### To My Parents and Grandparents

### Library of Congress Cataloging in Publication Data

Hyman, Larry M

Phonology: theory and analysis.

Bibliography: p.

Includes index.

1. Grammar, Comparative and general-Phonology.

I. Title.

P217.H9 415 74-32172

#### ISBN 0-03-012141-8

Copyright © 1975 by Holt, Rinehart and Winston All rights reserved Printed in the United States of America

8 9 059 9 8 7 6 5 4

### FOREWORD

"This book deals with *phonology*, the study of the sound systems of language." So begins this book which, true to its subtitle, is concerned with both phonological theory and descriptive analysis, recognizing and demonstrating that every phonological analysis is dependent on theory.

The author's main concern is to reveal "how speech sounds structure and function" in the languages of the world. All phonological theories have this as their goal; alternative theories are critically examined in reference to this goal. The basic tenets of the theory of generative phonology as proposed by Chomsky and Halle are set against the background of earlier phonologists like Trubetzkoy, Martinet, Jakobson, Sapir, Pike, and Firth. The book thus illuminates the continuity and the breaks between past and present in phonological theory, providing the reader with the theoretical and practical background necessary to understand and analyze phonological phenomena.

The book's primary aim is to serve as a textbook for students of linguistics, but it is more than a textbook. The author objectively assesses and summarizes what has been learned through the ages about the sound systems of human language and also reveals some of the gaps in our knowledge. This is not a book written by someone who has learned his phonology from books; it is written by a working phonologist who has himself struggled with and contributed to phonological theory and analysis. The modifications in current phonological theory which he proposes reflect the author's intimate knowledge of the many languages he has studied. For this reason, the book, while introductory in style and exposition and completely understandable by the novice, will also be of interest to the advanced student and working phonologist.

Little previous knowledge of phonology is assumed; anyone with a rudimentary knowledge of phonetics will have no difficulty. The tables in the appendixes define all the symbols used; both IPA charts of phonetic symbols and distinctive feature matrices are provided.

The book is comprehensive and detailed. Traditional and current con cepts and technical terms, such as distinctiveness, redundancy, complementary distribution, neutralization, assimilation, dissimilation, phonetic similarity, free variation, alternation, archiphoneme, segmental and sequential constraints, conjunctive and disjunctive ordering, alpha variables, are carefully explained and exemplified by language data drawn from more than seventy languages from Akan to Zulu.

Phonology is organized into six chapters. Chapter 1 discusses the basic distinction between phonetics and phonology, the notion of levels of representation, and the kinds of evidence which support theoretical hypotheses and analyses. Chapter 2 deals with the basic building blocks of phonology-distinctive features-and provides an historical view of the development of distinctive feature theory. Binary and multivalued features are discussed, as are the articulatory and acoustic correlates of universal phonetic features. Chapter 3 covers alternative approaches to phonological analyses and the nature of the "phoneme." The abstractness of phonological representation is considered. In Chapter 4 the formal representation of phonological analysis is presented. The notion of simplicity is discussed in relation to the formal devices and ordering relations between phonological rules that have been proposed in the literature. In this chapter, some recent proposals for modifications of generative theory—such as those dealing with global rules and derivational constraints—are considered. Chapter 5 deals with the concept of phonological naturalness-of classes of sounds, phonological systems, and rules. The development of the theory of "markedness" is discussed in terms of both synchronic and diachronic "natural" systems and rules.

The first five chapters thus present a comprehensive view of segmental phonology. Chapter 6, a special feature of the book, discusses suprasegmental phenomena. Stress and tone, the kinds of units to which they should be assigned, and the rules that affect them are considered. The syllable, the morpheme, and the word as phonological units are examined, and the concept of the transformational cycle is evaluated.

No description of the contents of this book, however, can suggest the exciting discoveries about the nature of sound systems that await the reader.

VICTORIA A. FROMKIN
University of California, Los Angeles

# PREFACE

When faced with the task of teaching an introductory course in phonology, a linguist must decide which of two strategies to follow. First, one may choose to devote the course to one particular theory of phonology, the theory that one personally esteems to be the most adequate—or possibly the "right" approach to the field. Or, the linguist may choose to reflect a wider range of views on the nature of sound systems, a subject that has inspired a number of different theoretical schools of thought.

In writing *Phonology*, my aim has been to present what I feel to be the major advances in the study of phonology over the past several decades. Though I cannot claim to have given each theorist the number of pages deserved, I have attempted to provide a historical perspective on the evolution of phonological study. By incorporating many of the contributions of earlier scholars, as well as discussions of some currently debated issues, I hope I have produced an introduction to the field that is broad enough to satisfy phonologists of different theoretical persuasions.

Because of the rapidly changing scope of phonology and because of the diversity of opinions held about its nature, it is impossible to satisfy all teachers of phonology with one book. In addition, some phonologists may not agree with the relative weight I have given various topics. Most professors would probably agree that it is good to expose students to different points of view. While some may prefer to make "comparative phonological theory" a topic for graduate seminars, devoting more elementary courses to one view of phonology, I have chosen to give the beginning student a more general picture. This should, I hope, enable students to approach the phonological literature (much of which is cited in the text) and make critical judgments on their own. The risk, of course, is that students may be discouraged by the fact that, as in other areas of linguistics, most of the answers are yet to be found.

The last fifty years have taught us a lot about the way sound systems work—and it is expected that the next fifty years will be at least as ex-

vm Prejace

citing. I hope that this introductory overview of phonology will contribute to the development of the science.

• • •

Research on the nature of stress and tone (Chapter 6) was supported in part by the Miller Institute for Basic Research in Science, University of California, Berkeley.

I would like to thank John Ohala, Edward Finegan, William Leben, and Stephen Krashen for reading and commenting on parts of an earlier draft of this manuscript. In addition, I would like to express my deepest appreciation to Victoria Fromkin and Meredith Hoffman, whose many detailed criticisms have led to improvements both in style and in content. Finally, I would like to thank members of my phonology classes at the University of Southern California and the University of California, Santa Cruz, whose stimulating response encouraged me to undertake this project.

L.M.H.

## CONTENTS

Foreword by Victoria A. Fromkin v Preface vii

1

#### WHAT IS PHONOLOGY? 1

- 1.1 Introduction 1
- 1.2 Phonetics and Phonology 2
- 1.3 Redundancy and Distinctiveness 5
- 1.4 Levels of Sound Representation 8
  - 1.4.1 Phonological and Phonetic Constraints 9
  - 1.4.2 Phonological Rules 12
- 1.5 Some Universals of Phonological Systems 15
  - 1.5.1 Phonological Inventories 15
  - 1.5.2 Language Acquisition 16
  - 1.5.3 Language Change 17
- 1.6 The Psychological Reality of Phonological Descriptions 19
  - 1.6.1 Linguistic Intuitions 19
  - 1.6.2 Foreign Accents 21
  - 1.6.3 Speech Errors 21
  - 1.6.4 Language Acquisition 22
- 1.7 Summary 23

2

#### DISTINCTIVE FEATURE THEORY 24

- 2.1 The Need for Distinctive Features 24
- 2.2 Trubetzkoy's Theory of Distinctive Oppositions 26
  - 2.2.1 Bilateral, Multilateral, Proportional, and Isolated Oppositions 26

Contents

 "	us		

2.2.2 Privative, Gradual, and Equipollent Oppositions 27
2.2.3 Constant and Neutralizable Oppositions 29
2.3 Jakobson's Theory of Distinctive Features 29
2.3.1 Articulatory vs. Acoustic Features 30
2.3.2 Binary vs. Nonbinary Features 32
2.3.3 The Distinctive Features of Jakobson and Halle 33
2.3.3.1 The Major Class Features 33
2.3.3.2 The Distinctive Features of Vowels 35
2.3,3.3 The Distinctive Features of Consonants 37
2.3.3.3.1 Primary Articulations 39
2.3.3.3.2 Secondary Articulations 41
2.3.3.4 Summary 42
2.4 The Distinctive Features of Chomsky and Halle 42
2.4.1 The Major Class Features 42
2.4.2 Primary Placement Features for Vowels and Consonants 45
2.4.2.1 The Features High, Back, and Low 45
2.4.2.2 The Features Anterior and Coronal 47
2.4.2.3 Secondary Articulations 48
2.4.2.4 Additional Features 51
2.5 Further Remarks and Revisions 52
2.5.1 The Feature Labial 53
2.5.2 The Treatment of Labiovelars 54
2.5.3 Binarity 55 2.5.4 Conclusion 57
2.5.4 Conclusion 51
그는 이는 그 이다는 사이는 네가 가능을 만찮았다.
3 PHONOLOGICAL ANALYSIS 59
PHONOLOGICAL ANALYSIS 59
PHONOLOGICAL ANALYSIS 59 3.0 Different Views of the Phoneme 59
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69 3.3 The Phoneme as a Psychological Reality 72
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69  3.3 The Phoneme as a Psychological Reality 72 3.3.1 Levels of Adequacy 74
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69  3.3 The Phoneme as a Psychological Reality 72 3.3.1 Levels of Adequacy 74 3.3.2 Grammatical Prerequisites to Phonology 76
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69  3.3 The Phoneme as a Psychological Reality 72 3.3.1 Levels of Adequacy 74 3.3.2 Grammatical Prerequisites to Phonology 76 3.3.3 Morphophonemics 79
PHONOLOGICAL ANALYSIS 59  3.0 Different Views of the Phoneme 59 3.1 The Phoneme as a Phonetic Reality 60 3.1.1 Minimal Pairs 60 3.1.2 Complementary Distribution 61 3.1.3 Phonetic Similarity 64 3.1.4 Free Variation 65 3.1.5 Discovery Procedures 66 3.2 The Phoneme as a Phonological Reality 67 3.2.1 Phonemic Overlapping 67 3.2.2 Neutralization 69  3.3 The Phoneme as a Psychological Reality 72 3.3.1 Levels of Adequacy 74 3.3.2 Grammatical Prerequisites to Phonology 76

3.4 General Considerations in Setting Up Underlying Forms 90 3.4.1 Predictability 91 3.4.2 Economy 93 3.4.3 Pattern Congruity 93 3.4.4 Plausibility 97
遺滅하는 열 물건이 된 작은 하고와 민준이는 글은 모든 모든 다.
PHONOLOGICAL SIMPLICITY 99
4.1 Simplicity, Economy, and Generality 99 4.1.1 Lexical Simplicity vs. Rule Simplicity 100 4.1.2 The Simplicity Metric 101
4.2 Feature Counting 103 4.2.1 Feature Counting in the Lexicon 104
4.2.1.1 Morpheme Structure Rules (MSRs) 105
4.2.1.2 Morpheme Structure Conditions (MSCs) 108
4.2.2 Feature Counting in Phonological Rules 113 4.3 Consequences of Feature Counting 114
4.3.1 Rule Formalisms 114
4.3.1.1 Feature-Saving Formalisms 115
4.3.1.2 Abbreviatory Conventions 116
4.3.1.2.1 Brace Notation 117
4.3.1.2.2 Bracket Notation 118
4.3.1.2.3 Parenthesis Notation 119
4.3.1.2.4 Angled Bracket Notation 120
4.3.1.2.5 Alpha Notation 121 4.3.1.3 The Problem of Notational Equivalence 122
4.3.1.3 The Problem of Notational Equivalence 122 4.3.1.4 Summary 124
4.3.2 Rule Ordering 125
4.3.3 Global Rules 131
4.4 An Evaluation of Feature Counting 132
4.4.1 One Phoneme or Two? 133
4.4.2 Derivational Constraints 135
[설명 : 10 10 10 10 10 10 10 10 10 10 10 10 10
PHONOLOGICAL NATURALNESS 138
5.1 Naturalness 138 5.1.1 Natural Classes 139 5.1.2 Natural Segments 142 5.1.2.1 Prague School Markedness 143 5.1.2.2 Universal Markedness 145 5.1.2.3 Markedness in Generative Phonology 146 5.1.3 Natural Systems 149

	그렇게 있는 그 그 그 그 그는 그 그 그 그 그 그 그 그 그 그 그 그 그
5.2	Natural Rules 153
	5.2.1 Linking Conventions 153
	5.2.2 Natural Assimilation Rules 156
	5.2.3 The Relativity of Rule Naturalness 159
	5.2.4 Strengthening and Weakening 161
	5.2.4.1 Preferred Syllable Structure 161
	5.2.4.2 Consonant Strengthening and Weakening 164
	5.2.4.3 Vowel Strengthening and Weakening 169
	5.2.5 The Phonetic Basis of Natural Rules 171
	5.2.6 The Denaturalization of Natural Rules 173
	5.2.6.1 Telescoping 173
	5.2.6.2 Morphologization 175
	5.2.6.3 Rule Inversion 176
	5.2.7 Rule Naturalness as a Phonological Criterion 178
	5.2.8 Rule Simplicity as a Phonological Criterion 182
6	
ŭ	그들이 그 나는 지역 사람은 사람이 많이 들어 가장하는 사람이 있었다.
CII	PRASEGMENTAL PHONOLOGY 186
SU.	MADEGINE THE THOMOLOGIC 100
- 0	71. 64.1.16
	The Study of Suprasegmentals 186
6.1	Suprasegmental Units 187
	6.1.1 Phonological Units 187
	6.1.1.1 The Syllable 188
	6.1.1.1.1 Defining the Syllable 188
	6.1.1.1.2 The Syllable in Generative Phonology 191
	6.1.1.2 Other Phonological Suprasegmentals 193
	6.1.2 Grammatical Units 194
	6.1,2.1. The Statement of (Underlying) Sequential Constraints 194
	6.1.2.2 The Statement of Phonological Rules: Boundaries 195
	6.1.2.3 The Transformational Cycle 198
6.2	Suprasegmentals of Prominence 203
	6.2.1 Stress 204
	6.2.1.1 What Is a Stress Language? 204
	6.2.1.2 Factors Determining Stress Placement 205
	6.2.1.2.1 Grammatical Factors 205
	6.2.1.2.2 Phonological Factors 206
	6.2.1.2.3 Factors Determined by Stress Placement 207
	6.2.1.3 Natural Stress Rules 208
	6.2.1.3.1 Conceptual Naturalness 208
	6.2.1.3.2 Phonetic Naturalness 209
	6.2.1.4 Degrees of Stress 210
	6.2.2 Tone 212
	6.2.2.1 What Is a Tone Language? 213
	6.2.2.2 The Lexical Representation of Tone 214

6.2.2.2.1 Segmental vs. Suprasegmental Representation of Tone 214 6.2.2.2.2 Contour Tones vs. Sequences of Level Tones 216 6.2.2.2.3 Distinctive Features of Tone 219 6.2.2.3 Natural Tone Rules 221 6.2.2.3.1 Phonetic Tone Rules 221 6.2.2.3.1.1 Assimilation 221 6.2.2.3.1.2 Simplification 223 6.2.2.3.2 Morphophonemic Tone Rules 224 6.2.2.3.2.1 Dissimilation 224 6.2.2.3.2.2 Copying 224 6.2.2.3.2.3 Polarization 224 6.2.2.3.2.4 Replacement 225 6.2.2.3.2.5 Floating Tones 225 6.2.2.4 Terraced-Level Languages 225 6.2.2.4.1 Downdrift 226 6.2.2.4.2 Downstep 227 6.2.2.4.3 Intonation and Tone 227 6.2.2.5 Consonant Types and Tone 228 6.2.3 Typologies of Prominence 229 6.2.3.1 (Dynamic) Stress vs. Pitch Accent (Musical Stress) 230 6.2.3.2 Monotonic vs. Polytonic Accent 232 6.3 Other Suprasegmentals 233 6.3.1 Vowel Harmony 233 6.3.1.1 Types of Vowel Harmony 233 6.3.1.2 Approaches to Vowel Harmony 235 6.3.2 Nasalization 236 Appendixes 239 List of Symbols 239 Notes on Phonetic Transcriptions 240 Vowel Chart 240 Consonant Chart 241

Distinctive Feature Matrices 242 References 245

Author Index 259 Subject Index 262 Language Index 267