Contents

List of figures and maps *page* x
List of tables xix
Preface xxi
Acknowledgments xxv
Key concepts xxvii

1 Introduction 1
The respiratory cycle 1
The source-filter model of phonation 3
Emotions 5
Voiced and unvoiced speech sounds 7
Laryngeal frequency 7
Fundamental frequency and melodic curve 7
Intensity 9
Spectrographic analysis 9
Syllabic duration 10
Syntax and prosody 11
The prosodic structure: the structure of spoken language 13
Stressed syllables 13
Intonation and syntax 14
Brain waves and prosody 14
A Copernican change 15
From laboratory to spontaneous speech 16
Reading and listening 16
Romance languages 17

2 The role of technological advances 20
The kymograph 20
The spectrograph 21
Fundamental frequency tracking 23
First results 23
Electroencephalography and brain waves 27
Transcription and alignment of speech 27

3 Transcription systems 29
Acoustic and perceived data 30

Martin, Philippe
The structure of spoken language

digitalisiert durch:
IDS Basel Bern

Obtaining data: pitch curves 30
Selecting data 32
Historical background 32
The AMPER project 36
The Prosogram 36
ToBI 38
INTSINT and Momel 40
Analor 41
Transcription as theory 42
Perception and interpretation 43
A phonological transcription system 44

4 The Autosegmental-Metrical Prosodic Structure 46
A brief description 46
Properties 48
Applying the concept 51
Questions and remarks 54
The prosodic structure revisited 56

5 The Incremental Prosodic Structure 59
Melodic curves 59
The stress group 61
The prosodic word 62
Syllabic chunking 63
The time dimension 64
Conversion of syllabic chunks 65
The syllable in the stress group 66
The stress group in the sentence 68
Classes of conclusive contours 68
Basic modalities 68
Modality variants 69
Alternative questions 71
Iconicity of conclusive contours 71
Imperative contour 73
Implicative contour 73
Contour of surprise 74
Contour of doubt 75
The Incremental Prosodic Structure 76
Independence 79
Prosodic events 79
Properties 81
Prosodic phrasing 82
Planarity 83
Connexity 83
Domain 84
Neutralization 85
Differentiation in the time domain 85
Differentiation of prosodic events 86
The dynamic prosodic structure 87

The Incremental Storage-Concatenation process 88
Preplanning 90
Melodic contours features 90
One prosodic word 91
Two prosodic words 92
Three prosodic words ended with C0 92
Contrast of melodic slope 94
Three prosodic words ended with C1 94
Prosodic structure constraints 96
The *arc accentuel* in French 96
Stress clash 97
Minimum duration of prosodic words 98
Maximum duration of prosodic words 99
Eurhythmy 101
Word alignment 104
Syntactic clash 105
Experimental data 106
Brain waves and prosodic structure 107
Theta brain waves and the perception of syllables 107
Delta brain waves and stressed syllables 108
Delta brain waves frequency range 110
Prosodic structure constraints and brain waves 111
Stress groups and brain waves 113
Constraints revisited 113
Sequential sentence structuration by prosody and syntax 115
A simple example: telephone numbers 116

6 Lexical stress in Romance languages 120
Stress and accent 120
Stress in various languages 121
Stressed syllables in Latin 122
Stressed syllables in Romance languages (other than French) 123
Orthographic convention and homographs 124
Rules for word stress placement 126
A statistical approach 127
A phonological-phonetic approach 127
A phonological approach 128
A morphophonetic approach 128
A morphological approach 128
French 130
Secondary accent and *arc accentuel* 131
The *groupe de sens*... 131
Stress variations in Romance languages 132

7 The Incremental Prosodic Structure in six Romance languages 133
EuRom4 and EuRom5 134
The process of reading 135
Note on figures 136
The Incremental Storage-Concatenation process 136
The melodic contours of Romance languages 137

Inventory 138
Processing prosodic information 141
Prosodic structures in Romance languages 144
Identification of prosodic contours 144
Complex contour 146
Experimental data 148
Sequences of two prosodic words 150
Sequences of three prosodic words 160
Sequences of four prosodic words and more 185
Coordination, enumeration, parenthesis 192
Coordination 192
Enumeration 198
Parenthesis 200
An example of AM prosodic analysis in French 203
An example of ISC prosodic processing in French 208
Conclusion 212

8 Macrosyntax 214
A first approach 215
Three current models for macrosyntax 217
The theory of *la lingua in atto* 220
Text macrosyntax and prosodic macrosyntax 221
Merging text and intonation 222
Dysfluencies 224
Ponctuants 225
The prosodic eraser 226
Use of dysfluencies 226
Deletions 227
Additions 228
Text and prosodic macrosegments 230
Examples of macrosyntactic analysis 232
French 233
Italian 241
Portuguese 245
Conclusion 248

9 Applications 249
Teaching French prosodic structure 249
Silent reading 252
Eye movement 253
Subvocalization 253
Delta wave synchronization 255

10 Conclusion 256
Quotes from Frédéric Dard (San Antonio) 256

11 WinPitch 259
Sound recording made clear 259
Sound and video 260
Transcription and alignment on the fly 261

Data mining for large speech corpora 262
Acoustic analysis 266
Prosodic morphing 270
Automatic segmentation 270
Interface with other software 270

References 272
Analyzed corpora 285
Author index 287
Subject index 290