

# An Introduction to Phonetics and Phonology

Second Edition

---

John Clark and Colin Yallop

# Contents

---

List of Figures	x
List of Tables	xiv
Preface to the Second Edition	xv
List of Abbreviations	xvi
<b>1 Introduction</b>	<b>1</b>
1.1 Phonetics and phonology	1
1.2 Theory and analysis	4
1.3 Relationships with other fields	6
1.4 Outline of this book	7
Exercises	9
<b>2 Segmental Articulation</b>	<b>10</b>
2.1 Introduction	10
2.2 A functional overview of the speech production process	11
2.3 The organs of speech	15
2.4 Describing speech sounds	16
2.5 Airstream mechanisms	16
2.6 Modes of phonation	19
2.7 Vocalic sounds	22
2.8 Duration and glide in vocalic articulations	33
2.9 Consonantal sounds	36
2.10 Vocal tract place	38
2.11 Tongue position	41
2.12 Manner of articulation	42
2.13 Stricture	49
2.14 Force	51

2.15 Length	52
2.16 Voice onset	52
Exercises	54
<b>3 Units of Speech</b>	<b>56</b>
3.1 Identifying the units of speech	57
3.2 Complex articulations	62
3.3 Nasalization	63
3.4 Labialization	64
3.5 Palatalization	64
3.6 Velarization and pharyngealization	65
3.7 Affrication	65
3.8 Double articulation	66
3.9 Vowel retroflexion	66
3.10 Diphthongization	67
3.11 Syllabicity	67
3.12 Segmentation and structure	69
3.13 Diphthongs and related phenomena	72
3.14 Interpretations	75
Exercises	80
<b>4 The Phonemic Organization of Speech</b>	<b>82</b>
4.1 Phonetic variability	82
4.2 The phoneme	91
4.3 Allophones	94
4.4 Phonemic norms	99
4.5 Pattern and symmetry	100
4.6 Phonological reality	104
4.7 Units and boundaries	106
4.8 Invariance and overlap	108
4.9 Biuniqueness and neutralization	110
4.10 Morphophonemic alternations	115
4.11 Free variation	117
4.12 The sounds of the world's languages	119
Exercises	125
<b>5 The Generative Approach to Phonology</b>	<b>128</b>
5.1 The origins of generative phonology	128
5.2 The sound pattern of English	131
5.3 Basic rule notation in generative phonology	133
5.4 Formalism and evaluation	139
5.5 Abbreviatory devices in rule notation	141
5.6 Rule order	147
5.7 Functional considerations	150
5.8 Naturalness and markedness	154

5.9 Abstractness	156
Exercises	159
<b>6 The Anatomy and Physiology of Speech Production</b>	<b>161</b>
6.1 Introduction	161
6.2 Conventions of anatomical description	162
6.3 The nervous system	164
6.4 The respiratory system	170
6.5 The larynx	178
6.6 Phonation	186
6.7 The pharynx	191
6.8 The velum and the nasal cavity	193
6.9 The oral cavity	197
6.10 The tongue	197
6.11 The lips	200
6.12 The mandible	203
Exercises	205
<b>7 The Acoustics of Speech Production</b>	<b>206</b>
7.1 The nature of sound	207
7.2 The propagation of sound	209
7.3 Simple harmonic motion	211
7.4 Complex vibrations	215
7.5 Resonance	219
7.6 Basic amplitude properties of sound waves	222
7.7 Time domain properties of sound waves	226
7.8 Frequency domain properties of sound waves	227
7.9 Some basic perceptual properties of sound waves	232
7.10 The acoustic model of speech production	236
7.11 Phonation as a sound source	237
7.12 Sources of frication	241
7.13 The vocal tract filter in vowel production	243
7.14 Spectrographic analysis of speech	253
7.15 Acoustic properties of vowel quality	266
7.16 The vocal tract filter in consonant production	275
7.17 The acoustic properties of consonants in syllables	282
7.18 The relationship between articulatory and acoustic properties of speech production	292
7.19 Acoustic features of prosody	295
Exercises	300
<b>8 Speech Perception</b>	<b>301</b>
8.1 Introduction	301
8.2 The auditory system	302
8.3 Psychophysical properties of the auditory system	306

8.4	Speech intelligibility	309
8.5	Acoustic-phonetic perception	312
8.6	Vowel perception	315
8.7	Consonant perception	317
8.8	Units of perception	318
8.9	Prosodic perception	322
8.10	Word recognition	324
8.11	Models of speech perception	324
8.12	Conclusion	326
	Exercises	326
<b>9</b>	<b>Prosody</b>	<b>328</b>
9.1	Introduction	328
9.2	The phonetic basis of suprasegmentals	331
9.3	The systemic organization of prosody	339
9.4	Tone languages	343
9.5	Pitch-accent languages	347
9.6	Stress in English	348
9.7	Stress assignment	353
9.8	Intonation in English	358
	Exercises	362
<b>10</b>	<b>Feature Systems</b>	<b>364</b>
10.1	Introduction	364
10.2	Acoustic features	365
10.3	Articulatory features	366
10.4	Perceptual features	367
10.5	Distinctive features	368
10.6	Cover features	370
10.7	Abstract features	371
10.8	Accuracy and universality	372
10.9	Universal feature systems	376
10.10	Features and discreteness	377
10.11	Hierarchical organization of features	379
10.12	Feature geometry	381
10.13	Overview	383
	Exercises	384
<b>11</b>	<b>The Progress of Phonology</b>	<b>385</b>
11.1	Currents of theory	386
11.2	Phonetics and phonology before the twentieth century	389
11.3	The phoneme	391
11.4	The traditions of phonetics	392
11.5	Phonology in North America	393
11.6	The Prague School	395

11.7	Glossematics and stratificational phonology	396
11.8	Prosodic phonology	398
11.9	Generative phonology	400
11.10	Natural generative phonology	402
11.11	Natural phonology	404
11.12	Autosegmental and CV phonology	405
11.13	Metrical phonology	410
11.14	Lexical phonology	412
11.15	Dependency phonology	414
11.16	Experimental phonology	416
11.17	Conclusion	418
	Exercises	420
<b>Appendix 1: Phonetic Symbols</b>		<b>422</b>
1.1	Vowel symbols	422
1.2	Consonant symbols	423
1.3	Diacritics and conventions for complex articulations	425
1.4	Symbols used in transcription of English	426
<b>Appendix 2: Features</b>		<b>429</b>
2.1	Jakobson and Halle's distinctive features	429
2.2	Chomsky and Halle's universal set of phonetic features	430
2.3	Ladefoged's 'Traditional Features'	432
2.4	Components in dependency phonology	433
<b>References</b>		<b>435</b>
<b>Index</b>		<b>455</b>