stills from a movie (Greenberg 1966c:517).

The existence of synchronic variation, treated as a problem for defining a basic language type (§2.3), is a godsend for discovering diachronic universals. Instead of comparing idealized language types like AN & NG & Prep and AN & GN &

Post, one compares real language types like AN/na & NG/N Prep–G/Prep–G N & N–Poss & Prep and AN & Prep G N & N–Poss/Prep–Poss N & Prep N Post/Prt N Post/N Post. In synchronic typology, one must idealize language types by identifying the basic type and ignoring other types. But this is an oversimplification of the actual synchronic state of a language, and in idealizing away from that variation, one loses an important empirical fact that needs to be explained, namely the nature of synchronic variation and its role in grammar. Diachronic typology allows us to drop the idealizations necessary for synchronic typology, and construct generalizations that apply to actual language types. And by examining more fine-grained intermediate stages of diachronic processes, a good deal of synchronic variation finds its place, since that variation is actually language change in progress.

The switch from viewing language change as a sequence of stages to viewing it as a process does raise some new problems, however. The chief problem is a new version of the problem of cross-linguistic comparability described in chapter 1. Two processes that appear to be identical from an abstract view of the process may turn out to differ in possibly crucial details across languages. For example, the change $s > h$ is attested in many languages, and many analysts have considered each example of the change as an instance of the same phenomenon. But examination of the way the change $s > h$ spreads through phonological contexts reveals differences across languages. In Greek, *s* changed to *h* in word-initial and intervocalic positions first; but in some varieties of Spanish *s* changed to *h* first in word-final position, then preconsonantal position, and is now spreading to intervocalic and initial positions (Ferguson 1978:416).

One cannot be certain that the Spanish and Greek changes can be thought of as instances of the same process. In fact, later research indicates that these represent two distinct ways in which *s* changes to *h*, both of which are found in a wide range of languages (Ferguson 1990). It is true that in both processes, *s* changes to *h* but *h* does not change to *s*; both the Spanish and Greek processes have the same overall directionality of change. Nevertheless, the Spanish and Greek changes may be in the same direction but for different reasons or motivations, and so any general explanation of $s > h$ without taking the specifics into account may turn out to be fallacious. It should be emphasized that this is not necessarily the case: it may be that the differences in details of otherwise similar diachronic processes may not be significant for the overall explanation of their directionality.

Another question that is very important for cross-linguistic generalizations of language change is directionality of the change. Let us return to the idealized situation that was illustrated by the Ethiopic example. In that situation, there are four language types, arranged below in a sequence so that each differs from the

next one in the sequence by one word order parameter:

NA & NG & Prep
AN & NG & Prep
AN & **GN** & Prep
AN & **GN** & **Postp**

This sequence is then presumed to represent a historical process. The Ethiopic example illustrates that the process can proceed in one direction: a change in adjective order leads to a change in genitive order which leads to a change in adposition order. Greenberg suggests that this change also occurred in the history of Iranian (Greenberg 1980:238–40). No cases of the reverse direction of change have been reported to my knowledge: a change in adposition order leads to a change in genitive order which leads to a change in adjective order. If this particular sequence of changes occurs only in the direction found in Ethiopian Semitic and Iranian – that is, this direction of change is the only direction of change attested – then the sequence of change is described as **unidirectional**. Another, widely confirmed example of a unidirectional change is the aforementioned sound change of *s* to *h*.

Discovering that a linguistic process is unidirectional is significant for diachronic typology because it imposes a major constraint on possible language changes. It cuts out half of the logically possible language changes, and thus dramatically restricts the number of types of language change. More important, most deeper explanations for language changes can account for only one direction of language change. For example, heaviness or dominance can account for a language change from RelN to NRel, but not vice versa. In the Ethiopian Semitic example, genitive–noun order changes, presumably in harmony with adjective–noun order (see §3.4, Figures 3.3 and 3.4), and then adposition order changes by the gradual replacement of the original adpositions by new adpositions derived from the new genitive construction by reanalysis. The harmony and reanalysis explanations work only in one direction. For this reason, a major focus of research in diachronic typology is the discovery of unidirectional language processes.

Actually, it may be that more language processes are unidirectional than one may think at first. On closer examination, language processes that appear to be bidirectional often turn out to represent two distinct unidirectional changes that involve different mechanisms of language change or involve different intermediate language states. For example, it is true that languages change from RelN to NRel and also vice versa. The change from RelN to NRel is motivated by heaviness or dominance, while the change from NRel to RelN is motivated by harmony: it occurs only after other modifiers have shifted to prenominal position (see §§3.3–3.4). The change from RelN to NRel is probably a relatively autonomous process, but

the change from NRel to RelN is (in theory) only motivated by a prior shift of at least one harmonic noun modifier from postnominal to prenominal position.

Another example, a phonological one, is offered by Ferguson (1978). The changes $\delta > d$ and $d > \delta$ are both possible, indicating an apparently bidirectional change. However, $\delta > d$ is an instance of the more general change of interdentals to dentals, as found in some modern American English dialects, and so is associated with $\theta > t$. The change $d > \delta$, on the other hand, is an instance of the change of voiced stops to fricatives, as found in Spanish, and so is associated with $b > \beta$ and $g > \gamma$. A single language change must be put in the context of other related changes going on at the same time in the language in order to discover its underlying motivation.

In fact, it may even be the case that *all* language changes are ultimately unidirectional; that is, that for any apparent bidirectionality of change between type A and type B, the mechanism underlying the change from A to B will be different from the mechanism for the change from B to A. At this point, however, there has been too little research on apparently bidirectional language changes to confirm the hypothesis that all language changes are unidirectional.

Unquestionably unidirectional language processes pose an apparent dilemma for the hypothesis of connectivity, that it is possible to get from any language state to any other language state. If the change from type A to type B is unidirectional, then it would appear that there is no way to get from type B to type A, and eventually all languages will become type B, which is contrary to the general view of language change. This is, in fact, what the dynamic interpretation of nineteenth-century morphological typology, as expounded by Schleicher, implied: languages went from isolating to agglutinative to inflectional but not the other way around. However, languages are also known to shift from inflectional to isolating (the occurrence of this in modern French and English in fact disturbed Schleicher). Does this last fact mean that the change is not unidirectional after all, but instead cyclic?

This paradox is only an apparent one: the *processes* of language change are unidirectional, but the changes in language *states* are cyclic. The endpoint of the sequence of changes is the beginning state, arrived at through a different process (compare 4 to 2–3 above):

(4)

States:	isolating	→	agglutinative	→	inflectional	→	isolating
Process:	particles	>	affixes	>	fused affix	>	loss

Schleicher's dynamic interpretation of morphological typology – isolating to agglutinative to inflectional – is now considered to be two-thirds correct, if it is recast as the description of a unidirectional process. The missing part is the final stage of the process: the loss of inflections. The strong unidirectionality hypothesis

described above simply states that bidirectional processes are, in fact, the simplest form of unidirectional cyclic processes: type A can change to type B by one mechanism and type B can change (back) to type A by a different mechanism.

We now turn to a large and important class of correlated unidirectional cyclic processes that have been strongly confirmed across a wide range of languages.

8.3 Grammaticalization

Diachronic typology, like synchronic typology, involves not just putting constraints on logically possible types but also discovering relationships among otherwise independent grammatical parameters. The major type of constraints found on diachronic language processes are twofold. First, sequences of language states have been found to represent a step-by-step language process (e.g. adjective order change → genitive order change → adposition change). Unattested synchronic states are excluded because they do not adhere to the sequence of changes entailed by the step-by-step process. Second, many such processes are unidirectional; the reverse sequence is impossible, and return to the original state is effected by a different process (cyclicity). The next step, then, is the discovery of relationships among otherwise logically independent unidirectional sequences of language changes.

One major class of correlated unidirectional changes has emerged from diachronic typological (that is, typological historical linguistic) research: **grammaticalization**. Grammaticalization is often described as a process by which individual lexical items evolve grammatical functions (e.g. Heine, Claudi and Hünnemeyer 1991:2), but it is more recently recognized that lexical items develop grammatical functions only in specific constructional contexts. That is to say, grammaticalization is essentially syntagmatic (Hopper and Traugott 1993:156). This process is unidirectional and cyclic in the senses of those terms given above: grammatical morphemes originate from lexical items, disappear through loss and reappear when new words become grammatical morphemes.

Phonological, morphosyntactic and functional (semantic/pragmatic) changes are correlated: if a lexical item undergoes a certain kind of morphosyntactic change, it implies corresponding functional and phonological changes. The correlation of phonological changes brings the nineteenth-century morphological typology back into consideration in modern typology. The pattern of correlated phonological, grammatical and functional changes allows grammaticalization to be defined in such a way that it covers the evolution of virtually every type of grammatical morpheme, from tense inflection to case marker to complementizer. A summary of the most common grammaticalization processes is given below (adapted

from Haspelmath 1998b:137 and Matthew Dryer, pers. comm.; see also Lehmann 1982/1995: chapter 3; Heine and Reh 1984:269–81):

(5a) full verb > auxiliary > tense–aspect–mood/modality affix
(5b) verb > adposition
(5c) noun > adposition
(5d) adposition > case affix
(5e) adposition > subordinator
(5f) emphatic personal pronoun > clitic pronoun > indexation affix
(5g) cleft sentence marker > highlighter
(5h) noun > classifier
(5i) verb > classifier
(5j) demonstrative > article > gender/class marker
(5k) demonstrative or article > complementizer or relativizer
(5l) numeral 'one' > indefinite article
(5m) numerals 'two' or 'three' > dual/paucal/plural affix
(5n) collective noun > plural affix
(5o) demonstrative > copula
(5p) positional verb > copula

Two seminal surveys of grammaticalization attempt an overall classification of the linguistic processes involved in grammaticalization. The two surveys use different parameters to classify the processes involved. Heine and Reh (1984) use a tripartite classification into phonological, morphosyntactic and functional changes, that is, changes in phonological substance, grammatical behavior and semantic/pragmatic substance. Lehmann (1982/1995; 1995) uses a classification based on paradigmatic and syntagmatic grammatical processes. Paradigmatic processes involve alterations to the morpheme itself or in contrast with other morphemes which could be substituted for it in the same role in the construction. Syntagmatic processes involve changes in the relationship between the morpheme in question and its grammatical context. These two classifications complement each other: phonological, morphosyntactic and functional processes can all be syntagmatic or paradigmatic.

More recent work in grammaticalization theory has altered the inventory of grammaticalization processes, but Heine and Reh's and Lehmann's classifications remain valid. Table 8.3 represents an integration of the two classifications (Croft 2000:157).

We now turn to a description of grammaticalization processes.

8.3.1 *Phonological processes*

The phonological process of grammaticalization involves the syntagmatic **coalescence** and paradigmatic **attrition** of a morpheme (Lehmann's terms). The

Table 8.3 *Grammaticalization processes*

Phonological	
Syntagmatic:	*coalescence*: free morpheme > cliticization; > affixation > loss compounding
	adaptation (including assimilation)
Paradigmatic:	*attrition*: reduction/erosion > phonological loss
Morphosyntactic	
Syntagmatic:	*rigidification* [word order]
	loss of independent syntactic status > morphological fusion > loss
Paradigmatic:	obligatorification > fossilization > morphological loss
	paradigmaticization: open class > closed class > invariant element
Functional	
Syntagmatic:	*idiomaticization*: compositional and analyzable > noncompositional and analyzable > unanalyzable
Paradigmatic:	subjectification > loss of function

syntagmatic process of coalescence begins with two independent words which over time eventually become one. Heine and Reh divide the process of coalescence into several stages: **compounding**, **cliticization**, **affixation** and **fusion**. The first three processes involve the reduction of a word boundary to a word-internal morpheme boundary. For this reason, Heine and Reh classify them as morphosyntactic processes; but they represent the phonological coalescence of words, for the most part. Most of the properties that distinguish different kinds of morpheme boundaries are phonological, though the syntactic property of word order/morpheme position also plays a role.

The distinction between compounding and cliticization/affixation is a fine one, in the way that Heine and Reh define them. Compounding involves the combination of two morphemes which are both roots or both nonroot, whereas cliticization/affixation involves the combination of a root morpheme and a nonroot morpheme (Heine and Reh 1984:32). Yoruba *kówě* 'study' is an example of the compounding of two root morphemes, *kó* 'learn' and *ìwé* 'book' (Rowlands 1969:29), and colloquial English *outta* is an example of the compound of the two nonroot morphemes *out* and *of*. An example of affixation is found in the Kituba examples 6 and 7 below, in which the subject pronoun and auxiliary become affixed to the verb. It is difficult, however, to maintain the distinction between compounding and affixation in examples such as the English contractions *I'm, I'll, he's*, etc., in which the stress falls on the pronoun though the auxiliary is more of a lexical root in the usual sense. This distinction may be an artificial one.

Cliticization precedes affixation, though defining the difference between the two is extremely difficult and is also artificial from a diachronic perspective

(Heine and Reh 1984:32–35). It is better to conceive of coalescence as a whole representing a continuum from independent words to outright fusion. The last stage, fusion, involves the loss of the word-internal morpheme boundary, which leads two morphemes to become one. For example, Ewe *nê* 'to him' evolved from *ná* 'DAT' + *e* '3SG.OBJ.' (Heine and Reh 1984:26); and French *du* 'of the.MSG' evolved from *de* 'of' + *le* 'the.MSG.'

A number of counterexamples to coalescence have been proposed in the grammaticalization literature. These counterexamples involve cases where an affix becomes a clitic. Examples include Estonian question and emphatic particles *es*, *ep* < *-es*, *-ep* (Campbell 1991), and the English possessive clitic *-'s*, from the genitive suffix *-s* (Janda 1980; 1981; Harris and Campbell 1995:337; Allen 1997[4]). However, these appear to be relatively sporadic compared to the large number of cases of coalescence in grammaticalization (see also §8.3.2).

On the paradigmatic side of phonological grammaticalization, Heine and Reh divide the process into **erosion** and **loss**. Phonological erosion is the shortening of a morpheme in length. Erosion can be quite irregular phonologically, not being directly comparable to regular phonological processes such as assimilation, etc. Erosion reduces a polysyllabic morpheme to a monosyllabic one, a monosyllabic morpheme to a single phoneme and possibly a single phoneme to a suprasegmental or internal alternation. An example of accelerated phonological erosion is found in Kituba, a pidginized variety of Kikongo (Heine and Reh 1984:21–22):

Two generations ago

(6) munu lenda ku- sala
I may INF- work
'I may work.'

Present generation

(7) mu- le- sala
I- may- work
'I may work.'

The final stage of an erosional process is phonological loss. Heine and Reh define loss as a phonological process, but there is also a morphosyntactic process of loss distinct from the phonological one. That is, loss may result from phonological reduction, or it may result from a morphosyntactic simplification of the construction with little or no phonological erosion involved; that is, the morpheme may

[4] Allen argues convincingly against Janda's hypothesis that the transition from affixal to clitic *-s* occurred because of the convergence of affixal *-s* with a pronominal *(h)is* possession construction. Allen's proposal, that the affixal *-s* became a clitic after spreading (at least optionally) to the entire nominal paradigm makes it even more clear that the change was from an affix to a clitic, rather than a word (the pronoun *his*) to a clitic.

just drop out suddenly. For example, the loss of the infinitive prefix in the Kituba example in 7 may involve morphological, not phonological, loss.

Heine and Reh describe a third process of phonological grammaticalization that covers both syntagmatic and paradigmatic processes. Phonological **adaptation** is any sort of phonological alteration of a morpheme to its environment. An example of adaptation are the segmental changes in *going to* > *gonna*: the final segment of *going* changes from [ŋ] to [n] and the initial segment of *to* change from [t] to [n]. In the vast majority of cases, phonological adaptation is assimilation, but adaptation could also be dissimilation or some other phonological process. Heine and Reh note that an effect of phonological adaptation is an increase in allomorphy (1984:17).

Phonological adaptation is syntagmatic, in that a phonological process may be triggered by the phonological environment of a contiguous morpheme; but it is also paradigmatic, in that the same process may also result in the erosion of the morpheme. For example, when the preposition *ní* in Yoruba is combined with a vowel-initial root such as *ówó* 'money', the preposition is phonologically adapted: in *l'ówó* 'Prep-money' the phonological change *n* > *l* is triggered by the syntagmatic combination with a following nonhigh vowel. The vowel is lost – an instance of erosion – and the root is adapted in that the initial vowel takes the high tone of *ní*.

8.3.2 Morphosyntactic processes

Morphosyntactic grammaticalization processes can also be divided into syntagmatic and paradigmatic types. There are two major syntagmatic processes. The first is **rigidification** of word order (called fixation by Lehmann and, oddly, permutation by Heine and Reh). Sometimes the rigidified word order differs from the normal syntactic order, as in the case of the positioning of object clitics in French before the verb, unlike full NP objects, which follow the verb (*Je **l'ai lu*** 'I read it' vs. *J'ai lu **le livre*** 'I read the book'). In many cases, however, rigidification is simply the fixing of the position of an element which formerly was free. The general phenomenon is the establishment of the word in a single position, which may or may not have been an acceptable position for the element before rigidification took place.

Heine and Reh follow Simon Dik's (1981; 1997) model of word order patterns for describing what factors determine position in rigidification. The first factor is analogy, which Heine and Reh describe as 'an attempt at placing constituents which have the same functional specification in the same structural position' (1984:28). This factor is essentially a version of harmony (see §3.3). The second factor is thematic, that is, the use of certain positions, such as clause-initial or clause-final position, for thematic (pragmatic) functions such as topic, focus, and new

information. The discourse significance of clause positions is based on research dating back at least to the functional sentence perspective of the Prague School (see §3.3). The third factor is Dik's Language-Independent Preferred Order of Constituents (LIPOC), that is overall preferences for the position of syntactic elements (for the most recent formulation, see Dik 1997:411–12). LIPOC appears to be a version of dominance and/or heaviness; for example, 'pronominal constituents tend to precede nominal constituents' (Heine and Reh 1984:31; compare Greenberg's Universal 25).

Heine and Reh's final factor is a novel one, **verbal attraction**, describing the common process in which various dependents on the verb – adverbs, auxiliaries, pronominal subjects and objects, etc. – move to a position next to the verb (and often ultimately become affixed to it). Heine and Reh illustrate verbal attraction with examples of adpositions being affixed to verbs (a very common process; see the discussion of the syntactic position of directionals in §7.2.3). In Dholuo, topicalization of a benefactive noun results in the benefactive preposition ('for') being moved and affixed to the verb (Heine and Reh 1984:51):

(8) jon nego diel ne juma
John is.killing goat for Juma
'John is killing a goat for Juma.'

(9) juma jon nego -ne diel
Juma John is.killing -for goat
'John is killing a goat for JUMA.'

Myhill argues that verbal attraction is just one instance of a more general process, which he calls **clustering** (Myhill 1988a). He argues that the 'most informationally important' element of the sentence – which he calls the nucleus (Myhill 1988a:261) – syntactically attracts lesser information-bearing units. Myhill presents examples of clustering for the grammaticalization processes listed in Table 8.4.

A second syntagmatic morphosyntactic grammaticalization process proposed by Lehmann is what he calls condensation. Condensation is the process by which the morpheme undergoing grammaticalization becomes the syntactic sister of a smaller constituent. For instance, in English one can say *inside of the box* or *inside the box*. In the former, *inside* is the sister of a prepositional phrase (though this depends on one's analysis), but in the latter, more grammaticalized, construction, *inside* is the sister of the noun phrase, a smaller constituent than the prepositional phrase. The logical endpoint of condensation is that the two syntactic sisters are single words, and may ultimately coalesce into a single word.

However, there are many counterexamples to condensation. That is, elements that combine with smaller syntactic constituents such as noun phrases are

Table 8.4 *Clustering and grammaticalization*

Informationally important element	Lower information element attracted to nucleus (> bound form)
Verb	pronoun (> indexation marker)
Verb	low-salience NP (> incorporated N)
Verb	auxiliary (> tense–aspect–modality affix)
Foregrounded verb	continuing topic NP
Foregrounded verb	coordinating conjunction (> narrative verb form)
Process verb	framing particle [see §7.2.3] (> affix)
Presentative NP	existential verb
Predicative NP	copula (> bound predicator)
Focused NP	equational verb in cleft (> focus NP form)
Emphasized element	pronoun (> clitic)

sometimes extended to combining with larger constituents such as clauses (Tabor and Traugott 1998). The two most common examples are the grammaticalization of adpositions to subordinators (see 5e; Genetti 1986; Heine et al. 1991:153) and of demonstratives or articles to complementizers or relativizers (see 7k; Heine et al. 1991:179–86). Tabor and Traugott survey these and other counterexamples to condensation. Tabor and Traugott argue that condensation should not be considered a unidirectional grammaticalization process. Instead, the syntactic scope of a grammaticalizing element is determined by semantic and other factors. Tabor and Traugott's arguments can also be applied to the sporadic cases of violations of coalescence. The Estonian particles modify clauses and the English *-'s* genitive governs a noun phrase, so their phonological liberation is partly justified by their semantic scope.

The paradigmatic morphosyntactic grammaticalization processes are more complex. Lehmann discusses two processes, paradigmaticization and obligatorification. **Paradigmaticization** is the integration of a former lexical item into a closed class of grammatical elements, or from a large closed class to a smaller one. For example, the case endings of Russian and other Slavic languages make up a small class (six cases in Russian), and thus a tightly organized paradigm, whereas the prepositions in those same languages, numbering a few dozen, make a very loose paradigm. The case endings are therefore more paradigmaticized than the prepositions.

The process of **obligatorification** involves the transition from an optional or variable element in the construction to an obligatory one. For example, the Latin prepositions are not an obligatory part of the oblique argument phrase, since some oblique argument phrases are formed with the case endings alone; but the modern

French descendants of those prepositions are obligatory in those oblique functions, the case endings having disappeared. Likewise, the different negative emphatic forms found in earlier stages of French have given way almost entirely to *pas*, which has also become an obligatory instead of an optional element in negative sentences.

A later stage in the paradigmatic morphosyntactic process of grammaticalization is **fossilization** (as Heine and Reh call it), the loss of productive use of a morpheme. Certain morphemes or phonological alternations cease to be the standard means of forming a grammatical category or construction. Instead, they become restricted chiefly to a limited specified class of words or constructions. For example, most locatives in Yurok are formed in *-(V)ɬ*, e.g. *cpegaʔr-oɬ* 'ear (LOC)' (Robins 1958:24). However, there is a less common locative in *-i(k)*, found on nouns denoting places, e.g. *ʔoʔlep-ik* 'house (LOC)' (Robins 1958:25).

An extreme case of fossilization is the random retention of a former morpheme on lexical items. In this case, the element is reinterpreted as part of the lexical root, that is, fused to it. For example, there is a prefix *k*(V)- found in Nilo-Saharan that Greenberg (1981) hypothesizes came originally from a definite article and, ultimately, a demonstrative (Greenberg 1978c). Cognates from distinct branches of Nilo-Saharan display random appearance of the *k*(V)- formative (Greenberg 1991; this example is from the original oral presentation):

Nile Nubian		Bari	
guar	'ant'	***ki-****gwur-te*	'ant'
ur	'head'	*ur-et*	'crown'
aru	'rain'	***k-****are*	'river'
gu-*mur*	'neck'	*mur-ut*	'neck'

The third possibility is that the morpheme will spread onto every lexical item of the relevant type. In Classical Nahuatl, there is a noun marker *-tl* found on every nominal root, e.g. *coyo-tl* 'coyote', *cihua-tl* 'star' (Andrews 1975). Presumably it had the same history as Nilo-Saharan *k*(V)-, except that it spread to all noun roots. This is actually obligatorification taken to the extreme: a grammaticalized morpheme becomes obligatory in all constructions, without any more meaning than the general indication of the construction type.

A morpheme that has lost its original function can be appropriated for a different function entirely: this is called **regrammaticalization** (Greenberg 1991) or **exaptation** (Lass 1990). For example, in some Nilo-Saharan languages the *k*(V)- formative, having lost its demonstrative and article functions, has been regrammaticalized as a prefix deriving verbal nouns, such as Ngambay Mundu *k-usa* 'act of eating' from *usa* 'eat' (found on vowel-initial stems only; Greenberg 1981:108). Finally,

or alternatively to fossilization, a grammatical morpheme can simply disappear; this is **grammatical loss**, which was distinguished above from phonological loss.

8.3.3 Functional processes

The one syntagmatic functional grammaticalization process is merger (Heine and Reh) or **idiomaticization** (Lehmann). Merger is defined by Heine and Reh as follows: 'the meaning or function of two linguistic units merges into one new meaning/function which is different from that of the combined units' (Heine and Reh 1984:44–45). Merger is basically the same as idiomaticization, where the meaning of the whole is not a simple semantic composition of the meanings of the parts. This is another gradual process, like cliticization/affixation, where some meaning combinations are more transparently derivable from the meanings of the parts than others. Heine and Reh give several examples from standard Ewe involving compounds with *ga* 'metal, money' (1984:45):

zĕ	'pot'	*ga-zĕ*	'metal pot, kettle'
sɔ́	'horse'	*ga-sɔ́*	'bicycle'
-tɔ́	'owner'	*ga-tɔ́*	(1) 'somebody owning money, rich person' (2) 'prisoner'
mí	'excrement'	*ga-mí*	'rust'
χɔ	'house'	*ga-χɔ*	'prison'

The compounds (including the two meanings of *ga-tɔ́*) are ranked in approximate order of idiomaticization, from least to most idiomatized, as suggested by Heine and Reh. Idiomaticization can also lead to **functional loss**. Heine and Reh give the example of Krongo *óob-íy* 'close-eyes', meaning 'sleep', as a case of idiomaticization (Heine and Reh 1984:44). In examples such as these, the two separate parts lose their independent meanings and function as a whole with a different meaning. Fossilization, grammatical loss and complete obligatorification also involve functional loss.

Heine and Reh propose two paradigmatic functional grammaticalization processes, desemanticization and expansion. Desemanticization, also called semantic bleaching, is described as a loss of meaning. A typical example of desemanticization is found in the evolution of reflexives: by comparative–historical evidence, the Dinka reflexive marker *rɔ* is derived from a word meaning 'body' (compare Kanuri *rô*; Kemmer 1993:193–94). For Heine and Reh, expansion involves the addition of a grammatical function to a grammatical unit, whereas desemanticization involves the addition of a grammatical function to a lexical unit (1984:39). Expansion can be illustrated with the verbal directional suffix *-da* 'up' in Mokilese, which has

come to indicate a variety of verbal derivatives (Harrison 1976:198, 230; Harrison and Albert 1977):

Direction:
aluh-da 'walk up' (alu 'walk')
wah-da 'carry up' (wa 'carry')
Repeated activity, possibly toward a goal:
doakoah-da 'stab repeatedly' (doakoa 'lunge, stab'),
pwukul-da 'make random holes in' (pwukul 'poke a hole in')
Activity directed toward goal:
audoh-da 'fill up' (audo 'fill')
jaun-da 'stoke up (a fire)' (jaun 'stoke')
Creation or bringing into being:
lemeh-da 'to recall, come into mind' (leme 'think')
diar-da 'find' (diar 'look for')

However, expansion and desemanticization are not inherent properties of grammaticalization. Expansion is simply a side effect of a word, morpheme or construction being extended to a new meaning but retaining the old meaning. For example, if a different word comes to mean 'up' in Mokilese, then the range of uses of *-da* will contract not expand. But this latter process has little to do with the grammaticalization of *-da*.

Desemanticization is a side effect of expansion combined with a questionable theoretical assumption, that of monosemy, or the idea that all the uses of a word, morpheme or construction can be characterized by a single, general meaning. In fact, that is not generally the case (Cruse 1992; Croft 1998a; Croft 2001:112–19; see §3.4). Instead, one finds polysemy, a chain of related meanings or uses. For example, there is no general meaning underlying English *that* as deictic demonstrative, anaphoric demonstrative, complementizer and relativizer, although one can identify semantic relations between each of these functions. As Cruse notes, a monosemy analysis must provide not only necessary conditions (a common meaning across all uses of a form) but also sufficient conditions (a property that only the uses have).

Also, a monosemy analysis subsuming both the less and more grammaticalized functions of a form is precluded if there are subtle yet genuine formal differences in the form used for the two different functions. For instance, only future *going* can be reduced to *gonna*, and only the complementizer *that* can be reduced to [ðɨ t] (I am grateful to Matthew Dryer for the latter example):

(10a) He's gonna stay home.
(10b) *He's gonna church.
(11a) I said [ðɨ t] I'm tired.
(11b) *I want [ðɨ t] book.

There are also major syntactic differences between the pairs of forms (see Croft 2001:113–15). Hence, we would not even want to say there is a single formal unit *going to* and a single formal unit *that* in English, which has supposedly expanded and/or bleached in meaning.

Instead, the functional paradigmatic process of grammaticalization involves a semantic change from a lexical meaning to a grammatical meaning. A number of researchers, notably Traugott (1982; 1985; 1988; 1989; 1990), have analyzed various processes of semantic change in grammaticalization. The general phenomenon that Traugott and others are trying to capture is the very well-attested unidirectional shift in semantic/pragmatic function of the use of lexical items in grammaticalization. The question is, can the shifts of lexical items from their original meanings to the wide variety of grammatical meanings or functions be subsumed under a single general process? This problem is the diachronic analog to the problem of distinguishing lexical from grammatical elements in synchronic analysis (see §7.2.4).

Traugott proposes that the semantic change involves three sorts of related shifts (Traugott 1989:34–35). First, there is a shift from meanings defined in terms of the external described situation, such as objects, properties and actions, to meanings based on the internal described situation, that is, including evaluative, perceptual and cognitive aspects of the described situation. Second, meanings based in the described situation shift to meanings based in the textual or metalinguistic situation such as discourse connectives and speech act markers. Finally, meanings tend to shift toward the speaker's subjective beliefs or attitudes toward the proposition, such as epistemic meaning. Traugott argues that all of the shifts have in common reference to speaker values and language function (1989:34–35), which she calls **subjectification**.

Heine and Reh propose another functional paradigmatic process, simplification. Simplification involves the loss of cross-cutting paradigmatic distinctions, for example, the loss of tense in the English modal auxiliary verbs. Lehmann includes simplification, specifically loss of inflections, with attrition (Lehmann 1985:307). Heine and Reh give examples of the loss of gender distinctions in various languages, where one gender form comes to be used for all noun/pronoun classes (e.g. Class 9 indexation in Kenya Pidgin Swahili).

There are many counterexamples to simplification, however. Inflectional distinctions may be added to a form via morphological fusion (compare Heine and Reh 1984:40–41). For example, subject inflections on verbs in many Melanesian languages display a realis–irrealis distinction (e.g. Manam; Lichtenberk 1983b:182–83). It is plausible that at an earlier stage there was a single subject pronominal form that fused with realis–irrealis modal markers in the process of becoming an indexation marker.

Simplification is not a grammaticalization process. Instead, what has been called simplification is a side effect of other grammaticalization processes. The replacement of distinct grammatical forms by one single form in a paradigmatic set, as in Heine and Reh's gender example, is an example of paradigmaticization. The loss of a morphosyntactically distinct inflectional category in a construction (the phenomenon described by Lehmann) is an example of morphological loss. Finally, morphological fusion and loss can be subsumed under coalescence.

Functional loss, the endpoint of grammaticalization, can take place in several ways (Heine and Reh 1984:46–50). An element may lose its function because it is **replaced** by another element which comes to have the same function. Replacement results in the eventual loss of the old element, or its fossilized retention, such as the *-en* plural in *ox-en, brethr-en* and *childr-en* in English, otherwise replaced by the productive *-s* plural. An old element may also be **reinforced** by a new element, so that both elements occur together, at least for a while. For example, French *ne* is reinforced by *pas*; the former has lost its negative meaning on its own, while the latter has lost its emphatic meaning, and has now been extended to virtually all negative contexts. Reinforcement usually involves the spread of the old element to all contexts, and often its loss (for example, French *ne* is being lost in colloquial speech). However, a fossilized form can be reinforced by another form; the *-r* plural in *child-r-en* is reinforced by *-en* (which is itself fossilized now).

We may now summarize the processes of grammaticalization. The paradigmatic phonological process of attrition, the erosion of the phonological size of the morpheme, ends in phonological loss. The syntagmatic phonological–syntactic process of coalescence (compounding and affixation of morphemes) ends in fusion (loss of morpheme boundary), which again may result in loss. The syntagmatic process of rigidification of word order generally leads to phonological coalescence (loss of word-external morpheme boundary). The paradigmatic morphosyntactic processes of paradigmaticization (shift to a closed class element) and obligatorification (obligatory presence in a construction) are generally accompanied by the paradigmatic functional process of subjectification. Finally, the loss of function of an element, which may occur by itself but can also occur through replacement, reinforcement and idiomaticization, results in complete morphosyntactic obligatorification, fossilization or loss, and also phonological attrition, fusion or loss.

8.3.4 *Issues in grammaticalization*

Grammaticalization represents a correlation of a set of unidirectional grammatical processes not unlike the correlations of synchronic grammatical properties that were described for transitivity, indexation, etc. in chapter 6. Unlike the synchronic correlations, grammaticalization represents a correlation of processes

over time, which raises a new question: how precisely are the various processes in grammaticalization synchronized? The strongest hypothesis would be that for each process one can (roughly) identify a sequence of stages, so that a morpheme that has reached a certain stage in one of the grammaticalization processes will also have reached the corresponding stage in the other grammaticalization processes. Weaker hypotheses would allow for greater or lesser degrees of synchronization for various parameters.

The strongest hypothesis is empirically untenable for at least some grammaticalization phenomena, even with fairly loose definitions of stages. The evolution of pronouns to indexation markers involves roughly three stages of morphosyntactic evolution:

1 The morpheme is optional, found only in certain contexts, often discourse-determined.
2 The morpheme is obligatory, found in every finite clause, but does not co-occur with independent NP arguments.
3 The morpheme is obligatory and does co-occur with independent NP arguments (at this stage, it is generally no longer called a pronoun but instead an indexation marker).

To this are correlated phonological changes, which can also be simplified to three stages:

(a) independent morpheme;
(b) clitic (informally defined here as an element that never can be stressed);
(c) affix.

The strongest hypothesis would imply the existence of only the following types, illustrated by attested examples:

1(a) Independent, optional pronoun: Salt-Yui (Irwin 1974:52, 55)

(12) (**ni**) buku irai makena ene?
(**you**) book that where did.you.put
'Where did you put the book?'

2(b) obligatory pronominal clitic: French object clitics

Je **le lui** dirai
I **it him** tell.fut
'I'll tell him.'

3(c) Indexation affix: Lenakel subject markers (Lynch 1978:45):

(14) ka(t) -lau **ki**- m- ia- **v**i**n** apwa i- paat
1IN -DU **1IN**- PST- DU- go LOC LOC- shore
'We (you and I) went toward the shore.'

However, a number of other combinations occur (the examples of independent obligatory pronouns and indexation markers may not be all that independent phonologically):

2(a) Obligatory independent pronouns: English pronouns

(15) **I** found **it**.

3(b) Indexation clitics: Woleaian subject markers (Sohn 1975:145)

(16) Yaremat laal **ye** be mas
man that **3SG** will die
'That man will die.'

2(c) Obligatory pronominal affixes: Kinyarwanda object prefixes (Kimenyi 1980:179; the 3SG emphatic is required after ná *'also' and refers to the subject)*

(17) N- a- guz -e igitabo na Yôhaani ná we
1SG.SBJ- PST- buy -ASP book and John also 3SG.EMPH

y- a- **ki-** guz -e
3SG.SBJ- PST- **3SG.OBJ-** buy -ASP
'I bought a book, and John also bought one.'

The examination of intermediate stages also illustrates 'out-of-sync' changes:

2/3(c) Obligatory affixes that may or may not allow doubling: Kanuri subject and object affixes (Hutchison 1981:139; see §2.1)

(18) **nzú-** rú -kə́ -nà
2SG- see -1SG -PRF
'I saw/have seen you.'

(19) **nyí** -à rú -kə́ -nà
2SG -ASSOC see -1SG -PRF
'I saw/have seen you.'

(20) **nyí** -à **nzú** rú -kə́ -nà
2SG -ASSOC 2SG see -1SG -PRF
'I saw/have seen you.'

It may be that the English, Woleaian and Kinyarwanda examples represent relatively unstable states, and Kanuri represents an exceptional pattern 'correcting itself' over time, just as the exceptional GN & Prep languages represent relatively unstable transitory states between two predicted and widespread states. However, the gradualness hypothesis that accounted for the existence of the GN & Prep languages does not help here: there is no explanation of how the grammaticalization process got out of sync in the first place.

Thus, it appears that the strongest hypothesis of grammaticalization – that the correlated diachronic processes associated with grammaticalization are always in sync – will have to be weakened somewhat. It may turn out that some grammaticalization processes are always synchronized, or that additional conditions may

constrain the number of possible 'out of sync' states. Nevertheless, the hypothesis of grammaticalization represents a degree of generalization comparable to that underlying hierarchies and prototypes in synchronic typology. A large number of diachronic linguistic phenomena have been subsumed under a single very general concept.

Another question about the nature of grammaticalization processes that has attracted considerable attention is the relationship between grammaticalization and reanalysis. Structural reanalysis plays an important role in some theories of grammatical change (e.g. Harris and Campbell 1995) and is often implicated in grammaticalization. Structural reanalysis is the reanalysis of the syntactic structure of a construction. A typical example of genuine structural reanalysis is the reanalysis of an external possessor as an adnominal possessor in some varieties of German (Haspelmath 1998a:59):

(21) [Da zerriss$_V$ [dem Jungen]$_{NP}$ [seine Hose]$_{NP}$]$_S$
'Then the pants tore on the boy.'

(22) [Da zerriss$_V$ [[dem Jungen]$_{NP}$ seine Hose]$_{NP}$]$_S$
'Then the boy's pants tore.'

The only difference between 21 and 22 is whether *dem Jungen* is a separate syntactic constituent or combined with *seine Hose*.

Haspelmath (1998a) argues that although a number of grammaticalization theorists assume that structural reanalysis plays a significant role in grammaticalization, it is a distinct process. According to Haspelmath, genuine structural reanalysis does not involve the loss of syntactic autonomy or phonological substance; the syntactic relations or dependencies change in an abrupt manner; and the process is 'potentially reversible' (1998a). Grammaticalization, on the other hand, does involve loss of autonomy and substance; the process is gradual, and it is unidirectional.

The phenomena within grammaticalization which have sometimes been interpreted as structural reanalysis are: word class changes, alleged restructuring of the syntactic tree, reversal of head-dependent relations, clause fusion, and changes in grammatical relations. Haspelmath argues that these processes have the three aforementioned properties of grammaticalization – this is not really in dispute – and that the reanalysis interpretation depends on certain assumptions about syntactic representation that need not be the case.

Haspelmath's arguments can be briefly summarized as follows. Word class membership is a matter of degree, and the changes in word class are gradual. Thus, grammaticalization does not involve reanalysis of word class. Using dependency relations instead of constituency for syntactic representation eliminates the alleged syntactic restructuring in grammaticalization. The alleged reversal of head-dependent relations in grammaticalization depends on one's theory of head;

some theories would not entail reanalysis of head-dependent relations in grammaticalization. Clause fusion is actually change in word class (syntactic category) membership (e.g. verb > auxiliary). Finally, grammatical relation changes can be interpreted as gradual extension of the semantics of an argument linking construction (case frame) to a new event class.

Space prevents us from going into Haspelmath's arguments in any detail. However, we can note that Haspelmath's arguments are themselves based on assumptions about the nature of syntactic representation. Hence, it appears that the role of syntactic reanalysis in grammaticalization depends on one's theory of syntactic representation more than on grammaticalization itself. The more minimal the syntactic theory (e.g. the typologically inspired model of Croft 2001), the less likely that grammaticalization will involve syntactic reanalysis. It is much less controversial, though, that grammaticalization involves a reanalysis of the relationship between form and function in a grammatical construction (see Croft 2000: chapters 5–6).

8.3.5 *Explanations for grammaticalization*

Grammaticalization has been a major research area in typology and historical linguistics (e.g. Heine and Reh 1984; Lehmann 1984; 1985; Traugott and Heine 1991; Heine, Claudi and Hünnemeyer 1991; Hopper and Traugott 1993; Bybee, Perkins and Pagliuca 1994). Keller (1990/1994) offers an interpretation of a model of language change developed by Lüdtke (1980; 1985; 1986) which offers an explanation of the grammaticalization cycle (compare Haspelmath 1998a:52). I will describe this model as the **periphrasis–fusion–erosion** cycle (Croft 2000:159–64). The result of each phase in the cycle creates the conditions for the next phase of the change. There is a close but not perfect correlation between periphrasis, fusion and erosion and the functional, morphosyntactic and phonological processes respectively.

The first phase, **periphrasis** (Lüdtke's *amplification sémantactique*; Lüdtke 1986:23–27), is the recruitment of a new, periphrastic construction for a particular function. The new construction is usually more or less sanctioned by the existing rules of the grammar. The new construction is a more complex construction whose compositional meaning is closely related to the novel function for which it is used.

Some linguists have argued that expressiveness is the mechanism to account for this first step in grammaticalization: a speaker creates a novel periphrastic expression for the function in question (e.g. Lehmann 1985:314–17; Heine, Claudi and Hünnemeyer 1991:78, Heine 1994:259). One failing of the expressiveness account, however, is that a new construction may arise for a grammatical function (e.g. plural marking) which did not previously have grammatical expression in the language. Another mechanism for periphrasis, avoiding misunderstanding

(Keller 1990/1994:94; see also Langacker's 'perceptual optimality': Langacker 1977:128), lacks this problem. Both Keller and Lüdtke argue that speakers introduce a certain degree of redundancy in communication in order to avoid misunderstanding. But there is an upper limit as to how clear one can be with a given expression: 'to increase redundancy beyond the acoustically possible, one must use lexical means' (Keller 1990/1994:109), i.e. periphrasis.

The question remains: what is the functional process by which a new periphrastic expression is chosen for an existing function? There are two broad theories of the semantic processes underlying grammaticalization: metaphorical extension and pragmatic inference. In **metaphorical extension** a concept is transferred from one conceptual domain to another. One of the commonest types of metaphorical extension is that from space to time; compare *from New York to Chicago* and *from May to September*. In **pragmatic inference** (Traugott and König 1991; Hopper and Traugott 1993:75–77), a contextual (pragmatic) property of the meaning is reanalyzed as an inherent (semantic) property of the meaning, and a related inherent property is reanalyzed as a contextual one. For example, English *since* formerly was purely temporal in meaning, as it still is in temporal phrases such as *since yesterday*. But temporal sequence frequently involves a causal connection, and by pragmatic inference *since* developed a separate causal meaning as well (Hopper and Traugott 1993:76–77).

Traugott and König (1991) argue that both processes are required in order to account for grammaticalization, but that they operate in different grammatical domains: the development of 'tense, aspect, case and so forth' is metaphorical, but the development of connectives involves pragmatic inference (Traugott and König 1991:190).

Heine, Claudi and Hünnemeyer (1991) argue that all grammaticalization processes involve pragmatic inference, which they call context-induced reinterpretation. They hypothesize that pragmatic inference represents the microstructure of the grammaticalization process, while metaphor represents the macrostructure. They convincingly demonstrate that the sort of changes that Traugott and König describe as being only metaphorical involve pragmatic inferencing. Their method is to show that for any apparent quantum leap between two meanings or situation types, there is a continuum of situation types that bridge the gap between the two such that pragmatic inference will allow a speaker to extend the meaning gradually from one situation type to the other. They give detailed examples of intermediate situation types for allative > purposive > future (Heine et al. 1991:70, given in 23 below):

(23a) Henry is going to town.
(23b) Are you going to the library?
(23c) No, I am going to eat.
(23d) I am going to do my very best to make you happy.
(23e) The rain is going to come.

Examples 23a–b can be interpreted as a pure allative situation type, but with a human subject; it is plausible to infer an intention on the part of the subject. If intention is interpreted as an inherent part of the meaning of *to*, then the complement of *to* can be an intended action as well as a spatial destination, as in 23c. In 23c, the motion meaning for *go* remains if we assume that it is an answer to 23b. In 23c, future time reference is a contextual inference but in 23d, the motion meaning may be absent and the (intentional) future meaning is then reanalyzed as an inherent aspect of the construction. Finally, while prediction is a contextual inference in 23d, it is reinterpreted as inherent and applied to an inanimate subject in 23e. Heine et al. also give detailed analyses of the process comitative > instrumental (1991:104, from Schlesinger 1979:310); and the processes involved in two Ewe changes: *gbé* 'back' > 'back of [object]' > 'behind' (1991: 65–68); and *kpɔ́* 'see' > 'really' > counterexpectation (1991:194–97).

Having given these microstructural analyses, Heine et al. nevertheless argue that one can still interpret grammaticalization as metaphorical because if one selects certain points along the continuum, the process then appears to make a quantum leap from one conceptual domain to another. However, the microstructural analysis as pragmatic inference is sufficient to describe grammaticalization. Also, metaphor involves a quantum leap from one conceptual domain to another (Lakoff and Johnson 1980), yet grammaticalization is a gradual process. There is good evidence for metaphor in lexical semantic change, but not as clearly in grammaticalization.

One reason for invoking metaphor in grammaticalization is to motivate unidirectionality. Heine et al. propose the following ranking of domains for metaphorical transfer (> indicates directionality of change):

(24) PERSON > OBJECT > PROCESS > SPACE > TIME > QUALITY [STATE]

However, some of these categories are rather loosely defined, and not all lexical metaphors obey this hierarchy. Consider for example the metaphor TIME IS MONEY (Lakoff and Johnson 1980:7–9), as in *I spent too much time on this.* Here, possession is the source domain transferred to time. Possession is a quality in Heine et al.'s scheme, because it is a stative relation; but it is lower in the hierarchy than time. The unidirectional shift in 24 appears to be valid for grammaticalization processes, but not for lexical metaphor. The unidirectional shift in 24 still requires explanation.

Once a periphrastic expression has been chosen to express a novel meaning, it then undergoes **fusion**, that is, it is perceived as a fixed unit (Lüdtke 1986:27–31; Keller 1990/1994:110). Lüdtke and Keller present this as a psychological phenomenon: the combination of words in the periphrastic expression becomes

entrenched as a single unit in the mind (see §4.3). However, fusion is also a social phenomenon, namely the conventionalization of the periphrastic expression with a particular meaning.

Conventionalization involves the reduction of variation in forms to express a particular function. One way to reduce variation is, of course, to eliminate the older form. However, there often are variants of the new construction, such as the variety of postverbal negative emphatic markers in the history of French (*pas*, *point*, etc.; see §8.3.2), that compete to be the conventional expression of the function. Among the ways to reduce this sort of variation are to: (i) fix the word order of the construction, i.e. rigidification; (ii) eliminate optionality, i.e. obligatorification; (iii) to reduce the range of elements that fit into a slot in the construction, i.e. paradigmaticization. These strategies correspond to the morphosyntactic processes of grammaticalization in Table 8.3.

The last stage in the grammaticalization cycle is **erosion** of the conventionalized expression (Lüdtke's *usure phonique*; Lüdtke 1986:15–23; Keller 1990/1994:108). Erosion is generally treated as phonological, that is, reduction, coalescence and adaptation. However, as noted in §8.3.1, coalescence and erosion may apply also to morphemes as well as phonemes.

The principle of economy is invoked by Lüdtke and Keller to account for erosion. Only certain elements in the construction will be phonologically eroded, namely the specific morphemes that are associated with the construction, the more invariant the better (compare Bybee and Scheibman 1999). For example, in the English *go*-future, [SBJ *be going to* VP_{inf}], *be* is always present but in its usual range of forms, while the string *going to* is always present in just that form. Thus, it is *going to* that reduces to [gʌnə]. Also, certain forms of *be* reduce to enclitics on the subject in this construction as they do elsewhere, due to the high token frequency of those forms compared with the variable parts of the construction (subject, infinitival verb phrase).

Of course, it is precisely the specific, especially invariant, morphemes associated with the construction that are interpreted by the interlocutors as encoding the meaning characteristically associated with the construction as a whole. It is this fact that gives the impression that grammaticalization is a process affecting individual morphemes (and the lexemes they are derived from). However, phonological erosion occurs only when the individual morphemes have the meaning that is conferred on them by the construction. For this reason, grammaticalization theorists now recognize that grammaticalization applies to whole constructions, not just to lexemes and morphemes.

As erosion proceeds, the need not to be misunderstood may reassert itself, and the periphrasis–fusion–erosion cycle may repeat itself for the particular function in question. Also, the grammaticalized construction may itself be extended to a

new function, that is, it may be drawn into a periphrasis–fusion–erosion cycle for a new function.

8.4 Inferring diachrony from synchrony

The vast majority of languages do not offer direct historical evidence of diachronic processes of change. Instead, diachronic processes must be inferred from synchronic states. In the case of intragenetic comparison (§8.2), one can use the historical–comparative method, informed by typological universals of language, to reconstruct processes of language change which can be used in diachronic typology.

But there is another method that can be used, based on synchronic typology. Since the diachronic typologist is not concerned with reconstruction for its own sake, this method can be extended to the comparison of unrelated or more distantly related languages. One can compare language states in their full range of internal variation and, if the data are orderly, rank them in a sequence representing gradual linguistic change. This is a further elaboration of the dynamicization of a typology. Now, however, the diachronic typologist compares real language states, displaying language-internal variation of different kinds, and uses the language-internal variation and knowledge of directionality of change as described in §§8.2–8.3 in order to extrapolate historical language processes. The methods described here and in the preceding sections allow us to determine paths of language change by means of discovering sequences of historically related language states.

In using synchronic variation in order to dynamicize a typology, one must have some criteria for establishing which form is older in the function in question and which is newer. The processes associated with grammaticalization offer important evidence for determining which variant is older and which is newer. Many of the examples in §8.3 contrast more grammaticalized with less grammaticalized constructions in specific languages. One can determine which of two competing forms, or two related forms, is the more grammaticalized. From this information one can then infer which is the newer form (which consequently may ultimately displace the older form). If the generalizations provided by grammaticalization theory are correct, the various symptoms should all point to the same form as being the more grammaticalized form.

Determining which form is the newer depends on whether the forms are related to each other as cognates or not. If the forms are related to each other, then the more grammaticalized form is the newer form, because it represents a later stage in the evolution of the same morpheme (with a proviso to be noted below). For example, the Russian verbal suffix *-sja* ~ *-s'* is more grammaticalized than the

reflexive *sebja*: the suffix *-sja* ~ *-s'* is phonologically more eroded; it changes form due to phonological context (adaptation); it is affixed to the verb (coalescence); and its meaning is less concrete and more grammatical (§7.2.4). The suffix is cognate with *sebja*; therefore it represents a later stage in the evolution of the reflexive form and so is the newer form.

If, on the other hand, the two forms are not related as cognates, then the less grammaticalized form is the newer form, since its relative lack of grammaticalization indicates its more recent evolution to a grammatical morpheme. For example, the English obligative construction *have to* is less grammaticalized than the obligative auxiliary *must*: *have to* is two more or less separate morphemes, though it is pronounced [hæftə], [hæstə] (not completely coalesced); and it is, arguably, part of a large class of verbs with *to* + infinitival verb-phrase complements (not paradigmaticized). It is not cognate with *must*; therefore it represents a more recently evolved competitor to *must* and so is the newer form.

In some cases it is difficult to tell whether a more grammaticalized form is the later stage of the less grammaticalized form, or a different form from it. For example, in Kanuri, we find the following deictic demonstratives (Hutchison 1981:50–51):

	Singular	Plural
Proximal	*ádə*	*ànyì*
Distal	*túdù*	*túnyì*

These forms can be used anaphorically as well, though in the anaphoric demonstrative function the proximal singular *ádə* 'this' can be used for any form. In addition, there is a suffix *-də* which can be used as an anaphoric marker and also more generally on topical nouns. *-də* is also used as a relativizer and a complementizer.

If we compare *ádə* to *-də*, it is clear that *-də* is the more grammaticalized form: it is phonologically more eroded; it is a suffix; and it is further down the grammaticalization path from demonstrative to article and noun marker. The suffix *-də* also appears to be a historical continuation of *ádə*, in which case it is the newer (i.e. further evolved) form. However, it may not be a continuation of the morpheme *ádə*. The reason for doubt is that *ádə* may be a reinforcement of *-də*. That is to say, rather than *-də* being historically derived from *ádə* through the phonological loss of *á-*, it may be that *ádə* is derived from *-də* by the addition of a morpheme *á-*. Examination of the demonstrative forms suggests that there exists a morpheme *á-*: one can analyze *á-/à-* proximal vs. *tú-* distal and *-də* singular (allowing for vowel harmony in the distal) vs. *-nyí* plural. If *ádə* is a reinforcement of *-də*, then *-də* is not the historical continuation of *ádə* but its predecessor, and is thus the older form. Thus, sometimes reinforcement of a grammatical morpheme might be confused with

a less-eroded version of the same morpheme. In general, however, the possibility of confusion is rather rare and even in the Kanuri case, the morphological analysis of the demonstratives makes it seem fairly clear that reinforcement has occurred.

In addition to the evidence offered by grammaticalization theory, we can also draw on sociolinguistic evidence. If one of the competing forms is associated with innovative sociolinguistic forces (younger speakers, oral speech, colloquial style, etc.), then it is likely to be the newer one (Bright and Ramanujan 1964; Labov 1966; compare Greenberg 1966c:516). One must of course be aware of static social stratification in language, such as age-grading, in which synchronic variation does not represent diachronic change in progress (e.g. Chambers 1995:190–93). However, age-graded variation appears to be much less common than change in progress.

An example of inferring diachrony from synchrony is the evolution of negative markers from negative existential verbs (Croft 1991b). The idealized language types/states and the hypothesized process are given below:

(25) *States*:

Neg + V/Neg + Exst	→	Neg + V/Neg.Exst	→	Neg + V/Neg + Exst

(26) *Process*: Neg + Exst > Neg.Exst > Neg.Exst + V

Evidence for the process in 25 is found in intermediate language states to those in 24, with synchronic variation exemplifying the process in progress. For example, in Balinese, the regular Neg + Exst *tan hana* alternates with the contracted form *tanana* (examples from the *Geguritan Calonarang*, provided to me by John Myhill):

(27) Asepi **tan hana** wong liwating awan
deserted **NEG EXST** person pass.by street
'It was deserted and there was no one passing on the street.' (v. 151)

(28) **Tanana** seraya
NEG.EXST substitute
'There was no substitute.' (v. 219)

The fact that *tanana* is a coalesced version of the cognate *tan hana* is evidence that *tanana* is the younger form, and represents the rise of a special, irregular negative existential form.

The transition to the next stage can be illustrated by Wintu. In Wintu, the negative existential *ʔelew* 'NEG.EX, no (interjection)' (Pitkin 1984:197; no example of

existential use given) is used with the suffix *-mina* 'NEG' to form negative verb constructions:

(29) **ʔelew** -be:sken hara: -wer **-mina**
NEG.EXST -you.IMPF go -FUT **-NEG**
'You were not supposed to go.' (p.198)

Here we find reinforcement of the older form by the newer one. The suffix *-mina* is said to itself derive from a verb *min* 'to not exist' (Pitkin 1984:121). In this case, the element *ʔelew* is not cognate with *-mina* and is less grammaticalized than *-mina* for at least two reasons. First, *ʔelew* is less closely fused with the verb it modifies than is *-mina*, i.e. coalescence. Second, *ʔelew* is not an invariant form, again unlike *-mina*; this is an example of obligatorification. Hence, *ʔelew* is newer than *-mina*.

Finally, we have the transition in which the negative-existential-cum-verbal-negator begins to be reinterpreted as a verbal negator, and a regular positive existential verb comes to be used with it in the negative existential construction. Marathi *nāhi* can still be used alone as the negative existential, but the positive existential form *āhe* can also be used with it (Madhav Deshpande, pers. comm.):

(30) tithə koṇi **āhe**
there anyone **EXST**
'Is anyone there?'

(31) koṇi tithə dzāt [əts] **nāhi**
anyone there goes [EMPH] **NEG**
'Nobody goes there.'

(32) tithə koṇi **nāhi** [**āhe**]
there anyone **NEG** [**EXST**]
'There isn't anyone there.'

The negative existential construction with the positive form *āhe* is considered more emphatic than the construction without it (Madhav Deshpande, pers. comm.). This suggests again that the construction with *āhe* is more recent, since it has greater pragmatic content than the construction with *nāhi* alone.

We conclude with an example of universals and diachronic typology outside grammar, in the realm of the lexicon. Research on lexical universals began not long after Greenberg's research on grammatical universals with a seminal study of color terms, Berlin and Kay (1969). Their work fits broadly into the typological tradition, and has stimulated a large amount of research and debate within linguistics and anthropology.

Most languages have a wide range of color terms, but Berlin and Kay restrict their study to what they define as basic color terms. Basic color terms are: monomorphemic (i.e. not *salmon-colored*); not included in another color term (e.g. *scarlet* is included in *red*); unrestricted in application to objects (e.g. not *blond*, applicable only to hair and wood); and psychologically salient, e.g. used by most informants, stable in use within and across informants, and tending to occur near the beginning of elicited lists of color terms (Berlin and Kay 1969:6). Colors were identified using a standard set of 329 Munsell color chips.

Berlin and Kay discovered that there are many languages with a small number of basic color terms, ranging as low as two. They also argue for a set of universals for the categorization of colors, and a dynamic interpretation of the evolution of color systems. The most striking universal is the fact that the focal or prototypical color value is uniform across languages; that is, informants identified the same hue as the best exemplar of the color. On the other hand, boundaries of color terms are quite variable, even among speakers of the same language.

Kay and McDaniel (1978) explain the uniformity of foci in physiological terms. Human beings respond to color with respect to three neurophysiological subsystems, believed to represent the response of different sets of cones in the eyes. The three subsystems are brightness and two hue subsystems, one based on a blue–yellow opposition and one based on a red–green opposition. (There is another dimension to the physiology of color, saturation, but it appears to play a minor role in color terminology; MacLaury 1992:150, footnote 15.) All additional perceived colors are combinations of activation of the cones of the two basic hue subsystems (black and white are achromatic, lacking hue and exhibiting only brightness).

Kay and McDaniel also offer a physiological explanation for color term systems with less than six terms, which must therefore subsume more than one physiologically basic color under a single term. They argue that no such system will combine the opposite colors of either hue subsystem, although it may combine hues from the different subsystems. Table 8.5 gives the attested systems found by Berlin and Kay and later researchers (Kay and Maffi 1999). The cross-linguistic facts, and the relevant perceptual-physiological parameters, can be represented in the conceptual space in Figure 8.2 (compare Kay, Berlin and Merrifield 1991:15, Fig. 2).

The diagonal from upper left to lower right in the conceptual space represents the brightness dimension. The colors in the center of the space (inside the gray oval) are chromatic, while the 'colors' at the peripheries are achromatic. The links are motivated by actually occurring basic color term systems. The double-headed arrows indicate physiological hue oppositions. There are further constraints on which physiologically basic colors can be grouped under a single basic color term, not represented in the conceptual space in Figure 8.2.

Table 8.5 *Two- to five-term basic color term systems*

Number of terms	Composite color categories	Examples	WCS languages
two-term	black – blue – green | red – yellow – white	Dani, Burara	0
three-term	black – blue – green | red – yellow | white	Tiv	10
four-term	black – blue – green | red | yellow | white	Urhobo	2
	black | blue – green | red – yellow | white	Ibibio	7
	black | blue – green | red | yellow – white	Waorani	1
	black | blue – green – yellow | red | white	Kuku-Yalanji	2
five-term	black | blue – green | yellow | red | white	Tzeltal	52
	black – blue | green | yellow | red | white	Chinook Jargon	4
	black | blue | green – yellow | red | white	Cree	1
six-term	black | blue | green | yellow | red | white	Nupe	23

Note: WCS refers to the sample of over one hundred languages the World Color Survey.
Sources: Types and WCS numbers from Kay and Maffi 1999; examples from Berlin and Kay 1969; Foley 1997; Kay and Maffi 1999.

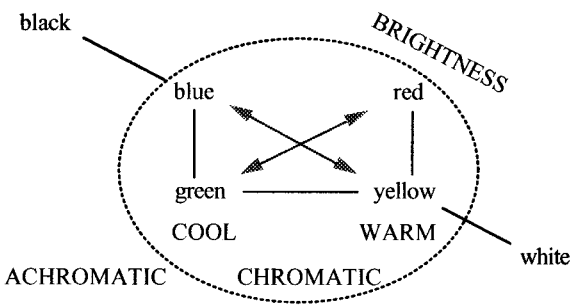


Figure 8.2 *Conceptual space for basic color terms*

All of the aforementioned studies also propose what we would describe as a dynamicization of the synchronic typology of color terms. It is assumed that change is essentially gradual, that is, color term systems evolve by the addition of one basic color term at a time, hence proceeding from two-term systems to three-term systems and so on. All of the aforementioned studies also argue that the change is unidirectional, and driven by technological change, where color is more significant in identifying artifacts of greater complexity (Kay and Maffi 1999:746). This last argument, interestingly, represents an externally motivated counterexample to the hypothesis that all language states are strongly connected.

Kay and Maffi (1999) describe the synchronic typology and its dynamicization in terms of four principles: partition the color space; distinguish the achromatic

'colors' black and white; distinguish the warm and cool hues; and distinguish red. Interestingly, the last principle does not have a clear physiological basis; the only clear evidence for it is linguistic, namely the systems of color terms and the initial acquisition of red by children (Kay and Maffi 1999:747–48 and references cited therein). In fact, red is the first hue to be separated from the composite color categories that contain black and white (Berlin and Kay 1969:2). There are also some exceptions to Kay and Maffi's dynamicization. Systems that combine yellow and green violate the principle of differentiating warm and cool hues. Finally, the systems that combine yellow, green and blue violate the principle enunciated in Kay and McDaniel (1978) that no color term will combine members of the same physiological hue opposition (Kay, Berlin and Merrifield 1991:25, footnote 3).

Two sorts of explanation have been offered for yellow–green systems. MacLaury (1987, 1992), analyzing individual as well as cross-linguistic variation, offers an account that combines both brightness and hue as an explanation of color systems. Two-term systems are based as much on brightness (light – dark) as hue (black – white); Foley suggests that the Burara two-term system is solely based on brightness (Foley 1997:154–55, citing Jones and Meehan 1978). Three-term systems are best glossed as dark–warm–light, not black–red–white (compare Berlin and Kay 1969:25, citing Bohannon 1963:35–36 on Tiv). MacLaury argues that the color term systems combining green and yellow actually indicate an intermediate degree of brightness, not hue. MacLaury argues that in the three-term color system of one Agta speaker who was interviewed, the third term is 'medium bright', not (solely) 'red'.

Kay and Maffi (1999) argue instead that yellow–green terms are a sort of 'left-over' color term (or terms). They note that some languages appear not to partition the color space: the basic color terms are restricted to the focal colors. For example, Yélîdnye appears to have the three terms *kpêdekpêde* 'black', *kpaapîkpaapî* 'white' and *mtyemtye* (or *taataa*) 'red', but they are not extended to other colors in the color space (Kay and Maffi 1999, citing Levinson 1997). Yélîdnye does not have any other basic color terms. However, languages such as Kuku-Yalanji and others in the World Color Survey also do not extend their terms for black, white and red, and have additional terms whose usage is highly variable among speakers, thereby giving the impression that the remaining color term is a 'leftover' term. This hypothesis allows Kay and Maffi to preserve the assumption of gradual change, leading to a yellow–green–blue term from a restricted (not partitioned) black–white–red system.

The physiological account has been criticized by anthropologists who argue for a relativistic position, in which color terms cannot be understood except in terms of their cultural associations (see Foley 1997: chapter 7, and references therein). However, the typological approach to universals, including Berlin and Kay's work,

does not posit unrestricted universals. Languages vary as to the number of basic color terms they have. Brightness may compete with the two opposite-hue subsystems in categorizing colors. This is not to say that other properties of the conceptual space require an explanation that goes beyond neurophysiology. It is still unclear why red is separated from black and white first. Their explanation is probably an interacting combination of psychological (neurophysiological) and cultural factors (on universals of kin terms, a topic beyond the scope of this textbook, compare Greenberg 1966b, 1980/1990). Both sorts of factors are external to language and common to all human beings.

8.5 Conclusion

Diachronic typology represents a reinterpretation of the results of synchronic typology and an extension of typological analysis to a new domain. Diachronic typology reinterprets synchronic patterns as the result of the interplay of dynamic factors. By expanding the scope of typology to language change, the typology of diachronic linguistic processes has begun to be explored, particularly in the area of grammaticalization.

9

Typology as an approach to language

9.1 Scientific approaches (research traditions) and linguistic theories

In chapter 1, it was observed that typology is an empirical approach to the study of language, beginning with a cross-linguistic survey of language structure. In §1.2, and also §3.5 and §7.1, the typological approach was compared to the structuralist–generative approach to language. This book has illustrated how the typological approach analyzes a wide range of phenomena in morphosyntax and phonology. In this concluding chapter, we look again at the way in which typology is an approach to the study of language.

Philosophy of science presents a means to understand the nature of scientific theories or approaches. Philosophy of science is often invoked in linguistics in terms of falsificationism (Popper 1934/1959). Falsificationism is the doctrine that no piece of empirical evidence can prove a theory, while a single piece of evidence can falsify it. However, it has been recognized in the decades since Popper's work that acceptance or abandonment of a scientific theory is not an all-or-none affair; judgment of a theory is based not only on empirical problems (putative counterexamples) but also on conceptual problems (Quine 1951/1961; Kuhn 1962/1970; Lakatos 1970; Laudan 1977). In other words, there is no recipe for choosing a particular scientific theory, and in fact the evolution of scientific theories involves a substantial amount of interplay among parallel competing theories (Laudan 1977; Hull 1988).

Laudan argues that there are two different ways in which the term 'theory' is used: to refer to analyses of specific phenomena (e.g. DuBois' theory of ergativity), or to very general and not so easily testable frameworks (e.g. functionalist theory; Laudan 1977: chapter 3). Laudan calls the latter **research traditions**, which corresponds closely to the term 'approach' as it is used in linguistics:

> Every research tradition exhibits certain *metaphysical* and *methodological* commitments which, as an ensemble, individuate the research tradition and distinguish it from others ... In brief, a research tradition provides a set of guidelines for the development of specific theories. Part of those guidelines constitute an ontology which specifies, in a general way, the types of fundamental entities which exist

> in the domain or domains within which the research tradition is embedded. The function of specific theories within the research tradition is to explain all the empirical problems in the domain by 'reducing' them to the ontology of the research tradition ... the research tradition will also specify certain modes of procedure which constitute the legitimate *methods of inquiry* open to a researcher within that tradition ... *research traditions are neither explanatory, nor predictive, nor directly testable.* (Laudan 1977:79, 81–82; emphasis original)

Instead, theories (of the specific sort) are formulated within research traditions: the research tradition frames the problem and provides tools for solving the problem. Specific theories are always part of specific research traditions; in fact, they cannot be understood outside of them. However, specific theories are separable from research traditions in that specific theories formulated in one research tradition can be taken over (with relevant modifications) by another research tradition (Laudan 1977:94).

Research traditions are the home of (and incubator for) specific theories. Multiple, incompatible theories can exist simultaneously within a single research tradition, sometimes because one is an attempt to improve on another (Laudan 1977:81). Laudan's 'theories' may be less confusingly called **analyses** (compare §1.3). Typological analyses of many grammatical phenomena have been described in this book, such as word order, typological markedness, ergativity, parts of speech, affix order and constituency. Some of them have been seen to conflict; but all of them are typological. Of course, typological analyses are open-ended and continue to expand as research in typology continues.

In linguistics, the term 'theory' is in fact largely used to describe models of syntactic, phonological and semantic representation. The models of representation are 'fundamental entities' in a research tradition in that they generally call for a **representational** commitment on the part of the researcher (Croft 1999): the researcher attempts to model his or her analysis in the representation language of the linguistic theory.

The typological approach to grammar has not presupposed a set of representational commitments until quite recently. In earlier work, typological analyses were said to be 'theory neutral', that is, they did not have any specific representational commitments. This situation has changed in recent times. In particular, the semantic map / conceptual space model described in chapter 5 offers a model of grammatical representation that allows for substantial variation in the types of categories posited in languages, and principles of economy and iconicity determine a minimal structure for complex grammatical units. In fact, it can be argued that the representational commitments of the typological approach are quite spartan in comparison to those of generative approaches (for a book-length discussion of these issues, see Croft 2001).

The other 'fundamental entities' of a research tradition are **ontological** commitments – what there is out there, or the fundamental nature of what we study – and **methodological** commitments – how we go about analyzing and understanding what is out there (Laudan 1977:79). The preceding chapters of this book have presented the ontological and methodological commitments of the typological approach to language and the analyses that they have spawned. The rest of this chapter will bring them together as a coherent approach to language.

9.2 Thinking like a typologist

After doing typology, certain ways of thinking about language come naturally to a typologist which are quite different to the ways of thinking in other linguistic theories. The preceding chapters offer an introduction to typological thinking. The following paragraphs briefly summarize this way of thinking.

Above all, **diversity (variation)** in language is basic. Variation is the normal state of language which we have to deal with. It is dealing mainly with cross-linguistic variation that is the domain of typology. But typologists have also come to integrate diachronic variation and language-internal variation into their purview as in grammaticalization theory (chapter 8).

Everything else about doing typology represents typology's way of dealing with the fact of variation. A typologist uses an **inductive** method of analysis, by constructing a sample of the world's languages and seeking language universals via cross-linguistic generalizations (chapter 3). Since diversity is basic, the only safe way that one can discover the range of linguistic diversity is by cross-linguistic research. And it is only through exploring linguistic diversity that one is able to discover the limits to variation, that is, the universals of human language.

The typologist's search for language universals is balanced by the recognition that **arbitrariness** in language exists and should be accepted as such. Not everything in language can be, or should be, explainable in terms of a completely deterministic set of formal or functional general principles, abstract generalizations, etc. (§1.3). If it were, all languages would be alike, all languages would be internally invariant, and no languages would change.

A typologist endeavors to make his or her language universals explainable, and hence anything arbitrary about language is, we hope, language particular. But the motivations for language structure compete with each other; and that means that the grammars of particular languages involve some arbitrariness mixed in with the motivated universal principles, because the conventional resolution of the competition for each language is always partly arbitrary (Croft 1995a: 504–9).

A typologist also accepts that all things in grammar must pass. Language is fundamentally **dynamic**, at both the micro-level – language use – and the macro-level – the broad sweep of grammatical changes that take generations to work themselves out (Croft 2000; see also chapter 8). Synchronic language states are just snapshots of a dynamic process emerging originally from language use in conversational interaction. This thinking follows from the recognition of arbitrariness. What is arbitrary can change (since it isn't dictated by general principles) and, indeed, does. What is basic are the principles that govern the dynamic or diachronic universals.

In fact, anyone who does typology soon learns that there is no synchronic language universal without exceptions. But a typologist sees not only the exceptions – which, after all, must be possible language types, since they actually exist – but also the highly skewed distribution. In a diachronic perspective, where every language type comes into existence and passes on to another type with different degrees of frequency and stability, and the gradualness of change means all sorts of 'anomalous' intermediate types are found, possibility is much less important than probability. As a result, there has been a shift in typological thinking from constraining possible language types to calculating probable language types.

Thinking about language like a typologist involves, therefore, a focus on variation, arbitrariness, change, and the fundamentally cross-linguistic character of universals.

9.3 Description, explanation and generalization

A good deal of debate between the structuralist–generative and functional–typological approaches has centered on the relationship between description and explanation. In the more polemical discussions (e.g. Smith 1982; Givón 1979: chapter 1), each approach claims that its own analysis constitutes an explanation and that the other approach's analysis is merely a description. In the case of Smith, an explanation involves the postulation of **abstract** structures and rules that relate those abstract structures to the actually-existing 'surface' structures of language. Typological analysis, by making generalizations over 'surface' structure facts of languages, can only be 'taxonomic' (Smith 1982:255–56).

For Givón, on the other hand, an explanation requires reference to one or more of the following 'natural explanatory parameters': propositional content; discourse pragmatics; the processor; cognitive structure; world-view pragmatics; ontogenetic development; diachronic change; and phylogenetic evolution (Givón 1979:3–4). These parameters are those that we have called external explanations. Any analysis that does not refer to these parameters, in particular a formal model of abstract

structures, is not an explanation in his view:

> a formal model *by itself* could not be 'a theory' of a complex, organismic behavior, since in the realms of complex organisms a theory without explanation is not a theory... To the extent that a linguistic theory makes no reference to the natural explanatory parameters of language, it remains perforce a higher level of formalism. (Givón 1979:57; emphasis original)

Although the views of Smith and Givón represent the standard way in which the lines are drawn in the debate between the two approaches, each side misinterprets the other to some extent. The generative approach finds its foundation in psychology and biology, in innate internal mental structures, even if those structures are discovered without direct reference to external parameters. And, as we have observed throughout this book, although typology begins with 'surface' structure generalizations like implicational universals, it has moved quickly to more abstract concepts, such as dominance, hierarchies, prototypes, economy, iconicity and grammaticalization. Both approaches include abstraction and external explanations, to a greater or lesser extent. Therefore, it should be easier to compare them more directly, using a more general framework for characterizing the notion of explanation in terms of **generalization** (Greenberg 1968; 1979; compare Bybee 1988).

Instead of using the dichotomy of description vs. explanation, one can describe grammatical analysis – or any sort of scientific analysis, for that matter – with a scalar concept of degrees of generalization. The basic concept is that a more general linguistic statement can be said to explain a more specific one, though it may itself be explained by a yet more general statement. Thus, any given statement is an explanation for a lower-level generalization, but a description in comparison to a higher-level generalization. Greenberg illustrates this point with a low-level linguistic example:

> If, for example, a student who is just learning Turkish is told that the plural of *dih* (tooth) is *dihler* while that of *kuh* (bird) is *kuhlar*, he may ask why the first word forms its plural by adding *-ler* while the second does so by adding *-lar*. He may then be told that any word whose final vowel is *-i* takes *-ler*, while one in which the final vowel is *-u* takes *-lar*. This may be considered an explanation, insofar as further interrogation has to do with classes of words that have *-i* or *-u* as their final vowel rather than with the individual forms *dih* and *kuh*. If he asks about these two classes, he may be given a still more general statement... Pressing still further, he will finally receive a full statement of the vowel harmony system of Turkish. (Greenberg 1968:180–81)

The shift from one level to a higher (more general, or more explanatory) is indicated by the shift in the phenomenon under investigation, from individual words to words ending in particular vowels, from words ending in particular vowels to words ending in vowels with particular features (front and back), from the

particular suffix *-lar/-ler* to all suffixes with the *a/e* alternation, and so on. In general, we may say that we have succeeded in explaining some phenomenon (to a relative extent), when we have shifted analysis from that phenomenon to another one: from a more specific to a more general or abstract concept, or from an internal phenomenon to an external one. A successful generalization shifts the kinds of questions that are asked to a higher plane. To the extent that the lower-level questions are not asked any more, one can say that the lower level of phenomena has been explained.

Given this view of scientific explanation, one could impose boundaries so that generalizations below the boundary are descriptions in some absolute sense and those above the level are explanations in an absolute sense. For example, one might decide that any generalization that covers less than the whole language – for example less than the whole system of vowel-alternating suffixes in Turkish – cannot constitute an explanation. Or one might decide that any generalization that does not involve the shift from internal, structural phenomena to external phenomena cannot constitute an explanation. These may be taken to be the generative and typological definitions of explanation respectively.

In linguistics, we may distinguish three levels of generalization that are significant for approaches to human languages. The first level is the lowest, the level of observation, that is what constitutes the basic facts of language. Even this level involves generalizations, in how we categorize the elements of utterances. The second level is actually a set of levels, the levels of internal generalization. The third level is that of external generalization, at which the linguist invokes concepts from psychology, biology and other realms outside the structure of the language. Finally, there is a cross-cutting level of generalization that plays a role in linguistic explanation, diachronic generalization.

One of the major differences between the generative and typological approaches is what direction to generalize first. Given a grammatical phenomenon such as relative clause structure in English, one could generalize in several directions. One could compare relative clause structure with other complex sentence structures in English, and other extraction constructions in English, and then generalize over these different structures in English. This is the classic structuralist–generative approach. Alternatively, one could compare relative clause structure in English with relative clause structure in other languages, and then generalize over relative clauses in human languages. This is the classic typological approach. In general, one can say that the typologist begins with cross-linguistic comparisons, and then compares typological classifications of different structural phenomena, searching for relationships. In contrast, the generative linguist begins with language-internal structural generalizations and searches for correlations of internal structural facts, and only then proceeds to cross-linguistic comparison.

In the long run, it appears that different sequences of generalizations should in principle ultimately lead to the same result. The generative linguist who has discovered generalizations over complex sentence structures and extraction structures in English will eventually have to compare complex sentence structures in other languages. The typologist who has discovered generalizations over relative clause structures will eventually have to compare relative clause typology to the typology of other complex sentence types and other extraction constructions. In the meantime, however, the nature of the explanations or generalizations offered differs considerably.

There are two arguments for favoring a cross-linguistic generalization over a language-internal generalization, both discussed in chapter 1. First, if one constructs a language-internal generalization, then in order to test its validity across languages, one will have to address the question of cross-linguistic comparability. This in turn will lead toward an analysis in terms of the relationship between internal form and external function or substance. A cross-linguistic approach addresses that question from the beginning. External factors in a generalization can be avoided more easily in single-language structural analysis, but only at the price of limiting the universal applicability of the generalization. Second, in language-internal generalization one ends up focusing on either unrestricted language universals, or on complex patterns of generalizations based on language-universal and language-specific relationships among grammatical features, without being able to distinguish the two. In cross-linguistic generalization, one discovers immediately which relationships between grammatical phenomena are language-universal and which are idiosyncratic to particular languages. Also, in cross-linguistic generalization, one can discover restricted (implicational) universals, which are the great majority of empirically valid language universals.

9.4 Typology, the Saussurean dichotomies and the evolutionary model

One of Saussure's major contributions to linguistic theory was to present clearly three fundamental distinctions that must be addressed by any linguistic theory (Saussure 1915/1959). The first is the distinction between signifier and signified, or more generally what we have been calling internal form and external function/meaning or substance. The second is the distinction between grammatical knowledge, which Saussure called *langue* and Chomsky competence, and language in use, which Saussure called *parole* and Chomsky performance. The third is the distinction between the linguistic system – synchrony – and language change – diachrony. In this section, I will recapitulate the typological approach to the Saussurean dichotomies, comparing it to other theoretical approaches.

Generative grammar has elevated the form–meaning distinction to an organizing principle of grammatical knowledge. Formal structure and rules are separated from semantic structures and rules, each being in a separate component or module, and linked by linking rules. This is the principle of the autonomy of syntax (Chomsky 1977:42; Newmeyer 1992; 1998; Croft 1995a). In the typological approach, form and function are linked because language universals are universals of the encoding of function into form. Hence, the typological approach is more like the original Saussurean conception of a linguistic sign. The typological approach also is more compatible with the conception of syntax found in construction grammar (Fillmore, Kay and O'Connor 1988; Goldberg 1995; Croft 2001), in which even complex syntactic constructions are linked directly to their semantic interpretations (see also the related system of Head-driven Phrase Structure Grammar; Pollard and Sag 1993).

Generative grammar, and most formal theories of syntax, keep a strict division between grammatical knowledge and language in use, at least in practice. The relationship between the two is largely one way: language use is determined in part by grammatical knowledge, but grammatical knowledge is not influenced by language use. The typological approach does not take this view. Economy and iconicity are major forces determining grammatical structure, and are ultimately motivated by considerations of language processing (§4.3). Typological conspiracies, and the range of constructions in general, are determined by communicative motivation. In this respect, the typological approach is more compatible with usage-based models of syntactic representation (Bybee 1985a; Langacker 1987).

Generative grammar and most formal theories of syntax also keep a strict division between the language system and language change. In this respect, they are closer to the original Saussurean conception of this distinction. The exact relationship between the two in generative grammar is more ambivalent. Language change emerges in language use, that is, in the child's acquisition of his or her grammar; but it is strictly limited by the innate language module. In the typological approach the relationship between language structure, use and change is more interactive. Language change emerges from language use among all members of the speech community (Croft 2000). As we noted in the preceding paragraph, typologists argue that properties of language use determine properties of the linguistic system.

The typological approach to the relationship between language use, language change and the linguistic system implies a different conception of the nature of the linguistic system than either the Saussurean structuralist view or the generative approach. This view of the linguistic system accounts for the nature of the 'biological' explanation for language in the typological approach, in contrast to that of generative grammar. In generative grammar, the biological explanation is a literal one: language universals are ultimately innate properties of human beings. In the typological approach, the biological explanation is not literal. It is an

evolutionary explanation, but of the evolution of language structures in language use, not of biological genetic evolution of the human language capacity.

Typologically oriented linguists sometimes describe their view of the linguistic system as the 'ecology of grammar' (DuBois 1985:273). The biological model they are drawing on is not a static one, in which an organism possesses a perfect adaptation to a stable niche inside an ecosystem in equilibrium. The static biological view of adaptation is not tenable in the face of empirical evidence of non-adaptive variation and competing adaptive motivations of organisms, the difficulty (if not impossibility) of defining discrete niches, and the realization that ecosystems go through natural processes. Taking into account variation and change in organisms and their environment, the biologist actually speaks of approximate adaptations to constantly shifting niches – to the extent that they are definable – in dynamic ecosystems.

In the typological approach, the synchronic language system is not as stable, uniform and perfectly adapted as the Saussurean view implies. A language in a community at any given time is highly variable, as we noted in §2.2, describing the difficulties in defining a language type, and in §8.2, arguing that most language systems are really types in transition. A great deal of the variation involves the uses of different structures for the same or similar functions, so that the iconic principle of 'one form, one meaning' discussed in §4.2 and §7.2 is constantly in a state of flux:

> language – within the minds of speakers, rather than as some abstract system of *langue* – is always in the middle of change in lexicon/meaning, syntax, morphology and phonology. Language as a cognitive map is thus not only a system of coding knowledge, but perhaps primarily a system of re-coding, modifying and re-structuring existing knowledge and integrating into it newly-acquired knowledge. (Givón 1982:112)

This flux is a consequence of the competing motivations in mapping function onto grammatical form. The principles motivating the form–function mapping must be resolved into a social convention of the speech community for language to be used in communication. As DuBois writes, 'Indeed we may suggest that it is largely the need to consistently resolve the competition between diverse external motivations that leads in the first place to the existence – as a fixed structure – of grammar itself' (DuBois 1985:360).

Arbitrariness is an essential aspect of convention: a convention is a strategy chosen in a speech community rather than some alternative, more or less equally reasonable strategy (Lewis 1969). But conventions may be violated, and the violation of convention is where language change takes place:

> [The functionalists'] chief insight [is] that all change originates as a violation of preexisting 'rules.' The focus of this kind of investigation is on the nature of

> these mistakes, and the factors which motivate them constantly, throughout the evolution of all languages ... [T]he 'grammar of mistakes' ... is no less significant than the grammar of 'correct speech.' Perhaps it is even more significant, since it attests directly to the dynamic forces which cause language change, while the grammar of correct speech at any time may be no more than an agglomeration of fossils. (Haiman 1985:259)

Much of grammar is fossilized, preserved through the inertia of social convention. However, language change is a cognitive-psychological activity as well as a social one. To put it aphoristically: languages don't change; people change language. Speakers are involved in a dynamic, unstable language system, not a fixed, static one. Therefore, speakers have cognitive competence of dynamic processes – not static arrangements – by which they comprehend the variation in the language they use, and influence it so that, over time, the language changes. Hopper has given the name 'emergent grammar' to this view:

> The notion of Emergent Grammar is meant to suggest that structure, or regularity, comes out of discourse and is shaped by discourse as much as it shapes discourse in an on-going process ... [Grammar's] forms are not fixed templates, but are negotiable in face-to-face interaction in ways that reflect the individual speakers' past experience of these forms, and their assessment of the present context, including especially their interlocutors, whose experiences and assessments may be quite different. Moreover, the term Emergent Grammar points to a grammar which is not abstractly formulated and abstractly represented, but always anchored in the specific concrete form of an utterance. (Hopper 1987:142)

These processes represent innovation in language change. Once an innovation has taken place, it may become propagated through the speech community by social forces, that is, become a new convention of the speech community.

The effect of the argument by Givón, Haiman, Hopper and others is to relate synchrony to diachrony through the analysis of intralinguistic as well as cross-linguistic variation. The synchronic system is in a constant state of flux, and what the speaker knows about his or her language are the dynamic principles that govern the flux (and, of course, the language-specific conventions that represent stabilizing factors in the synchronic situation).

The ultimate goal for the typological approach is to unify the study of all types of linguistic variation: cross-linguistic (synchronic typology), intralinguistic (sociolinguistics and language acquisition) and diachronic (diachronic typology and historical linguistics; for a detailed proposal, see Croft 2000). What all these subdisciplines have in common is that they study linguistic variation, rather than abstracting away from it. As such, they represent a reaction to structuralist idealization and its primary dependence on unrestricted universals (though it has, of course, benefited from a century of structuralist research, as we have indicated in

a number of places in this volume). It is believed that the underlying factors in all types of linguistic variation are fundamentally the same; in particular, that external factors of all types play a major role in linguistic explanations.

In its reaction to certain aspects of structuralist thought, its advocates have revived the work of nineteenth century and early twentieth century linguists of a functional and/or historical persuasion, such as Paul (1880), Wegener (1885), Brugmann (1906–11), Jespersen (1909–49), Behaghel (1923–32), Frei (1929), Havers (1931), Bühler (1934), Gardiner (1935), Zipf (1935), Meinhof (1936) and Bally (1965). What is perhaps distinctive of the contemporary manifestation of this approach compared to its precursors is the strong typological dimension to the modern work (which itself has historical roots in the Prague School).

This chapter has provided an outline of typology as an approach to language, and the implications it has for fundamental questions such as the nature of linguistic generalization and language universals, and the Saussurean dichotomies of form/function, knowledge/use and system/change. These theoretical debates will continue into the future, of course, and one cannot predict how they will evolve. Whatever the outcome of those debates is, however, the primary achievement of typology has been the establishment of the substantial body of empirical language universals, some of the most important of which have been described in this volume.

References

Abraham, R. C. 1959. *The language of the Hausa people*. London: University of London Press.

Aikhenvald, Alexandra 2000. *Classifiers: a typology of noun categorization devices*. Oxford: Oxford University Press.

Aissen, Judith 1980. Possessor ascension in Tzotzil. *Papers in Mayan linguistics*, ed. Laura Martin, 89–108. Columbia, Mo.: Lucas Publishers.

Aissen, Judith 1987. *Tzotzil clause structure*. Dordrecht: Kluwer.

Allen, Barbara, Donna B. Gardiner and Donald G. Frantz 1984. Noun incorporation in Southern Tiwa. *International Journal of American Linguistics* 50:292–311.

Allen, W. Sidney 1956. Structure and system in the Abaza verbal complex. *Transactions of the Philological Society* 1956:127–76.

Allen, W. Sidney 1964. Transitivity and possession. *Language* 40:337–43.

Allen, Cynthia L. 1997. Investigating the origins of the 'group genitive' in English. *Transactions of the Philological Society* 95:111–31.

Andersen, Henning 1968. IE *s* after *i*, *u*, *r*, *k* in Baltic and Slavic. *Acta Linguistica Hafniensa* 11:171–90.

Andersen, Henning 1972. Diphthongization. *Language* 48:11–50.

Anderson, Lloyd B. 1974. Distinct sources of fuzzy data: ways of integrating relatively discrete and gradient aspects of language, and explaining grammar on the basis of semantic fields. In *Towards tomorrow's linguistics*, ed. Roger W. Shuy and Charles-James N. Bailey, 50–64. Washington, D.C.: Georgetown University Press.

Anderson, Lloyd B. 1982. The 'perfect' as a universal and as a language-particular category. In *Tense–aspect: between semantics and pragmatics*, ed. Paul Hopper, 227–64. Amsterdam: John Benjamins.

Anderson, Lloyd B. 1986. Evidentials, paths of change, and mental maps: typologically regular asymmetries. In *Evidentiality: the linguistic encoding of epistemology*, ed. Wallace Chafe and Johanna Nichols, 273–312. Norwood: Ablex.

Anderson, Lloyd B. 1987. Adjectival morphology and semantic space. In *Papers from the Twenty-third Annual Regional Meeting of the Chicago Linguistic Society, part one: the general session*, ed. Barbara Need, Eric Schiller and Ann Bosch, 1–17. Chicago: Chicago Linguistic Society.

Anderson, Stephen R. 1976a. On the notion of subject in ergative languages. In *Subject and topic*, ed. Charles Li, 1–24. New York: Academic Press.

Anderson, Stephen R. 1976b. On the description of multiply-articulated consonants. *Journal of Phonetics* 4:17–27.

Andrews, J. Richard 1975. *Introduction to Classical Nahuatl.* Austin: University of Texas Press.

Ariel, Mira 1990. *Accessing noun phrase antecedents.* New York: Routledge.

Aristar, Anthony Rodrigues 1991. On diachronic sources and synchronic patterns: an investigation into the origin of linguistic universals. *Language* 67:1–33.

Asher, R. E. 1985. *Tamil.* (Croom Helm Descriptive Grammars.) London: Croom Helm. (Originally published in 1982 as *Lingua Descriptive Studies*, 7, by North Holland, Amsterdam.).

Aske, Jon 1989. Path predicates in English and Spanish: a closer look. *Proceedings of the Fifteenth Annual Meeting of the Berkeley Linguistics Society*, ed. Kira Hall, Michael Meacham and Richard Shapiro, 1–14. Berkeley: Berkeley Linguistics Society.

Bach, Emmon 1980. In defense of passive. *Linguistics and Philosophy* 3:197–341.

Bally, Charles 1965. *Linguistique générale et linguistique française* (4th edition). Berne: Editions Franke.

Bamgbose, Ayo 1966. *A grammar of Yoruba.* Cambridge: Cambridge University Press.

Barlow, Michael 1988. A situated theory of agreement. Ph.D. dissertation, Stanford University.

Battistella, Edwin L. 1996. *The logic of markedness.* Oxford: Oxford University Press.

Behaghel, Otto 1923–32. *Deutsche Syntax*, vols. 1–4. Heidelberg: Carl Winter.

Behrens, Leila 1982. *Zur funktionalen Motivation der Wortstellung: Untersuchungen anhand des Ungarischen.* Publication of the Finno-Ugric seminar, University of Munich, C-13.

Bell, Alan 1978. Language samples. In *Universals of human language*, vol. 1: *Method and theory*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 123–56. Stanford: Stanford University Press.

Bellwood, Peter 1997. Prehistoric cultural explanations for widespread language families. In *Archaeology and linguistics: aboriginal Australia in global perspective*, ed. Patrick McConvell and Nicholas Evans, 123–34. Melbourne: Oxford University Press.

Berlin, Brent 1978. Ethnobiological classification. In *Cognition and categorization*, ed. Eleanor Rosch and B. B. Lloyd, 9–26. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Berlin, Brent and Paul Kay 1969. *Basic color terms: their universality and evolution.* Berkeley: University of California Press.

Berman, Ruth and Dan Isaac Slobin 1994. *Relating events in narrative: a crosslinguistic developmental study.* Hillsdale, N.J.: Lawrence Erlbaum Associates.

Biligiri, H. S. 1965. *Kharia phonology, grammar and vocabulary.* Poona: Deccan College.

Bloomfield, Leonard 1933. *Language.* New York: Holt, Rinehart and Winston.

Boas, Frans 1947. *Kwakiutl grammar, with a glossary of the suffixes.* Transactions of the American Philosophical Society, vol. 37, Part 3.

Boas, Frans and Ella Deloria 1941. *Dakota grammar.* Washington, D.C.: National Academy of Sciences.

Bohannon, Paul 1963. *Social anthropology.* New York: Holt, Rinehart and Winston.

Bolinger, Dwight 1977. *Meaning and form.* London: Longman.

Borg, A. J. and Bernard Comrie 1984. Object diffuseness in Maltese. In *Objects*, ed. Frans Plank, 109–26. New York: Academic Press.

Bresnan, Joan and Samuel A. Mchombo 1987. Topic, pronoun and agreement in Chichewa. *Language* 63:741–82.

Bright, William and A. K. Ramanujan 1964. Sociolinguistic variation and language change.

Proceedings of the Ninth International Congress of Linguists, ed. Horace Lunt, 1107–12. The Hague: Mouton.

Brown, Penelope and Stephen C. Levinson 1987. *Politeness*. Cambridge: Cambridge University Press.

Brugmann, Karl 1906–11. *Grundriß der vergleichenden Grammatik der indogermanischen Sprachen* (2nd edition). Strassburg: K. J. Trubner.

Brunner, Jana 2002. Economy in number marking: structural coding and phonological length. Manuscript, University of Manchester.

Budiņa Lazdiņa, Terēza 1966. *Latvian*. London: English Universities Press.

Buechel, Eugene 1939. *A grammar of Lakota*. Rosebud, S. Dakota: Rosebud Educational Society.

Bühler, Karl 1934. *Sprachtheorie: die Darstellungsfunktion der Sprache*. Jena: Fischer.

Bybee, Joan L. 1985a. *Morphology*. Amsterdam: John Benjamins.

Bybee, Joan L. 1985b. Diagrammatic iconicity in stem-inflection relations. In *Iconicity in syntax*, ed. John Haiman, 11–48. Amsterdam: John Benjamins.

Bybee, Joan L. 1988. The diachronic dimension in explanation. In *Explaining language universals*, ed. John A. Hawkins, 350–79. Oxford: Basil Blackwell.

Bybee, Joan L. 1994. The grammaticization of zero: asymmetries in tense and aspect systems. In *Perspectives on grammaticalization*, ed. William Pagliuca, 235–54. Amsterdam: John Benjamins.

Bybee, Joan L. 2001. *Phonology and language use*. Cambridge: Cambridge University Press.

Bybee, Joan L. and Mary Alexandra Brewer 1980. Explanation in morphophonemics: changes in Provençal and Spanish preterite forms. *Lingua* 52:271–312.

Bybee, Joan L., Revere D. Perkins and William Pagliuca 1994. *The evolution of grammar: tense, aspect and modality in the languages of the world*. Chicago: University of Chicago Press.

Bybee, Joan L., William Pagliuca and Revere D. Perkins 1990. On the asymmetries in the affixation of grammatical material. In *Studies in typology and diachrony for Joseph H. Greenberg*, ed. William Croft, Keith Denning and Suzanne Kemmer, 1–42. Amsterdam: John Benjamins.

Bybee, Joan L. and Joanne Scheibman 1999. The effect of usage on degrees of constituency: the reduction of *don't* in English. *Linguistics* 37:575–96.

Bybee, Joan L. and Sandra A. Thompson 1997. Three frequency effects in syntax. *Proceedings of the Twenty-third Annual Meeting of the Berkeley Linguistics Society*, ed. Matthew L. Juge and Jeri L. Moxley, 378–88. Berkeley: Berkeley Linguistics Society.

Campbell, Lyle 1991. Some grammaticalization changes in Estonian and their implications. *Approaches to grammaticalization*, vol. 1, ed. Elizabeth Closs Traugott and Bernd Heine, 285–99. Amsterdam: John Benjamins.

Campbell, Lyle, Terrence Kaufman and Thomas C. Smith-Stark 1986. Mesoamerica as a linguistic area. *Language* 62:530–70.

Carlson, Greg N. 1977. A unified analysis of the English bare plural. *Linguistics and Philosophy* 1:413–57.

Carlson, Robert Joel 1994. *A grammar of Supyire* (Mouton Grammar Library, 15.) Berlin: Mouton de Gruyter.

Chafe, Wallace 1977. Caddo texts. In *Caddoan texts* (IJAL Native American Text Series, 2.1), ed. Douglas R. Parks, 27–43. Chicago: University of Chicago Press.

Chambers, J. K. 1995. *Sociolinguistic theory*. Oxford: Basil Blackwell.
Chambers, J. K. and Peter Trudgill 1980. *Dialectology*. Cambridge: Cambridge University Press.
Chomsky, Noam 1976. *Reflections on language*. London: Fontana.
Chomsky, Noam 1977 [1975]. Questions of form and interpretation. *Essays on form and interpretation*, 25–59. Amsterdam: North-Holland. [Originally published in *Linguistic Analysis* 1:75–109.]
Chomsky, Noam 1981. *Lectures on government and binding*. Dordrecht: Foris Publications.
Chomsky, Noam and Morris Halle 1968. *The sound pattern of English*. New York: Harper and Row.
Chung, Sandra 1976. *Case marking and grammatical relations in Polynesian*. Austin: University of Texas Press.
Churchward, C. Maxwell 1940. *Rotuman grammar and dictionary*. Sydney: Australasian Medical Publishing Company.
Churchward, C. Maxwell 1953. *Tongan grammar*. Nuku'alofa, Tonga: Taulua Press.
Clark, Eve V. 1993. *The lexicon in acquisition*. Cambridge: Cambridge University Press.
Claudi, Ulrike 1993. *Die Stellung von Verb und Objekt in Niger-Kongo-Sprachen: ein Beitrag zur Rekonstruktion historischer Syntax*. Afrikanistische Monographien, vol. 1. Köln: Institut für Afrikanistik.
Cole, Peter, Wayne Harbert, Gabriella Hermon and S. N. Sridhar 1980. The acquisition of subjecthood. *Language* 56:719–43.
Collinge, N. E. 1985. *The laws of Indo-European*. Amsterdam: John Benjamins.
Comrie, Bernard 1978. Ergativity. In *Syntactic typology*, ed. Winfrid Lehmann, 329–94. Austin: University of Texas Press.
Comrie, Bernard 1979. Definite and animate objects: a natural class. *Linguistica Silesiana* 3:13–21.
Comrie, Bernard 1981. *The languages of the Soviet Union*. Cambridge: Cambridge University Press.
Comrie, Bernard 1982. Grammatical relations in Huichol. In *Studies in transitivity* (Syntax and Semantics, 15), ed. Paul Hopper and Sandra Thompson, 95–115. New York: Academic Press.
Comrie, Bernard 1983. Review of Mallinson and Blake 1981. *Language* 59:908–11.
Comrie, Bernard 1986. Markedness, grammar, people and the world. In *Markedness*, ed. Fred R. Eckman, Edith A. Moravcsik and Jessica R. Wirth, 85–196. New York: Plenum Press.
Comrie, Bernard 1989. *Language universals and linguistic typology* (2nd edition). Chicago: University of Chicago Press.
Comrie, Bernard and Edward Keenan 1979. Noun phrase accessibility revisited. *Language* 55:649–64.
Corbett, Greville 1991. *Gender*. Cambridge: Cambridge University Press.
Corbett, Greville 2000. *Number*. Cambridge: Cambridge University Press.
Corbett, Greville, Andrew Hippisley, Dunstan Brown and Paul Marriott 2001. Frequency, regularity and the paradigm: a perspective from Russian on a complex relation. In *Frequency and the emergence of linguistic structure*, ed. Joan Bybee and Paul Hopper, 201–26. Amsterdam: John Benjamins.
Cowell, Mark 1964. *A reference grammar of Syrian Arabic*. Washington, D.C.: Georgetown University Press.

Crazzolara, J. P. 1955. *A study of the Acooli language* (2nd impression, revised). London: Oxford University Press.

Cristofaro, Sonia 2003. *Subordination*. Oxford: Oxford University Press.

Croft, William 1988. Agreement vs. case marking in direct objects. In *Agreement in natural language: approaches, theories, descriptions*, ed. Michael Barlow and Charles A. Ferguson, 159–80. Stanford: Center for the Study of Language and Information.

Croft, William 1991a. *Syntactic categories and grammatical relations: the cognitive organization of information*. Chicago: University of Chicago Press.

Croft, William 1991b. The evolution of negation. *Journal of Linguistics* 27:1–27.

Croft, William 1994. Semantic universals in classifier systems. *Word* 45:145–71.

Croft, William 1995a. Autonomy and functionalist linguistics. *Language* 71:490–532.

Croft, William 1995b. Modern syntactic typology. In *Approaches to language typology: past and present*, ed. Masayoshi Shibatani and Theodora Bynon, 85–143. Oxford: Oxford University Press.

Croft, William 1996. 'Markedness' and 'universals': from the Prague school to typology. In *Multiple perspectives on the historical dimensions of language*, ed. Kurt R. Jankowsky, 15–21. Münster: Nodus.

Croft, William 1998a. Linguistic evidence and mental representations. *Cognitive Linguistics* 9:151–73.

Croft, William 1998b. Event structure in argument linking. In *The projection of arguments: lexical and compositional factors*, ed. Miriam Butt and Wilhelm Geuder, 1–43. Stanford: Center for the Study of Language and Information.

Croft, William 1999. What (some) functionalists can learn from (some) formalists. *Functionalism and formalism in linguistics*, vol. 1: *General papers*, ed. Michael Darnell, Edith Moravcsik, Frederick Newmeyer, Michael Noonan and Kathleen Wheatley, 85–108. Amsterdam: John Benjamins.

Croft, William 2000. *Explaining language change: an evolutionary approach*. London: Longman.

Croft, William 2001. *Radical Construction Grammar: syntactic theory in typological perspective*. Oxford: Oxford University Press.

Croft, William, Jóhanna Barðdal, Willem Hollmann, Violeta Sotirova and Chiaki Taoka 2002. Revising Talmy's typological classification of complex events. Paper presented at the Annual Meeting of the Linguistic Society of America, San Francisco.

Croft, William, Hava Bat-Zeev Shyldkrot and Suzanne Kemmer 1987. Diachronic semantic processes in the middle voice. *Papers from the 7th International Conference on Historical Linguistics*, ed. Anna Giacolone Ramat, Onofrio Carruba and Giuliano Bernini, 179–192. Amsterdam: John Benjamins.

Cruse, D. Alan 1986. *Lexical semantics*. Cambridge: Cambridge University Press.

Cruse, D. Alan 1992. Monosemy vs. polysemy (review article on Ruhl, *On monosemy*) *Linguistics* 30:577–99.

Crystal, David 2000. *Language death*. Cambridge: Cambridge University Press.

Cutler, Anne, John A. Hawkins and Gary Gilligan 1985. The suffixing preference: a processing explanation. *Linguistics* 23:723–58.

Cysouw, Michael 2001. *The paradigmatic structure of person marking*. Proefschrift, Katholieke Universiteit Nijmegen. (Revised edition to appear at Oxford University Press, Oxford.)

Dahl, Östen 1985. *Tense and aspect systems*. Oxford: Basil Blackwell.

Davies, John 1981. *Kobon.* (Lingua Descriptive Studies, 3.) Amsterdam: North-Holland.
Dayley, Jon 1985. *Tzutujil reference grammar.* (University of California Publications in Linguistics, 107.) Berkeley and Los Angeles: University of California Press.
DeLancey, Scott 1981. An interpretation of split ergativity and related patterns. *Language* 57:626–57.
DeLancey, Scott 1982. Aspect, transitivity and viewpoint. In *Tense and aspect: between semantics and pragmatics*, ed. Paul Hopper, 167–84. Amsterdam: John Benjamins.
DeLancey, Scott 1987. Transitivity in grammar and cognition. In *Coherence and grounding in discourse*, ed. Russell Tomlin, 53–68. Amsterdam: John Benjamins.
Derbyshire, Desmond 1977. Word order universals and the existence of OVS languages. *Linguistic Inquiry* 8:590–99.
Derbyshire, Desmond and Geoffrey Pullum 1981. Object-initial languages. *International Journal of American Linguistics* 47:192–214.
Dik, Simon 1981. *Functional Grammar.* Dordrecht: Foris.
Dik, Simon. 1997. *The theory of Functional Grammar, part 1: the structure of the clause* (2nd revised edition), ed. Kees Hengeveld. Berlin: Mouton de Gruyter.
Dimmendaal, Gerrit Jan 1983. *The Turkana language.* Dordrecht: Foris.
Dixon, R. M. W. 1972. *The Dyirbal language of North Queensland.* Cambridge: Cambridge University Press.
Dixon, R. M. W. 1977. Where have all the adjectives gone? *Studies in Language* 1:19–80.
Dixon, R. M. W. 1979. Ergativity. *Language* 55:59–138.
Dixon, R. M. W. 1994. *Ergativity.* Cambridge: Cambridge University Press.
Dodds, R. W. 1977. *Malay.* Sevenoaks: Hodder and Stoughton.
Doke, Clement M. 1930. *Textbook of Zulu grammar* (2nd edition). Cape Town: Maskew Miller Longman.
Dorian, Nancy 1981. *Language death.* Philadelphia: University of Pennsylvania Press.
Downing, Bruce T. 1978. Some universals of relative clause structure. In *Universals of human language*, vol. 4: *syntax*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 375–418. Stanford: Stanford University Press.
Dryer, Matthew 1983. Indirect objects in Kinyarwanda revisited. In *Studies in relational grammar*, vol. 1, ed. David Perlmutter, 129–40. Chicago: University of Chicago Press.
Dryer, Matthew 1986. Primary objects, secondary objects and antidative. *Language* 62: 808–45.
Dryer, Matthew 1988. Object-verb order and adjective-noun order: dispelling a myth. *Lingua* 74:185–217.
Dryer, Matthew 1989a. Large linguistic areas and language sampling. *Studies in Language* 13:257–92.
Dryer, Matthew 1989b. Discourse-governed word order and word order typology. *Belgian Journal of Linguistics* 4:69–90.
Dryer, Matthew 1991. SVO languages and the OV:VO typology. *Journal of Linguistics* 27:443–82.
Dryer, Matthew 1992a. The Greenbergian word order correlations. *Language* 68:81–138.
Dryer, Matthew 1992b. Modifying Hawkins' Prepositional Noun Modifier Hierarchy. Paper presented to the Word Order Theme Group, EUROTYP Plenary Meeting, San Sebastian, Spain.

Dryer, Matthew 1997a. Why statistical universals are better than absolute universals. *CLS 33: papers from the panels*, ed. Kora Singer, Randall Eggart and Gregory Anderson, 123–45. Chicago: Chicago Linguistic Society.

Dryer, Matthew 1997b. On the six-way word order typology. *Studies in Language* 21: 69–103.

Dryer, Matthew 1997c. Are grammatical relations universal? In *Essays on language function and language type*, ed. Joan Bybee, John Haiman and Sandra A. Thompson, 115–43. Amsterdam: John Benjamins.

Dryer, Matthew 2000. Counting genera vs. counting languages. *Linguistic Typology* 3: 334–50.

Dryer, Matthew 2001. Unpublished typological database.

DuBois, John A. 1985. Competing motivations. In *Iconicity in syntax*, ed. John Haiman, 343–66. Amsterdam: John Benjamins.

DuBois, John A. 1987. The discourse basis of ergativity. *Language* 64:805–55.

Durie, Mark 1988. The so-called passive of Achenese. *Language* 64:104–13.

Edwards, Jane A. and Martin D. Lampert (ed.) 1993. *Talking data: transcription and coding in discourse research*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Elbert, Samuel H. and T. Momberg 1965. *From the two canoes*. Copenhagen: Danish National Museum.

Elman, Jeffrey L., Elizabeth A. Bates, Mark H. Johnson, Annette Karmiloff-Smith, Domenico Parisi and Kim Plunkett 1996. *Rethinking innateness: a connectionist perspective on development*. Cambridge, Mass.: MIT Press.

Elman, Jeffrey L. and James L. McClelland 1984. Speech perception as a cognitive process: the interactive activation model. *Speech and language*, vol. 10, ed. Norman Lass, 337–74. New York: Academic Press.

England, Nora 1983. *A grammar of Man, a Mayan language*. Austin: University of Texas Press.

Everett, Daniel L. 1986. Pirahã. *Handbook of Amazonian languages*, vol. 1, ed. Desmond Derbyshire and Geoffrey K. Pullum, 200–325. Berlin: Mouton de Gruyter.

Faltz, Leonard M. 1978. Indirect objects in universal grammar. In *Proceedings of the Fourteenth Regional Meeting of the Chicago Linguistic Society*, ed. Donka F. Farkas, Wesley M. Jacobsen and Karol W. Todrys, 76–87. Chicago: University of Chicago Linguistics Department.

Farkas, Donka 1981. Intensionality and Romance subjunctive relatives. Ph.D. dissertation, University of Chicago. Bloomington: Indiana University Linguistics Club.

Feldman, Harry 1986. *A Grammar of Awtuw*. Pacific Linguistics, Series B, No. 94. Canberra: Australian National University.

Ferguson, Charles A. 1966. Assumptions about nasals: a sample study in phonological universals. In *Universals of language*, ed. Joseph H. Greenberg, 53–60. Cambridge, Mass.: MIT Press.

Ferguson, Charles A. 1978. Phonological processes. In *Universals of human language*, vol. 2: *Phonology*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 403–42. Stanford: Stanford University Press.

Ferguson, Charles A. 1990. From esses to aitches: identifying pathways of diachronic change. In *Studies in typology and diachrony for Joseph H. Greenberg*, ed. William Croft, Keith Denning and Suzanne Kemmer, 59–78. Amsterdam: John Benjamins.

Fillmore, Charles J., Paul Kay and Mary Kay O'Connor. 1988. Regularity and idiomaticity in grammatical constructions: the case of *let alone*. *Language* 64:501–538.

Foley, William A. 1997. *Anthropological linguistics: an introduction*. Oxford: Blackwell.

Forrest, Linda B. 1994. The de-transitive clauses in Bella Coola: passive vs. inverse. In *Voice and inversion*, ed. Talmy Givón, 147–68. Amsterdam: John Benjamins.

Fox, B. J. 1979. *Big Nambas grammar*. (Pacific Linguistics, B60.) Canberra: Australian National University.

Freeland, L. S. 1951. *Language of the Sierra Miwok*. (Indiana University Publications in Anthropology and Linguistics, Memoir 6.) Baltimore: Waverly Press.

Frei, Henri 1929. *La grammaire des fautes*. Paris: Geuthner.

Gabelentz, Georg von der 1901/1972. *Die Sprachwissenschaft: ihre Auggaben, Methode and bisherige Ergebnisse*. Tübingen: Tübinger Beiträge zur Linguistik.

Galloway, Brent D. 1993. *A grammar of Upriver Halkomelem*. (University of California Publications in Linguistics, 96.) Berkeley: University of California Press.

Gamble, Geoffrey 1978. *Wikehamni grammar*. (University of California Publications in Linguistics, 89.) Berkeley and Los Angeles: University of California Press.

Gamkrelidze, Thomas V. 1978. On the correlation of stops and fricatives in a phonological system. In *Universals of human language*, vol. 2: *Phonology*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 9–46. Stanford: Stanford University Press.

Gamkrelidze, Tamas and Vyacheslav V. Ivanov 1995. *Indo-European and the Indo-Europeans: a reconstruction and historical analysis*. Berlin: Mouton de Gruyter.

Gardiner, Sir Alan 1935. *The theory of speech and language* (2nd edition). Oxford: Oxford University Press.

Genetti, Carol 1986. The development of subordinators from postpositions in Bodic languages. *Proceedings of the Twelfth Annual Meeting of the Berkeley Linguistics Society*, ed. Vassiliki Nikiforidou, Mary VanClay, Mary Niepokuj and Deborah Feder, 387–400. Berkeley: Berkeley Linguistics Society.

Gensler, Orin 1997. Grammaticalization, typology, and Niger-Congo word order: progress on a still-unsolved problem. Review article on *Die Stellung von Verb und Objekt in Niger-Kongo Sprachen*, by Ulrike Claudi. *Journal of African Languages and Linguistics* 18:57–93.

Gildersleeve B. L. and Gonzalez Lodge 1895. *Latin grammar*. London: Macmillan.

Gilligan, Gary Martin 1987. A cross-linguistic approach to the pro-drop parameter. Ph.D. dissertation, University of Southern California.

Givón, Talmy 1975a. Serial verbs and syntactic change: Niger-Congo. In *Word order and word order change*, ed. Charles Li, 47–112. Austin: University of Texas Press.

Givón, Talmy 1975b. Promotion, accessibility and case marking: towards understanding grammars. *Working Papers in Language Universals* 19:55–126.

Givón, Talmy 1976. Topic, pronoun and grammatical agreement. In *Subject and topic*, ed. Charles Li, 149–89. New York: Academic Press.

Givón, Talmy 1979. *On understanding grammar*. New York: Academic Press.

Givón, Talmy 1980a. *Ute reference grammar*. Ignacio, Colo.: Ute Press.

Givón, Talmy 1980b. The binding hierarchy and the typology of complements. *Studies in Language* 4:333–77.

Givón, Talmy 1982. Logic vs. pragmatics, with natural language as the referee: towards an empirically viable epistemology. *Journal of Pragmatics* 6:81–133.

Givón, Talmy 1985. Iconicity, isomorphism and nonarbitrary coding in syntax. In *Iconicity in syntax*, ed. John Haiman, 187–220. Amsterdam: John Benjamins.

Givón, Talmy 1988. The pragmatics of word order: predictability, importance and attention. In *Studies in syntactic typology*, ed. Michael Hammond, Edith Moravcsik and Jessica Wirth, 243–84. Amsterdam: John Benjamins.

Givón, Talmy 1991. *Syntax: a functional–typological introduction*, vol. 2. Amsterdam: John Benjamins.

Glinert, Lewis 1989. *The grammar of Modern Hebrew*. Cambridge: Cambridge University Press.

Goldberg, Adele E. 1995. *Constructions: a construction grammar approach to argument structure*. Chicago: University of Chicago Press.

Goodwin, William W. 1892. *A Greek grammar*. Boston: Ginn.

Gordon, Lynn 1986. *Maricopa morphology and syntax*. (University of California Publications in Linguistics, 108.) Berkeley and Los Angeles: University of California Press.

Greenberg, Joseph H. 1954. A quantitative approach to the morphological typology of language. In *Method and perspective in anthropology*, ed. R. F. Spencer, 192–220. (Reprinted in *International Journal of American Linguistics* 26:178–94, 1960.)

Greenberg, Joseph H. 1957. Order of affixing: a study in general linguistics. *Essays in Linguistics*, 86–94. Chicago: University of Chicago Press.

Greenberg, Joseph H. 1966a. Some universals of grammar with particular reference to the order of meaningful elements. In *Universals of grammar*, ed. Joseph H. Greenberg (2nd edition), 73–113. Cambridge, Mass.: MIT Press.

Greenberg, Joseph H. 1966b. *Language universals, with special reference to feature hierarchies*. (Janua Linguarum, Series Minor, 59.) The Hague: Mouton.

Greenberg, Joseph H. 1966c. Synchronic and diachronic universals in phonology. *Language* 42:508–17.

Greenberg, Joseph H. 1968. *Anthropological linguistics*. New York: Random House.

Greenberg, Joseph H. 1969/1990. Some methods of dynamic comparison in linguistics. *Substance and structure of language*, ed. Jan Puhvel, 147–203. Berkeley and Los Angeles: University of California Press. Reprinted in *On Language*, 71–118. Stanford: Stanford University Press.

Greenberg, Joseph H. 1969/1975. Language universals: a research frontier. *Language, culture and communication: essays by Joseph H. Greenberg*, ed. Anwar S. Dil, 295–313. Stanford: Stanford University Press. [Originally appeared in *Science* 166:473–78, 1969.]

Greenberg, Joseph H. 1970. Some generalizations concerning glottalic consonants, especially implosives. *International Journal of American Linguistics* 36:123–45.

Greenberg, Joseph H. 1974a. *Language typology: a historical and analytic overview*. (Janua Linguarum, Series Minor 184.) The Hague: Mouton.

Greenberg, Joseph H. 1974b. The relation of frequency to semantic feature in a case language (Russian). *Working Papers in Language Universals* 16:21–47.

Greenberg, Joseph H. 1978a. Some generalizations concerning initial and final consonant clusters. In *Universals of human language*, vol. 2: *Phonology*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 243–80. Stanford: Stanford University Press.

Greenberg, Joseph H. 1978b. Diachrony, synchrony and language universals. In *Universals of human language*, vol. 1: *Method and theory*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 61–92. Stanford: Stanford University Press.

Greenberg, Joseph H. 1978c. How does a language acquire gender markers? In *Universals of human language*, vol. 3: *Word structure*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 47–82. Stanford: Stanford University Press.

Greenberg, Joseph H. 1978d. Typology and cross-linguistic generalizations. In *Universals of human language*, vol. 1: *Method and theory*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 33–59. Stanford: Stanford University Press.

Greenberg, Joseph H. 1979. Rethinking linguistics diachronically. *Language* 55:275–90.

Greenberg, Joseph H. 1980. Circumfixes and typological change. In *Papers from the Fourth International Conference on Historical Linguistics*, ed. Elizabeth Traugott, Rebecca Labrum and Susan Shepherd, 233–41. Amsterdam: John Benjamins.

Greenberg, Joseph H. 1980/1990. Universals of kinship terminology: their nature and the problem of their explanation. *On linguistic anthropology: essays in honor of Harry Hoijer*, ed. Jacques Maquet, 9–32. Malibu: Undena Publications. [Reprinted in Greenberg 1990, 310–27.)

Greenberg, Joseph H. 1981. Nilo-Saharan movable *k*- as a Stage III article (with a Penutian typological parallel). *Journal of African Languages and Literature* 3:105–12.

Greenberg, Joseph H. 1990. *On language: selected writings of Joseph H. Greenberg*, ed. Keith Denning and Suzanne Kemmer. Stanford: Stanford University Press.

Greenberg, Joseph. H. 1991. The last stages of grammatical elements: contractive and expansive desemanticization. In *Approaches to grammaticalization*, vol. 1, ed. Elizabeth Closs Traugott and Bernd Heine, 310–14. Amsterdam: John Benjamins.

Greenberg, Joseph H. and Chris O'Sullivan 1974. Frequency, marking, and discourse styles with special reference to substantival categories in the Romance languages. *Working Papers in Language Universals* 16:47–73.

Gregores, Emma and Jorge A. Suárez 1967. *A description of colloquial Guaraní*. The Hague: Mouton.

Grice, H. Paul. 1967/1989. Logic and conversation. *Studies in the way of words*, 1–143. Cambridge, Mass.: Harvard University Press.

Grimes, Barbara F. (ed.) 2000. *Ethnologue* (14th edition). Arlington, Texas: Summer Institute of Linguistics.

Gundel, Jeannette K., Kathleen Houlihan and Gerald A. Sanders 1986. Markedness and distribution in phonology and syntax. In *Markedness*, ed. Fred R. Eckman, Edith A. Moravcsik and Jessica R. Wirth, 107–38. New York: Plenum Press.

Haider, Hubert 1994. (Un-)heimliche Subjekte: Anmerkungen zur pro-drop Causa. *Linguistische Berichte* 153:372–85.

Haiman, John 1974. Concessives, conditionals, and verbs of volition. *Foundations of Language* 11:341–59.

Haiman, John 1976. Agentless sentences. *Foundations of Language* 14:19–53.

Haiman, John 1977. Connective particles in Hua: an essay on the parts of speech. *Oceanic Linguistics* 16:53–107.

Haiman, John 1978a. Conditionals are topics. *Language* 54:564–89.

Haiman, John 1978b. A study in polysemy. *Studies in Language* 2:1–34.

Haiman, John 1980. The iconicity of grammar: isomorphism and motivation. *Language* 54:565–89.

Haiman, John 1983. Iconic and economic motivation. *Language* 59:781–819.
Haiman, John 1985. *Natural syntax*. Cambridge: Cambridge University Press.
Hale, Kenneth 1983. Warlpiri and the grammar of nonconfigurational languages. *Natural Language and Linguistic Theory* 1:5–47.
Hall, Christopher 1992. *Morphology and mind*. London: Routledge.
Hall, Robert A. Jr. 1953. *Haitian Creole grammar, texts, vocabulary*. (American Anthropologist Memoir, 74.) New York: American Anthropological Association.
Harning, Kerstin Eksell 1980. *The analytic genitive in the modern Arabic dialects*. Göteborg: Acta Universitatis Gothoburgensis.
Harrell, Richard S. 1962. *A short reference grammar of Moroccan Arabic*. Washington, D.C.: Georgetown University Press.
Harris, Alice C. 1982. Georgian and the unaccusative hypothesis. *Language* 58:290–306.
Harris, Alice C. and Lyle Campbell 1995. *Historical syntax in cross-linguistic perspective*. Cambridge: Cambridge University Press.
Harris, Zellig S. 1946. From morpheme to utterance. *Language* 22:161–83.
Harris, Zellig S. 1951. *Methods in structural linguistics*. Chicago: University of Chicago Press.
Harrison, Sheldon P. 1976. *Mokilese reference grammar*. Honolulu: University Press of Hawaii.
Harrison, Sheldon P. and Salich Albert 1977. *Mokilese–English dictionary*. Honolulu: University Press of Hawaii.
Haspelmath, Martin 1993. The diachronic externalization of inflection. *Linguistics* 31:279–309.
Haspelmath, Martin 1997a. *Indefinite pronouns*. Oxford: Oxford University Press.
Haspelmath, Martin 1997b. *From space to time: temporal adverbials in the world's languages*. München: Lincom Europa.
Haspelmath, Martin 1998a. Does grammaticalization need reanalysis? *Studies in Language* 22:49–85.
Haspelmath, Martin 1998b. Review of Harris and Campbell 1995. *Linguistic Typology* 2:131–39.
Haspelmath, Martin 1998c. The semantic development of old presents: new futures and subjunctives without grammaticalization. *Diachronica* 15:29–62.
Haspelmath, Martin. To appear. The geometry of grammatical meaning: semantic maps and cross-linguistic comparison. *The new psychology of language*, vol. 2, ed. Michael Tomasello. Mahwah, N. J.: Lawrence Erlbaum Associates.
Havers, Wilhelm 1931. *Handbuch der erklärenden Syntax*. Heidelberg: Carl Winter.
Hawkins, John A. 1980. On implicational and distributional universals of word order. *Journal of Linguistics* 16:193–235.
Hawkins, John A. 1983. *Word order universals*. New York: Academic Press.
Hawkins, John A. (ed.) 1988. *Explaining language universals*. Oxford: Basil Blackwell.
Hawkins, John A. 1990. A parsing theory of word order universals. *Linguistic Inquiry* 21:223–261.
Hawkins, John A. 1994. *A performance theory of order and constituency*. Cambridge: Cambridge University Press.
Hawkins, John A. and Anne Cutler 1988. Psycholinguistic factors in morphological asymmetry. In Hawkins 1988, 280–317.

Hawkins, John A. and Gary Gilligan 1988. Prefixing and suffixing universals in relation to basic word order. *Lingua* 74:219–59.

Heath, Jeffrey 1978. *Ngandi grammar, texts and dictionary*. Canberra: Australian Institute of Aboriginal Studies.

Heath, Jeffrey 1986. Syntactic and lexical aspects of nonconfigurationality in Nunggubuyu (Australia). *Natural Language and Linguistic Theory* 4:375–408.

Heine, Bernd 1994. Grammaticalization as an explanatory parameter. *Perspectives on grammaticalization*, ed. William Pagliuca, 255–87. Amsterdam: John Benjamins.

Heine, Bernd and Mechthild Reh 1984. *Grammaticalization and reanalysis in African languages*. Hamburg: Helmut Buske Verlag.

Heine, Bernd, Ulrike Claudi and Friederieke Hünnemeyer 1991. *Grammaticalization: a conceptual framework*. Chicago: University of Chicago Press.

Hewitt, B. G. 1979. *Abkhaz*. (Lingua Descriptive Studies, 2.) Amsterdam: North-Holland.

Holisky, Dee Ann 1987. The case of the intransitive subject in Tsova-Tush (Batsbi). *Lingua* 71:103–32.

Holton, David, Peter Mackridge and Irene Philippaki-Warburton 1997. *Greek: a comprehensive grammar of the modern language*. London: Routledge.

Hooper, Joan Bybee 1976. *An introduction to natural-generative phonology*. New York: Academic Press.

Hopper, Paul 1979. Aspect and foregrounding in discourse. In *Discourse and syntax* (Syntax and Semantics, 12), ed. Talmy Givón, 213–41. New York: Academic Press.

Hopper, Paul 1987. Emergent grammar. In *Proceedings of the Thirteenth Annual Meeting of the Berkeley Linguistics Society*, ed. Jon Aske, Natasha Beery, Laura Michaelis and Hana Filip, 139–57. Berkeley: University of California at Berkeley.

Hopper, Paul and Sandra A. Thompson 1980. Transitivity in grammar and discourse. *Language* 56:251–99.

Hopper, Paul and Sandra A. Thompson (eds.) 1982. *Studies in transitivity* (Syntax and Semantics, 15). New York: Academic Press.

Hopper, Paul and Sandra A. Thompson 1984. The discourse basis for lexical categories in universal grammar. *Language* 60:703–72.

Hopper, Paul and Elizabeth Traugott 1993. *Grammaticalization*. Cambridge: Cambridge University Press.

Huang, C.-T. James 1984. On the distribution and reference of empty pronouns. *Linguistic Inquiry* 15:531–74.

Hull, David L. 1988. *Science as a process: an evolutionary account of the social and conceptual development of science*. Chicago: University of Chicago Press.

Humboldt, Wilhelm von 1825. Über das Entstehen der grammatischen Formen, und ihren Einfluß auf die Ideeentwicklung. *Abhandlungen der hist. phil. Klasse*, 401–30. Berlin: Königliche Akademie der Wissenschaften.

Hutchison, John P. 1981. *The Kanuri language: a reference grammar*. Madison: University of Wisconsin African Studies Program.

Hyman, Larry 1975. On the change from SOV to SVO: evidence from Niger Congo. In *Word order and word order change*, ed. Charles Li, 113–47. Austin: University of Texas Press.

Irwin, Barry 1974. *Salt-Yui grammar*. (Pacific Linguistics, B35.) Canberra: Australian National University.

Jakobson, Roman 1958. Typological studies and their contribution to historical and comparative linguistics. In *Proceedings of the Eighth International Congress of Linguists*, ed. Eva Sivertsen, Carl Hj. Borgstrøm, Arne Gallis and Alf Sommerfelt, 17–25. Oslo: Oslo University Press.

Jakobson, Roman 1932/1984. Structure of the Russian verb. In *Russian and Slavic grammar: studies, 1931–1981* (Janua Linguarum, Series Maior 106), ed. Linda R. Waugh and Morris Halle, 1–14. The Hague: Mouton. (Originally published as 'Zur Struktur des russischen Verbums,' *Charistera Guglielmo Mathesio*, 74–84, Prague, 1932.)

Jakobson, Roman 1939/1984. Zero sign. In *Russian and Slavic grammar: Studies, 1931–1981* (Janua Linguarum, Series Maior 106), ed. Linda R. Waugh and Morris Halle, 151–60. The Hague: Mouton. (Originally published as 'Signe zéro.' in *Mélanges de linguistique offerts à Charles Bally*, Geneva, 1939.)

Janda, Richard 1980. On the decline of the declensional system: the overall loss of OE nominal case inflections and the ME reanalysis of *-es* as *his*. *Papers from the 4th International Conference on Historical Linguistics*, ed. Elizabeth C. Traugott, Rebecca LaBrum and Susan Shepherd, 243–52. Amsterdam: John Benjamins.

Janda, Richard 1981. A case of liberation from morphology into syntax: the fate of the English genitive marker -(*e*)s. In *Syntactic change* (Natural Language Studies 25), ed. Brenda B. Johns and David R. Strong, 59–114. Ann Arbor: University of Michigan Department of Linguistics.

Jelinek, Eloise and Richard A. Demers 1983. The agent hierarchy and voice in some Coast Salishan languages. *International Journal of American Linguistics* 49:167–85.

Jespersen, Otto 1909–49. *A modern English grammar on historical principles*, vol. 1–7. London: Allen and Unwin.

Jones, R. and B. Meehan 1978. Anbarra concept of colour. In *Australian aboriginal cognition*, ed. L. Hiatt, 20–39. Canberra: Australian Institute of Aboriginal Studies.

Joos, Martin (ed.) 1957. *Readings in Linguistics I*. Chicago: University of Chicago Press.

Justeson, John S. and Laurence D. Stephens 1990. Explanations for word order universals: a log-linear analysis. *Proceedings of the XIV International Congress of Linguists*. Berlin: Mouton de Gruyter.

Kager, René 1999. *Optimality theory*. Cambridge: Cambridge University Press.

Kaufman, Terrence 1990. Language history in South America: what we know and how to know more. *Amazonian linguistics: studies in lowland South American languages*, ed. Doris L. Payne, 13–73. Austin: University of Texas Press.

Kay, Paul, Brent Berlin and William Merrifield 1991. Biocultural implications of color naming. *Journal of Linguistic Anthropology* 1:12–25.

Kay, Paul and Luisa Maffi 1999. Color appearance and the emergence and evolution of basic color lexicons. *American Anthropologist* 101:743–60.

Kay, Paul and Chad McDaniel 1978. The linguistic significance of the meanings of basic color terms. *Language* 54:610–46.

Kazenin, Konstantin I. 1994. Split syntactic ergativity: toward an implicational hierarchy. *Sprachtypologie und Universalienforschung* 47:78–98.

Keenan, Edward 1979. Passive is phrasal, not sentential or lexical. In *Lexical grammar*, ed. T. Hoekstra, H. Hulst and M. Moortgat, 181–215. Dordrecht: Foris.

Keenan, Edward and Bernard Comrie 1977. Noun phrase accessibility and universal grammar. *Linguistic Inquiry* 8:63–99. (Reprinted in Edward L Keenan, *Universal grammar: 15 essays*, 3–46. London: Croom Helm, 1987.)

Keenan, Edward and Bernard Comrie 1979. Data on the noun phrase accessibility hierarchy. *Language* 55:333–51.

Keller, Rudi 1990/1994. *On language change: the invisible hand in language*. London: Routledge. (Translation and expansion of *Sprachwandel*, 1990.)

Kemmer, Suzanne 1993. *The middle voice*. (Typological Studies in Language, 23.) Amsterdam: John Benjamins.

Kimenyi, Alexandre 1980. *A relational grammar of Kinyarwanda*. (University of California Publications in Linguistics, 91.) Berkeley and Los Angeles: University of California Press.

Klein, Richard 1999. *The human career* (2nd edition). Chicago: University of Chicago Press.

König, Ekkehard and Martin Haspelmath 1998. Les constructions à possesseur externe dans les langues d'Europe. *Actance et valence dans les langues de l'Europe*, ed. Jack Feuillet, 525–606. Berlin: Mouton de Gruyter.

Koptjevskaja-Tamm, Maria 1993. *Nominalizations*. London: Routledge.

Kortmann, Bernd 1997. *Adverbial subordination: a typology and history of adverbial subordinators based on European languages*. Berlin: Mouton de Gruyter.

Kraft, C. H. and A. H. M. Kirk-Greene 1973. *Hausa*. London: English Universities Press.

Krauss, Michael 1992. The world's languages in crisis. *Language* 68:3–10.

Kroeber, A. L. 1904. The languages of the coast of California south of San Francisco. *University of California Papers in American Archaeology and Ethnology* 2:29–80.

Kuhn, Thomas S. 1962/1970. *The structure of scientific revolutions* (2nd edition, enlarged). Chicago: University of Chicago Press.

Kuno, Susumu 1973. *The structure of the Japanese language*. Cambridge, Mass.: MIT Press.

Labov, William 1966. *The social stratification of English in New York City*. Washington, D.C.: Center for Applied Linguistics.

Ladefoged, Peter 1964. *A phonetic study of West African languages*. Cambridge: Cambridge University Press.

Ladefoged, Peter and Ian Maddieson 1996. *The sounds of the world's languages*. Oxford: Basil Blackwell.

Lakatos, Imre 1970. The methodology of scientific research programmes. In *Criticism and the growth of knowledge*, ed. Imre Lakatos and Alan Musgrave, 91–196. Cambridge: Cambridge University Press.

Lakoff, George 1977. Linguistic gestalts. In *Papers from the Thirteenth Regional Meeting of the Chicago Linguistic Society*, ed. Woodford A. Beach, Samuel E. Fox and Shulamith Philosoph, 236–87. Chicago: Chicago Linguistic Society.

Lakoff, George and Mark Johnson 1980. *Metaphors we live by*. Chicago: University of Chicago Press.

Lambrecht, Knud 1987. On the status of SVO sentences in French discourse. In *Coherence and grounding in discourse*, ed. Russell Tomlin, 217–62. Amsterdam: John Benjamins.

Langacker, Ronald W. 1977. Syntactic reanalysis. In *Mechanisms of syntactic change*, ed. Charles Li, 57–139. Austin: University of Texas Press.

Langacker, Ronald 1987. *Foundations of cognitive grammar*, vol. 1: *Theoretical prerequisites*. Stanford: Stanford University Press.

Larsen, Thomas W. 1981. Functional correlates of ergativity in Aguacatec. In *Proceedings of the Seventh Annual Meeting of the Berkeley Linguistics Society*, ed. Danny K. Alford *et al.*, 136–53. Berkeley: Berkeley Linguistics Society.

Larsen, Thomas W. and William Norman 1979. Correlates of ergativity in Mayan grammar. In *Ergativity*, ed. Frans Plank, 347–70. New York: Academic Press.

Lass, Roger 1984. *Phonology*. Cambridge: Cambridge University Press.

Lass, Roger 1990. How to do things with junk: exaptation in language change. *Journal of Linguistics* 26:79–102.

Laudan, Larry 1977. *Progress and its problems: towards a theory of scientific growth*. Berkeley and Los Angeles: University of California Press.

Lawler, John 1977. *A* agrees with *B* in Achense: a problem for relational grammar. In *Grammatical relations* (Syntax and Semantics, 8), ed. Peter Cole and Jerrold Sadock, 219–48. New York: Academic Press.

Lee, Kee-dong 1975. *Kusaiean reference grammar*. Honolulu: University Press of Hawaii.

Lehmann, Christian 1982a. Directions for interlinear morphemic translations. *Folia Linguistica* 16:199–224.

Lehmann, Christian 1982b. Universal and typological aspects of agreement. *Apprehension: Das sprachliche Erfassen von Gegenständen*, vol. 2, ed. Hansjakob Seiler and Franz Josef Stachowiak, 201–67. Tübingen: Gunter Narr.

Lehmann, Christian 1982/1995. *Thoughts on grammaticalization: a programmatic sketch*, vol. I. (Arbeiten des Kölner Universalien-Projekts, 48.) Köln: Institut für Sprachwissenschaft. (Reprinted by LINCOM Europa, München, 1995.)

Lehmann, Christian 1984. *Der Relativsatz: Typologie seiner Strukturen, Theorie seiner Funktionen, Kompendium seiner Grammatik*. Tübingen: Gunter Narr.

Lehmann, Christian 1985. Grammaticalization: synchronic variation and diachronic change. *Lingua e Stile* 20:303–18.

Lehmann, Christian 1986. On the typology of relative clauses. *Linguistics* 24:663–80.

Lehmann, Christian 1988. Towards a typology of clause linkage. *Clause combining in grammar and discourse*. ed. John Haiman and Sandra A. Thompson, 181–226. Amsterdam: John Benjamins.

Lehmann, Winfred P. 1973. A structural principle of language and its implications. *Language* 49:47–66.

Leslau, Wolf 1968. *Amharic textbook*. Berkeley and Los Angeles: University of California Press.

Levinson, Stephen 1997. *The theory of basic color terms and Yélîdnye*. Working Papers of the Cognitive Anthropology Group. Nijmegen: Max Planck Institute for Psycholinguistics.

Lewis, David 1969. *Convention*. Cambridge, Mass.: MIT Press.

Lewis, G. L. 1967. *Turkish grammar*. Oxford: Oxford University Press.

Li, Charles and Sandra A. Thompson 1981. *Mandarin Chinese: a functional reference grammar*. Berkeley and Los Angeles: University of California Press.

Lichtenberk, Frantisek 1983a. Relational classifiers. *Lingua* 60:147–76.

Lichtenberk, Frantisek 1983b. *A grammar of Manam*. (Oceanic Linguistics Special Publication, 18.) Honolulu: University of Hawaii Press.

Lichtenberk, Frantisek 1985. Multiple uses of reciprocal constructions. *Australian Journal of Linguistics* 5:19–41.

Lindblom, Bjorn and Ian Maddieson 1988. Phonetic universals in consonant systems. In *Language, speech and mind: studies in honour of Victoria A. Fromkin*, ed. Larry M. Hyman and Charles N. Li, 62–78. London: Routledge.

Lohr, Marisa 1998. Methods for the genetic classification of languages. Ph.D. dissertation, Cambridge University, Cambridge.

Lüdtke, Helmut 1980. The place of morphology in a universal cybernetic theory of language change. In *Historical morphology*, ed. Jacek Fisiak, 273–81. The Hague: Mouton.

Lüdtke, Helmut 1985. Diachronic irreversibility in word-formation and semantics. In *Historical semantics; historical word-formation*, ed. Jacek Fisiak, 355–66. Berlin: Mouton.

Lüdtke, Helmut 1986. Esquisse d'une théorie du changement langagier. *La linguistique* 22:3–46.

Lynch, John 1978. *A grammar of Lenakel*. (Pacific Linguistics, B55.) Canberra: Australian National University.

Mace, John 1962. *Modern Persian*. London: English Universities Press.

MacLaury, Robert 1987. Color category evolution and Shuswap yellow-with-green. *American Anthropologist* 98:107–24.

MacLaury, Robert 1992. From brightness to hue: an explanatory model of color-category evolution. *Current Anthropology* 33:137–86.

Maddieson, Ian 1984. *Patterns of sounds*. Cambridge: Cambridge University Press.

Mallinson, Graham and Barry Blake 1981. *Language typology*. Amsterdam: North-Holland.

Maslova, Elena 2000. A dynamic approach to the verification of distributional universals. *Linguistic Typology* 4:307–33.

Maslova, Elena 2002. A cluster-based approach to probability sampling. Paper presented at the Third Winter Typological School, Moscow, Russia.

Matisoff, James 1969. Verb concatenation in Lahu: the syntax and semantics of 'simple' juxtaposition. *Acta Linguistica Hafniensa* 12:69–120.

Matisoff, James 1973. *The grammar of Lahu*. (University of California Publications in Linguistics, 75.) Berkeley and Los Angeles: University of California Press.

Matthews, Peter H. 1993. *Grammatical theory in the United States from Bloomfield to Chomsky*. Cambridge: Cambridge University Press.

Maxwell, Daniel 1979. Strategies of relativization and NP accessibility. *Language* 55:352–71.

Maxwell, Daniel 1984. A typologically based principle of linearization. *Language* 60:251–85.

Maxwell, Daniel 1985. *A crosslinguistic data sample in support of a principle of linearization*. Bloomington: Indiana University Linguistics Club.

McCawley, James D. 1992. Justifying part-of-speech distinctions in Mandarin Chinese. *Journal of Chinese Linguistics* 20:211–46.

Meinhof, Carl 1936. *Die Entstehungflektierender Sprachen*. Berlin: Reimel.

Merlan, Francesca 1983. *Ngalakan grammar, texts and vocabulary*. (Pacific Linguistics, B89.) Canberra: Australian National University.

Merlan, Francescas 1994. *A grammar of Wardaman*. Berlin: Mouton de Gruyter.

Mithun, Marianne 1984. The evolution of noun incorporation. *Language* 60:847–94.

Mithun, Marianne 1986. On the nature of noun incorporation. *Language* 62:32–7.

Mithun, Marianne 1987. Is basic word order universal? In *Coherence and grounding in discourse*, ed. Russell Tomlin, 281–328. Amsterdam: John Benjamins.

Mondloch, James 1978. *Basic Quiché grammar.* Albany: State University of New York Institute for Mesoamerican Studies.

Moravcsik, Edith A. 1974. Object–verb agreement. *Working Papers in Language Universals* 15:25–140.

Morrow, Daniel G. 1986. Grammatical morphemes and conceptual structure in discourse processing. *Cognitive Science* 10:423–55.

Munro, Pamela and Lynn Gordon 1982. Syntactic relations in Western Muskogean: a typological perspective. *Language* 58:81–115.

Myhill, John 1988. Categoriality and clustering. *Studies in Language* 12:261–97.

Myhill, John 1992. *Typological discourse analysis.* Oxford: Basil Blackwell.

Nandris, Grigore 1945. *Colloquial Rumanian.* London: Routledge and Kegan Paul.

Nettle, Daniel 1999. *Linguistic diversity.* Oxford: Oxford University Press.

Nettle, Daniel and Suzanne Romaine 2000. *Vanishing voices: the extinction of the world's languages.* Oxford: Oxford University Press.

Newman, Stanley 1944. *Yokuts language of California.* (Viking Fund Publications in Anthropology, 2.) New York: Viking Fund.

Newmeyer, Frederick J. 1992. Iconicity and generative grammar. *Language* 68:756–96.

Newmeyer, Frederick J. 1998. *Language form and language function.* Cambridge, Mass.: MIT Press.

Nichols, Johanna 1984. Direct and oblique objects in Chechen-Ingush and Russian. In *Objects*, ed. Frans Plank, 183–209. New York: Academic Press.

Nichols, Johanna 1992. *Linguistic diversity in space and time.* Chicago: University of Chicago Press.

Ohala, John 1983. The origin of sound patterns in vocal tract constraints. *The production of speech*, ed. Peter F. MacNeilage, 189–216. New York: Springer.

Ohala, John and James Lorentz 1977. The story of [w]. In *Proceedings of the Third Annual Meeting of the Berkeley Linguistics Society*, ed. Kenneth Whistler, Robert D. Van Valin et al., 577–99. Berkeley: University of California at Berkeley.

Osborne, C. R. 1974. *The Tiwi language.* Canberra: Australian Institute of Aboriginal Studies.

Osumi, Midori 1995. *Tinrin grammar.* (Oceanic Linguistics Special Publications, 25.) Honolulu: University of Hawaii Press.

Palmer, F. R. 1986. *Mood and modality.* Cambridge: Cambridge University Press.

Paul, Hermann 1880. *Prinzipien der Sprachgeschichte* (8th edition). Tübingen: Max Niemeyer.

Pawley, Andrew 1987. Encoding events in Kalam and English: different logics for reporting experience. In *Coherence and grounding in discourse*, ed. Russell Tomlin, 329–60. Amsterdam: John Benjamins.

Payne, Doris 1987. Information structuring in Papago narrative discourse. *Language* 63:783–804.

Payne, John R. 1980. The decay of ergativity in Pamir languages. *Lingua* 51:147–86.

Perkins, Revere D. 1989. Statistical techniques for determining language sample size. *Studies in Language* 13:293–315.

Pinkerton, Sandra 1986. Quichean (Mayan) glottalized and nonglottalized stops: a phonetic study with implications for phonological universals. In *Experimental phonology*, ed. John J. Ohala and Jeri J. Jaeger, 125–39. New York: Academic Press.

Pitkin, Harvey 1984. *Wintu grammar.* (University of California Publications in Linguistics, 94.) Berkeley and Los Angeles: University of California Press.

Pollard, Carl and Ivan A. Sag 1993. *Head-driven Phrase Structure Grammar.* Chicago and Stanford: University of Chicago Press and the Center for the Study of Language and Information.

Poppe, Nicholas 1974. *Grammar of written Mongolian.* Wiesbaden: Otto Harrassowitz.

Popper, Karl R. 1934/1959. *The logic of scientific discovery.* New York: Harper. (Translation of *Logik der Forschung*, Vienna, 1934.)

Prince, Alan and Paul Smolensky 1993. *Optimality theory: constraint interaction in generative grammar.* Technical Reports of the Rutgers University Center for Cognitive Sciences 2. New Brunswick, NJ: Rutgers University Center for Cognitive Sciences.

Prince, Ellen F. 1981. Topicalization, Focus-movement and Yiddish-movement: a pragmatic differentiation. In *Proceedings of the Seventh Annual Meeting of the Berkeley Linguistics Society*, ed. Danny K. Alford *et al.*, 249–64.

Pullum, Geoffrey 1977. Word order universals and grammatical relations. In *Grammatical relations* (Syntax and Semantics, 8), ed. Peter Cole and Jerrold Sadock, 249–77. New York: Academic Press.

Pullum, Geoffrey 1981. Languages with object before subject: a comment and a catalogue. *Linguistics* 19:147–55.

Quine, Willard van Orman 1951/1961. Two dogmas of empiricism. *From a logical point of view* (2nd edition), 20–46. (Originally published in *Philosophical Review* 60:20–43, 1951.)

Rabel, Lili 1961. *Khasi, a language of Assam.* Baton Rouge: Louisiana State University Press.

Raz, Shlomo 1983. *Tigre grammar and texts.* (Afroasiatic Dialects, 4.) Malibu, Calif.: Undena Press.

Reed, Irene, Osahito Miyaoka, Steven Jacobson, Paschal Afcan and Michael Krauss 1977. *Yup'ik Eskimo grammar.* Anchorage: University of Alaska, Alaska Native Language Center.

Reesink, Ger P. 1980. *Structures and their functions in Usan.* (SLCS vol. 13.) Amsterdam: John Benjamins.

Rijkhoff, Jan and Dik Bakker 1998. Language sampling. *Linguistic Typology* 2:263–314.

Rijkhoff, Jan, Dik Bakker, Kees Hengeveld and Peter Kahrel 1993. A method of language sampling. *Studies in Language* 17:169–203.

Rischel, Jørgen 1995. *Minor Mlabri: a hunter-gatherer language of Northern Indochina.* Copenhagen: Museum Tusculanum Press.

Rizzi, Luigi 1982. *Issues in Italian syntax.* Dordrecht: Reidel.

Roberts, John R. 1987. *Amele.* London: Croom Helm.

Robins, R. H. 1958. *The Yurok language: grammar, texts, lexicon.* (University of California Publications in Linguistics, 15.) Berkeley and Los Angeles: University of California Press.

Rood, David and Allan R. Taylor 1976. *Beginning Lakhota*, vol. 1. Boulder, Colo.: University of Colorado Lakhota Project.

Rosch, Eleanor 1978. Principles of categorization. In *Cognition and categorization*, ed. Eleanor Rosch and B. B. Lloyd, 27–48. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Rowlands, E. C. 1969. *Yoruba*. Sevenoaks: Hodder and Stoughton.
Ruhlen, Merritt 1976. *A guide to the languages of the world*. Stanford: Stanford Language Universals Project.
Ruhlen, Merritt 1987. *A guide to the world's languages*, vol. 1: *Classification*. Stanford: Stanford University Press.
Sadock, Jerrold 1980. Noun incorporation in West Greenlandic: a case of syntactic word formation. *Language* 56:300–19.
Sadock, Jerrold 1985. The Southern Tiwa incorporability hierarchy. *International Journal of American Linguistics* 51:568–71.
Sadock, Jerrold 1986. Some notes on noun incorporation. *Language* 62:19–31.
Sadock, Jerrold M. 1991. *Autolexical syntax*. Chicago: University of Chicago Press.
Safir, Kenneth 1985. *Syntactic chains*. Cambridge: Cambridge University Press.
Saltarelli, Mario 1988. *Basque*. London: Croom Helm.
Sandfeld, Kr. 1930. *Linguistique balkanique: problèmes et résultats*. (Collection linguistique publiée par la Société Linguistique de Paris, 31.) Paris: Champion.
Sapir, Edward 1921. *Language*. New York: Harcourt, Brace and World.
Sapir, Edward 1922. Takelma. In *Handbook of American Indian languages, part 2*, ed. Franz Boas, 1–296. Washington, D.C.: Bureau of American Ethnology.
Saussure, Ferdinand de 1915/1959. *Course in general linguistics* (translated Wade Baskin). New York: McGraw-Hill.
Scatton, Ernest A. 1983. *A reference grammar of Modern Bulgarian*. Columbus, Ohio: Slavica.
Schachter, Paul 1973. Focus and relativization. *Language* 49:19–46.
Schachter, Paul 1976. The subject in Philippine languages: topic, actor, actor–topic, or none of the above. In *Subject and topic*, ed. Charles Li, 491–518. New York: Academic Press.
Schachter, Paul 1977. Reference-related and role-related properties of subjects. In *Grammatical relations* (Syntax and Semantics, 8), ed. Peter Cole and Jerrold Sadock, 279–306. New York: Academic Press.
Schlegel, August Wilhelm von 1818. *Observations sur la langue et la littérature provençales*. Paris: Librairie grecque-latine-allemande.
Schlegel, Karl Wilhelm Friedrich von 1808. *Über die Sprache und Weiheit der Indier*. Heidelberg: Mohr and Zimmer.
Schleicher, August von 1859. Zur Morphologie der Sprache. *Mémoires de l'Academie Impériale des Sceinces de St. Pétersbourg*, 7e Série, Tome 1, No. 7.
Schlesinger, Itzchak M. 1979. Cognitive structures and semantic deep structures: the case of the instrumental. *Journal of Linguistics* 15:307–24.
Schmalstieg, William R. 1976. *Old Church Slavonic*. Columbus, Ohio: Slavica.
Schütz, Alfred 1969. *Nguna texts*. (Oceanic Linguistics Special Publication, 4.) Honolulu: University of Hawaii Press.
Schwartz, Linda 1980. Syntactic markedness and frequency of occurrence. In *Evidence and argumentation in linguistics*, ed. Thomas Perry, 315–33. Berlin: Walter de Gruyter.
Searle, John R. 1969. *Speech acts: an essay in the philosophy of language*. Cambridge: Cambridge University Press.
Shackle, C. 1972. *Punjabi*. London: English Universities Press.
Shibatani, Masayoshi 1985. Passives and related constructions: a prototype analysis. *Language* 61:821–48.

Siewierska, Anna 1984. Phrasal discontinuity in Polish. *Australian Journal of Linguistics* 4:57–71.

Siewierska, Anna 1997. The formal realization of case and agreement marking. In *Reconnecting language: morphology and syntax in functional perspectives*, ed. Anne-Marie Simon-Vendenbergen, Kristin Davidse and Dirk Noël, 181–210. Amsterdam: John Benjamins.

Siewierska, Anna 1998. On nominal and verbal person marking. *Linguistic Typology* 2:1–55.

Silverstein, Michael 1976. Hierarchy of features and ergativity. In *Grammatical categories in Australian languages*, ed. R. M. W. Dixon, 112–71. Canberra: Australian Institute of Aboriginal Studies.

Smith, Neil 1982. Review of Comrie 1981. *Australian Journal of Linguistics* 2:255–61.

Sohn, Ho-min 1975. *Woleaian reference grammar*. Honolulu: University Press of Hawaii.

Stassen, Leon 1985. *Comparison and universal grammar*. Oxford: Basil Blackwell.

Stassen, Leon 1997. *Intransitive predication*. Oxford: Oxford University Press.

Steele, Susan 1975. On some facts that affect and effect word order. In *Word order and word order change*, ed. Charles Li, 197–268. Austin: University of Texas Press.

Steele, Susan 1978. Word order variation: a typological study. In *Universals of human language*, vol. 4: *Syntax*, ed. Joseph H. Greenberg, Charles A. Ferguson and Edith A. Moravcsik, 585–624. Stanford: Stanford University Press.

Stolz, Thomas 1996. Some instruments are really good companions – some are not: on syncretism and the typology of instruments and comitatives. *Theoretical Linguistics* 23:113–200.

Stucky, Susan 1979. Focus of contrast aspects in Makua: syntactic and semantic evidence. In *Proceedings of the Fifth Annual Meeting of the Berkeley Linguistic Society*, ed. Christine Chiarello *et al.*, 362–72. Berkeley: University of California at Berkeley.

Stucky, Susan 1981. Word order variation in Makua: a phrase structure grammar analysis. Ph. D. dissertation, Department of Linguistics, University of Illinois at Champaigne-Urbana.

Tabor, Whitney and Elizabeth C. Traugott 1998. Structural scope expansion and grammaticalization. *The limits of grammaticalization*, ed. Anna Giacolone Ramat and Paul J. Hopper, 229–72. Amsterdam: John Benjamins.

Talmy, Leonard 1972. Semantic structures in English and Atsugewi. Ph.D. dissertation, Department of Linguistics, University of California at Berkeley.

Talmy, Leonard 1974. Semantics and syntax of motion. In *Syntax and semantics*, vol. 4, ed. John Kimball, 181–238. New York: Academic Press.

Talmy, Leonard 1978. The relation of grammar to cognition. In *Proceedings of TINLAP–2*, ed. David Waltz. Urbana, University of Illinois Coordinated Science Laboratory.

Talmy, Leonard 1985. Lexicalization patterns: semantic structure in lexical forms. In *Language typology and syntactic description*, vol. 3: *Grammatical categories and the lexicon*, ed. Timothy Shopen, 57–149. Cambridge: Cambridge University Press.

Talmy, Leonard 1988a. The relation of grammar to cognition. In *Topics in cognitive linguistics*, ed. Brygida Rudzka-Ostyn, 165–205. Amsterdam: John Benjamins.

Talmy, Leonard 1988b. Force dynamics in language and cognition. *Cognitive Science* 12:49–100.

Talmy, Leonard 1991. Path to realization: a typology of event integration. *Buffalo Working Papers in Linguistics* 91–01:147–87.

Talmy, Leonard 2000a. *Toward a cognitive semantics*, vol. 1: *Concept structuring systems*. Cambridge, Mass.: MIT Press.

Talmy, Leonard 2000b. *Toward a cognitive semantics*, vol. 2: *Typology and process in concept structuring*. Cambridge, Mass.: MIT Press.

Taraldsen, Knut Tarald 1980. *On the nominative island constraint, vacuous application and the* that-*trace filter*. Bloomington: Indiana University Linguistics Club.

Thomas, David D. 1971. *Chrau grammar*. (Oceanic Linguistics Special Publication, 7.) Honolulu: University of Hawaii Press.

Tiersma, Peter Meijes 1982. Local and general markedness. *Language* 58:832–49.

Tomlin, Russell 1986. *Basic word order: functional principles*. London: Croom Helm.

Traugott, Elizabeth Closs 1982. From propositional to textual and expressive meanings: some semantic–pragmatic aspects of grammaticalization. In *Perspectives on historical linguistics*, ed. Winfred P. Lehmann and Yakov Malkiel, 245–71. Amsterdam: John Benjamins.

Traugott, Elizabeth Closs 1985. On regularity in semantic change. *Journal of Literary Semantics* 14:155–73.

Traugott, Elizabeth Closs 1988. Pragmatic strengthening and grammaticalization. In *Proceedings of the Fourteenth Annual Meeting of the Berkeley Linguistics Society*, ed. Shelley Axemaker, Annie Jaisser and Helen Singmaster, 406–16. Berkeley: University of California at Berkeley.

Traugott, Elizabeth Closs 1989. On the rise of epistemic meanings in English: an example of subjectification in semantic change. *Language* 65:31–55.

Traugott, Elizabeth Closs 1990. From less to more situated in language: the unidirectionality of semantic change. In *Papers from the 5th International Conference on Historical Linguistics*, ed. Sylvian Adamson, Vivien Law, Nigel Vincent and Susan Wright, 497–517. Amsterdam: John Benjamins.

Traugott, Elizabeth C. and Bernd Heine 1991. *Approaches to grammaticalization* (2 vols.). Amsterdam: John Benjamins.

Traugott, Elizabeth C. and Ekkehart König 1991. The semantics-pragmatics of grammaticalization revisited. *Approaches to grammaticalization*, ed. Elizabeth C. Traugott and Bernd Heine, 189–218. Amsterdam: John Benjamins.

Trubetzkoy, Nicholas 1931. Die phonologischen Systeme. *Travaux du Cercle Linguistique de Prague* 4:96–116.

Trubetzkoy, Nicholas 1939/1969. *Principles of phonology*. (Translation of *Grundzüge der Phonologie*, Prague, 1939). Berkeley and Los Angeles: University of California Press.

van der Auwera, Johan 1984. Subject and non-subject asymmetries in the relativization of embedded NPs. In *Sentential complementation: proceedings of the international conference held at UFSAL, Brussels, June 1983*, ed. W. de Geest and Y. Putseys, 257–69. Dordrecht: Kluwer.

van der Auwera, Johan and Vladimir A. Plungian 1998. Modality's semantic map. *Linguistic Typology* 2:79–124.

van Driem, George 1987. *A grammar of Limbu*. Berlin: Mouton de Gruyter.

van Hoek, Karen A. 1997. *Anaphora and conceptual structure*. Chicago: University of Chicago Press.

Vennemann, Theo 1973. Explanation in syntax. In *Syntax and semantics*, vol. 2, ed. John Kimball. New York: Academic Press.

Watahomigie, Lucille J., Jorigine Bender and Akira Y. Yamamoto 1982. *Hualapai reference grammar*. Los Angeles: UCLA American Indian Studies Center.

Watkins, Laurel J. 1984. *A grammar of Kiowa*. Lincoln: University of Nebraska Press.

Wegener, Philipp 1885. *Untersuchungen über die Grundfragen des Sprachlebens*. Halle: Max Niemeyer.

Welmers, William E. 1973. *African language structures*. Berkeley: University of California Press.

Whitney, Arthur 1944. *Colloquial Hungarian*. London: Routledge and Kegan Paul.

Whorf, Benjamin Lee 1956. *Language, thought and reality*. Cambridge, Mass.: MIT Press.

Wierzbicka, Anna 1981. Case marking and human nature. *Australian Journal of Linguistics* 1:43–80.

Wierzbicka, Anna 1985. Oats and wheat: the fallacy of arbitrariness. In *Iconicity in syntax*, ed. John Haiman, 311–42. Amsterdam: John Benjamins.

Williams, C. J. 1980. *A grammar of Yuwaalaraay*. (Pacific Linguistics, B74.) Canberra: Australian National University.

Witkowski, Stanley R. and C. H. Brown 1983. Marking reversals and cultural importance. *Language* 59:569–82.

Wolfart, H. Christoph and Janet F. Carroll 1981. *Meet Cree: a guide to the Cree language* (2nd edition). Lincoln: University of Nebraska Press.

Wurm, Stephen and Shiro Hattôri 1981. *Language atlas of the Pacific area*. (Pacific Linguistics, C66.) Canberra: Australian National University.

Zipf, George 1935. *The psychobiology of language: an introduction to dynamic philology*. Cambridge, Mass.: MIT Press.