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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Tone

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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:	ā	mid tone
In combination:	ǎ	rising tone
	â	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

!H	downstepped H
Ⓗ	floating H
H*	accentual H, which associates to the stressed syllable
F_0	fundamental frequency, in Hertz

OT conventions

☞	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)

TBU	Tone-Bearing Unit. Syllable or mora, and perhaps vowel. The entity to which tones associate.
trochaic	A left-headed binary foot, usually evenly weighted. May be two moras, or two syllables.
UG	Universal Grammar.
ultima	The final syllable/mora.
UR	Underlying Representation.
VOT	Voice onset time.

Alphabetical list of OT constraints

Faithfulness constraints

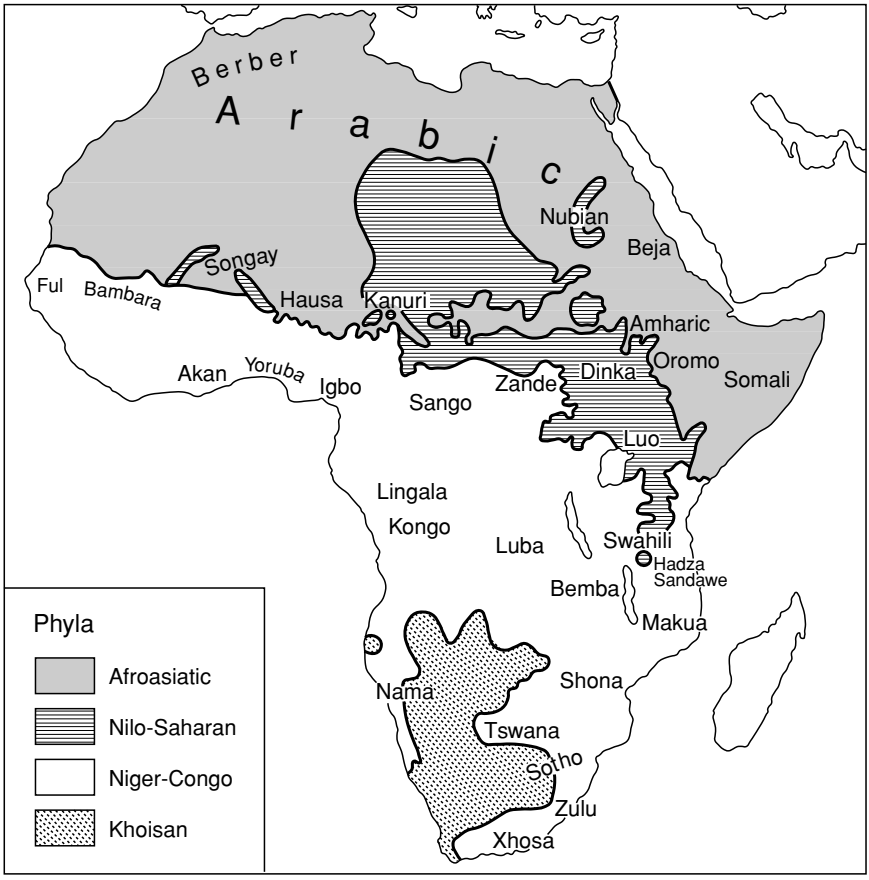
*ASSOCIATE (=*ASSOC)
*DELETE
DEP-IO
DEP-MORA
DEP-T
*DISASSOCIATE (=*DISASSOC)
FAITH-BR
HEAD-MAX-T (includes FAITHNUCLEARTONE)
IDENT-IO
IDENT-T
INTEGRITY
LINEARITY
MAX-BR (TONE)
MAX-IO
MAX (LAR)
MAX-T (=MAX-IO (TONE))
NOCROSSING
NOFUSION
OUTPUTOUTPUTMATCH (=OO-MATCH)
PARSE-σ
PRESWEIGHT
REALIZE-MORPH
TONALPROMINENCEFAITH

Markedness constraints

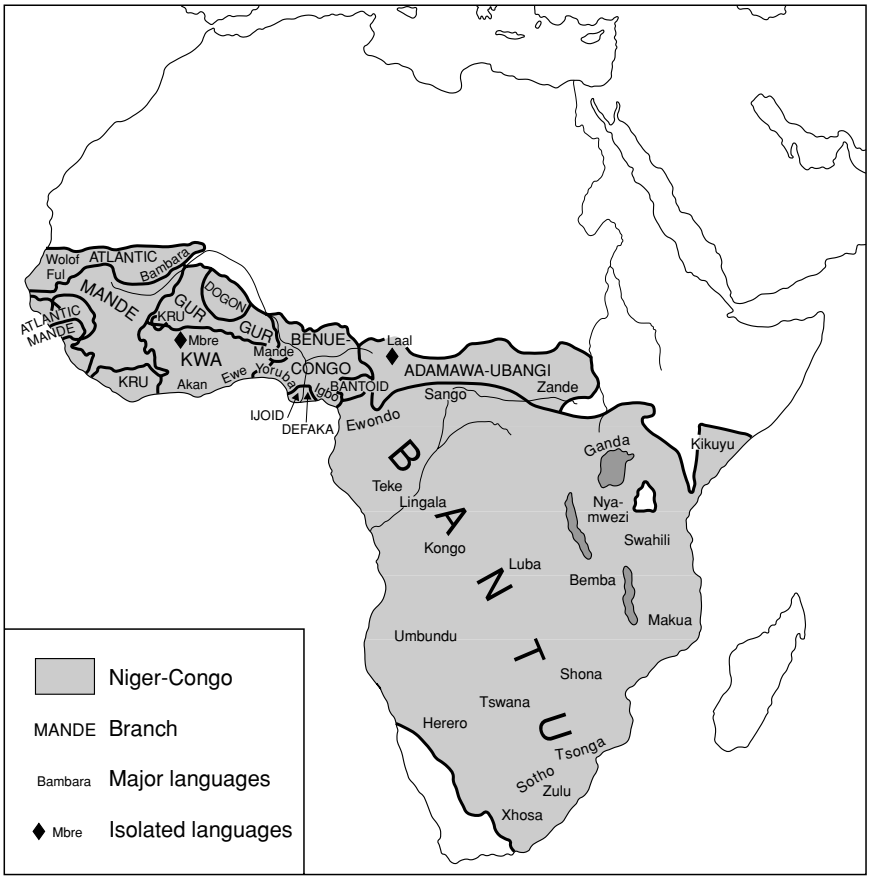
ALIGN-L
ALIGN-R

*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)
FTBINMIN (=BINMIN)
FTFORMTROCHEE
*H
*HD/L >> *HD/M >> *HD/H
HEAD=H
*L
*LAPSE
LICENCECONTOUR
LOCAL
MINARTICEFFORT
NOCODA
NOGAP
NOLONGTONE (=NOLONGT)
NONFINALITY
*NONHD/H >> *NONHD/M >> *NONHD/L
NONINITIALITY (=NONINITIAL)
NOSTRADDLING
OCP
ONET/μ
ONSET
PROMTONEMATCH
*RISE
*[–SON][TONE]

SPACE-100%
SPECIFY-T
SPREAD
STRESS=H
STRESSTOWEIGHTPRINCIPLE (SWP)
*TONE (=*T)
*TROUGH
*VOICE
WEIGHTTOSTRESSPRINCIPLE (WSP)
WRAP-XP

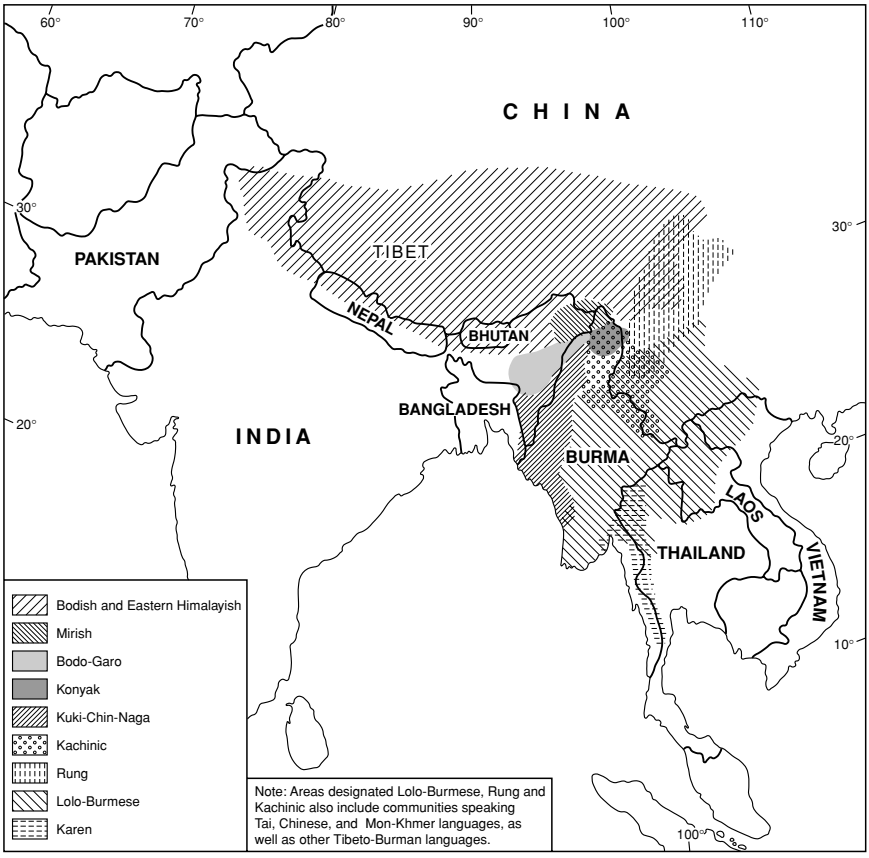


Map 1. *Africa, from Heine and Nurse 2000: 2*

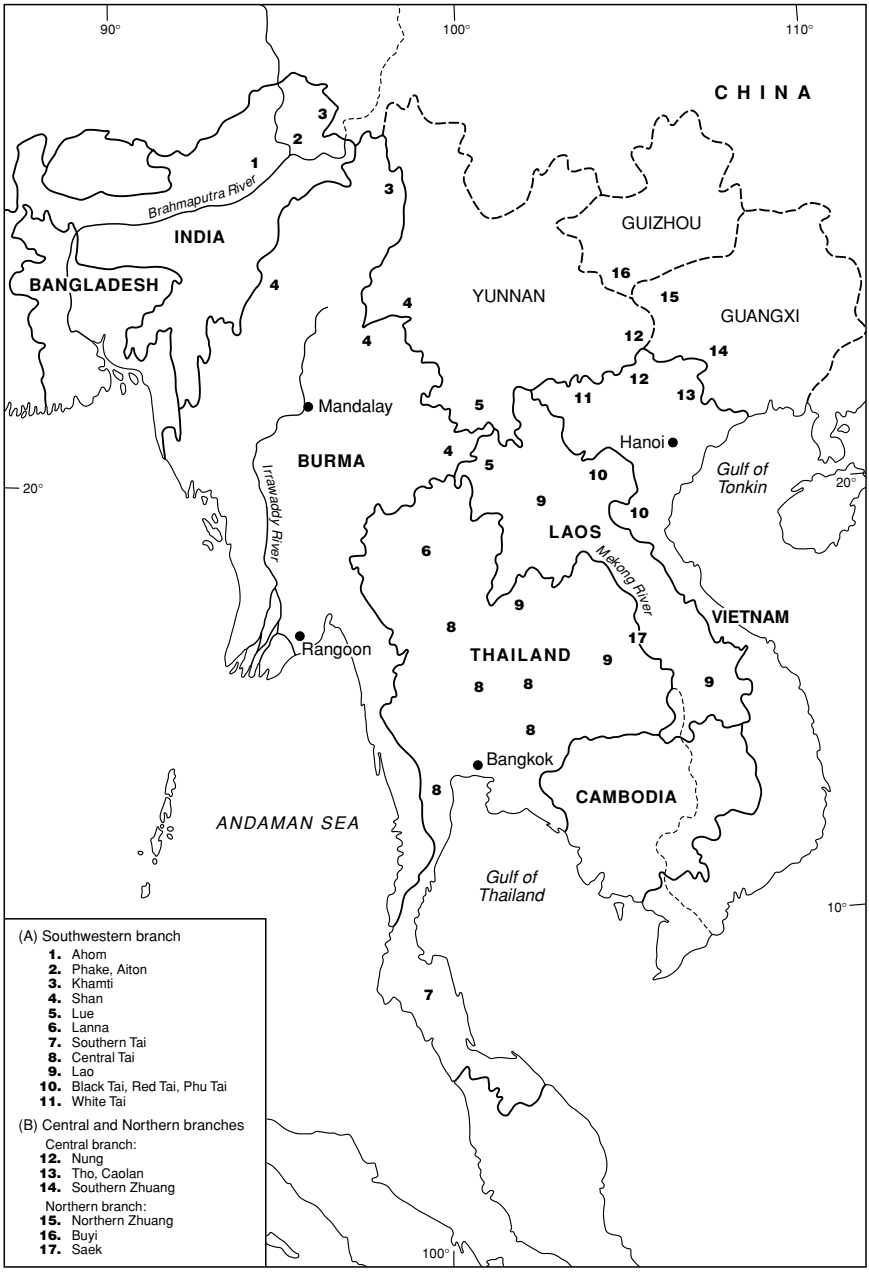


Map 2. *Niger-Congo, from Heine and Nurse 2000: 12*

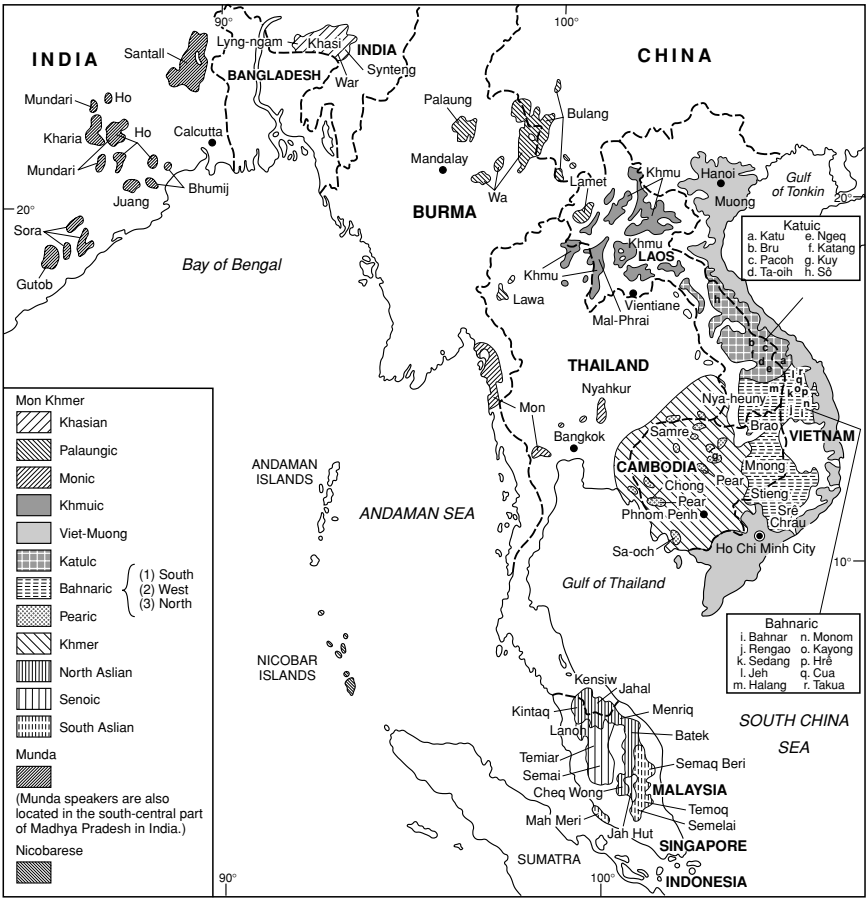
Map 3. *Sinitic languages, from Lyovin 1997, Map VIII*



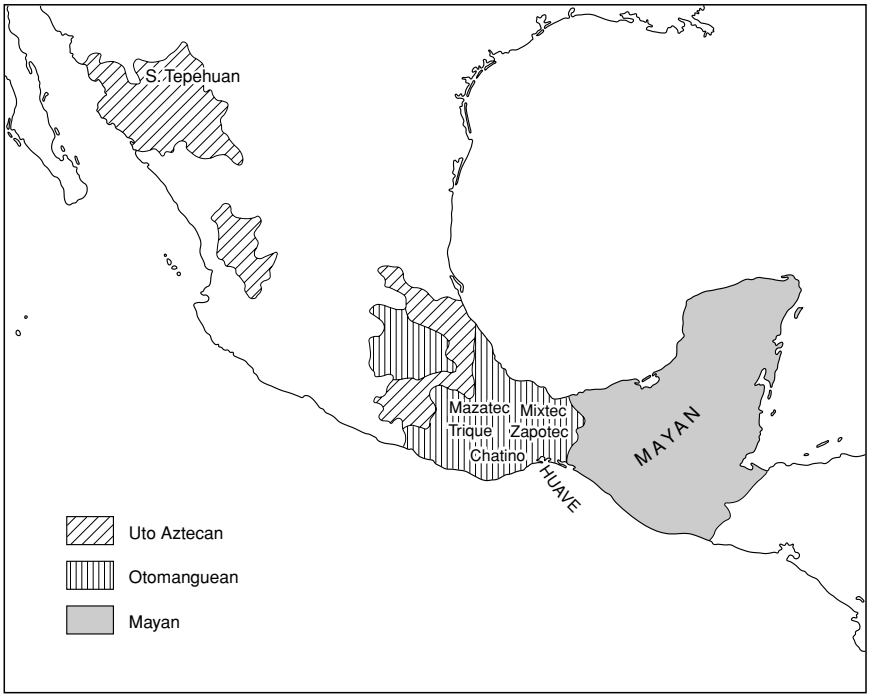
Map 4. *Sino-Tibetan languages, excluding Sinitic, from Lyovin 1997, Map VII*



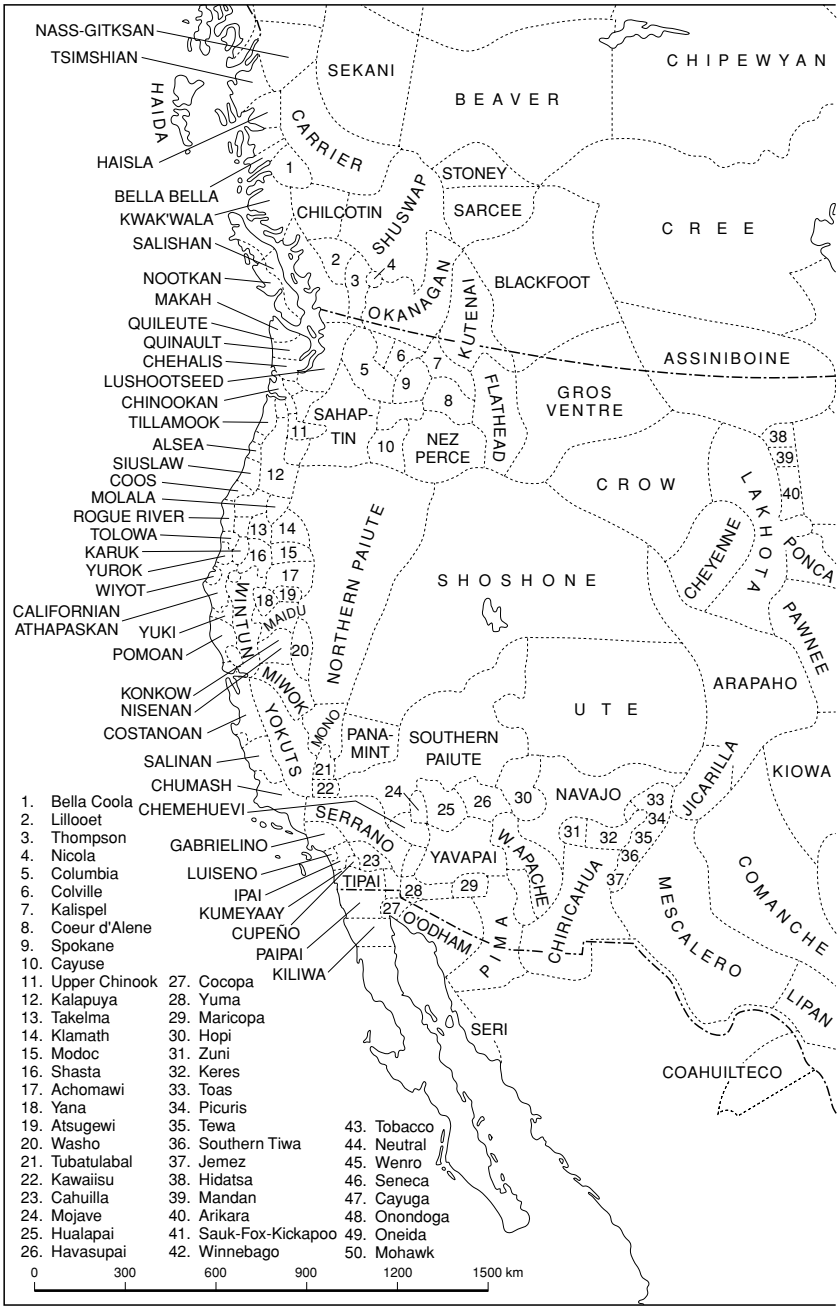
Map 5. *Thai languages, from Lyovin 1997, Map IX*



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*