The sounds of language can be divided into consonants, vowels and tones – the use of pitch to convey word meaning. As many as seventy per cent of the world’s languages may use pitch in this way.

Assuming little or no prior knowledge of the topic, this textbook provides a clearly organized introduction to tone and tonal phonology. Comprehensive in scope, it examines the main types of tonal systems found in Africa, the Americas and Asia, using examples from the widest possible range of tone languages. It provides students with a basic grasp of the simple phonetics of tone, and covers key topics such as the distinctive feature systems suitable for tonal contrasts, allophonic and morphophonological tonal alterations, and how to analyse them within Optimality Theory. The book also examines the perception and acquisition of tone, as well as the interface between tonal phonology and the morphosyntax.

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M. YIP Tone
This book is dedicated to the memory of my father Bill Winsland, 1920–2001, who taught me my first word of a tone language, Kikuyu, many, many years ago. Little did he know where it would lead.
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Preface

This book is designed for students of linguistics who want to learn more about tone. It assumes a basic knowledge of phonological theory such as might be acquired in a year-long phonology course, but it does not assume any particular prior exposure to work on tone. The theoretical chapters of the book are framed in Optimality Theory (OT), but should be intelligible to students with no previous background in OT.

The book is suitable for a semester-long course on tonal phonology at the advanced undergraduate or graduate level. The theoretical chapters include some simple exercises, and the answers are given at the end of each chapter. It is also hoped that the book will be a useful reference work on the fundamentals of tone, and to this end it includes extensive references to both primary fieldwork sources and to theoretical works. An effort has been made to give broad coverage of tone languages, both typologically and geographically.
Acknowledgements

This book could not have been written without the help of a number of people. My thanks go first and foremost to Neil Smith. He first suggested I should write this book, he found me office space at a time when I had no professional home, and he read every chapter in first draft, within days, and gave me back detailed and probing comments. It has been a privilege to work with him.

Particular thanks also to Akin Akinlabi, Larry Hyman and Scott Myers, who took the time to give me detailed comments on the manuscript, thereby saving me from numerous embarrassing mistakes.

This book has also benefited from help and comments from many other people over the last two years, including Mary Bradshaw, Nick Clements, Bruce Connell, Jerry Edmondson, Dan Everett, Colleen Fitzgerald, Seldron Geziben, Sharon Hargus, Joyce McDonough, David Odden, Stuart Rosen, Bernard Tranel, Justin Watkins, Yi Xu, and the participants in talks and seminars at University College London and the School of Oriental and African Studies. Some of you have read parts of the manuscript and given me honest feedback, some of you have pointed me in the right directions for references or data, some of you have asked pointed questions to which I then had to find out the answers. To all of you, my thanks.

All errors, misjudgements and misrepresentations are of course my own responsibility.
Notation systems, symbols and abbreviations

Segmental transcriptions will be those of the original source, unless otherwise noted.

Accent marks

Acute accent: á high tone
Grave accent: à low tone
Macron: ã mid tone
In combination: â rising tone
ã falling tone

[Note: occasionally accents are used to show stress instead; this will be explicitly noted where relevant.]

Numerical systems

Asianist: 5 = high tone, 1 = low tone
Meso-americanist: 1 = high tone, 5 = low tone
Both: 2 digits in sequence show starting and ending pitches, so 35 is a contour tone.

Other symbols

ϕ foot
σ syllable
µ mora
# word-boundary; occasionally used for phrase-boundaries
H% phonological phrase boundary tone
H// intonational phrase boundary tone
Notation systems, symbols, abbreviations

!H  downstepped H
\(\text{\H} \)  floating H
H*  accentual H, which associates to the stressed syllable
F_0  fundamental frequency, in Hertz

OT conventions

\( \Rightarrow \)  winning candidate in OT tableau
*  constraint violation
*!  fatal constraint violation
shading  cell whose violations, if any, are now irrelevant, since a higher ranked constraint has decided things
C1 >> C2  C1 ranked higher than C2, shown by left-to-right placement in tableau
Glossary of terms and abbreviations

ballistic  Ballistically stressed syllables have post-vocalic aspiration, and are articulated more forcefully than controlled stressed syllables. They often rise slightly in pitch at the end, whereas controlled stressed syllables show a gradual decrease. The last part of a ballistically stressed syllable shows aperiodic noise, characteristic of aspiration.

Bernoulli’s Law  A high-velocity airstream passing through a narrow opening exerts a sucking effect on the walls of the opening, drawing them together.

contour tone  A tone that changes pitch during its duration, either rising or falling.

debuccalization  Loss of all oral articulations, leaving only a laryngeal such as [h] or [ʔ].

declination  An overall fall in pitch as an utterance proceeds, possibly due to a drop in sub-glottal pressure.

default tones  A tone inserted on a toneless syllable at the end of the phonology. Usually a low tone.

docking  The association of a floating tone to a tone-bearing unit (TBU).

downdrift  The lowering of a H tone after an overt L tone. Sometimes called automatic downstep.

downstep  The lowering of H in the absence of an overt L tone, but usually caused by a floating L. Sometimes called non-automatic downstep. Used in this book on occasions as a cover term for both downdrift and downstep.

extrametricality  The exclusion of a peripheral element (syllable, mora, TBU) from some process, such as tone association or stress calculations.

gradient assessment  Calculation of the extent to which a constraint is violated, instead of a pass/no pass approach. Used especially in assessing alignment, so that the greater the misalignment, the more violations are counted.
iambic Right-prominent binary feet, usually weight-sensitive.
LF Term used by syntacticians, short for Logical Form.
modal voice Normal phonation, no breathiness or creakiness.
mora A weight unit: a light syllable has one, a heavy syllable has two. Long vowels always have two. Coda consonants may or may not count for weight i.e. may or may not have a mora.
non-automatic See ‘downstep’ above.
OCP Obligatory Contour Principle: Adjacent identical elements are prohibited.
PF Term used by syntacticians, short for Phonetic Form. Always used in its abbreviated form. Could more appropriately be called Phonological Form.
polarity Choice of the opposite tone to the adjacent tone, so that H roots take L suffixes, and vice-versa.
prosodic Relating to the phonological constituent structure in which syllables are grouped into feet, feet into prosodic words, prosodic words into phonological phrases, and phrases into intonational phrases. Domains in which prominence is assigned. Often syntactically conditioned.
register Three different senses:
(1) Tonal range of the voice is divided into two registers, [+Upper] and [−Upper]. Refers only to pitch. Most common usage in this book.
(2) Voice quality distinctions, such as modal register vs. creaky register.
(3) Frequency at which a tone is realized at that point in an utterance. In this usage, downstep lowers the register on which H tones are realized.
rhyme The part of the syllable starting with the nuclear vowel, and including all post-nuclear material.
Richness of the Base An OT term, arising from the impossibility of restricting inputs in an output-based theory. All possible inputs must thus be considered.
sandhi Phonological process which happen between words. In this book, usually tonal changes.
secret language Language disguise games used by children (or sometimes teenagers or criminals!), in which the language is distorted in a regular way unintelligible to the outsider.
SPE Sound Pattern of English (Chomsky and Halle 1968)
<table>
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<th>Term</th>
<th>Definition</th>
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<tr>
<td>TBU</td>
<td>Tone-Bearing Unit. Syllable or mora, and perhaps vowel. The entity to which tones associate.</td>
</tr>
<tr>
<td>trochaic</td>
<td>A left-headed binary foot, usually evenly weighted. May be two moras, or two syllables.</td>
</tr>
<tr>
<td>UG</td>
<td>Universal Grammar.</td>
</tr>
<tr>
<td>ultima</td>
<td>The final syllable/mora.</td>
</tr>
<tr>
<td>UR</td>
<td>Underlying Representation.</td>
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<td>VOT</td>
<td>Voice onset time.</td>
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Alphabetical list of OT constraints

Faithfulness constraints

*ASSOCIATE (=*ASSOC)
*DELETE
DEP-IO
DEP-MORA
DEP-T
*DISASSOCIATE (=*DISASSOC)
FAITH-BR
HEAD-MAX-T (includes FAITHNUCLEAR TONE)
IDENT-IO
IDENT-T
INTEGRITY
LINEARITY
MAX-BR (TONE)
MAX-IO
MAX (LAR)
MAX-T (=MAX-IO (TONE))
NO CROSSING
NO FUSION
OUTPUTOUTPUTMATCH (=OO-MATCH)
PARSE-σ
PRESWEIGHT
REALIZE-MORPH
TONAL PROMINENCE FAITH

Markedness constraints

ALIGN-L
ALIGN-R

xxii
*ALIGN-L(H, Word) (=NonInitiality)
ALIGN-L (X”, PhPh) (or any other pairing of syntactic boundary and prosodic category)
ALIGN-R-CONTOUR
ALIGN-R(H, PrWd) (or any other pairing of tone and prosodic or morphological entity)
ALIGN-TONE
ALLFEETLEFT (=All FTLeft)
ANCHOR-R(T, SPONSOR)
*CLASH
CONGRUENCE
*CONTOUR (=NoContour=OneT/m)
*FALL
FINALSTRESS
*FLOAT
FTBIN
FTBINMAX (=BinMax)
FTBMIN (=BinMin)
FTFORMTROCHEE
*H
*Hd/L >> *Hd/M >> *Hd/H
HEAD=H
*L
*LAPSE
LICENCECONTOUR
LOCAL
MINARTICEEFFORT
NoCoda
NoGap
NoLongTone (=NoLongT)
NONFINALITY
*NonHd/H >> *NonHd/M >> *NonHd/L
NONINITIALITY (=NonInitial)
NoSTRADDLING
OCP
OneT/μ
ONSET
PromToneMatch
*Rise
*[–son][Tone]
OT constraints

SPACE-100%
SPECIFY-T
SPREAD
STRESS=H
STRESS TO WEIGHT PRINCIPLE (SWP)
*TONE (= *T)
*TROUGH
*VOICE
WEIGHT TO STRESS PRINCIPLE (WSP)
WRAP-XP
Map 1. Africa, from Heine and Nurse 2000: 2
Map 3.  *Sinitic languages, from Lyovin 1997, Map VIII*
Note: Areas designated Lolo-Burmese, Rung and Kachinic also include communities speaking Tai, Chinese, and Mon-Khmer languages, as well as other Tibeto-Burman languages.

Map 4.  Sino-Tibetan languages, excluding Sinitic, from Lyovin 1997, Map VII
Map 5. Thai languages, from Lyovin 1997, Map IX
Map 6. Austronesian languages, from Lyovin 1997, Map VI
Map 7. Meso-America, from Suarez 1983, Map 1
Map 8. North America, from Mithun 1999, Map 1b