The Routledge Handbook of North American Languages is a one-stop reference for linguists on those topics that come up the most frequently in the study of the languages of North America (including Mexico). This handbook compiles a list of contributors from across many different theories and at different stages of their careers, all of whom are well-known experts in North American languages. The volume comprises two distinct parts: the first surveys some of the phenomena most frequently discussed in the study of North American languages, and the second surveys some of the most frequently discussed language families of North America. The consistent goal of each contribution is to couch the content of the chapter in contemporary theory so that the information is maximally relevant and accessible for a wide range of audiences, including graduate students and young new scholars, and even senior scholars who are looking for a crash course in the topics. Empirically driven chapters provide fundamental knowledge needed to participate in contemporary theoretical discussions of these languages, making this handbook an indispensable resource for linguistics scholars.

Daniel Siddiqi is Professor of Linguistics, Cognitive Science, and English at Carleton University in Ottawa. His research focuses on stem allomorphy, metatheory and grammatical architecture, and non-standard English phenomena. Beyond editing this volume, he has edited The Routledge Handbook of Syntax and Benjamins’ Morphological Metatheory. Professor Siddiqi is also the co-editor of the Canadian Journal of Linguistics/Revue canadienne de linguistique.

Michael Barrie is a syntactician at Sogang University in Seoul, whose work also includes the syntax-semantics interface and the syntax-prosody interface. Much of his work is based on extensive fieldwork on Northern Iroquoian languages as well as some work on Algonquian languages. Outside of North America, Barrie has also worked on Cantonese, Korean, and Romance.

Carrie Gillon is the co-founder of Quick Brown Fox Consulting and the co-host of The Vocal Fries, the podcast about linguistic discrimination. In a previous life, she researched the syntax and semantics of understudied languages, mainly Indigenous languages of Canada. She wrote the book The Semantics of Determiners: Domain Restriction in Škwxwú7mesh, co-authored Nominal Contact in Michif, co-edited the Škwxwú7mesh-English bilingual dictionary, wrote or co-authored eight articles and three book chapters, and co-edited three volumes of University of British Columbia Working Papers in Linguistics and a special edition of the Canadian Journal of Linguistics on noun phrases.

Jason D. Haugen is Associate Professor of Anthropology at Oberlin College. His research focuses on the morphosyntax and historical linguistics of Uto-Aztecan languages.

Éric Mathieu is Professor of Linguistics at the University of Ottawa. He completed his PhD in 2002 at University College London. His research focuses on French (Modern and Old) and Ojibwe (an Algonquian language). He has published in Linguistic Inquiry, Natural Language and Linguistic Theory, Syntax, International Journal of American Linguistics, Journal of Linguistics, Lingua, Probus, Studio Linguistica, and Linguistic Variation. He is also the author of numerous chapters in books (with Oxford University Press, Cambridge University Press, John Benjamins, Routledge, and Springer, among others) and co-author of several books, a monograph on island effects entitled ‘The syntax and semantics of split constructions’, a special edition of Lingua on noun incorporation, an edited volume on Romance languages, Variation Across and Within Languages, and a forthcoming book on plurals.
Routledge Handbooks in Linguistics provide overviews of a whole subject area or sub-discipline in linguistics, and survey the state of the discipline including emerging and cutting edge areas. Edited by leading scholars, these volumes include contributions from key academics from around the world and are essential reading for both advanced undergraduate and postgraduate students.

THE ROUTLEDGE HANDBOOK OF LANGUAGE AND DIALOGUE
Edited by Edda Weigand

THE ROUTLEDGE HANDBOOK OF LANGUAGE AND POLITICS
Edited by Ruth Wodak and Bernhard Forchtner

THE ROUTLEDGE HANDBOOK OF LANGUAGE AND MEDIA
Edited by Daniel Perrin and Colleen Cotter

THE ROUTLEDGE HANDBOOK OF ECOLINGUISTICS
Edited by Alwin F. Fill and Hermine Penz

THE ROUTLEDGE HANDBOOK OF LEXICOGRAPHY
Edited by Pedro A. Fuertes-Olivera

THE ROUTLEDGE HANDBOOK OF DISCOURSE PROCESSES, SECOND EDITION
Edited by Michael F. Schober, David N. Rapp, and M. Anne Britt

THE ROUTLEDGE HANDBOOK OF PHONETICS
Edited by William F. Katz and Peter F. Assmann

THE ROUTLEDGE HANDBOOK OF VOCABULARY STUDIES
Edited by Stuart Webb

THE ROUTLEDGE HANDBOOK OF NORTH AMERICAN LANGUAGES
Edited by Daniel Siddiqi, Michael Barrie, Carrie Gillon, Jason D. Haugen and Éric Mathieu

Further titles in this series can be found online at www.routledge.com/series/RHIL
THE ROUTLEDGE HANDBOOK OF NORTH AMERICAN LANGUAGES

Edited by
Daniel Siddiqi, Michael Barrie, Carrie Gillon,
Jason D. Haugen and Éric Mathieu
Dedicated to the speakers of the Indigenous languages of North America – past, present, and future. And to the activists and documentarians working to preserve, maintain, and revitalize them.

And to our beloved colleague Jane Hill, whose contribution to the study of Indigenous American languages is immeasurable. Her absence from the field will be felt for a long time.
CONTENTS

List of Contributors x
Editor’s Note by Daniel Siddiqi xv

PART I
Common Phenomena in North American Languages 1

1 Phonological Inventories 3
   Keren Rice

2 Segmental Processes 35
   Heather Newell and Andréia de Souza

3 Stress, Tone, and Pitch Accent 68
   Eugene Buckley

4 Prosodic Morphology and Reduplication 91
   Suzanne Urbanczyk

5 The Expanded NP: Number, Possessors, Gender, Animacy, and Classifiers 114
   Carrie Gillon

6 Morphosyntactic Strategies in Locative Description 149
   Carolyn O’Meara and Gabriela Pérez Báez

7 Agreement and Related Phenomena in North American Languages 167
   Richard Compton
Contents

8 Inverse Systems and Person Hierarchy Effects
   Heather Bliss, Elizabeth Ritter, and Martina Wiltschko 193

9 Switch-Reference in American Languages: A Synthetic Overview
   Mark C. Baker and Livia Camargo Souza 210

10 Ergativity and Ergativity Splits
    Bettina Spreng 233

11 Noun Incorporation and Polysynthesis
    Michael Barrie and Éric Mathieu 253

12 Antipassives
    Kumiko Murasugi 275

13 Evidentials and Modals
    Marianne Huijmsmans and Sarah E. Murray 290

14 Quantification
    Henry Davis and Lisa Matthewson 310

PART II
Selected Language Families and Issues in the Historical Linguistics of North America 329

15 Otomanguean Languages
   Brook Danielle Lillehaugen 331

16 Mayan Languages
   Lauren Clemens 365

17 Muskogean Languages
   George Aaron Broadwell 397

18 Iroquoian Languages
   Michael Barrie and Hiroto Uchihara 424

19 Salish Languages
   Henry Davis 452

20 The Na-Dene Languages
   Alessandro Jaker, Nicholas Welch, and Keren Rice 473

21 Algonquian Languages
   Will Oxford 504
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Eskimo-Aleut</td>
<td>Alana Johns</td>
<td>524</td>
</tr>
<tr>
<td>23</td>
<td>Evaluating Proposals for Long-Distance Genetic Relationships:</td>
<td>Jason D. Haugen</td>
<td>549</td>
</tr>
<tr>
<td></td>
<td>Uto-Aztecan vs. Plateau Penutian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Areal Linguistics and Linguistic Areas in California</td>
<td>Jane H. Hill</td>
<td>572</td>
</tr>
</tbody>
</table>

Languages Index 587
Subject Index 593
CONTRIBUTORS

Mark C. Baker is Distinguished Professor of Linguistics and Cognitive Science at Rutgers University. He received his PhD in Linguistics in 1985 from MIT. He taught at McGill University in Montreal for 12 years before moving to Rutgers in 1998. He specializes in the syntax and morphology of less-studied languages, particularly those of the Americas, Africa, and Asia, seeking to bring together generative-style theories, data collected from fieldwork, and typological comparison in a way that illuminates all three. He has written five research monographs, as well as numerous journal articles, and one book for a popular audience, The Atoms of Language (2001).

Heather Bliss has been working with Siksika and Kainai community members since 2003 on Blackfoot linguistic research and language documentation projects. Her 2005 MA thesis and 2013 PhD dissertation both focus on issues related to Blackfoot’s inverse system. She is Lecturer in Linguistics at Simon Fraser University, and Adjunct Professor at the University of British Columbia and University of Calgary, researching a diverse range of topics around Indigenous language revitalization, syntactic theory, articulatory phonetics, and second language pronunciation. She is the editor and curator of the Blackfoot Oral Stories Database.

George Aaron Broadwell (PhD 1990, UCLA) is Elling Eide Professor of Anthropology at the University of Florida. He is a specialist in Native American languages of the southeastern United States and Oaxaca, Mexico, with a special focus on Choctaw, Timucua, several varieties of Zapotec, and Copala Triqui. He is interested in the issues of integrating language description and documentation with contemporary work in linguistic theory. He is also committed to working with Native American communities to provide dictionaries, texts, and other materials that are useful in language revitalization and maintenance.

Eugene Buckley is Associate Professor of Linguistics at the University of Pennsylvania. His main research interests are syllable and metrical structure, and the role of explanation in phonological theory. Much of his work has focused on Kashaya, a Pomoan language of northern California, as well as other Native languages of California and Oregon.

Livia Camargo Souza is a PhD student at Rutgers University with a background in Generative Syntax and Language Documentation. She coordinated the Yawanawa language documentation project between 2011 and 2013, and she continues to be involved in Panoan linguistics in the Brazilian
Amazon, currently as the team leader of the language documentation project of the recently contacted Xinane people (both projects funded by Museu do Índio, Brazil, and UNESCO). Her work has focused on different aspects of Panoan syntax, especially case and switch-reference, as well as syntax-semantics interface phenomena in both Panoan languages and Brazilian Portuguese.

**Lauren Clemens** is Assistant Professor in the Program of Linguistics and Cognitive Science in the Department of Anthropology at the University at Albany, State University of New York. She received her PhD in 2014 from Harvard University. Her research work brings prosodic evidence to bear on problems related to syntactic constituency. She draws heavily on data from Mesoamerican languages, including Ch’ol (Mayan) and Copala Triqui (Otomanguean). In addition to bringing data from minoritized languages to linguistic theory, she collaborates in community-engaged language documentation with those who speak their language in diaspora.

**Richard Compton** is Associate Professor in the Department of Linguistics at the Université du Québec à Montréal. He received his PhD in 2012 from the University of Toronto and then spent one year as a postdoctoral fellow at McGill University. His research interests include agreement, polysynthetic word formation, and lexical categories in varieties of the Inuit language, particularly Inuktitut and Inuinnaqtun. His co-edited dictionary of Kangiryuarmiut Inuinnaqtun with Emily Kudlak was published by Nunavut Arctic College Media in 2018. He holds a Canada Research Chair in Transmission and Knowledge of the Inuit Language.

**Henry Davis** is Professor of Linguistics at UBC. He specializes in languages of northwest North America, including those of the Salish, Tsimshianic, and Wakashan families. Most of his research is on syntax and its interfaces with semantics and morphology, but he has also worked extensively on the collection, transcription, and translation of texts, dictionary compilation, and the construction of pedagogical materials.

**Andréia de Souza** is a PhD student in Linguistics at the Université du Québec à Montréal. Her research interests are phonology and its interaction with morphology and phonetics, and second language acquisition. She is currently working on projects related to syllabic structure, stress, and the distribution of rhotics in major Iberian languages. She teaches Portuguese as a foreign language at the Université du Québec à Montréal.

**Jane H. Hill** was Regents’ Professor of Anthropology and Linguistics (Emerita) at the University of Arizona. Her work on Uto-Aztecan languages includes fieldwork on Cupeño, Nahuatl, and Tohono O’odham. At the time of her death in 2018, she held the Viking Fund Medal in Anthropology, the Franz Boas Prize of the American Anthropological Association, and was a Fellow of the American Association for the Advancement of Science, the American Academy of Arts and Sciences, and the Linguistic Society of America.

**Marianne Huijsmans** is a PhD candidate at the University of British Columbia. Her work focuses on the semantics and syntax of ?ayʔajúθəm (Comox-Sliammon), a highly endangered Coast Salish language. She is also collaborating with the Tla’amin, Homalco, Klahoose, and Comox First Nations on a dictionary of ?ayʔajúθəm. Her current research focuses on a diverse set of second-position clitics that includes mood/force markers, subject clitics, modals/evidentials, tense markers, and discourse particles.

**Alessandro Jaker** is a Postdoctoral Fellow at the University of Toronto, and is also affiliated with the Alaska Native Language Center in Fairbanks, Alaska. He has worked with the Yellowknives Dene First Nation since 2005, working with both of their traditional languages, Williideh (a dialect
of Tłı̨chǫ Yatıı́ and Tetǫ́t’ìné (a dialect of Dene Sųłıné). His interests are phonetics, phonology, morphology, and the development of teaching materials for Dene languages.

Alana Johns was Professor of Linguistics at the University of Toronto until 2017. She taught syntax and morphology and conducted research on Inuktut grammar and dialects, with a focus on verb paradigms, complex predicates, ergativity, noun incorporation, and language revitalization. As Professor Emeritus, Johns is currently lead investigator in a SSHRC-funded project, Sinānì, which involves the collection and transcription of Inuttut oral audio/video materials for linguistic analysis and as a community resource.

Brook Danielle Lillehaugen is a linguist who specializes in Zapotec languages, spoken in Oaxaca, Mexico. She is Associate Professor of Linguistics at Haverford College and co-director of Ticha, a digital text explorer for Colonial Zapotec texts (http://ticha.haverford.edu). She received her PhD in Linguistics in 2006 from the University of California, Los Angeles and has been doing fieldwork with speakers of Zapotec languages since 1999. Lillehaugen’s research profile includes technical grammatical description as well as collaborative language documentation and revitalization projects.

Lisa Matthewson is Professor of Linguistics at the University of British Columbia. Her research focuses on formal semantics with a cross-linguistic perspective. The primary languages she investigates are Stʼátʼimctc̱ (Salish), Gitksan (Tsimshianic), and Niuean (Austronesian). She has worked on a range of areas including determiners, quantifiers, pronouns, adverbs, lexical categories, tense, aspect, modals, mood, evidentials, discourse particles, and presupposition. Her research also focuses on methodologies for semantic fieldwork.

Kumiko Murasugi is Associate Professor of Linguistics and Cognitive Science at Carleton University in Ottawa. Her research areas include theoretical and applied linguistics, Inuit languages, language documentation, and linguistic cartography. She is currently developing an online cybercartographic atlas of the Inuit language in Canada in partnership with the Geomatics and Cartographic Research Centre at Carleton, linguistic and applied linguistic collaborators, and Inuit partner organizations.

Sarah E. Murray is Associate Professor in Linguistics at Cornell University, as well as a member of the graduate fields of American Indian and Indigenous Studies, Cognitive Science, and Philosophy. She earned her PhD in Linguistics from Rutgers University in 2010. Her research brings together language documentation with cross-linguistic formal semantics and pragmatics. Every summer since 2006, she has worked with speakers on the Northern Cheyenne Indian Reservation in Montana. She is currently working with Chief Dull Knife College, the Northern Cheyenne tribal college, on a project to create a database of Cheyenne language texts.

Heather Newell is Associate Professor in the Linguistics Department at the Université du Québec à Montréal. She obtained her PhD at McGill University in 2009. She is the editor of the Canadian Journal of Linguistics/Revue canadienne de linguistique and has been involved in the organization of the Canadian Linguistics Olympiad. She has published in Lingua, The Routledge Handbook of Phonology, The Oxford Encyclopedia of Morphology, and Morphological Metatheory and has published in and co-edited the volume The Structure of Words at the Interfaces in the Oxford Studies in Theoretical Linguistics Series.

Carolyn O’Meara is Associate Research Professor in the Department of Indigenous Languages in the Philological Research Institute at the National Autonomous University of Mexico. She is interested in the relationship between language, culture, and cognition. Her research has a particular
focus on the domains of landscape and spatial reference and how concepts lexicalized in these domains differ cross-linguistically. She conducts fieldwork on Indigenous languages of Mexico, with a particular focus on the language isolate Seri.

**Will Oxford** is Associate Professor of Linguistics at the University of Manitoba. His research focuses on the morphosyntax of the Algonquian languages from comparative and theoretical perspectives.

**Gabriela Pérez Báez** is Assistant Professor in the Linguistics Department, University of Oregon, and co-director of the National Breath of Life Archival Institute for Indigenous Languages. Gabriela has served as Curator of Linguistics at the National Museum of Natural History, Smithsonian Institution, and in its Recovering Voices initiative. Her research centers on Zapotec languages and she has published on migration and language vitality, verbal inflection and derivation, semantic typology, and language and cognition. Gabriela is the compiler of two dictionaries of Isthmus Zapotec within a participatory and interdisciplinary model. She holds a PhD in Linguistics from the University at Buffalo.

**Keren Rice** is University Professor in the Department of Linguistics at the University of Toronto. She has worked with speakers of Dene languages for many years, with a focus on phonology and morphology as well as language revitalization and the ethics of fieldwork. She was the editor of the *International Journal of American Linguistics* from 2003 until 2013, and served as president of the Society for the Study of Indigenous Languages of the Americas in 2017 and 2018.

**Elizabeth Ritter** is Professor in the Linguistics Division of the School of Languages, Linguistics, Literatures and Cultures of the University of Calgary. She has been conducting research on Siksika and Kainai Blackfoot since 2004, and has explored a range of topics, including clause structure, animacy, person and tense, direct-inverse marking, and number marking. Much of her research has been conducted in collaboration with linguists Heather Bliss, Martina Wiltshko, Sara Thomas Rosen, and Kyumin Kim, and with her Blackfoot teachers and consultants, Rachel Ermineskin, Noreen Breaker, Brent Prairie Chicken, and Sandra Many Feathers.

**Bettina Spreng** is Assistant Professor at the University of Saskatchewan. Her research focuses on the interface between morphosyntax and semantics, especially with respect to the interaction of tense and aspect semantics with case and agreement alternations. Her fieldwork focuses on the description and analysis of understudied languages, primarily Canadian Inuktitut and nonstandard German dialects.

**Hiroto Uchihara** is Assistant Research Professor in the Institute of Philological Research at the National Autonomous University of Mexico. He received his PhD in Linguistics from the University at Buffalo, State University of New York in 2013, and published his dissertation, *Tone and Accent in Oklahoma Cherokee*, with Oxford University Press in 2016. His research focuses primarily on the phonology and morphology of Native American languages in North America, particularly Cherokee and Otomanguean languages (especially Zapotec, Tlapanec, and Mixtec) from both a synchronic and diachronic perspective.

**Suzanne Urbanczyk** is Associate Professor of Linguistics at the University of Victoria. Her research focuses on non-concatenative morphology of Salish and Wakashan languages.

**Nicholas Welch** is Assistant Professor in the Department of Linguistics at Memorial University of Newfoundland. He has worked on the syntactic structure of Tłı̨chǫ and Ṯsútlı̨ n̨áá since 2006, focusing on nonverbal predication and temporal grammar. His work on language revitalization
Contributors

with the Tłı̨chǫ and Tsúùt’íína First Nations since 2007 has centered on lexicography, curriculum design, and the building of IT tools for pedagogy.

**Martina Wiltschko** is ICREA Research Professor at Universitat Pompeu Fabra (UPF). She holds a PhD from the University of Vienna. Her main area of interest is syntactic theory and how it is to be modeled in light of language variation. She has conducted fieldwork on several First Nations languages indigenous to North America (Halkomelem, Blackfoot, Ktunaxa) and published on various issues relating to the universality and variation associated with functional categories along the nominal and the clausal spine.
In 2015, I attended a wonderful conference called “Gender, Class, and Determination” hosted by Éric Mathieu and the University of Ottawa. Most of the editors of this volume and a number of the contributors were there participating. During a talk, a speaker offhandedly threw out that “Everyone knows Blackfoot is the weird Algonquian language”. Everyone agreed. My first thought was “Wait a second. Everyone knows this? I don’t know this! How do I not know this?” It struck me as a very real possibility that I was the only person in the room that had not one clue about why Blackfoot is an exceptional Algonquian language. Eventually “. . . except Blackfoot” became a bit of a refrain at the conference. It always drew laughs. I tried to hide in the back of the room.

Then Michif came up. It turns out that Michif is famous for being a mixed language with the NP of French and the VP of Cree. Again, everyone in the room knew this fact, and I did not.

This experience began to repeat itself. At small local workshops. At larger conferences. If I was at a conference in North America, there was always a shared knowledge about Indigenous American languages that I just didn’t have. I took a moment to reflect on this and realized it wasn’t limited to my conference-going experience. The particular subset of the field I work on, Distributed Morphology, is saturated with data from North American languages. Indeed, many of my co-authors, including Heidi Harley, Jason Haugen, and Brandon Fry, specialize in some Indigenous language. I clearly needed to know the generalizations about North American languages. It was increasingly obvious to me that my ability to function as a contemporary linguist was dependent on my understanding the broad strokes of Indigenous American languages, even if I were content to continue to specialize on European languages in my own work (not that I should be so content).

So, of course, I set out to learn as much as I could about North American languages. Marianne Mithun’s 2001 book was great, but it wasn’t really couched in contemporary theory the way I needed it to be. What I needed was a handbook. Linguistics is swimming in handbooks. It should have been easy enough to find one that surveys North American languages. I didn’t find one.

So, I sent a note to my colleagues, Jessica Coon and Éric Mathieu, and asked them if they knew of a handbook on North American languages. I told them it seemed to me that this really ought to be a thing that exists. I assumed I couldn’t be the only linguist whose education didn’t include familiarity with North American languages. I couldn’t be the only linguist who needed to catch up on the hot data everyone is talking about. They told me that there wasn’t such a thing. Then Éric said, “You should do one”.

So, I did. And you’re reading it.
What Mike, Carrie, Jason, Éric, and I attempted to do with this volume is create a one-stop reference for linguists to find most of the topics that come up most frequently in the study of North American languages. Following in the footsteps of other handbooks in this series, such as The Routledge Handbook of Syntax, we compiled a great list of contributors from across many different theories and at different stages of their careers, all of whom are well-known experts in North American languages. We broke this volume into two distinct parts: the first part surveys the types of phenomena most frequently discussed in the study of North American languages, and the second part surveys the most frequently discussed language families of North America. The consistent goal of each contribution is to couch the content of the chapter in contemporary theory so that the information is maximally relevant and accessible for graduate students, young new scholars, and even senior scholars, like me, who are looking for a crash course in the topics primarily being discussed in the literature and conferences of North American linguistics.

Despite my humor, the challenge of putting together a handbook of this type, which has not been done before, is not something we as editors took lightly. The handbook we set out to create is different from the lion’s share of linguistics handbooks in circulation. Besides the normal responsibility we have to our audience and the ideas we are setting out to summarize, we have the additional responsibility to the speakers of these languages. The languages documented in this volume are all endangered. For much of our audience, this handbook will be their first in-depth exposure to these languages and will lay the foundations of how they regard these languages. Thus, we had a responsibility to do this absolutely right – to take seriously the important documentary role such a handbook has, even though we are not presenting original documentary research. We have tried our best to live up to that responsibility.

The first part of this book comprises the 14 topics across the major subfields that we thought were most necessary for the emerging scholar to know in order to dive into contemporary linguistic study in North America. The chapters are roughly organized from smallest linguistic constituent to largest (or sounds to clausal semantics, as it were). The contributors have focused primarily on North American data for examples of the phenomena, but we have also made an effort to also include data from and applicability to other linguistic areas. Because of this, we also feel like the first 14 chapters make up a sort of Pocket Handbook of Frequently Studied Linguistic Phenomena. We have prioritized the types of phenomena that are typically not found in the European languages that dominate the literature and thus tend to dominate linguistic handbooks. Thus, we have chapters dedicated to ergativity, polysynthesis, evidentials, and inverse systems.

While the first part of the book focuses on describing particular phenomena cross-linguistically, the second half of the book focuses on describing the North American language families that a budding linguist is most likely to encounter. Again, we have put an effort into couching the description of the languages in contemporary theory in order to maximize the content’s accessibility and applicability to our audience’s research needs. We have organized the language families from south to north, starting with Otomanguean and Mayan in Mexico and ending with Na-Dene and Eskimo-Aleut in Alaska and Canada. We have also included two special chapters in this section that we think will be especially valuable to our readers. Chapter 23 focuses on proposed long-distance genetic relationships using Uto-Aztecan and Plateau Penutian as an example. Chapter 24 uses the languages of California to exemplify linguistic areas where unrelated languages share systematic common properties as a function of their geographic proximity. What we have created with these ten chapters, we hope, is something akin to a Pocket Handbook of North American Language Families.

I have had the unique experience of being the lead editor of this volume and part of its target audience. Over the course of the last year and a half, it has been my great pleasure to work with the contributors of this volume who have taken very seriously the content of this volume and its importance both to the linguistic theory community and to the various Indigenous communities in North America that it represents. As a person who would benefit from learning the content of this
Editor’s Note

book, I feel confident in thinking this book has made me a better linguist, better able to engage in the literature and discussion generated in North American linguistics, and better able to serve the communities we study. It was our hope in developing this handbook that this will be a shared experience across our audience. I hope you find this volume as helpful as it was to me. I speak for all the editors when I say that we are very proud of the volume we have put together.
PART I

Common Phenomena in North American Languages
1

PHONOLOGICAL INVENTORIES

Keren Rice

1. Introduction

One of the first things that is often done in examining the sound system of a language is to determine the inventories of consonants, vowels, and, if present, tones of the language. This can be done in various ways, but the basic assumption is that it is possible to come to a phonemicization of a language, identifying the distinctive sounds and fitting each into a chart such as that used for presenting the International Phonetic Alphabet (IPA). There may be disagreements around phonemicization: for instance, it might be controversial to determine whether a sound is truly contrastive or is an allophone of some other sound; it might be difficult to determine what should be considered the phoneme and what should be considered the allophone. Nevertheless, there is something important about the notion of inventory, the topic of this chapter. Phonological inventories provide information about the distinctive sounds of a language and about the patterning of those sounds, and, as Maddieson (1984: 1) writes, generalizations about “the content and structure of phonological inventories has been a significant objective of recent work in linguistics”.

This chapter examines characteristics of consonant and vowel inventories of languages indigenous to North America. I begin by identifying some of the challenges inherent in such work, and then turn to a study of inventories, considering contrasts and how inventories grow, taking vertical (sound change) and horizontal (borrowing) effects into account. I then address positional inventories, phonological patterning and inventories, and inventories and orthography.

2. Some Challenges

While establishing the phonological inventory of a language is an early step in the analysis of a sound system, it can be a challenge in many ways.

2.1. Perception and Underdetermination

Perception plays a large role in establishing an inventory. The linguist who does the transcription of a language that they do not speak fluently may miss a contrast. For instance, Buckley (2007) writes that Alsea (Alsean) most likely had ejective sonorants as well as obstruents, but that the transcriptions (Frachtenberg 1917; 1920) are difficult to interpret, and he does not include them in the inventory. Thus, it is likely that the Alsea consonant inventory was underdetermined by Frachtenberg.
2.2. Analysis and Possible Overdetermination of Inventories

It might be that two sounds are in complementary distribution, but they are treated as distinctive. For example, Golla (1996: 366) analyzes Hupa (Dene) as having six phonemic vowels, /i, a, o, e, a:, o:/, noting allophones. Goddard (1905: 7), on the other hand, includes more vowels: i, e, a, o, i:, a:, o:, u:. Goddard does not give a phonemic analysis, but his inventory can be interpreted as including allophones as well as phonemes.

Central Alaskan Yupik (Eskimo-Aleut) presents another example. One version of the consonant inventory is shown in (1).

(1) Central Alaskan Yupik consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts/tʃ & k & q & x & x^w & χ & χ^w \\
f & l & s & x & χ & γ & γ^w & v & r & r^w \\
v & l & z & j & η & η \\
m & n & m & n & ŋ & ŋ \\
\end{array}
\]

(Jacobson 1990: 277; Dorais 2003: 22)

Compton (2008: 31) proposes the smaller inventory in (2), with some of the consonants in (1) being allophonic, and thus predictable in distribution.

(2) Central Alaskan Yupik consonant inventory: reanalysis

\[
\begin{array}{ccccccc}
p & t & ts/tʃ & k & q & x & χ \\
f & l & s & x & χ & γ & v & r \\
v & l & z & γ & r \\
m & n & η & η \\
\end{array}
\]

(Compton 2008: 31)

Beyond allophones, other decisions must be made about what to include in an inventory. Are sounds from loanwords and special types of vocabulary to be included? Are infrequent sounds? For example, Golla (1996: 383) lists Hupa sounds that occur in sound symbolism. I use Golla’s transcription in (3).

(3) Hupa sound symbolism

\[
\begin{array}{ll}
\text{Normal sound} & \text{Replacement in affectionate forms} \\
w & b \\
W & s \text{ (or } f') \\
ʒ & ʒ \\
ɛ^w & c \\
ɛ' & c' \\
g' & g \text{ (or } g) \\
k' & k \\
k' & k' \text{ (or } q') \\
\end{array}
\]

(Golla 1996: 383)

Golla notes that b, ŋ, g, k, k’ exist only in sound symbolism, and he does not include these in the Hupa consonant inventory.

Similar questions arise in many languages. For instance, Chafe (1996: 553–554) does not include labials in the Seneca (Iroquoian) inventory, saying that they occur only in nicknames and expressive vocabulary. Uchihara (2016: 43), on the other hand, notes that /m/ is marginal in Cherokee
Phonological Inventories

(Iroquoian), found in just a handful of native words and loanwords and not patterning with other consonants in terms of clusters, but he nevertheless includes it in the inventory. Li (1946: 399) includes /m/ in the Dene Suline (Dene; also called Chipewyan) inventory, but writes that in his material it occurred in only one word.

Considering loanwords, Haas (1946: 338) includes /b, d, g, l/ in the consonant inventory of Tunica (isolate), but states that they occur “only in a few isolated words (of foreign or probably foreign) origin”. Hill (2005) includes sounds found only in loanwords for Cupeno (Uto-Aztecan). Some do not include such sounds in the inventory. For instance, Moore (2002: 322) does not include /p/ in the inventory of Kaska (Dene) consonants but gives a loanword with /p/. Boudreault (2009: 23–25) partitions the Sierra Popoluca (Mixe-Zoquean) inventory into native phonemes and restricted phonemes, with the latter occurring in ideophones, lexicalized expressions, borrowings, and stylistic alternations.

2.3. Phonemes vs. Sequences?

There is debate about whether something is best analyzed as a single sound or as a sequence. Li (1946: 398) includes labialized velars /gw, kw, kw', xw, ɣw/ (his transcription) in the consonant system of Dene Suline, while Cook (2004: 3) treats these as deriving from Cu sequences. The inventories presented by Cook and Li for the same language thus differ.

Montgomery-Anderson (2015: 20) includes aspirated resonants (sonorants written /hw, hy, hn/) in the inventory in Cherokee (Iroquoian), while Uchihara (2016: 37) treats them as clusters of /h/ followed by a resonant. Uchihara (2016: 38) and Montgomery-Anderson (2015: 20) include /ts, kw, tl/ in the inventory; Cook (1979: 5) treats these as sequences for a different Cherokee variety. Zuni (isolate) is considered by some to have ejectives /ts’ tʃ’ k’ k’w/ (Walker 1964), while others analyze these as sequences of /C+t/ (Newman 1965: 16).

2.4. Variation and Phonemicization

There may be variation between sounds, with a decision made about which to include in the inventory. In Plains Cree (Algonquian), and other languages, variation is found between [s] and [ʃ] and between [ts] and [tʃ] (Wolfart 1996: 430). Wolfart writes these as /s/, /ts/ (his symbol c), not including the variant in the consonant chart, a decision that might be interpreted as being about phonemicization.

2.5. Other Challenges

Transcription conventions vary, with different symbols used for the same sound and the same symbol used for different sounds. For instance, older sources often use ‘ for aspiration; this is not common today. ‘c’ might be used for an alveolar affricate, an alveopalatal affricate, or a palatal stop. The same author may use different symbols for the same sound at different times. For instance, Golla (1996: 368) uses /g/ for the Hupa front velar voiceless unaspirated stop, and /g/ for what he calls a back velar voiceless unaspirated stop; while Golla (2011: 82) uses /k/ for the voiceless unaspirated front velar and /q/ for the voiceless unaspirated back velar (uvular). In the Dene literature generally, symbols /d, g/, etc., are used for what are usually identified as voiceless unaspirated stops and /t, k/, etc., for voiceless aspirated stops.

Terminology changes over time. For example, for Dene Suline, Li (1946: 398) uses the term ‘guttural’ where Cook (2004: 9) uses ‘velar’, and Li distinguishes fricatives with ‘surd’ and ‘sonant’ where Cook (2004: 7) uses ‘voiceless’ and ‘voiced’. ‘Resonant’ is commonly used in some language families (e.g., Salish), while ‘sonorant’ is used in others.

Inventories may differ by where a sound is placed in a phonemic chart. For instance, Haas (1946: 338) includes /j/ (IPA /j/) under semivowels in Tunica, while Li (1946: 398) includes it
with the sonant (voiced) fricatives in Dene S̱úliné. /w/ is variably treated as a labial, a velar, or a labiovelar consonant depending on the source. See also §6.2.

Considering vowels, the symbol e might be used for a phonetically lax vowel if there is no contrast between tense and lax vowels in a language. Maddieson (2013b) includes discussion of the types of factors used to determine the size of vowel inventories, including the challenges of length, nasalization, and diphthongs. For example, a distinction might be considered as primarily featural (e.g., tense/lax) by some, and as involving timing (long/short) by others.

2.6. Summary

Comparison of inventories must be done carefully, ascertaining that assumptions underlying the choice of symbols and the composition of inventories are shared. While it is important to be aware that assumptions might differ, nevertheless, inventories are worthy of study.

3. Factors Determining Inventory Shapes

Gordon (2016) provides an overview of accounts of the typology of inventory shapes, including phonetic (perception, articulation), phonological, and historical factors. Dispersion (pressure for segments to be maximally dispersed throughout the available phonetic space), perceptual distinctness, articulatory simplicity, feature economy, featural robustness, and symmetry have been argued to play important roles in shaping inventories. See Gordon (2016), Hall (2011), and Mielke (2009) for overviews and references. We will see some unusual features in inventories of languages of North America, given these factors.

As a preview, in this section I review expectations of consonant inventories based on typological studies. Gordon (2016), building on Maddieson (1984), chapters in Dryer and Haspelmath (2013), and others, investigates common cross-linguistic characteristics of inventories. While languages indigenous to North America meet many of these, some properties are present that stand out as unusual. The 20 cross-linguistically most common consonants are, according to Maddieson (1984), given in (4) (Gordon 2016: 45):

(4) Consonants with highest cross-linguistic frequency

\[
\begin{array}{cccc}
p & t & \text{ʃ} & k \\
b & d & g \\
f & s & \text{j} & h \\
m & n & \text{n} & \text{n} \\
w & \text{l}, \text{r} & \text{j} \\
\end{array}
\]

(Maddieson 1984; Gordon 2016)

A number of North American languages lack common sounds. For instance, labials, or at least labial obstruents, are missing in several languages including many Dene and Iroquoian languages. Maddieson’s (1984) survey and PHOIBLE (an online repository of cross-linguistic phonological inventory data; Moran et al. 2014) show that over 80% of the languages surveyed have /p/ and over 90% /m/, so this absence is striking. Nasals are missing phonemically in several languages (e.g., Quileute [Chimakuan], Pawnee [Caddoan]). Again, this absence is unusual. In Maddieson’s survey, almost 100% of the languages have /n/ (81% of the languages in PHOIBLE have /n/).

There are also uncommon sounds. Some Salishan languages have pharyngeal consonants. Maddieson (2013c) notes that pharyngeal consonants occur in only 4.1% of the languages surveyed (PHOIBLE, approximately 2%). Maddieson (2013c) also notes that dental/alloveolar non-sibilant fricatives are rare, occurring in 7.6% of the languages surveyed (PHOIBLE, 4%); a number of
North American languages include /θ/ (e.g., Karuk [isolate], Arapaho [Algonquian]). Lateral affricates are rare – according to PHOIBLE, /tɬ/ occurs in 14 of 2,155 languages surveyed (1%); all but three are in North America. The ejective lateral affricate occurs in 24 of the PHOIBLE languages, with all but three in North America. The uvular stop /q/ occurs in many languages of North America but in only 9% of the languages in PHOIBLE. See also Mithun (1996: 137; 1999: 15–20) for discussion of unusual sounds in North American inventories.

Some languages exhibit rare sounds to the exclusion of ones that might be expected. In general, the presence of an ejective stop/affricate implies the presence of its non-ejective counterpart. A number of languages have an ejective lateral affricate but lack its non-ejective counterpart (e.g., Patwin [Wintun]; Lawyer 2015: 225). Popti’ (Mayan; Day 1973: 9) has an ejective uvular stop without a plain uvular stop. Ktunaxa (isolate; Morgan 1991: 15) has an uvular fricative /χ/ but lacks a velar fricative; PHOIBLE finds that 18% of languages have /ʃ/ while 6% have /χ/. Languages tend to have plain coronal stops and nasals: Ch’ol (Mayan; Vázquez Álvarez 2011: 35) has palatalized coronals /tʃ, ts/ but not non-palatalized coronals.

There are North American languages with very small and very large consonant inventories. The small inventories are reasonably similar, although they can differ. While the small inventories surveyed for this work contain some of the sounds that are most common according to the surveys – /t/, /k/, /ʃ/ – the highly frequent /n/ is not present in all small inventories, nor are labials. Inventories increase in size through the introduction of contrasts in place of articulation, particularly in obstruents, and through the introduction of laryngeal contrasts. While generally these contrasts appear in obstruents before sonorants, this is not always the case. Large inventories too can lack common sounds – large inventories are found without nasals and without labials, for instance.

4. Consonant Inventories

Maddieson (2013a) classifies languages by the size of consonant inventories: small (6–14); moderately small (15–18); average (19–25); moderately large (26–33); and large (34+). He notes that smaller-than-average consonant inventories are concentrated in the eastern part of North America, while larger-than-average inventories “are most spectacularly concentrated in the northwest of North America”. In this section I review some of these inventories, organized from small to large in Maddieson’s classification, to give a taste of what inventories of various sizes are like, focusing on the kinds of contrasts that are present in inventories of different sizes.

4.1. Small Inventories (6–14 Consonants)

Caddoan languages tend to have small consonant inventories. For instance, Pawnee has the inventory in (5).

(5) Pawnee consonant inventory

\[
\begin{array}{cccc}
\text{p} & \text{t} & \text{ts} & \text{k} & \text'? \\
\text{s} & \text{h} \\
\text{r} & \text{w} \\
\end{array}
\]

(Parks 1976: 13)

The absence of nasals stands out.

Iroquoian languages have small consonant inventories. Seneca has the inventory in (6). Mithun (1999: 15) identifies the same inventory for Mohawk, with a single liquid /l/ or /r/, depending on variety.
Chafe notes that more consonants occur phonetically. He also remarks on the presence of labials in nicknames and expressive vocabulary (1996: 554) but does not include them in the inventory.

Algonquian languages tend to have small consonant inventories. Wolfart (1996) proposes the inventory in (7) for Plains Cree.

(7) Plains Cree consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ts} & \text{tf} & \text{k} & \text{s} & \text{h} & \\
\text{m} & \text{n} & \text{w} & \text{j} & \\
\end{array}
\]

(Wolfart 1996: 430)

This small inventory has a basic obstruent/sonorant contrast, with stops/affricates, fricatives, nasals, and glides, but no liquid.

Some Uto-Aztecan languages have small inventories. An example is Shoshone, with a labiovelar.

(8) Shoshone consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ts} & \text{k} & \text{k\w} & \\
\text{s} & \\
\text{m} & \text{n} & \text{w} & \text{j} & \\
\end{array}
\]

(Miller 1996: 694)

Charney (1993: 10) gives a similar inventory for Comanche (Uto-Aztecan), adding /ʔ h/. Again note the absence of liquids, a property that is not typical of Uto-Aztecan languages.

Dorais (2010) presents the inventory in (9) for Inuktitut (Nunavik dialect, Eskimo-Aleut). This inventory has an uvular stop.

(9) Inuktitut consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{k} & \text{q} & \\
\text{s} & \\
\text{v} & \text{l} & \text{j/r} & \text{y} & \text{s} & \\
\text{m} & \text{n} & \text{ŋ} & \\
\end{array}
\]

(Dorais 2010: 67)

Many Siouan languages have small inventories. Mixco (1997) gives the inventory in (10) for Mandan. He remarks that /ʃ/ occurs in only one morpheme, and he mentions the absence of nasals, saying that they occur as allophones of /w/ and /r/ in some environments.
Phonological Inventories

(10) Mandan consonant inventory

\[
\begin{array}{cccc}
p & t & (tʃ) & k \\
s & s & x & \\
w & r & h & \\
\end{array}
\]

(Mixco 1997: 6)

Hidatsa (Siouan), too, has a small inventory (Park 2012: 19), differing from Mandan largely by the presence of a nasal /n/ and /ts/ instead of /tʃ/.

Some Muskogean languages have below average inventories. Koasati (Gordon et al. 2015: 94) and Alabama (Hardy 2005: 82) have the inventory in (11). Martin (2011: 47) does not include /b/ in the Creek inventory, but otherwise it is identical to that of Koasati.

(11) Consonant inventory for two Muskogean languages: Koasati and Alabama

\[
\begin{array}{cccc}
p & t & tʃ & k \\
b & \\
f & s, l & h & \\
m & n & \\
l & j & \\
w & j & \\
\end{array}
\]

San Miguel Cimalpa Zoque (Mixe-Zoquean) has a small inventory.

(12) San Miguel Cimalpa Zoque consonant inventory

\[
\begin{array}{cccc}
p & t & ts & k & ? \\
s & h & \\
m & n & η & \\
j & w & \\
\end{array}
\]

(Johnson 2000: 26)

Faarlund (2012: 6) gives a similar inventory for Chiapas Zoque. Johnson notes that if loanwords, sound symbolism, and derived consonants are considered, the inventory is larger, with voiced stops, /l/, /ʃ/, and /l, r/. Wichmann (1995: 21) notes an almost identical inventory for South Highland Zoque, but writes that most of the consonants have palatalized counterparts.

To summarize, small inventories have much in common. They have stops, including a coronal and a velar, and most, but not all, have a labial stop. Many have an affricate, either /ts/ or /tʃ/. Many have /s/. Many have a liquid, either /l/ or /ɾ/, and glides. Many have laryngeal consonants. Distinctions in phonation type are generally absent, at least phonologically, although they may be present phonetically. The presence of /b/ in Koasati and Alabama stands out – Gordon et al. (2015: 287) note, based on Haas (1947), that Koasati and Alabama /b/ is a reflex of Proto-Muskogean *kʷ (in Creek, *kʷ developed as /k/ or /p/). Thus, essential to small inventories is a place contrast in stops, an overall lack of phonation contrasts, and a manner distinction between obstruents and sonorants. Within sonorants, nasals, while common cross-linguistically, may be absent phonologically, although there may be nasal allophones.

4.2. Moderately Small Inventories (15–18 Consonants)

Several families with languages with small inventories also have languages with moderately small inventories. These languages tend to expand their inventories in a few ways: additional places of articulation or laryngeal contrasts in stops/affricates.
Muskogean languages were introduced earlier. In some, the inventory has an additional consonant, glottal stop. Gordon et al. (2000: 380) give the Koasati inventory (11) for Chickasaw, with the addition of /ʃ/ and /ʔ/, as does Broadwell (2006: 15) for Choctaw.

While some Uto-Aztecan languages have small inventories (§4.1), others fall in the moderately small category. Dedrick and Casad (1999) give the inventory in (13) for Yaqui.

(13) Yaqui consonant inventory

\[
\begin{array}{ccccccc}
p & t & ʃ & k & ʔ \\
b^w & s & h \\
\beta/\nu & m & n & r, l \\
w & j \\
\end{array}
\]

(Dedrick & Casad 1999: 21)

In addition to the same consonants as in Shoshone (8), Yaqui has laryngeal consonants and two liquids. Additional consonants occur in Spanish loanwords.

Miwok languages have moderately small inventories, as illustrated by Sierra Miwok. This inventory occurs in all the languages of the family except for Lake Miwok (§4.6.2). Note the extended coronal places of articulation in stops/affricates.

(14) Sierra Miwok consonant inventory

\[
\begin{array}{ccccccc}
p & t & ʃ & k & ʔ \\
s & j & h \\
m & n & η \\
w & j \\
\end{array}
\]

(Golla 2011: 161)

Totonac languages tend to have moderately small inventories, as illustrated by Misantla Totonac.

(15) Misantla Totonac consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts & ʃ & k & q & ʔ \\
s & l & j & h \\
m & n \\
w & l & j \\
\end{array}
\]

(MacKay 1994: 370)

Karuk (isolate) has several places of articulation in fricatives.

(16) Karuk consonant inventory

\[
\begin{array}{ccccccc}
p & t & ʃ & k & ʔ \\
f & θ & j & x & h \\
v \\
m & n & r & j \\
\end{array}
\]

(Golla 2011: 86, from Bright 1957)

Tonkawa (isolate) has labiovelars.
Phonological Inventories

(17) Tonkawa consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts & k & k^w & ? \\
s & x & x^w & h \\
m & n & l & j & w \\
\end{array}
\]

(Hoijer 1946: 290)

Seri (isolate) has many fricatives, including uvulars.

(18) Seri consonant inventory

\[
\begin{array}{ccccccc}
p & t & k & k^w & ? \\
\phi & s & l & \mathcal{f} & x & x^w & \mathcal{\chi} & \mathcal{\chi}^w \\
m & n & j \\
\end{array}
\]

(Marlett 1988: 246)

Northeastern Maidu (Maiduan) has voiceless unaspirated, ejective, and voiced stops and voiceless unaspirated and ejective affricates.

(19) Northeastern Maidu consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts & k & ? \\
p' & t' & ts' & k' \\
b & d & s & h \\
m & n & w & l & j \\
\end{array}
\]

(Golla 2011: 139, from Shipley 1964)

Chitimacha (isolate) contrasts voiceless unaspirated and ejective stops and affricates.

(20) Chitimacha consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts & t\mathcal{f}' & k & ? \\
p' & t' & ts' & t\mathcal{f}'' & k' \\
b & d & s & \mathcal{f} & h \\
m & n & w & l & j \\
\end{array}
\]

(Brown et al. 2014: 428)

Natchez (isolate) distinguishes voiced and voiceless sonorants, but has no laryngeal contrast in obstruents.

(21) Natchez consonant inventory

\[
\begin{array}{ccccccc}
p & t & ts & k & k^w & ? \\
\mathcal{f} & & & & h \\
m & n & l & j & w \\
m & n & l & j & w \\
\end{array}
\]

(Kimball 2005: 392)

In summary, at the small end of moderately small inventories, some Muskogean languages have two additional consonants to those presented in §4.1, /ʔ/ and /\mathcal{f}/, but an inventory that is, in spirit,
like that of smaller inventories. Yaqui is not too different from Uto-Aztecan languages with small inventories, adding /β~v/ and /b~w/. Miwok languages extend small inventories through the introduction of a retroflex place of articulation for stops and a velar nasal. Karuk, Tonkawa, and Seri have more places of articulation. Northeastern Maidu, Chitimacha, and Natchez have additional phonation types; they differ in that the first two distinguish these in stops and affricates, and the latter contrasts voiced and voiceless sonorants.

4.3. Average Inventories (19–25 Consonants)

Inventories of average size build on small inventories by extending places of articulation, especially in coronals and in fricatives, and by extending phonation contrasts.

Mutsun (Costanoan) contrasts coronal places in stops/affricates.

(22) Mutsun consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ʈ} & \text{ts} & \text{ʈʃ} & \text{k} & \text{ʔ} \\
\text{s} & \text{sʃ} & \text{h} \\
\text{m} & \text{n} & \text{nʃ} \\
\text{w} & \text{l} & \text{lʃ} & \text{r} & \text{j}
\end{array}
\]

(Golla 2011: 167)

Jamul Tipai (Yuman) has extended coronals, labialized velars, and additional sonorants.

(23) Jamul Tipai consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ʈ} & \text{ʈʃ} & \text{k} & \text{kʃ} & \text{ʔ} \\
\text{s} & \text{jʃ} & \text{x} & \text{xʃ} \\
\text{m} & \text{n} & \text{ɲ} \\
\text{w} & \text{r} & \text{j} \\
\text{l} & \text{lʃ} \\
\text{l} & \text{lʃ}
\end{array}
\]

(Golla 2011: 123, from Miller 2001)

Some languages have increased places of articulation for obstruents. Golla (2011) gives the inventory in (24) for Cahuilla (Uto-Aztecan), noting that it has the smallest inventory of the languages of its subgroup. /ɾ/ is rare in non-Spanish words.

(24) Cahuilla consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ʈʃ} & \text{k} & \text{q} & \text{qʃ} & \text{ʔ} \\
\text{s} & \text{jʃ} & \text{x} & \text{χʃ} & \text{h} \\
\text{β} & \\
\text{m} & \text{n} & \text{ɲ} & \text{ŋ} \\
\text{l} & \text{(r)} & \text{ɟ} \\
\text{w} & \text{j}
\end{array}
\]

(Golla 2011: 184, from Bright 1965)

Adding phonation contrasts is another strategy for increasing inventory size. Kiowa (Kiowa-Tanoan) has a four-way laryngeal contrast in stops and a two-way contrast in affricates and fricatives.
Phonological Inventories

(25) Kiowa consonant inventory
\[
\begin{array}{cccc}
p & t & ts & k \\
p' & t' & ts' & k' \\
b & d & s & g \\
m & n & l & j \\
\end{array}
\]
(Watkins, with McKenzie 1984: 4)

Patwin (Wintuan), too, introduces phonation contrasts in stops/affricates and has an ejective lateral affricate but not a non-ejective one.

(26) Patwin consonant inventory
\[
\begin{array}{cccc}
p & t & ts & k & ? \\
p' & t' & ts' & k' \\
b & d & s & l \\
m & n & m' & n' \\
w & r & l & j \\
\end{array}
\]
(Lawyer 2015: 225)

Languages also introduce laryngeal contrasts in sonorants. Yuki (Yuki-Wappo) adds a retroflex place of articulation, as well as ejective stops, affricates, nasals, and a lateral (27). The first coronal column is dental and the second alveolar. The parenthesized consonants are considered marginal.

(27) Yuki consonant inventory
\[
\begin{array}{cccc}
p & t & t' & ts & k \\
p' & t' & t' & ts' & k' \\
b & d & s & l \\
m & n & m' & n' \\
w & r & l & j \\
\end{array}
\]
(s’)
(Balodis 2016: 39, based on Sawyer & Schlichter 1984: 10)

Ktunaxa (isolate) has ejective nasals.

(28) Ktunaxa consonant inventory
\[
\begin{array}{cccc}
p & t & ts & k & q & q^w & ? \\
p' & t' & ts' & k' & q' & q^w' \\
b & d & s & l & s & \chi & \chi^w \\
m & n & m' & n' & j & w \\
\end{array}
\]
(Morgan 1991: 15)

Proto-Mayan has been reconstructed as in (29).
Reconstructed consonant inventory for Proto-Mayan

*Kb*  *t*  *ts*  *tf*  *k*  *q*  *ʔ*

*Kb'  *ts'  *tʃ'  *k'  *q'  *

*S*  *ʃ*  *χ*  *h*

*M*  *n*  *ŋ*

*L, R*  *j*  *w*

(Campbell & Kaufman 1985: 191)

Interesting here is the implosive /ɓ/ while other places of articulation have ejectives.

As a final example, E. Campbell (2014) presents the inventory in (30) for Zenzontepec Chatino (Zapotecan).

Zenzontepec Chatino consonant inventory

p  t  tɭ  ts  tʃ  k  k  kʰ  ?

s ʃ  h

m  n  nɭ  l, r  l

β ɣ  m  n  w

(Campbell 2014: 39)

Campbell remarks that the labials are rare. Note the contrasting plain and palatalized coronals.

Overall, languages in the sample with average inventories tend to have additional place contrasts (coronal contrasts, velar-uvular contrast) to those in languages with smaller inventories. They may have more fricative contrasts, creating greater symmetry in place of articulation in obstruents. They also may have contrasts of phonation type in stops, affricates, and sonorants.

4.4. Moderately Large Inventories (26–33 Consonants)

As inventories get larger, they tend to add obstruent place and phonation contrasts.

Wiyot (Algic) has the consonant inventory in (31), with more approximants than in smaller inventories.

Wiyot consonant inventory

p  t  ts  tʃ  k  k  kʰ  ?

pʰ  tʰ  tsʰ  tʃʰ  kʰ  kʰ  kʰ  ?

s ɭ ʃ  h

β ɣ  m  n  w

r, r  l  j

(Golla 2011: 64, based on Teeter 1964)

Sahaptin (Sahaptian), too, has a large number of places of articulation in obstruents, as well as ejective stops/affricates.
### Phonological Inventories

#### (32) Sahaptin consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>tl</th>
<th>tf̖</th>
<th>k</th>
<th>kʷ</th>
<th>q</th>
<th>qʷ</th>
</tr>
</thead>
<tbody>
<tr>
<td>p̲</td>
<td>t̲</td>
<td>ts̲</td>
<td>tl̲</td>
<td>tf̖̲</td>
<td>k̲</td>
<td>k̲ʷ</td>
<td>q̲</td>
<td>q̲ʷ</td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>f</td>
<td>x</td>
<td>xʷ</td>
<td>χ</td>
<td>χʷ</td>
<td>h</td>
<td></td>
</tr>
</tbody>
</table>

As in some other languages, there is an ejective lateral affricate without a non-ejective one.

#### (33) Nuxalk consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>k</th>
<th>kʷ</th>
<th>q</th>
<th>qʷ</th>
</tr>
</thead>
<tbody>
<tr>
<td>p'</td>
<td>t'</td>
<td>ts'</td>
<td>k'</td>
<td>kʷ'</td>
<td>q'</td>
<td>qʷ'</td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>x</td>
<td>xʷ</td>
<td>χ</td>
<td>χʷ</td>
<td>h</td>
</tr>
</tbody>
</table>

As in some other languages, there is an ejective lateral affricate without a non-ejective one.

#### (34) Wintu consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>tf̖</th>
<th>k</th>
<th>q</th>
</tr>
</thead>
<tbody>
<tr>
<td>p̲</td>
<td>t̲</td>
<td>tf̖</td>
<td>k̲</td>
<td>q̲</td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>x</td>
<td>χ</td>
<td>h</td>
</tr>
</tbody>
</table>

Southern Pomo (Pomoan) has both extensive place and laryngeal contrasts in stops/affricates.

#### (35) Southern Pomo consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t̥</th>
<th>ts</th>
<th>tf̖</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>p̲</td>
<td>t̲</td>
<td>ts̲</td>
<td>tf̖̲</td>
<td>k̲</td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>f</td>
<td>h</td>
<td></td>
</tr>
</tbody>
</table>
Dene (Athabaskan) languages have moderately large to large inventories. They achieve this primarily through laryngeal contrasts available to stops/affricates and places of articulation available to obstruents. Navajo (Diné Bizaad) has the typical organization of a Na-Dene inventory. The labialized velars are considered rare.

(36) Navajo (Diné Bizaad) consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>tʃ</th>
<th>k</th>
<th>kʷ</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>tʰ</td>
<td>tsʰ</td>
<td>tʰ</td>
<td>tʃʰ</td>
<td>kʰ</td>
<td>kʷʰ</td>
<td>ʔ</td>
</tr>
<tr>
<td>t’</td>
<td>ts’</td>
<td>t’</td>
<td>tʃ’</td>
<td>k’</td>
<td>s</td>
<td>l</td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td>w</td>
<td>j</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(McDonough 2003: 4)

Some Siouan languages show a different pattern. Shaw (1980) presents inventories for varieties of Dakota, including Teton, shown in (37).

(37) Teton consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>tʃ</th>
<th>k</th>
<th>ʔ</th>
</tr>
</thead>
<tbody>
<tr>
<td>pʰ</td>
<td>tʰ</td>
<td>tʃʰ</td>
<td>kʰ</td>
<td>ʔ</td>
</tr>
<tr>
<td>p’</td>
<td>t’</td>
<td>tʃ’</td>
<td>k’</td>
<td>ʔ</td>
</tr>
<tr>
<td>b</td>
<td>s</td>
<td>f</td>
<td>x</td>
<td>h</td>
</tr>
<tr>
<td>s’</td>
<td>f’</td>
<td>x’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>3</td>
<td>y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>w</td>
<td>j</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Shaw 1980: 16)

Striking are the phonation contrasts in fricatives as well as in stops/affricates. The presence of glottalization with fricatives offers another way of extending the size of an inventory.

In the moderately large inventories presented so far, the inventory size is due predominantly to extended places of articulation and laryngeal contrasts in obstruents. Some languages extend their inventories through introducing glottalized sonorants.

Yana has ejective nasals and approximants.

(38) Yana consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>k</th>
<th>ʔ</th>
</tr>
</thead>
<tbody>
<tr>
<td>pʰ</td>
<td>tʰ</td>
<td>tsʰ</td>
<td>kʰ</td>
<td>ʔ</td>
</tr>
<tr>
<td>p’</td>
<td>t’</td>
<td>ts’</td>
<td>k’</td>
<td>ʔ</td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td>m’</td>
<td>n’</td>
<td></td>
</tr>
<tr>
<td>w</td>
<td>r</td>
<td>l</td>
<td>j</td>
<td></td>
</tr>
<tr>
<td>w’</td>
<td>l’</td>
<td>j’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Golla 2011: 102, from Sapir 1922)
Golla (2011) gives the inventory in (39) for Ventureño Chumash (Chumashan), with a full set of ejective sonorants as well as stops/affricates.

(39) Ventureño Chumash consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ts} & \text{tʃ} & \text{k} & \text{q} & ? \\
\text{p}^h & \text{t}^h & \text{k}^h & \text{q}^h \\
\text{p}' & \text{t}' & \text{ts}' & \text{tʃ}' & \text{k}' & \text{q}' & \text{x} & \text{h} \\
\text{m} & \text{n} \\
\text{m}' & \text{n}' \\
\text{w} & \text{l} & \text{j} \\
\text{w}' & \text{l}' & \text{j}' \\
\end{array}
\]

(Golla 2011: 198, from Whistler 1981)

Gitxsan (Tsimshianic), too, has ejective sonorants.

(40) Gitxsan consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ts} & \text{tɬ} & \text{k} & \text{k}^w & \text{q} & ? \\
\text{p}' & \text{t}' & \text{ts}' & \text{tɬ}' & \text{k}' & \text{k}^w & \text{q}' \\
\text{m} & \text{n} \\
\text{m}' & \text{n}' \\
\text{w} & \text{l} & \text{j} & \text{w} \\
\text{w}' & \text{l}' & \text{j}' & \text{w}' \\
\end{array}
\]

(Brown et al. 2016: 368)

Other languages with moderately large inventories and phonation contrasts in sonorants as well as obstruents include Salinan (isolate; Golla 2011: 117, from Turner 1980); Nez Perce (Sahaptian; Aoki 1994: xi–xii); and Achumawi (Palaihnihan; Golla 2011: 99, from Nevin 1998). Haida (isolate; Enrico 2003: 9) has ejective nasals and an ejective lateral but only plain approximants. Washo (isolate; Yu 2005: 439) has a two-way contrast in sonorants, voiced and voiceless (ŋ is absent, /m, ŋ, w, l, j/ are present).

Summarizing, languages with moderately large inventories tend to show phonation distinctions in stops/affricates, and sometimes in fricatives. They commonly have extended contrasts in place of articulation in coronals and often have a velar-uvular contrast. Several languages also introduce laryngeal contrasts in sonorants; in the sample, these are found only when there are laryngeal contrasts in obstruents.

4.5. Large Inventories (34+ Consonants)

Not unexpectedly, languages with large consonant inventories (34 or more consonant contrasts) have contrasts on place, laryngeal, and manner dimensions. Such languages are found largely on the west coast, particularly in the Pacific Northwest; see §4.6.2.

Kashaya (Pomoan) has the consonant inventory in (41).
Buckley’s inventory differs from that proposed by Oswalt (1961), who treats ejective and aspirated sonorants as sequences rather than as single segments and includes /b/ and /d/, corresponding to /m’, n’/ in (41). See §2.3 on segment vs. sequence analysis, and on issues in choosing underlying forms.

Yokuts (Yokutsan) has a number of places of articulation and phonation contrasts in sonorants as well as obstruents. The parenthesized nasals are present in a few Yokuts varieties.

Oowekyala is typical of a Northern Wakashan language (Howe 2000: 21), with many places of articulation in obstruents and phonation contrasts in stops/affricates and sonorants. Howe also includes long resonants m:, n:, l:.

Salish languages typically have large consonant inventories, with an elaboration of places of articulation which is particularly striking in the post-velar area, phonation contrasts in stops/affricates, and ejective sonorants. Lushootseed has the inventory in (44). Bates et al. (1994) note that
nasals m, m’, n, n’ appear in certain special words and speech styles, but they do not include them in the inventory.

(44) Lushootseed consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>tʃ</th>
<th>k</th>
<th>kʷ</th>
<th>q</th>
<th>qʷ</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>d</td>
<td>dz</td>
<td>dʒ</td>
<td>g</td>
<td>gʷ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p’</td>
<td>t’</td>
<td>ts’</td>
<td>tl’</td>
<td>k’</td>
<td>k’⁺</td>
<td>q’</td>
<td>q’⁺</td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>f</td>
<td>x</td>
<td>χ</td>
<td>χ’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Bates et al. 1994: xiii)

The absence of nasals is notable, as are the number of obstruent places of articulation. Another Salish language, St’át’imcets (Lillooet) has a number of places of articulation, pharyngeal consonants, ejective resonants (often with a fricative-like quality), and a lateral ejective affricate without a non-ejective one. The underdot indicates retraction.

(45) St’át’imcets consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>tʃ</th>
<th>k</th>
<th>kʷ</th>
<th>q</th>
<th>qʷ</th>
</tr>
</thead>
<tbody>
<tr>
<td>p’</td>
<td>ts’</td>
<td>tl’</td>
<td>k’</td>
<td>k’⁺</td>
<td>q’</td>
<td>q’⁺</td>
<td></td>
</tr>
<tr>
<td>s</td>
<td>l</td>
<td>f</td>
<td>x</td>
<td>χ</td>
<td>χ’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td>l</td>
<td>l’</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m’</td>
<td>n’</td>
<td></td>
<td></td>
<td>z</td>
<td>j</td>
<td>ɣ</td>
<td>ʔ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>z’</td>
<td>j’</td>
<td>ɣ’</td>
<td>ʔ’</td>
</tr>
</tbody>
</table>

(van Eijk 1997: 3)

San Mateo Huave (isolate) has a large consonant inventory, with a pervasive non-palatalized/palatalized contrast, a voicing contrast, and prenasalized stops and affricates.

(46) San Mateo Huave consonant inventory

<table>
<thead>
<tr>
<th>p</th>
<th>pʲ</th>
<th>t</th>
<th>tʲ</th>
<th>ts</th>
<th>tsʲ</th>
<th>k</th>
<th>kʲ</th>
<th>kʷ</th>
<th>kʷʲ</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>bʲ</td>
<td>d</td>
<td>dʲ</td>
<td></td>
<td></td>
<td>g</td>
<td>gʲ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>mʲ</td>
<td>n</td>
<td>nʲ</td>
<td></td>
<td></td>
<td>w</td>
<td>wʲ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>rʲ</td>
<td>j</td>
<td>w</td>
<td>wʲ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l</td>
<td>lʲ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Noyer 2013: 4)

Languages with large inventories tend to have expanded obstruents, with multiple places of articulation and phonation contrasts in stops and affricates. There are often phonation contrasts in sonorants as well, and some of the languages have pharyngeal consonants.
4.6. Historical Changes: Shifts, Mergers, Splits

Within a family, inventories can differ in size, and in this section I briefly review some of the factors involved in changing sizes. Changes can be vertical, or internally motivated, and horizontal, with inventories shifting due to contact.

4.6.1. Vertical Change

Languages can both shift sounds in quality, maintaining contrasts, and merge sounds. Dene (Athabaskan) languages show both shifts and mergers. The reconstructed inventory is given in (47).

(47) Reconstructed consonant inventory for Proto-Dene

| *t  | *ts | *tl | *tʃ | *tʃr | *k | *q | *ʔ |
| *tʰ| *tsʰ | *tlʰ | *tʃʰ | *tʃrʰ | *kʰ | *qʰ |
| *t̚ | *ts̚ | *tl̚ | *tʃ̚ | *tʃr̚ | *k̚ | *q̚ |
| *z | *l | *ʒ | *r | *s | *ɬ | *ʃ | *x |

*[^m] [^n] [^ɲ] [^w] [^ɬ] [^m’] [^n’] [^w’] [^ɬ’]

(Leer 2005: 284)

Daughter languages display shifts and mergers in places of articulation. For instance, considering places of articulation of plosives in root-initial position, in Hän the Proto-Dene system is essentially intact, with shifts *ts > tθ, *tʃ > ts, *tʃr > tsr, *k > tʃ, and *q > k – shifts in place of articulation of a series but with the number of contrastive places maintained. Other languages merge places of articulation; for instance, Koyukon mergers led to a system with /p, t, tl, ts, k (tʃ), q/, with the following shifts and mergers of series: *ts > tɬ, *tʃ > ts, *tʃr > ts, *k > k, *q > q. In Witsuwit’en, *ts, *tʃ, *tʃr series merged to /ts/ (Hargus 2007: 738–740). (See Krauss & Golla 1981: 72). The Pacific Coast Dene languages are often missing sounds found in related languages due to mergers resulting in neutralization. Mattole, for example, has lateral consonants /l, l’, l’’, with /l/ as a reflex of *l, *tl, *tɬ (Li 1930: 14). Many Oregon Dene varieties lack voiceless unaspirated and aspirated affricates at lateral, dental, and retroflex places of articulation due to mergers (Golla 2011: 75).

While Algonquian languages generally have small inventories, their more distant relations within Algic, Yurok and Wiyot, have larger inventories. Yurok has a moderately large inventory (Blevins 2003: 372).

(48) Yurok consonant inventory

| p | t | tʃ | k | k̩ | ʔ |
| p’ | t’ | tʃ’ | k’ | k̩’ |
| s [ʃ] | f | x |
| l |
| m | n |
| m’ | n’ |
| w | l, r | j | y |
| w’ | l’, r’ | j’ | y’ |

(Blevins 2003: 372)

Proulx (1984: 178) proposes a Proto-Algic reconstruction with voiceless unaspirated, aspirated, and ejective consonants, and various mergers in Algonquian languages.
Northern Wakashan languages have large inventories (§4.5), while Southern Wakashan inventories, illustrated with Ditidaht in (49), are smaller.

(49) Ditidaht consonant inventory

\[
\begin{array}{cccccccc}
\text{p} & \text{t} & \text{ts} & \text{tl} & \text{tf'} & \text{k} & \text{q} & \text{ʔ} \\
\text{p’} & \text{t’} & \text{ts’} & \text{tl’} & \text{tf’} & \text{k’} \\
\text{b} & \text{d} \\
\text{b’} & \text{d’} \\
\text{s} & \text{l} & \text{j} & \text{x} & \text{χ} & \text{ʔ} & \text{h} \\
\text{w} & \text{l} & \text{j}
\end{array}
\]

(Sylak-Glassman 2013)

Sylak-Glassman includes /m, m’, n, n’/ in parentheses, noting that they are marginal (he also includes q’ as marginal), with nasals generally shifting to voiced stops. Other mergers occur (for instance, voiced consonants merge with voiceless ones; Fortescue 2007: 8), yielding a smaller inventory than in Northern Wakashan languages.

Inventories can increase in size in various ways as well. I illustrate two: reanalysis of sequences into single segments and splits.

While Caddoan languages have inventories with voiceless unaspirated stops, laryngeals, fricatives, and sonorants (see (5)), Caddo has ejective consonants as well. Chafe (1979: 223–224) suggests that these likely arose through coalescence of a stop with a glottal stop (although he notes that they might have been present in the proto-language, with simplification in Northern Caddoan languages). In a study of Seneca (Iroquoian), Chafe (2015: 10) remarks that Proto-Iroquoian is reconstructed with two stops, *t, *k; in modern Seneca, clusters *th, *kh have been reanalyzed as single aspirated segments, yielding a larger inventory.

What is reconstructed as a single phoneme may split through sound change into two (or more). For instance, Langdon and Munro (1980: 126) propose that Proto-Yuman *l split into Proto-Delta-California Yuman *l and l; Miller (2018: 393) further proposes that Proto-Yuman *t and *n split into Proto-Delta-California Yuman *t/*n and *t/*n, likely a result of sound symbolism.

Algonquian languages are generally analyzed as having small inventories (§4.1), but some are treated as having moderately small inventories. Valentine (2001) gives the inventory in (50) for Nishnaabemwin, adding that /h/ occurs in a few adverbs.

(50) Nishnaabemwin consonant inventory

\[
\begin{array}{cccccc}
\text{p} & \text{t} & \text{tf’} & \text{k} & \text{ʔ} \\
\text{b} & \text{d} & \text{dʒ} & \text{g} & \text{ʔ} \\
\text{s} & \text{j} & \text{‌} & \text{ʒ} \\
\text{m} & \text{n} & \text{‌} & \text{‌} \\
\text{w} & \text{j}
\end{array}
\]

(Valentine 2001: 41–42)

Proto-Algonquian is reconstructed with *p, *t, *tf’, *k, *0, *s, *ʃ, *h, *m, *n, *r, *w, *j; the nature of *0 is uncertain (Thomason 2006: 191). The Nishnaabemwin inventory includes a voicing distinction in stops; this is treated as involving length rather than voicing in some of the languages, and Valentine notes that voiceless stops are longer than voiced stops. This might be a case of an inventory that increased in size through a split; it is also possible that the different analytic assumptions are involved about segments vs. sequences; see §2.3.
4.6.2. Horizontal Change

Changes in inventories can be externally motivated, attributable to contact. Such changes occurred in Lake Miwok. The Sierra Miwok inventory in (14) is typical of Miwok languages, with voiceless unaspirated stops, two fricatives, nasals, and approximants. Lake Miwok has a larger system. Sounds found in only a small number of words, usually loanwords, are omitted (g, f, θ).

\[(51) \text{ Lake Miwok consonant inventory} \]

<table>
<thead>
<tr>
<th>p</th>
<th>t</th>
<th>ts</th>
<th>tʃ</th>
<th>t’</th>
<th>k</th>
<th>?</th>
</tr>
</thead>
<tbody>
<tr>
<td>pʰ</td>
<td>tʰ</td>
<td>tʃʰ</td>
<td>t’ʰ</td>
<td>kʰ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>d</td>
<td>s</td>
<td>l</td>
<td>ʂ</td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>n</td>
<td>w</td>
<td>l</td>
<td>j</td>
<td>(r)</td>
<td></td>
</tr>
</tbody>
</table>

Lake Miwok has phonation contrasts and affricates not present in related languages. It is generally assumed that these arose through contact with Hill Patwin and Southeastern Pomo (Golla 2011: 161; Callaghan 1964). Active contact involving borrowing words with new sounds can thus increase the size of inventories.

Inventories may also lose consonants due to contact. Campbell (1997: 331) remarks on the absence of labial stops in Aleut, following Leer (1991) in suggesting that this may be due to contact with other languages of the area including Dene languages, Eyak, and Tlingit, all of which lack labial obstruents. Kinkade (1985) identifies another areal effect, the shifting of consonants. The absence of nasals in Quileute (Chimakuan), Lushotseed and Twana (Salish), and Makah and Ditidaht (Wakashan) represents a shift from nasals to voiced obstruents, an effect he attributes to contact.

4.7. Summary

North American languages span from having very small consonant inventories to very large ones. Several interesting features stand out, including the absence of labial obstruents, even in some very large inventories (e.g., Tanacross [Dene; Holton 2000: 24] has a labial [m] but no other labials, and a large inventory); the absence of nasals, even in large inventories; the presence of lateral affricates; and the presence of ejective affricates in the absence of non-ejective affricates. Many large inventories exhibit a two- or three-way phonation contrast between voiceless unaspirated, voiceless aspirated, and ejective stops and affricates, lacking a voicing contrast. Many languages, even some with average-size inventories, have phonation contrasts in sonorants. The continent thus has languages that are typologically unusual, regardless of inventory size.

5. Vowels

As Mithun (1996: 137) remarks, vowel systems in North American languages are generally relatively simple. In presenting vowel systems, I follow Maddieson (2013b), focusing on quality. Maddieson does not count long and short variants of the same vowel, nor does he count nasalized vowels if there is a non-nasalized counterpart: he focuses on contrasts in qualities of height, backness, and roundness, identifying inventories that are small (2–4 vowel qualities), average (5–6 qualities), and large (7–14 qualities).
As with consonants, there are challenges in phonemicizing vowels. It can be difficult to interpret what symbols mean, with a symbol like \( i \) representing different phonetic values. Some authors count vowels found only in loanwords, while others do not. The status of schwa can be controversial, with debates about whether it is underlying, epenthetic, or both in a language. Nevertheless, a brief introduction to vowels is worthwhile.

I list inventories by number of vowels; indicating if there are length (L) and nasalization (N) contrasts. Vowels often show variation in quality, and there is some arbitrariness in the choice of symbols.

Three vowel systems are found in languages across North America and are phonemicized in a variety of ways.\(^2\)

- i a u. Aleut (L); Alsea; Caddo (L); Nuxalk (L); Misantla Totonac (L, laryngealized)
- i a o. many Muskogean languages (L); Blackfoot (L); Hupa (L e: a: o:)
- e a o. Cheyenne

Several languages have four vowel systems.

- i a u ə. Central Alaskan Yupik; Jamul Tipai; Oowekyala (L except /ə/)
- i e a u. Pawnee (L); Cahuilla (L); Cupéno (L)
- i e o a. Klamath (L); Navajo (L, N); Proto-Algonquian (L)
- i e a o. Nishnaabemwin (all L; short i, a, o); Plains Cree (all L; short i, a, o)
- i i u a. Sahaptin (L except i, Sahaptin, Umatilla)

Many languages have five vowel systems.

- i e a o u. Arikara (L); Chimariko; Siouan languages (Dakota, Chiwere L, nasal i a u + L; Tutelo N i, a, o plus L); Eastern Pomo (L); Kashaya (L); Esselen (L); Patwin (L); some Southern Wakashan (L no o:); Maricopa (L); Spokan (epenthetic o); Takelma (L); Wappo (L); Wintu (L); Yana (L); Yokuts (L most varieties); Zuni (L); Achumawi (L); Mutsun (L); Huehuetla Tepehua (L); Tataltepec de Valdés Chatino (L; nasalized ĥ ā ē ō + L); Tz’utujil (L); Huastec (L); Popti’; Yalálag Zapotec (laryngealized a’a e’e i’i o’o)
- i: e: a: o: u:. Karuk (short i a, u); Hidatsa (short i, a, u)
- i ø a o u. Ute (L)
- i æ a o u. Nez Perce (L)
- i e a o a. Delaware (Munsee, Ontario) (L i: e: o: a:)
- i a o o u. Yuki
- i e a o a. Kiowa (L, N; [u] only after velars)
- i e a o o. Lower Rogue River Athabaskan; Tolowa (L, N i, a, u +LN); Wiyot (allophonic L except o)
- i e a o ĕ. Tuscarora (L in one variety; tense/lax in other)

Several languages have six vowel systems.

- i e æ a o u. Mandan (L, N i, a, u + LN)
- i, ū c a o. Washo (L); Northeastern Maidu; Sierra Miwok (L); Tubatulabal (L); Chumash languages; Shoshoni (L); Western Mono (L)
- i e ĕ a o u. Cherokee (L)
- i, e/e a o o u. Yurok (L no e:)

---

\(^2\) For some languages, I list the best data available; for others, I include a range of systems. The emphasis is on phonetic contrasts, and in some cases, I list a system that is phonologically complex. Many of these languages are not well documented, and the data can be ambiguous. On some occasions, I have attempted to translate vowel symbols in different systems into English. The list includes only a few systems, but the systems are representative of possible inventories across North America.
The largest inventories that I found have seven vowels.

The five most common vowels in the world’s languages are not surprising – i, e, a, o, u (Gordon 2016: 49), with i, a, u most common. The variety of three-vowel inventories proposed for North American languages is interesting, as are the combinations of vowels in five vowel systems, all having /a/ but varying with respect to other vowels. Larger inventories do not necessarily include all the five most common vowels. Careful study of vowel inventories, looking at phonological patterning as well as phonetic realization, might lead to a different understanding of these inventories.

6. Inventories and Phonological Patterning

While inventories are of interest in and of themselves, there are questions that cannot be answered through the study of inventories alone, divorced from phonological patterning. This section addresses a few interesting questions, including inventories and morphological analysis, variation in analysis of what appears to be the same sound, phonological activity, and abstractness.

6.1. Positional Inventories and Morphological Analysis

While generally a single inventory is proposed for a language, there are often several inventories, with constraints on what can appear in positions such as root/stem-initial vs. affix-initial. Roots often host more contrasts than do affixes, aiding in morphological analysis.

Dene languages have restrictions on inventories, as illustrated by Witsuwit’en. The root-initial inventory is given in (52).

(52) Witsuwit’en consonant inventory for roots

| p  | t  | ts | tl | c  | kʰ | q  |
| pʰ | tʰ | tsʰ| tlʰ| cʰ| kʰ | qʰ |
| p’ | t’ | ts’| tl’| c’| kʰ | q’ |?
| s  | l  | ç  | xʷ | χ | h  |
| z  | l  | j  | w  | k |    |

m n

(Hargus 2007: 19–20, 604–607)

Hargus (2007: 20) notes that the number of consonants is reduced in affixes: in non-lexical affixes, the following consonants appear: l, l, t, s, c, n, xʷ, w, z, h, tʰ, c’ (one morpheme), p (one morpheme), ts’/z (one morpheme). Thus, root-initial position hosts a wider range of contrasts than prefix-initial position, aiding the listener in identifying the root.

Tohono O’odham (Uto-Aztecan) has the consonant inventory in (53), with several consonants absent in affixes – p, tʃ, dʒ, g, s, w, l. As in Witsuwit’en, the richer stem-initial inventory provides clues to morphological structure.
O’Hara (2015) argues that while Klamath has the four-vowel inventory /i u e a/ and long counterparts, the full inventory is allowed only in privileged positions; /e/ in verbs is found only in word-initial syllables and raises to [i] or deletes elsewhere, yielding a three-vowel system in non-initial syllables of verbs.

An inventory often represents an amalgam, with morphological (and phonological) constraints on what can occur where, with positional inventories giving clues to word structure.

### 6.2. Same Sound, Same Status?

Another interesting issue involves the phonological patterning of sounds. How does the phonetics of a sound match its phonological patterning? The IPA chart gives a place to every sound, yet in studying inventories as presented in phonological sketches and grammars, the organization may look quite different from that of the IPA chart. For instance, as noted in §2, /j/ is treated as a sonorant in Tunica, and as a voiced fricative in Dene Sulînê.

I focus first on /l/, a sound that is generally classified as a sonorant. In many languages it patterns as a sonorant. Klamath (Barker 1964: 39–40; Blevins 1993: 238), for instance, has triplets of sonorants (nasals, laterals, glides) – voiced, voiceless, and ejective. These are distinct from fricatives, where no laryngeal contrasts exist. In other cases, a voiceless lateral fricative and /l/ are found, but no voiced fricatives, suggesting that /l/ is a sonorant and /ɬ/ a fricative (e.g., Wiyot, Golla 2011: 64, based on Teeter 1964). In these languages, /l/ is grouped with sonorants.

However, /l/ does not always pattern as a sonorant. In many Dene languages, this sound is paired with a voiceless lateral, /ɬ/, and, along with fricatives, enters into voicing alternations, as illustrated for stem-initial fricatives in Tanacross (Dene). The accents represent tones and the hyphen before the stem indicates that the noun is possessed.

<table>
<thead>
<tr>
<th>NON-Possessed Form</th>
<th>Possessed Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ðeθ</td>
<td>-ðéðʔ</td>
<td>‘skin’</td>
</tr>
<tr>
<td>se:x</td>
<td>-zë:ɣʔ</td>
<td>‘saliva’</td>
</tr>
<tr>
<td>fïʔ</td>
<td>-ʒïʔi</td>
<td>‘food’</td>
</tr>
<tr>
<td>xel</td>
<td>-ɣë:l</td>
<td>‘pack’</td>
</tr>
<tr>
<td>lu:ɡ</td>
<td>-lû:ɡʔ</td>
<td>‘fish’</td>
</tr>
</tbody>
</table>

Laterals also participate in the so-called D-Effect, in which a prefix called D combines with certain stem-initial consonants including fricatives. In Tanacross, D combines with a stem-initial fricative, including the lateral, to create stops/affricates at the same of articulation (Holton 2001: 174). In addition, while voiceless sonorants do not occur stem-initially, voiced and voiceless laterals do, as do voiced and voiceless fricatives (Holton 2001: 398). The evidence suggests that the voiced lateral is phonologically a fricative. In presenting inventories of Dene languages, /l/ is placed in the same row as voiced fricatives.
Another language that suggests the importance of language-internal phonological factors in determining the place of sounds in an inventory is Lillooet (St’at’imcets). Van Eijk (1997: 4) divides the consonant inventory into obstruents and resonants, with obstruents including plain and ejective stops/affricates and voiceless fricatives. Resonants include nasals, liquids, and glides in plain and glottalized forms. Listed under glides are /z z’ y’ y S θ S’ θ’ θ’ h θ/ as well as /j j’ w w’/. Most of the former are generally classed as fricatives rather than sonorants, but their patterning, illustrated by pairings, suggests sonorant status; van Eijk (1997: 4) also notes phonotactic evidence for this classification.

While it is tempting to hear a sound and, based on hearing it, place it in a sound chart, in fact what is judged to be the same sound phonetically may pattern differently in different languages.

6.3. Inventories and Phonological Activity

This section builds on observations in §6.2 and briefly examines a perspective on inventories based on phonological activity, focusing on vowels. As just discussed, what appears to be the same sound can differ in phonological patterning between languages. The discussion is framed in the theory of Modified Contrastive Specification; see, for instance, Dresher (2009) and Hall (2011). This theory of feature specification has bearing on how we view inventories, with phonemes specified only for contrastive features. The contrastive status of a feature is defined based on phonological activity, and expressed as a hierarchy. For instance, the inventory /i, a, u/ could be specified in different ways; two possibilities are shown in (55), using the features [low] and [back]; see Hall (2011: 13).

(55) Contrasting feature specifications for a three-vowel inventory

\[
\begin{array}{ccc}
\text{a.} & \text{[low]} > \text{[back]} & \text{b.} & \text{[back]} > \text{[low]} \\
\text{i} & \text{a} & \text{u} & \text{i} & \text{a} & \text{u} \\
\text{[low]} & - & + & - & [\text{back}] & - & + & + \\
\text{[back]} & - & + & [\text{low}] & + & a
\end{array}
\]

In (55a), [low] is selected first, dividing the inventory into /a/ vs. /i u/. The plus value is interpreted as active phonologically, while the minus value is, essentially, default; the expectation is that [+low] could be active in the phonology while [−low] would not be. Next, [back] is selected; [+back] could be active phonologically in the non-low vowels, with no role in the non-low vowels, where it has no specification. In (55b), [back] is selected first, with /i/ [−back]. /u a/ are then distinguished by [low], and [low] is not a relevant feature for /i/. The result is that two inventories that are phonemicized identically are phonologically distinct, with different features, and different patterning is expected. The language learner determines the features based on exposure to the language.

I compare two inventories with four vowels (plus long vowels). Proto-Algonquian, as reconstructed by Bloomfield (1946), had the inventory *i, *ɛ, *a, *o and their long counterparts. Oxford (2015) proposes the following analysis. I omit the feature [long] that he uses in his analysis. Summarizing evidence for the features, the vowel /i/ triggers palatalization, and thus has a feature to give; Oxford calls this feature [coronal]. The sequence */wɛ/ coalesces to */o/; Oxford suggests the feature [labial]. Oxford (2015) proposes the hierarchy in (56); I use plus/minus features whereas he uses privative features.

(56) Proto-Algonquian vowel feature hierarchy

\[
\begin{array}{ccc}
[\text{labial}] & > & [\text{coronal}] & > & [\text{low}] \\
\text{o} & + & & & \\
\text{a} & - & - & & \\
\varepsilon & - & + & + & \\
\text{i} & - & + & - & \\
\end{array}
\]

(Oxford 2015: 322)
Phonological Inventories

Klamath has a similar vowel inventory (Barker 1964; Blevins 1993; O'Hara 2015), with four short and four long vowels. I consider only short vowels. O'Hara proposes that /a/ is unmarked, adducing evidence from epenthesis. He further proposes that /e/ is marked: in verbs it occurs only in privileged positions and neutralizes to [i] otherwise. Blevins (1993: 239) discusses variation in vowel quality: /a/ varies between [a] and [ə]; /e/ between [æ] and [ɛ]; /i/ between [ɪ] and [i]; and /o/ between [ɔ] and [u]. One way of capturing this patterning is through a feature hierarchy with [coronal] > [low] > [labial].

(57) Klamath vowel feature hierarchy
[coronal] > [low] > [labial]

<table>
<thead>
<tr>
<th></th>
<th>[coronal]</th>
<th>[low]</th>
<th>[labial]</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>+</td>
<td></td>
<td>−</td>
</tr>
<tr>
<td>o</td>
<td>−</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>a</td>
<td>−</td>
<td>−</td>
<td></td>
</tr>
</tbody>
</table>

(O’Hara 2015)

/e/ is the most marked vowel (only plus values), and /a/ the least marked (only minus values). While /o/ can vary in height from low to high, its front counterpart /i/ does not show the same range of variation as it is contrastive with the [+low] /e/. /a/ too shows some variation in height.

Phonological activity demonstrates that the inventories of Proto-Algonquian and Klamath are different despite their superficial similarities, further suggesting that IPA-type charts that assume a particular organization of sounds have limitations in predicting phonological patterning.

6.4. Abstract Inventories

Sections 6.2 and 6.3 point to the need to examine phonological activity in individual languages to understand the inventory of the language at a deep level. In some cases, small surface inventories can be misleadingly small when phonological activity is considered.

Compton and Dresher (2011) present a detailed study of palatalization across Inuit dialects. Proto-Inuit is reconstructed with four vowels: *i, *a, *u, *ə. Compton and Dresher demonstrate that languages that maintain four vowels show the effect of palatalization by /i/. Some languages merge /i/ and /ə/ to [i], yielding a surface three-vowel inventory. Yet in some of these languages, [i] from *i continues to trigger palatalization, while [i] from *ə does not. In these cases, they argue, the four-vowel system is maintained, despite the surface three-vowel system.

Similar neutralization is found in other languages. Frantz (2017: 1–2) proposes the Blackfoot (Algonquian) vowel inventory /i a o/. However, in discussion of phonological processes he gives a four-vowel inventory, /i i o a/, with /i/ and /ə/ neutralizing to [i]. Primary evidence is from variable patterning of [i]: it triggers different processes. Some [i] trigger breaking (/k/ becomes [ks] before the vowel) and other [i] instead change /t/ to [ts] (Frantz 2017: 34–35). If Blackfoot has a phonological three-vowel inventory, it is difficult to account for the different activities of [i]. This different patterning suggests that Blackfoot is similar to Inuit languages with a fourth underlying vowel. See Oxford (2015) for discussion of the development of vowel inventories in Algonquian languages.

Similar discrepancies exist with consonants. For instance, in the Fort Good Hope variety of Sahtú Dene (Rice 1989), there are regular voicing alternations in fricatives.

(58) Non-Possessed Possessed
sa -zá ‘sun, month’
ʃək -jéné ‘song’
Some fricatives are always voiceless, even in the environment where voicing is expected.

\[
\begin{array}{ccc}
\text{NON-POSSESSED} & \text{POSSESSED} & \\
\text{sè} & -\text{sè́} & \text{‘firewood’} \\
\text{ʃo} & -\text{ʃórɛ́} & \text{‘feather’} \\
\end{array}
\]

If non-alternating voiceless fricatives are treated as voiceless unaspirated affricates /ts, tʃ/, the historical source of these non-alternating voiceless fricatives and sounds that are generally absent from the surface inventory, then both the failure of voicing and the surface gaps can be explained. There is additional evidence for such an analysis, including variation in casual speech.

6.5. Summary

Phonological inventories as determined by surface contrasts alone are useful but can be misleading: the same apparent sound can pattern differently in different languages, and the same apparent surface inventory can show different phonological patterning in different languages. Moreover, the surface inventory alone may mask contrasts that are apparent as phonological activity is considered. Care must be taken in working with inventories as there is not a one-to-one relationship between sound and patterning. The importance of patterning has long been recognized; this is why, for instance, grammars of some languages place sounds such as [j] and [l] as sonorants, and grammars of other languages treat these same sounds as voiced fricatives. A challenge for analysts is to be able to explain these differences; see, for instance, Mielke (2008) and Dresher (2009).

7. Orthography

Linguists sometimes think that if the inventory of a language is understood, then it should be straightforward to develop a writing system for the language — simply use that inventory. While this is perhaps sometimes the case, many factors, both linguistic and social, challenge this assumption; see Sebba (2007) and articles in Cahill and Rice (2014) and Jones and Mooney (2017), for instance. Hinton (2014), writing about Yurok, notes that speakers and learners chose to include symbols for sounds that are not phonemic in Yurok but are in English. Chafe (1996: 553) analyzes Seneca as having two stops, /t k/, but says that “such an orthography obscures the manner in which the language is actually pronounced and is much disfavored by Seneca speakers”, who use, for instance, <t, th, d> instead of just <t>. (Note that the angled brackets are used for orthographic representations.) Munro (2014) presents a Tongva (Uto-Aztecan) example, with vowels /i: e: a: o: u:, e a o/. While this phonemicization is adequate from a linguistic perspective, it did not work well for learners trying to understand what appear to be idiosyncratic patterns of reduplication, and it was decided to write short vowels <i u> as well although their distribution is predictable. It is important to keep in mind that the linguistic principles by which inventories are determined are not necessarily the best principles for orthographies, perhaps particularly when literacy in another language exists.

8. Conclusion

A study of phonological inventories introduces many fascinating questions. What inventories are possible? What are the reasons why there are many common properties of inventories cross-linguistically? How can both cross-linguistic commonalities and variation that is found be accounted for? There remains much to understand. The reader, especially those interested in typological generalizations, should take care to consult original sources, as there is much room for debate in the construction of an inventory, with different assumptions leading to different sizes and shapes.
Further Reading

For readings on inventories in languages of North America generally, see Mithun (1996; 1999). For languages of California, Golla (2011) is an excellent source. Suarez (1983) is a good source on languages of Mexico. Maddieson (1984), together with his chapters in WALS (Dryer & Haspelmath 2013), provides information about inventories. Databases of inventories include PHOIBLE (Moran et al. 2014) and LAPSYD (Lyon-Albuquerque Phonological Systems Database). For theoretical work on inventories, see Clements (2003; 2009), Dresher (2009), Gordon (2016), Hall (2011), Mielke (2009), and references therein.

Notes

1. I use IPA symbols unless otherwise noted. The first line shows stops and affricates, with lines below showing stops/affricates of different phonation types. The next lines have fricatives, then nasals, then other sonorants. See §6 for further discussion.

2. Sources for vowel inventories are as follows: Achumawi (Golla 2011); Aleut (Taff et al. 2001); Alsea (Buckley 2007); Arapaho (Cowell & Moss 2008); Arikara (Parks et al. 1979); Blackfoot (Frantz 2017); Caddo (Chafe 1979); Cahuilla (Golla 2011); Central Alaskan Yupik (Jacobson 1990); Cherokee (Cook 1979; Montgomery-Anderson 2015; Uchihara 2016); Cheyenne (Leman 2011); Chitimacha (Brown et al. 2014); Chiwere (Greer 2016); Chumash languages (Golla 2011); Coatzospan Mixtec (Gerfen 1999); Cupeno (Hill 2005); Dakota (Shaw 1980); Delaware (O’Meara 1996); Eastern Pomo (Golla 2011); Esselen (Golla 2011); Haisla (Wehrle 2010); Hitatsa (Park 2012); Huastec (Larsen & Pike 1949); Huehueta Tepehua (Kung 2007); Hupa (Golla 2011); Jamul Tipai (Miller 2001); Karuk (Golla 2011); Kashaya (Buckley 1994); Kiowa (Watkins, with McKenzie 1984); Lower Rogue River Athabaskan (Golla 2011); Mandan (Mixco 1997); Maricopa (Gordon 1986); Misantla Totonac (MacKay 1994); Muskogean languages (Mithun 1999); Mutsun (Golla 2011); Navajo (McDonough 2003); Nez Perce (Aoki 1994); Nishnaabemwin (Valentine 2001); Northeastern Maidu (Golla 2011); Nuxalk (Bagemihl 1991); Oowekyala (Howe 2000); Patwin (Lawyer 2015); Pawnee (Parks 1996); Plains Cree (Wolfart 1996); Plains Miwok (Golla 2011); Popti’ (Craig et al. 2014); Rude (2014); Ute (Givón 2011); Wappo (Golla 2011); Washo (Golla 2011); Western Mono (Golla 2011); Zuni (Newman 1965).

3. By Maddieson’s criteria, this inventory would have two contrasts, height and backness. Other analyses posit an additional vowel, /o/ or /u/.

4. Syllable-based constraints on distribution of sounds exist as well, and these can intersect with morphologically based constraints. This section examines only morphological restrictions.

5. [j] is the voiced counterpart of [ʃ]. The acute accent represents high tone; the hook is nasalization.

6. The example in (1) from Navajo is discussed further in §3.

7. The symbol N* indicates a voiceless nasal with a voiced transition, and N indicates a floating nasal feature.
6. The /ː/ preceding the /k/ in the morpheme /ːkʰe/ (seen also in various morphemes in (13)–(15) is a laryngeal increment, and may have varying phonological effects depending on its morphological context. The /H/s in (15) are also laryngeal increments. For a discussion of laryngeal incrementation in Southern Pomo, see §2.2.1 and §2.6.6 of Walker (2013).
8. The final [as] in the surface forms in (27) and (28) are “the epenthetic terminal a by stem form” (Shaw 1980: 330). STEM FORM is a phonological rule (121).
9. “The most frequently encountered schwa/zero alternations in Passamaquody are those produced by the deletion of unstressable /ə/ before obstruents” (Lesourd 1993: 167).
10. (k), as with many morpheme-final consonants, is deleted under affixation (Dresher & Johns 1995: 80). Note that in Rose et al. (2012), the ‘q’s in these examples are transcribed as ‘χ’ and the morphemes ‘nanu’ and ‘tutu’ both end in /k/.
12. The % symbol indicates “the lexical derivation boundary” in Shaw (1980: 35).
13. The morphological glosses are not given for every example in Shaw (1980).
14. ‘Government’ within the framework of Government Phonology (Kaye et al. 1990) is a lateral relationship between segments. A vowel in this framework has the capacity to govern the vowel in the syllable to its left.
15. Word-finally all consonants are subject to aspiration or frication (Barker 1964: 24; Blevins 1993: 247). This process is independent of neutralization.
16. Neutralization is also evidenced in the sonorant series (voiced, voiceless, glottalized) but displays a different pattern than that of the obstruents. See the references cited in this section for detailed discussions.
17. Phonological interactions between the classifier and the verb root are quite complex. See Sapir & Hoijer (1967), Stanley (1969), and Howren (1971).
18. VP is said in the literature to be a phase. See Chomsky (1995), Marantz (2007), and Abels (2012), among others, for discussion of phases and their relation to domains for phonological and syntactic operations.
19. Due to the effects of e-epenthesis, only [k] emerges as extrasyllabic word-internally.
20. Dyck argues that this domain cannot be linked to a particular syntactic constituent due to the fact that not all types of affixes in the verbal template are obligatory. We do not see this as an issue; whatever morphosyntactic structure contained within the clause (CP) will be interpreted as a cohesive phonological domain in Cayuga. Independent nominal domains may also be parsed as phonological domains.
21. Note that there is no universal definition of what a word is. There is no consensus on what a grammatical word is, and phonological words do not always equal morphosyntactic constituents. See Julien (2002), Haspelmath (2011), and Newell (2017b) for discussion.
22. Nominal domains parallel verbal domains in important ways that will not be discussed here due to space limitations.
23. Neither vowel length nor vowel quality are determining factors in hiatus resolution in Ojibwe. Any sequence of vowels within a single PWd will be repaired.
1. Here and throughout this chapter, primary stress is marked by [’] and secondary stress by [.] preceding the syllable. Parentheses mark foot structure. Syllable boundaries are indicated by a period [.] when not otherwise shown by stress marks or foot boundaries.
2. Morphologically complex structures may have a secondary stress on the final syllable of a word contained in the larger structure, such as a compound, but this is a matter of cyclicity rather than iterative footing.
3. There is, however, an alternative pronunciation in which the stem takes primary stress; thus the form (bada), isats) can also be stressed as (bada)(isats).
4. For simplicity, all epenthetic vowels are written here as schwa, but these vowels take on various qualities depending on the adjacent segments.
5. See Hernández Mendoza (2017) for an analysis with four level tones and six contour tones. The five-level analysis is also discussed in Longacre (1952) and Elliott et al. (2016).
6. Enrico (1991) does not transcribe high tone, but accent marks are added here according to his description.
1. The following abbreviations are used: ADJ = adjective, BR = base-redundant, BRCT = base-redundant Correspondence Theory, CONS = consequent, CRT = control transitive, GTT = Generalized Template Theory, IA = Item and Arrangement, IND = indicative, INDR = indirect, IO = input-output, IP = Item and Process, IT = iterative, L = vowel lengthening triggering suffix, MDT = Morphological Doubling Theory, OBJ = object, OT = Optimality Theory, Pl = plural, POSS = possessive, RED = reduplicant, REP = repetitive, S = subject, SG = singular, TETU = the emergence of the unmarked, TR = transitive, WP = Word and Paradigm.
2. See Saba Kirchner (2010: 11) for a range of analyses that were proposed to follow from affixing a floating mora in several languages of North America, including Diegueño, Kwak’wala, Proto-Uto-Aztecan, Southern Sierran Miwok, and Washo.

3. Stonham (1994: 178–179) discusses evidence of moraic codas from an analysis of stress in Squamish (a related language) and word minimalism. Crucially, there is no evidence that stress is attracted to heavy syllables. Furthermore, the word-minimality pattern is compatible with a preference that content words are consonant-final in Saanich.

4. This could be explained by assuming a bimoraic foot with an extrametrical syllable (Kager 2012).

5. It is also the case that multiple exponent involves affixes only. See Caballero (2011) and Caballero and Harris (2012).

6. Words like those above – where the reduplicant has a contrast not present in the base – have also been used to argue for a modification in how input-output faithfulness is formalized (see Struijke 1998 for more information on this).

7. English affective reduplication is an example of this: e.g., police > po-po and crazy > cray-cray. Thanks to Jason Haugen for sharing this example.

8. Abbreviations in this chapter are as follows: I = first person, 2 = second person, 3 = third person, 3’ = third person obviative, A = agent, abl = ablative, abs = absolutive, acc = accusative, agr = agreement, al = alienable, all = allative, alien = alienable, an = animate, art = article, assoc = associative, attr = attributive, aux = auxiliary, bas = basic, ben = benefactive, cl = classifier, col = collective, compl = completive, conj = conjunct, def = definite, dem = demonstrative, dir = direct, disj = disjoint, dist = distal, distr = distributive, du = dual, ep = epenthetic element, emph = emphatic, erg = ergative, f = feminine, fact = factive, fin = finite, fut = future, gen = genitive, hyp = hypothetical, imp = imperative, impp = imperfective, in = inanimate, inal = inalienable, indef = indefinite, ins = instrumental, intr = intransitive, inv = inverse, invis = invisible, irr = irrealis, loc = locative, m = masculine, n = neuter, neut = neutral, nom = nominative, nsf = noun suffix, obl = oblique, obj = object, obv = obviative, p = patient, part = participial, pau = paucal, perf = perfective, pl = plural, poss = possessive, prev = preverb, prog = progressive, prox = proximal, prs = present tense, prsv = presentative, pst = past tense, purp = purposive, q = question marker, redup = reduplicant, refl = reflexive, sbj = subject, sim = simulative, sg = singular, spec = specific, ss = same subject, ta = transitive animate, ti = transitive inanimate, tr = transitive, up = unknown possessor, vial = vialis, vis = visible.

3. It is unclear why tári- ‘house’ patterns with mass nouns.

4. The a- prefix is underlingly wa- (Michael Barrie, p.c.).

5. Wiltschko (2012) argues that animacy in Blackfoot (Algonquian) is not in fact gender, but instead a form of inner nominal aspect. I do not address that possibility here.

6. This is an oversimplification; singular obviative forms disambiguate between animate and inanimate (Brittain 1993). See Wolfast (1996) and Oxford (this volume) for discussions of obviation.

7. Mixtec (Otomangean) has a similar system, based on sex (masculine/feminine), age/politeness (older, younger, deceased, etc.), supernatural, animal, and inanimate, but it is only marked on pronouns (Macaulay 1996). Age/politeness might be part of a different formality system (cf. Bliss & Ritter 2009), but I am agnostic as to its status in Mixtec.

8. Boas and Swanton (1911: 939–941) also list an indefinite article wi", which can be used for any referent or grammatical role.

9. There are instances where plural is not entirely obligatory, but number marking is much more systematic in most Algonquian languages than in the languages discussed in §3.1.1. One place where number marking is not obligatory is in certain syntactic contexts in Blackfoot; unmarked nouns in those cases have general number (see Kim et al. 2017).

10. Brown (2007) reports that, for at least one speaker, the singular form is not grammatical, humuxw is the regular form, ganumux a more regional one, and gahumuxw means ‘their ears’.

11. Further, in an experiment using nonce words, speakers used almost all of the strategies to pluralize the words (Brown 2008). Thus, there does not appear to be a default pluralization strategy.

12. This is sometimes dependent on obviation; see Wolfast (1996) and Oxford (this volume) for discussion.

13. The paucal only occurs on a small number of nouns, and these nouns do not take the plain plural suffix by itself. Mark C. Baker (p.c.) suggests that paucal might be misleading in this context; however, I can think of no better term for the semantics of this suffix.

14. Watohamigie et al. (1982) describe a very different system of plural marking. I assume dialect difference here. Further, Redden’s description might be better thought of as plural and augmentative, rather than paucal and plural.
15. Mark C. Baker (p.c.) suggests that the inalienable forms may be related to the alienable ones; this is beyond the scope of this chapter.
17. There are also forms for berries, containers, etc., but they do not involve reduplication.
18. The position of the articles can vary from language to language and is likely determined by the meaning of the article. I abstract away from such issues here.
19. This is an incomplete table; possessive forms are not included. Further, a better description of the distal series might be "non-deictic". Nicholson and Werle (2009) describe the distal articles as lacking any deictic information.
20. There is also a more complicated system of negative articles, which I do not discuss (Rood & Taylor 1996).
21. Smith uses different terminology for some of these.
22. While this appears to be an unergative verb, and we would expect agent marking on the subject, "patients tend to be affected but not in control of the action expressed by a verb" (Balodis 2016: 107). I infer from this description that children are not considered to have full control of their play.
1. Note that they treat deixis separately and do not include discussion of it in their volume.
2. The topic of motion has certainly not been excluded from the analyses of languages of North America. See for instance Mithun (1999) on Mohawk, Broadwell (2006) on Choctaw, and Rude (1985) on Nez Perce, which describe the morphosyntactic strategies for the expression of motion towards a speaker (cislocative) or towards a reference point (translocative). Rood (2003) describes distinctions in Lakota focused on motion towards or away from a reference point. Strategies for encoding source, goal, and similar concepts often involve the use of prefixes and suffixes. Some of these strategies are described for Nishnaabemwin (Valentine 2001), Hualapai (Watahomigie et al. 2001), Haida (Enrico 2003), Ineseño Chumash (Applegate 1966), and Creek (Martin 2001). Mithun (1999) reports on similar features for Central Pomo, Shasta (from Silver 1966) and Tsimshianic.
3. Oblique marking with adpositions and locative case is discussed in more detail in §4 regarding strategies used to encode locative information in ground phrases.
4. Although perhaps this is the case in Kalispel (Salish), but more data are needed to verify this pattern.
5. The following abbreviations are used: A = cross-reference ‘Set A’ (ergative possessor), ABS = absolutive, ACC = accusative, ART = article, APP = appositional mood, B = cross-reference ‘Set B’ (absolutive), CL = classifier, CR = Cora, D2 = distal/anaphoric particle, DECL = declarative, DEF = definite, DEF = adverbial demonstrative, DEM = demonstrative, DFP = dependent aspect-mood, DET = determiner, DIR = directional, DIST = distal, DP = distant past, DUR = durable, EMPI = emphasis, EXIST = existential, HU = Huichol, IND = independent order indicative (unmarked mode), INDIC = indicative, LOC = locative, NMLZ = nominalizer, OBJ = object, OBL = oblique, PART = participle, PASS = passive, PASTP = past participle, PL = plural, POSS = possessive, POT = potential, PROX = proximal, PV = preverb, R = ditransitive recipient, RP = recent past, SBI = subject, SG = singular, UNSPEC = unspecified.
6. Note that in many Mayan languages this predicate is also a positional root; for example, in Quichean, the existential root k'o can also be used locatively (Larsen 1988: 293). Mayan languages are known for having large positional root classes, forms of which can be used in locative descriptions. Tseltal is an example of a language that can use the existential ay in locative constructions, but speakers prefer positional roots (Polian 2013: 575).
7. Existential forms appear to be preferred in cases where the figure object is animate and not attached to the ground object (Bohnemeyer & Stolz 2006).
8. Although note that katek ‘sit’ is used with insects and birds (Freeze 1989).
9. Broadwell (2006: 335) indicates that the plural forms of position verbs show two forms that differ in their ending but not in what they encode. Additional description as to the four plural forms listed for the verb ‘to sit, dwell’ is in Broadwell (2006: 338), which explains that áashah and áyyušah may be reduced and unreduced forms of an unattested root ashah and involve additional semantic distinctions.
10. We are grateful for Ives Goddard for consulting with us while drafting the text on Algonquian languages. Any errors or lack of clarity are strictly our responsibility as authors of this chapter.
11. The term relative root dates back to Howse’s (1844) grammar of Cree (Algonquian), and refer to roots whose meaning is dependent on those of other words with which they co-occur in the same sentence.
12. Svorou (1994: 31) has termed “all of these grammatical forms of language which express primarily spatial relations as spatial grams”, but this term has not persisted in the literature.
13. Other part morphemes may attach as verbal prefixes for other functions.
14. Note that some consider Haida to be a Na-Dene language (Enrico 2004).
1. Following Adger and Harbour (2008: 2), φ-features are taken to include “those involved in predicate-argument agreement, typically person, number, and gender”.
2. Abbreviations: 1, 2, 3 = first, second, third person, 3’ = third-person obviative, 0 = third-person inanimate, A = Set A (ergative/possessive), ABS = absolutive, AF = agent focus, AP = antipassive, N = Set B (absolutive), CAUS = causative, CL = classifier, COM = completive aspect, COND = conditional clause type (in the sense
of an antecedent in a hypothetical proposition), CONT = contingent clause type, CONTEMP = contemporaneous, DA = disjoint anaphor, DECL = declarative, DEF = definite, DEP = dependent, DIR = direct, directional, DIST = distant, DS = different subject, DTV = ditransitive verb suffix, DU = dual, ERG = ergative, FOC = focus
FUT = future 1 = inverse number, IC = initial change, IMP = imperative, INTR = intransitive, INV = inverse, ITV = intransitive verb suffix, NEG = negative, NOM = nominative; OBJ = object; OBL = oblique; OBIV = obviative; PERF = perfect; PL = plural; PREV = perfective, ROX = proximate, RDP = reduplication; REFL = reflexive; SBJ = subject SG = singular; SJV = subjunctive; SUF = suffix; TA = transitive animate, TI = transitive inanimate, TV = transitive verb suffix. For consistently, glossing has been regularized. Unattributed examples from Inuktitut and Innuaqqun were collected by the author.

3. According to Mithun (1999: 207), “two adjacent identical obstructions merge to an aspirated obstruent, so the sequence k-k is pronounced k’k”.

4. The number symbol “#” indicates the boundary between disjunct and conjunct prefixes within the verb.

5. Similarly, switch-reference marking (a phenomenon whereby subjects, prototypically, are marked as being the same or distinct across clauses) in dependent clauses in Inuit can exhibit a nominative-accusative alignment, tracking the logical subjects between clauses, regardless of transitivity (Pittman 2005; Allen 2013). In terms of its relative position in the verbal complex and its sensitivity to clause type, switch-reference in Inuit patterns to some degree like agreement. See also Berge (2011) for a discussion of switch-reference in West Greenlandic.

6. Forms are presented in the IPA. The underlying /ph/ sequences here surface as [H] and are represented as such in the orthography.

7. Such forms are also found in the possessive marking on nouns, but once again, these are concomitant with ergative marking on possessors (when overt).

8. While Nichols (1997: 10) calls the ergative-absolute pattern in Zuni epiphenomenal, her reasoning that “prefixal and suffixal agreement can be shown to have different sources and therefore do not reflect a single coherent structural case-marking strategy” seems nevertheless compatible with the phenomenon of ergativity, broadly construed.

9. As is the case in many languages, third-person singular in Lakhota, for both active and stative verbs, is null.

10. Woolford proposes that Optimality-Theoretic constraints limit the exponent of this cross-referencing and set language-specific preferences in terms of their expression as agreement or clitics at PF. She contrasts her approach with two more syntactically oriented explanations of split systems. First, she argues against proposals attributing such splits to abstract case, in which stative verbs assign accusative to their subjects. She states that such a system “does not occur among languages that mark their arguments with morphological case” (Woolford 2010: 2). However, Mithun (1999) provides two examples of languages which at least manifest morphological case distinctions in free pronouns following an active-stative pattern: Haida and Central Pomo. If free pronouns can manifest a split-intransitive pattern, it is not clear that split agreement patterns must be reduced to PF constraints on the expression of clitics and agreement. The agentive and patientive pronouns in these languages thus point to case and not morphophonological considerations as being responsible for the split. Woolford also argues against an analysis of agreement “that directly targets external and internal arguments” (Woolford 2010: 2). However, as discussed later in this chapter, Coon (2017) provides compelling arguments in favor of agreement on little v targeting external arguments in Mayan languages.

11. This list provides only an illustrative sample of languages. Mithun (1999: 213) lists other languages and families as being active-stative or agent-patient, but her classification extends beyond agreement. For instance, she shows that Haida and Central Pomo manifest a split transitive pattern in their choice of free pronouns, as mentioned previously.

12. This hierarchy is a simplified version of the hierarchy presented in Valentine, which includes the ‘unspecified actor’ in passives above third person (Valentine 2001: 271–272). See Bliss et al.’s chapter in this volume on hierarchies and direct-inverse systems, as well as Oxford (2017b) for a discussion of a number of myths involving agreement in Algonquian.

13. For instance, Murasugi (2017) argues for the presence of a morpheme in the transitive declarative/participial clause type in Inuktitut that corresponds to inverse contexts (i.e., non-local subject and local object), despite the lack of a pattern of preferential agreement along a hierarchy.

14. Jacques and Antonov (2014) also treat the cislocative marker in Nez Perce, which occurs in contexts where second person is acting on first person, as a type of inverse marker. Deal (2015b) treats this as a type of “agreement extension”, in an agreement system that is otherwise nominative-accusative.

15. However, as noted by a reviewer, this evidence would be more compelling if we were able to rule out the possibility that this is a case of possessor raising.

16. Walker (p.c.) suggests that the form identified as the (optional) first person marker, -na, (in Walker 2013) should in fact be analyzed as the imperfective [-ad(u)] followed by the performative evidential [-l:al], which are then subject to morphophonological changes, including a rule whereby an underlying /d/ can become [:] or [n] in some contexts.
17. Another such language is Shoshone (Uto-Aztecan), which according to Lindsey (2000) and Matsumoto (2015: 86–87) has optional agreement for number and number suppletion for a small closed class of verbs. Matsumoto suggests these could be instances of lexical verbal number, akin to the difference between *kill* and *massacre*.

18. While most Algonquian languages do not show an overt obviative contrast marked on inanimate nouns, Oxford (2017b) and Oxford and Bliss (2017) explain that the contrast nevertheless exists covertly in numerous languages, as evidence by the fact that these inanimates trigger obviative forms of agreement on the verb.

19. Kiowa verbal agreement is considerably more complex than might be suggested by the examples here. For the full set of agreement markers and discussion thereof, see Harbour (2017).

20. A similar phenomenon involving objects is found in Dene languages, whereby third-person objects with disjoint reference with respect to the subject receive special agreement marking (see Saxon 1986; Rice & Saxon 2005). For instance, in the following examples from Tłı̨chǫ Yatiì, the third-person object marking distinguishes between (i) disjoint reference with a third-person subject (called “disjoint anaphor” in the literature), (ii) coreference with a third-person subject, and (iii) third-person animate referents with a local subject (Nicholas Welch, p.c., from speaker Archie Wedzin):

   This phenomenon may fall outside the definition of switch-reference, which typically involves two or more clauses. Similarly, Inuit possessor marking differentiates between coreference and disjoint reference with clausemate subjects.

21. The contingent clause type, used to mean ‘if’ or ‘when’ (in the future), is often (confusingly) called ‘conditional’ in the literature on Inuit.

22. This clause type receives different names in the literature on Inuit, including “appositional” (Dorais 2003) and “conjunctive” (Lowe 1985). Agreement forms exhibit phonologically and morphologically conditioned allomorphy.

23. Although Pittman (2005) describes switch-reference in Inuktitut as “non-canonical”, and on this basis McKenzie (2015) concludes that it lacks (genuine) switch-reference, as he defines it, Mauro (2018) shows that some dialects do in fact have a genuine canonical system of switch-reference, although in other dialects the system is disappearing due to language change, particularly among younger speakers.

24. I use the label *ergative* instead of *relative* for the case found on the agent (and also found on possessors in the language). I have also separated and augmented the glosses for each agreement head. Johns’s original glossing labels the morpheme -ja(q)- as a passive participle.

25. While the status of this morpheme as a tense marker in West Greenlandic is debatable, its status as a clause type marker in the neighboring dialect of Baffin Inuktitut is supported by existence of dedicated past-tense markers with which it may co-occur. Furthermore, it is compatible with present tense (Nunavut 2000; 2002).

26. Nevins (2011) also proposes that the Person–Case Constraint (PCC) and omnivorous number (i.e., a phenomenon whereby number agreement can index a lower argument if the higher argument bears no marked number features) are diagnostics for differentiating agreement and pronominal clitics, but the reasons for which this should obtain appear to be internal to his theory of Multiple Agree.

27. While we might expect the possibility of plural number agreement with a third-person subject and person agreement with a local object, Preminger argues that this is prevented due to there being a single morphological slot available to mark agreement in this construction, with the first- and second-person forms taking precedence over (third-person) plural.

1. Unless otherwise cited, examples come from the authors’ field notes. Our own examples are given in a four-line format in which the top line represents the phonetic and/or orthographic form. Morphophonological processes such as epenthesis, deletion, pitch accent, etc., that are apparent from the top line are not discussed in this chapter. Abbreviations: 1, 2, 3 = first, second, third person, A = subject of transitive verb, ACC(ative), ANIM(ate), APPL(ative), DIRT(ective), DIRTV = directive; ERG(ative), FUT(ure), INAN(imate), INDI(ative), INV(ersive), NOM(inative), OBJ(ective Case), OBV(inative), PL(ural), PROX(imate), PST = past, S(subject of intransitive verb), SG = singular, TA = transitive animate.

2. In some cases, the verb in both direct and inverse is ditransitive, and the alignment is determined by the relation between the subject and indirect object. Since the choice of direct or indirect object does not affect the discussion in this chapter, we abstract away from this detail.

3. An accusative case pattern consists of accusative case-marked direct objects and (default) nominative case-marking elsewhere, i.e., on subjects of transitive and intransitive verbs; an ergative case pattern consists of ergative case-marked subjects of transitive verbs and (default) absolutive case-marking elsewhere, i.e., on direct objects and subjects of intransitive verbs.
4. As Henry Davis (p.c.) observes, the label referential hierarchy may be misleading for (5b) because pronouns may not be more referential than other nominals due to the fact that they may serve as bound variables. What Croft intends here is a hierarchy of nominal types.

5. Bliss (2005) demonstrates that in Blackfoot, both morphological animacy and sentence (semantic animacy) play a role in direct/inverse marking.

6. Although transitivity and reference to a prominence hierarchy are two defining properties of inverse systems, neither of these properties are critical on their own for distinguishing between active/passive and direct/inverse systems. A more nuanced view of how in/transitivity and hierarchies (person vs. thematic) interact may yield a useful crosslinguistic typology of voice phenomena. This is beyond the scope of this chapter, but we thank Henry Davis for pointing us in this direction.

7. For reasons of space, we omit comparison with Austronesian voice systems, which like direct/inverse systems, are widely seen as different realizations of transitive predicates. See Rackowski (2002), Wouk and Ross (2002), and Pearson (2005), among many others, for discussion.

8. Conversely, passive constructions in some languages (e.g., Straits Salish) can be sensitive to prominence hierarchy effects. Thanks to Henry Davis for this observation.

9. For example, Algonquian languages require one hierarchy for person agreement prefixes, another for number agreement suffixes, and a third for direct/inverse marking on verbs. These three prominence hierarchies encode different options for the relative rankings for Speech Act Participants (2 > 1 > . . . vs. 1 > 2 > . . ., respectively). See Hockett (1966), McGinnis (2005), and Oxford (2014), among many others, for discussion. Similarly, in the Mixe-Zoquean language Ocotepec, the second-person marker is used in both 1:2 and 2:1 interactions, suggesting a 2 > 1 ranking in this language (Boudreault 2017).

10. Discourse prominence is one of the determinants of obviation, but syntactic position is also a factor; e.g., in possessed nominals, the possessee is always obviative relative to its possessor.

11. It has been claimed that Lummi (Salish) and Nuu-chal-nulth (Wakashan) also have inverse systems. However, on closer inspection, neither language fits our characterization because in both cases, the inverse is best analyzed as a detransitivizing operation (cf. Jelinek & Demers 1983: 168; Whistler 1985 for Nuu-chal-nulth). Similarly, although Aissen (1997) finds striking similarities between Algonquian direct clauses and Tzotzil (Mayan) active ones, we exclude Tzotzil from our sample because “the function of the inverse in Algonquian is carried by the passive in Tzotzil” (Aissen 1997: 722).

12. Kinkade (1989) describes what he calls a topical object marker. Following a suggestion by Henry Davis, we consider this as an inverse marker because it (i) appears only on transitive verbs; (ii) is in complementary distribution with the regular object suffix; and (iii) appears when the object is human and the subject is not. We have not included Lushootseed (Salish) in our table because Kinkade (1989: 27) reports that although it has remnants of a topical object marker with these properties, speakers no longer use it. We have also omitted Cowlitz, Quinault, and Tillamook (Salish) from our table because it is unclear whether their topical object markers should be treated as inverse markers due to the fact that there is either no evidence for, or no information on, a prominence hierarchy that determines the distribution this suffix in these languages (Kinkade 1989: 37).

13. Scancarelli (1986) uses the terms subject focus and object focus, rather than direct and inverse. Since we analyze these forms as direct and inverse, respectively, we have modified her glosses to ease comparison with other languages considered here.

14. Thank you to Hiroto Uchihara for alerting us to the fact that the a:- prefix in (9a) and the k- prefix in (10a) are phonologically and lexically conditioned allomorphs of the same morpheme. Uchihara also suggests that the morphemes glossed here as encoding two participants may in fact just encode one, with a :-k- encoding the actor and u:- encoding the goal. We have followed the analysis of Scancarelli in the glosses provided here.

15. Double-marking languages are those in which the verb is indexed with agreement expressing features of the arguments, and the arguments have Case reflecting their grammatical relations (Nichols 1986). In our view, proximate and obviative marking on nouns alongside direct and inverse marking on verbs does not qualify as a double-marking system, as proximate and obviative are properties of the nominals and not a reflex of their relation to the predicate. However, the Mixe-Zoquean language Jitotoltec constitutes a second exception to Klaiman’s generalization; like Sahaptin, it has an inverse and is a double-marking language (Boudreault 2017; Zavala 2011).

16. The Sahaptin examples in (11a), (11b), and (12) are originally due to Rigsby and Rude (1996), and (13) is due to Rude (1994), who attributes (13a) to Jacobs (1929: 221: 8) and (13b) to Jacobs (1937: 28:22:2, p. 63). The sources differ slightly in the glosses assigned to the different morphemes. We follow Zühi in labeling the verbal prefixes as agreement, rather than case markers, Rigsby and Rude (1996: 676 (13)) in labeling the suffix -yawan in (11b) as a directive suffix, and Rude (1994) in labeling the prefix pú- in (13b) as inverse. In addition, our glosses have been modified to conform to those used elsewhere in this chapter.
1. The following abbreviations are used: 1/2/3 = first, second, third person, AN = animative, ABL = ablative, ABS = absolutive, ACC = accusative, AG = agent, ASP = aspect, AUX = auxiliary, CMP = comparative, COMPL = complementizer, COMPL = comple mentizer, CONJ = conjuncts, CONJ = conjunctive, COND = conditional, D = dual,DECL = declarative, DEF = definite, DEM = demonstrative, DS = different subject, ERG = ergative, EXCL = exclusive, I = agreement class I, II = agreement class II, IMPF = imperfective, IND = indicative, INF = infinitive, INV = inverse number, IRR = irrealis, LOC = locative, N = negative agreement class, NEG = negative, NOM = nominative, O = object agreement, OBL = oblique, OP/S = embedded object is the same as matrix subject, P = patient, PASS = passive, PL = plural, PTCP = participle, POSS = possessive, POT = potential, PREV = previous mention, PFV = perfective, PROG = progressive, PRF = second position particle (evidential), PST = past tense, RECIP = reciprocal, S = subject agreement, SBJV = subjunctive, SG = singular, SR = switch-reference, SS = same subject, S.T. = something (unspecified argument), T = temporal, TNS = default tense, TOP = topic, UT = unspecified time, VAL = val idator (evidential).

2. See also Woodbury (1983) for a different argument that SR operates in larger discourse units than clauses/ sentences. There seems, however, to be a real difference between Eskimoan languages and others in this respect; see § 5 for a brief comment on this.

3. In particular, what counts as “clause chaining” is not well defined by McKenzie (or others). We hope that this category can be reduced to either a particular kind of conjunction (as Keine (2013) does for Amele, and Nonato (2014) for Kisêdjê), or to a particular kind of subordination, depending on the language (see also Broadwell 1997 for another possible structure). If that is correct, then we need to sort out which instances of clause chaining are which in order to fully evaluate the McKenzie/Weisser empirical generalization. Some potential problems may be lurking here. For example, Mithun (1993) shows that there is non-canonical SR in Central Pomo, and McKenzie classifies this as clause chaining, consistent with his generalization. But if forced to choose between conjunction and subordination, there is some reason to think that most of Mithun’s cases may be subordination. For example, three of the four SS markers allow the reference-marked clause to follow the main clause. This suggests that they are subordinate clauses, which often can come before or after the main clause rather freely, in contrast to conjointed clauses, which are usually ordered iconically, matching the sequence of the events they report. So there is important work to be done to clarify this issue.

4. The only complements that might be reference-marked in Shipibo and Yawanawa are the complements of certain auxiliary verbs (e.g., ‘go’, ‘begin’, ‘be’), where only SS marking is possible; see (17). McKenzie (2015a: 33) shows that similar verb-auxiliary constructions in Yuman languages also mark SS. He analyzes it as a historical vestige of a former SR construction, since these constructions always require SS and there is no second subject to be tracked.

5. The one sort of neo-Finerian theory that might have more trouble generalizing SR to complement clauses is one based purely on Agree relationships, such as Camacho (2010). It is not clear that the C head on a CP inside VP is close enough to the matrix subject to enter into Agree with it, there being a phase head (v) and sometimes a goal object between the two.

6. The matrix subject is not ergative in (16b) because the infinitive complement is marked for oblique case.

7. In addition, the obviative affixes found on nouns are also used to mark SR on relative clauses in Hopi, presumably for the same reason. Another interesting case is Washo (Jacobson 1964; 1967). Although the DS marker -s appears on nominalized complement clauses (and on internally headed relative clauses), Washo is somewhat unusual in that the nominal head/morpheme -gi/ge appears outside of the SR marker, and there are no obvious signs of nominalization internal to the clause. This morpheme order is in marked contrast to languages like Choctaw and Hopi, where SR markers are outside of C or NOML morphemes. Following Arregi and Hanick (2018), we could say that a D head takes a full CP complement in Washo, and then there is still room for an operator in Spec CP (cf. 18).

8. Still pending, however, is the question of why the operator is always controlled by the matrix subject, never by the matrix object, as noted in connection with (12). Although this is not a property of canonical control, it is apparently a property of the control of logophoric operators and of complementizer agreement in Bantu languages like Lubukusu (see Diercks 2013). Thus, the principles of control may be somewhat different for subject PROs and for null operators in CP, for reasons that remain to be understood.

9. Note that in (20), the two subjects disagree in person features as well as in number features. Therefore, splitting T into separate person and number probes along the lines of Béjar and Rezac (2009) and Preminger (2014: Chapter 4) and saying that SR is mediated by the person probe only (as suggested to us by Richard Compton) does not help to explain this example. Not all languages that allow SS marking in cases of referential overlap allow it in cases where the subjects do not match in person (Stirling 1993: 38, 82–83), but some do, including Mojave.

10. This account also explains the fact that a passive clause linked to an intransitive clause with the “unspecified subject” marker ka can also be marked SS in Seri (Marlett 1981: 357). See Keine (2013) for a somewhat different but related interpretation of these facts.
One sometimes sees SS marking if the subject of one clause is coreferential with the possessor of the subject of the other clause, even when there is no independent evidence of possessor raising. Seri (Marlett 1981: 362–363) has one clearly described instance of this. Since all of the examples involve inalienable possession (I = my limbs, my heart, my spirit), it may simply be that an NP that denotes a person can count as coreferential with an NP that denotes a part of the person, as happens with discontinuous constituents in Australian languages like Warlpiri.  

Case is relevant to SR in Panoan languages too, although in a different way: the form of the SS marker varies depending on whether the matrix subject is ergative or not (Valenzuela 2003; Camacho 2010; Baker 2014). So case features can be picked up by SR markers, and Pomo is presumably a variant of this. See Camacho (2010) for the stronger claim that case is central to the agreement relation that establishes inter-clausal dependencies in SR constructions. More generally, the relationship of SR to case marking is an important topic that we are unable to discuss systematically here.  

There is also good evidence that what counts as the object of the embedded clause for O=S reference marking in Panoan is an agreement-theoretic sense of object. See Baker and Camargo Souza (in preparation) for discussion.  

We thank Richard Compton for pointing out this reference to us.

11. One sometimes sees SS marking if the subject of one clause is coreferential with the possessor of the subject of the other clause, even when there is no independent evidence of possessor raising. Seri (Marlett 1981: 362–363) has one clearly described instance of this. Since all of the examples involve inalienable possession (I = my limbs, my heart, my spirit), it may simply be that an NP that denotes a person can count as coreferential with an NP that denotes a part of the person, as happens with discontinuous constituents in Australian languages like Warlpiri.  

12. Case is relevant to SR in Panoan languages too, although in a different way: the form of the SS marker varies depending on whether the matrix subject is ergative or not (Valenzuela 2003; Camacho 2010; Baker 2014). So case features can be picked up by SR markers, and Pomo is presumably a variant of this. See Camacho (2010) for the stronger claim that case is central to the agreement relation that establishes inter-clausal dependencies in SR constructions. More generally, the relationship of SR to case marking is an important topic that we are unable to discuss systematically here.  

13. There is also good evidence that what counts as the object of the embedded clause for O=S reference marking in Panoan is an agreement-theoretic sense of object. See Baker and Camargo Souza (in preparation) for discussion.  

14. We thank Richard Compton for pointing out this reference to us.

1. Abbreviations A, S, and O are based on Dixon (1994).

2. Gloss: ERG = ergative case; ABS = absolutive case; IND = indicative mood, PART = participial mood. The mood marker is an obligatory part of the verbal agreement inflection and these function as declarative moods. See Johns (1987, 1992) and Yuan (2017) for detailed discussion.

3. Also known as active, active-neutral, active-inactive, active-static, stative-active, agentive, agent-patient, and split intransitive patterns (Mithun, 1991). I will use the term split-S.

4. Except for when it is used as possessor case (Johns 1987) and in some recently emerging passive constructions (Spreng 2012).

5. Dependent clauses do not show ergativity in this way.


8. Gaps with the corresponding case added by this author.

9. Although see Davis (2010) for an appreciation of the complexities analyzing relative constructions in more unfamiliar languages.


11. Mattissen actually splits this category into two subgroups. We have conflated them here to keep the discussion brief.

12. Although Iroquoianists largely agree that the agreement morphology in Iroquoian is generally portmanteau, Chafe (1960) gives an attempt of full decomposition with significant allomorphy. See Barrie and Uchihara (this volume) and the other references cited here for more details.

13. One criticism of Baker (1996) we do not address here is Koenig and Michelson (2015). This is because Koenig and Michelson do not directly address the issue of polysynthesis, so it is out of place to discuss it in detail here. Nevertheless, they offer a strong and important critique of Baker (1996), both empirically and theoretically, and their discussion impinges a great deal on the study of polysynthesis. The core of their claim is that overt NPs are never selected by the verb but are rather syntactically adjoined to the verb. They claim that lexical words in Northern Iroquoian are “functionally complete”, thus obviating the need for selection of any kind, lambda-abstraction, and phrase structure (be it X-Bar Theory or Bare Phrase Structure).

14. The following abbreviations are used in the glosses: 3 = third person, A = Set A (ergative/genitive), ABS = absolutive, AF = agent focus, AP/ANTIPASS = antipassive, ASP = aspect, B = Set B (absolutive), COM/CP = completive, DAT = dative, E/ERG = ergative, HAB = habitual, ICP = incompletive, IMPERF = imperfective, IND = indicative mood, INTR = intransitive, IV = intransitive verb, MOD = modalis, NEG = negation, NONFUT = nonfuture, NML = nominal suffix, OBJ = objective case, PART = participial mood, PASS = passive, PERF = perfective, PL = plural, PRFV = perfective, REL = relative case (= ergative), RN = relational noun, SG = singular, SS = status suffix, SUBJ = subject, TR = transitive, TV = transitive verb.

1. Mattissen actually splits this category into two subgroups. We have conflated them here to keep the discussion brief.

2. Although Iroquoianists largely agree that the agreement morphology in Iroquoian is generally portmanteau, Chafe (1960) gives an attempt of full decomposition with significant allomorphy. See Barrie and Uchihara (this volume) and the other references cited here for more details.

3. One criticism of Baker (1996) we do not address here is Koenig and Michelson (2015). This is because Koenig and Michelson do not directly address the issue of polysynthesis, so it is out of place to discuss it in detail here. Nevertheless, they offer a strong and important critique of Baker (1996), both empirically and theoretically, and their discussion impinges a great deal on the study of polysynthesis. The core of their claim is that overt NPs are never selected by the verb but are rather syntactically adjoined to the verb. They claim that lexical words in Northern Iroquoian are “functionally complete”, thus obviating the need for selection of any kind, lambda-abstraction, and phrase structure (be it X-Bar Theory or Bare Phrase Structure).

4. Except for when it is used as possessor case (Johns 1987) and in some recently emerging passive constructions (Spreng 2012).

5. Dependent clauses do not show ergativity in this way.


8. Gaps with the corresponding case added by this author.

9. Although see Davis (2010) for an appreciation of the complexities analyzing relative constructions in more unfamiliar languages.


11. Mattissen actually splits this category into two subgroups. We have conflated them here to keep the discussion brief.

12. Although Iroquoianists largely agree that the agreement morphology in Iroquoian is generally portmanteau, Chafe (1960) gives an attempt of full decomposition with significant allomorphy. See Barrie and Uchihara (this volume) and the other references cited here for more details.

13. One criticism of Baker (1996) we do not address here is Koenig and Michelson (2015). This is because Koenig and Michelson do not directly address the issue of polysynthesis, so it is out of place to discuss it in detail here. Nevertheless, they offer a strong and important critique of Baker (1996), both empirically and theoretically, and their discussion impinges a great deal on the study of polysynthesis. The core of their claim is that overt NPs are never selected by the verb but are rather syntactically adjoined to the verb. They claim that lexical words in Northern Iroquoian are “functionally complete”, thus obviating the need for selection of any kind, lambda-abstraction, and phrase structure (be it X-Bar Theory or Bare Phrase Structure).

14. The following abbreviations are used in the glosses: 3 = third person, A = Set A (ergative/genitive), ABS = absolutive, AF = agent focus, AP/ANTIPASS = antipassive, ASP = aspect, B = Set B (absolutive), COM/CP = completive, DAT = dative, E/ERG = ergative, HAB = habitual, ICP = incompletive, IMPERF = imperfective, IND = indicative mood, INTR = intransitive, IV = intransitive verb, MOD = modalis, NEG = negation, NONFUT = nonfuture, NML = nominal suffix, OBJ = objective case, PART = participial mood, PASS = passive, PERF = perfective, PL = plural, PRFV = perfective, REL = relative case (= ergative), RN = relational noun, SG = singular, SS = status suffix, SUBJ = subject, TR = transitive, TV = transitive verb.

1. Mattissen actually splits this category into two subgroups. We have conflated them here to keep the discussion brief.

2. Although Iroquoianists largely agree that the agreement morphology in Iroquoian is generally portmanteau, Chafe (1960) gives an attempt of full decomposition with significant allomorphy. See Barrie and Uchihara (this volume) and the other references cited here for more details.

3. One criticism of Baker (1996) we do not address here is Koenig and Michelson (2015). This is because Koenig and Michelson do not directly address the issue of polysynthesis, so it is out of place to discuss it in detail here. Nevertheless, they offer a strong and important critique of Baker (1996), both empirically and theoretically, and their discussion impinges a great deal on the study of polysynthesis. The core of their claim is that overt NPs are never selected by the verb but are rather syntactically adjoined to the verb. They claim that lexical words in Northern Iroquoian are “functionally complete”, thus obviating the need for selection of any kind, lambda-abstraction, and phrase structure (be it X-Bar Theory or Bare Phrase Structure).

4. Except for when it is used as possessor case (Johns 1987) and in some recently emerging passive constructions (Spreng 2012).

5. Dependent clauses do not show ergativity in this way.


8. Gaps with the corresponding case added by this author.

9. Although see Davis (2010) for an appreciation of the complexities analyzing relative constructions in more unfamiliar languages.

because the investigation of modal force is still ongoing, as for ?ayʔajũʔəm (Reisinger 2018; Huijsmans in prep).

4. I do not include Blackfoot in citing examples, we retain the orthographic representations used in the original sources; however, glossing and formatting have in some cases been updated. Abbreviations which are not in the Leipzig Glossing Rules are as follows: 0 = third person inanimate, attr = attributive, b = series b agreement marker (Mayan), circ = circumstantial modal, cn = common noun connective, disc = discourse marker, dist = distal invisible, ds = different subject, exis = assertion of existence, fact = factual mode, i,ii,iii = series i,ii,iii pronoun, infer = inferential, infr = informative, lc = limited control, med = medial visible, part = particle, partit = partitive, preter = preterite, prv = preverb (which usually has past or perfective interpretation), pt = past/perfective, punct = punctual aspect, red = reductive transitivizer, sx = intransitive subject extraction, tr = transitive, vti = transitive inanimate (object) verb stem.

2. The same can be – and has been – argued for English all: see Lasersohn (1999); Brisson (2003). More broadly, Baker uses three syntactic diagnostics to distinguish ‘true’ quantifiers like English every from all-type quantifiers: ‘true’ quantifiers c-command dependent variables, they show weak crossover effects, and they take singular agreement. In semantic terms, ‘true’ quantifiers presumably create generalized quantifiers, while all-type quantifiers are operators on plural domains.

3. A possible counter-example is provided by Pima (aka Akimel O’odham; Uto-Aztecan), where according to Smith (2012), the quantifier mu’i ‘many’ requires a partitive ending when it acts as a predicate. Compare (i) with (ii):

(i) However, the translation given for (ii) is not partitive, so further investigation is required into these constructions.

4. This sentence may also be syntactically analyzed with the quantifier in predicate position, taking a headless relative clause as its argument (‘The policemen who went home were many’). However, Matthewson (1998) demonstrates that this alternative structure is not always available, due to categorial restrictions on modification. Gillon (2006/2013) provides even stronger syntactic evidence from S̱kwxwú7mesh, a Central Salish language closely related to Straits: here, pre-determiner weak quantifiers are freely available in post-predicative positions, where no alternative predicative analysis is possible:

5. The Gitksan cases are complicated by the fact that weak quantifiers in clause-initial position are structurally ambiguous between main predicate and DP-internal uses. See Bicevskis et al. (2017: 313) for ways to distinguish the two structures.

6. Part of Jelinek’s argumentation that məkʷ is an A-type quantifier is that it unselectively quantifies over entities and events, as suggested by the translations of (38). However, Davis (2013) shows that these translations are misleading. The reason is that in Straits (a) number marking on DPs is optional, and (b) the universal quantifier məkʷ, like English all, can quantify either over individuals or proper subparts of individuals. There is therefore a reading of (38) in which məkʷ quantifies over proper subparts of ce sčə:nəxʷ ‘the fish’; this is truth-conditionally indistinguishable from an event-related ‘completely’ reading. (The same reasoning applies to the case in (17).) However, it is possible to test specifically for event-related readings by using singular arguments with predicates where proper subpart readings are absurd, as in the St’át’imcets example in (i):

7. ‘Determiners’ here excludes demonstratives, which have different syntax and semantics from ‘true’ determiners in many languages; see for example (35), where demonstratives and determiners co-occur in St’át’imcets.

8. The property ‘lives on’ is otherwise known as conservativity, and states that Q(A)(A∩B) is true if and only if Q(A)(A∩B) is true. The point here is the prediction that all languages have determiners which turn common noun phrases into generalized quantifiers.
9. Lyon (2013) confirms this for Nsyilxcən (Okanagan; Southern Interior Salish), but Gillon (2006/2013) argues against it based on Skwxwú7mesh. Further afield, Lee (2008) argues that San Lucas Quiavini Zapotec (Otomanguean) also lacks determiners that access the common ground.

10. Gillon (2006/2013) suggests that the last option may be the case for Skwxwú7mesh, a language which possesses overt determiners and allows quantifiers to appear either in combination with full DPs, or in structures without an overt D such as in (45)–(46).

11. What Moewaki calls “distributive” and “inverse distributive”, we previously called “wide scope subject” and “narrow scope subject”, respectively.

1. The term “Otomi-Mangue” was used as a designation for this family in the early 20th century (Schmidt 1977 [1926], cited in Campbell 2017b: 4) and “Otomanguean” seems to be derived from that (Jiménez Moreno 1962, cited in Campbell 2017b: 4). The language family name is often spelled with a hyphen, “Oto-manguean” or “Oto-Manguean”, which is likely an analogy to other family names like Uto-Aztecan. However, because Otomanguean is a blend, I write the name without a hyphen.

2. Ethnologue data supplemented with data from Palancar (2018), though there is disagreement between these sources about subgroup internal structure and number of languages.

3. The glossing of the original authors are retained throughout, which means there might be inconsistencies across examples. The following abbreviations are used in glossing: 2 = second person; 3 = third person; aml = animal; com = completive; con = continuative; cpl = completive; decl = declarative; dist = distal; hab = habitual aspect; incpl = incompletive; invis = invisible; m = masculine; pl = plural; pot = potential aspect; prox = proximate; pst = past tense; sg = singular.

4. Anderson marks the completive with C.

5. This section benefited greatly from comments and suggestions from Michael Swanton.

6. Consists of the same doctrine in two different varieties of Mixtec.

1. Abbreviations used in glosses are as follows: A = Set A (ergative, possessive), abs = absolutive, adj = adjectival, af = agent focus, ant = anticausative, antip = antipassive, apl = applicative, art = article, aSP = aspect, aux = auxiliary, B = Set B (absolutive), cl = classifier, cpl = completive, dem = demonstrative, def = dependent, det = determiner, dir = directional, dur = durative, enc = enclitic, emph = emphatic, exh = exhortative, fam = familiar, foc = focus, for = formal; hs = hearsay, icpl = incompletive, idph = ideophone, imperf = imperfect, intr = intransitive, irr = irrealis, lat = lative, neg = negation, nml = nominalizer, nom = nominal, opt = optative, p = person, par = particle, pass = passive, perf = perfect, pfv = perfective, pfm = phrase-final marker, pl = plural, pos = positional, pot = potential, prep = preposition, pron = pronoun, rep = reportative, rN = relational noun, sg = singular, s = “status suffix”, top = topical, tr = transitive. In some cases, glosses and transcriptions have been modified from the original source for consistency and in accordance with revised conventions (see discussion in Mateo Toledo 2003 and Bennett et al. 2016).

1. Martin (2011) notes that Creek formerly had a contrast between /ay/ and /ey/, but that for most speakers this has been neutralized to /ey/.

2. The following abbreviations are used in this chapter: 1 = first person, 2 = second person, 1 = agreement from the I set, II = agreement from the II set, III = agreement from the III set, acc = accusative, agt = agent-type agreement, atn = focus of attention, aux = auxiliary, caus = causative, com = comitative, comp = complementizer, con = contrastive, dat = dative, def = definite, det = demonstrative, dir = directional, dPast = distant past, ds = different subject, du = dual, dur = durative, evid = evidential, fgr = falling grade (in Creek), foc = focus, fut = future, glgr = glottal-grade (in Chickasaw), ggr = g-grade (verbal form with gemination of penult-initial onset), hgr = h-grade (verbal form with infixed h), hsay = hearsay evidential, impers = impersonal, impf = imperfective, ind = indicative, indef = indefinite, inf = infinitive, ins = instrumental, lgr = lengthened grade, loc = locative, n = neuter, neg = negation, negative, nag = nasalized grade, nom = nominative, part = participle, pfv = perfective’, pl = plural, pot = potential, pres = present’, prev = previous mention, prosp = prospective, prt = participle, pst = past, recp = reciprocal, ref = referential clitic (Creek), s = single argument of canonical intransitive verb, sg = singular, ss = same subject, tns = default tense (in Choctaw), tpl = trip plural, tr = transitive, ygr = y-grade.

3. As Martin (2011: 101–103) explains, traditional Creek spelling does not show a very clear distinction between representations of /i/ and /i/. Martin and Mauldin (2000) add a macron <è> to distinguish /i:/.

4. However, see Haas (1941) for discussion of archaic instances of incorporation in Proto-Muskogean.

5. See also Fitzgerald (2015) for another recent overview of morphology in Muskogean.

6. Martin and Munro (2005) make the same distinction, referring to the monomorphic stems as ‘neutral’ verbs, and the polymorphemic verb stems as ‘voiced verbs’.

7. The transitive suffix -li in Chickasaw (and Choctaw) assimilates to the preceding consonant when the consonant is /b, f, l, m, n, w/.

8. In some cases, the -k- form is primarily seen in a derived adjectival form.
9. The first detailed description of this system is due to Haas (1940), who referred the system as ‘ablaut’. Although grade morphology in Muskogean does bear some resemblance to Indo-European ablaut alternations, the term ablaut is not particularly appropriate. The Muskogean grade system does not alter vowel qualities, but involves infixing laryngeals, /y/, and nasals, and generating various consonants.

There are also some intriguing similarities between Muskogean grades and the Semitic system of binyan-nim or stem templates (see Arad 2006 and Bat-El 1994, inter alia).

10. I have combined in this table the forms that Munro (1985) calls “grades” as well as the “glottal” form of the root. Munro argues that because the glottal form is far more productive than other forms, fails to change the pitch accent, and has no independent semantics, it is substantially different from the other grades and ought to be considered a different kind of infixing morphology.

11. Choctaw negative verbs also have an -o(k) suffix and appear in the l-grade, which places an accent on the penult, and lengthens the vowel of the penult if the syllable is open. See Broadwell (2006: 148–152) for further discussion.

12. The translation of one verb with English ‘going to’ and the other with ‘will’ follows Martin (2011), but the Creek distinction is not clearly the same as the English distinction.

13. Different dialects or idiolects of Choctaw have different variants of this affix.

14. In Choctaw and Chickasaw, the reflex of different subject marking is typically nasalization of the final vowel.

15. The example is taken from a longer text Haas et al. (2015: 514). The final verb ‘defecate’ has SS marking because it has the same subject as the following verb.

16. The narrator used the English word ‘rabbit’ instead of the Chickasaw chokfi’ in this clause.

17. Some authors (Kimball 1991: 525–526) have argued that these constructions are not truly subordinate clauses, but that an example like (29c) should be interpreted as coordination, along the lines of ‘My father saw the woman and she is your wife’.

1. The following abbreviations are used: A = joiner vowel /a/, AG = agent, AMB = ambulative, AN = animate, AND = andative, ASR = assertive, CAUS = causative, CISL = cislocative, CMP = compact, DAT = dative, DIM = diminutive, DISTR = distributive, DU = dual, DUC = dualic, E = epenthetic, EX = exclusive, EXT = external, F = feminine, FACT = factual, FL = flexible, FUT = future, HAB = habitual, I = prothetic vowel /i/, IMPF = imperfective, IN = inanimate, IND = indicative, INF = infinitive, INT = internal, IRR = irrealis, ITER = iterative, LG = long, LOC = locative, LQ = liquid, M = masculine, MID = middle, MOT = motion, NE = a nominal particle related to definiteness and specificity in Iroquoian languages, NFS = noun forming suffix, NM = non-masculine, NOM = nominative, NT = neuter, NZLR = nominalizer, PART = partitive, PAT = patient, PFT = perfective, PL = plural, PRES = present, PROG = progressive, PUNC = punctual, PURP = purposive, Q = interrogative, REFL = reflexive, REL = relative, REP = reportative, REPET = repetitive, REV = reversative, SG = singular, SH = superhigh, STAT = stative, TRNSL = translative, UNSP = unspecific.

2. v is a mid-central unrounded [ʌ] or a mid-back unrounded [ʌ], with an optional nasalization.

3. The alternation of the vowel length of o: is due to a general phonological constraint against a sequence of a long vowel followed by a glottal stop (*Vʔ). The pronominal prefixes of the 3SG.AG and 1SG.AG have the same form here (k-) due to the phonological context (see Table 18.1).

4. The choice has been made here to gauge language status by the average age of the remaining L1 speakers rather than by giving absolute numbers, because the latter measure is notoriously difficult to judge. There are two main reasons for this: first, assessment measures for linguistic competence used by speech communities are usually based on self-evaluation, which can be unreliable; and second, even L1 status (based on “natural” exposure in the home) is gradient. Since this chapter is specifically concerned with the analysis of Salish languages as first languages, I do not include the increasing number of fluent second-language speakers here; this should in no way discount their critically important role in language revitalization efforts.

5. An exception is the Jesuit missionary Father Gregorio Mengarini, who wrote a full grammar of Montana Salish (“Flathead”), one of the three major dialects of the Salish-Spokane-Kalispel language, published in Latin in 1861.

3. Phonemic representations are given here in the “northwestern” version of the Americanist Phonetic Alphabet (APA) standardly employed by Salishanists.

4. The term “resonant” is the one traditionally used in Salish linguistics, but “sonorant” might be more appropriate, given the inclusion of glides. Even that term, however, does not extend to ? and h, which are phonetically a stop and a fricative, respectively, but group phonologically with the sonorants (in terms of phonotactics, for example).

5. The Coast Salish outlier Tillamook appears to be an exception, having developed a set of unaspirated (voiced) stops which contrast with the regular aspirated (voiceless) and ejective stop series.

6. I use the asterisk * throughout to indicate a proto-form; unacceptability (both syntactic and semantic) is indicated by #.
7. A bullet (•) is used throughout to mark reduplication, in contrast to a dash for (-) for affixation or an equals sign (=) for cliticization.

8. Certain types of reduplication (particularly -VC₁- and -VC₂-) may be sensitive to phonological rather than morphological constituency, and therefore may copy non-root material. This possibility seems to be cross-linguistically variable across Salish; see, e.g., van Eijk (1990).

9. It is important to distinguish lexical nominalization from two other types of nominalization, both of which also involve reflexes of Proto-Salish *s, but which apply above the word-level. Predicate nominalization with the prefix s- forms NPs from extended projections of the VP, with an obligatory possessive-marked agent; clause nominalization with the proclitic s= derives nominalized subordinate clauses, with an obligatory possessive-marked subject. See Kroeker (1999) and J. Thompson (2012).

10. Lillooet, however, marks number obligatorily in its determiner system.

11. While Newman’s reconstruction of the Proto-Salish singular object forms is straightforward, his reconstruction of the plural forms is much less so, as pointed out by Kroeker (1999). Both across and within languages, there is much overlap in the plural part of the paradigm between first and second persons and between the plain and causative series, and the persistent presence of a vowel + l/l sequence (-al, -ul, -ul) is suspiciously reminiscent of the compound connector also found fused to many lexical suffixes. It is possible, in fact, that there may originally have been no plural object forms at all, with contemporary languages having innovated them by borrowing and repurposing fragments of other morphemes.

1. In addition to the conventions of the Leipzig Glossing Rules (Comrie, Haspelmath, & Bickel n.d.), we use the following abbreviations in this chapter: ANT = anteriord, ATT = attitudinal, EVID = evidential, INC = inceptive, OBJ = indirect object, ITER = iterative, LEX = lexical affix (or thematic, in the Dene literature), MOM = momentaneous, OPT = optative; PNS = possessed noun suffix, STAT = stative, 0SUB = impersonal (unspecified) subject. Examples are cited by source, by author and date for previously published sources, or by initials for fieldwork consultants (ANON for consultants who prefer not to have their names published): AW = Archie Wedzin, BRS = Bruce R. Starlight, LS = Linda Smith, MLBW = Marie-Louise Bouvier White, VM = Violet Meguinis. The data are generally drawn from the Dene group, with a few examples from Tlingit and Eyak; most are from languages that we have worked on and/or that are under-represented in the literature. We use transcription conventions from the sources.

2. In the Dene literature, the term mode often refers to a shared templatic position where viewpoint aspect alternates with future, irrealis modes, or both, depending on the language. For further discussion, see §2.5.

3. SVO in main clauses may require case marking on the subject, as well as verb allomorphy, as in (14b).

4. The first line of each example is Leer’s transcription; the second is the Tlingit practical orthography, based on examples in Crippen (2012). Further Tlingit examples in this chapter are presented only in the practical orthography.

5. This is perhaps equivalent to clausal focus (Welch 2015a).

6. Or mirativity; these two categories are often marked identically.

7. It is not always clear whether this ordering signals topicalization or focalization. More research is needed on this subject.

8. The third person and disjoint forms are not labeled “singular” as those that are not explicitly plural may have, contextually, either singular or plural interpretations.

9. Note that these suffixes are not universally productive, and co-exist with ablaut and suppletion.

10. These concepts are also discussed in §2.1.2 and §2.1.4.

11. This is a simplification. For full details on this rather subtle topic, see Bogal-Allbritten (2016).

12. The morphological glosses in these examples are our own.

13. Note that the term “head” in this terminology is a semantic one, referring to the relativized verb’s salient argument, rather than to a syntactic head. Hence, the statement that head-internal relative clauses are common in head-final languages uses the word “head” in two different and unrelated ways.

Typically, though not universally, relative clauses are formed by the addition of a relativizing morpheme to a clause-level constituent, as in (33), whether attached to the verb, as in (33a), or a postverbal element (33b). In some languages, relativizations and nominalizations are formed with a variety of markers. Hence, in Dena’in, -na marks a plural human agent, as in (33c), and -i an inanimate (Boraas 2010: 17).

14. The stage-individual-level predicate distinction has a large cross-linguistic literature; see especially Carlson (1977), Kratzer (1995), and Roy (2013).

15. The latter, termed characterizing predicates by Roy (2013), are individual-level predicates that allow temporal gaps or agentivity, and in some respects like stage-level predicates.

16. That is, perfective aspect, irrealis mode, or non-third-person-singular subject agreement.

1. *H represents the neutralization of *h and *. The symbols *x and *e are placeholders for segments whose phonemic identity is obscure (Bloomfield 1946: 88) and should not be read with their IPA values. The reconstruction of the two clusters in parentheses is tenuous.

2. Abbreviations in glosses follow the Leipzig Glossing Rules, with the following meanings: 0 = inanimate third person, 3 = animate proximate third person, 3′ = animate obviative third person, AN = animate, DIM
Underlying

There is not enough space here to give a finer breakdown of these many varieties (see Dorais 2010).

Participial is sometimes termed declarative.

Labrador Inuttut requires a copula on adjectives in first/second person but not on verbs:

This restriction

In this example, the third-person singular participial ending -jong. This process turns it into a question.

-jong.

This process also manifests as consonant merger.

Ku

tie 2012). This process is likely related to an Eastern dialect process of word-final consonant deletion (Murasugi 1977).

considered. Those not in or used differently from the Leipzig glossing rules are as follows: / = subject/object or possessor/possessee, caus = causative mood, cond = conditional mood, conj = conjunctive mood, dj. conj = disjoint conjunctive mood, d.past = distant past, imp = imperative mood, indic = indicative mood, 'infl = stem has undergone phonological change because of following affix, inter = interrogative mood, mod = modalis, n.fut = near future, n.past = near past, n.sg = non-singular, opt = optative mood, part = participial mood, pot = potentiality (nominalizer), pro = pronoun, r = reflexive, rel = relative, semtr = semi-transitive, sim = simulative, tran = transitive.

In 2010 the Inuit Circumpolar Council made a resolution that the term Eskimo should be replaced by Inuit in communities and science.

There is not enough space here to give a finer breakdown of these many varieties (see Dorais 2010).

Innuinaqtun within the NWT is also called Kangiryuarmiut (see Lowe 1985a; Kudlak & Compton 2018).

Quite a number of different dialect groups settled in Qamani’tuq, which have presumably undergone dialect amalgamation, a natural consequence of close dialect contact.

The Labrador dialect has long been called Inuttut, although many also use Inuititut or even Inuktitut when referring to the language in English.

Sometimes termed declarative.

I use indicative or participial mood to refer to particular sets of morphological forms (i.e., not function).

This restriction on first and second person looks to be a PCC (Person-Case Constraint; see Johns & Kučerová 2017).

In the Rigolet dialect, uvular and velar alternants are conditioned by vowels (Dresher 1988, Johns 1996).

In Labrador Inuttut requires a copula on adjectives in first/second person but not on verbs:

This is oversimplified. Other roots allow gradation, which affords further distinctions.

Some dialects in Nunavik are undergoing this merge also (Richard Compton, p.c.). In South Baffin, this change is likely related to an Eastern dialect process of word-final consonant deletion (Murasugi & Christie 2012). This process also manifests as consonant merger.

Participial is sometimes termed declarative.

I use indicative or participial mood to refer to particular sets of morphological forms (i.e., not function).

This restriction on first and second person looks to be a PCC (Person-Case Constraint; see Johns & Kučerová 2017).

In this example, the third-person singular participial ending -juk has been lengthened and nasalized to -jong. This process turns it into a question.

Note that the terms used for this mood are somewhat misleading, as there is no necessary causativization, and if it is indeed perfective, it would only be one small aspect of its meaning.

As far as I know, modalis case should be on the object here.

Double person is also relevant in the debate about whether or not the Inuit language involves possessor raising (Van Geenhoven 2002; Woolford 2017) since the “raised possessor” will be marked on the verb with double person.

This is for first/second person. Third-person reflexive may create double person inflection in some dialects (see Dorais 1988: 95–96 for double person conjunctive in Nunavik).

In the disjoint form.

1. Greenberg (1987) follows suit by putting these language families into distinct sub-groups of his controversial “Amerind”. Like Sapir, Greenberg places PP in Penutian (which in Greenberg’s proposal is a larger stock than Sapir originally proposed), while UA is clustered with Kiowa-Tanoan and Oto-Manguean in a
branch he calls ‘Central Amerind’. While Penutian still maintains some proponents, none of these Greenbergian classifications are accepted by mainstream linguists.

2. The specific numbers from Maddieson’s (2013) survey of a sample of 564 languages are: 93 ‘small’ (2–4 vowels, = 16.5%); 287 ‘average’ (5–6 vowels, = 51%); and 184 ‘large’ (7–14 vowels, = 33%).

1. Most linguists suspect – and some are sure – that these “Hokan” languages are genetically related. However, the common ancestor, if it existed, was very ancient, and the trajectories of radiation of the family are obscure. Golla (2011: 242–243) advances some proposals for grouping the California Hokan languages based on areal linguistic evidence. I use scare quotes around “Penutian” for the same reason. The California “Penutian” families (Yok-Utian, Wintun, Maiduan) do not form a single clade within the phylum.

2. Utian (with two subgroups, Miwokan and Costanoan) and Yokutsan probably constitute a single clade, Yok-Utian (Callaghan 1997; 2001; 2014). However, while Utian ancestors were probably in the Central Valley by about 4,500 years ago, the Yokutsan spread appears to be no more than about 1,500 years old (Golla 2011).

3. Tübatulabal, perhaps distantly related to Takic, is another Uto-Aztecan language that has been located in the southernmost Sierra Nevada for about 2,500 years (Garfinkel 2007).

4. A linguistic “trait” is a structural feature (sometimes a cluster of features) at any level of organization, from patterning in discourse to phonetic realizations.

5. Thomason (2001) has an excellent summary of the diverse processes that yield areality.

6. These are pronoun systems where the first person has n as its prominent (or only) consonant, and the second person has m; for example, the Kitanemuk (Uto-Aztecan, Takic subgroup) independent pronouns niʔ ‘I’, imiʔ ‘you (singular)’. Such systems contrast with m/t systems (e.g., French moi, tu) that are widespread in Eurasia (Nichols & Peterson 2013b).

7. Interestingly, Mithun (2017) does not include in her list – headed by the words “such as” – perhaps the best-known proposal of a “Northern California linguistic area” (Haas 1967; 1976). Haynie’s (2012) statistical analysis shows that many of the languages that Haas includes are better understood as the southernmost members of a Northwest Coast linguistic area rather than as constituting a coherent linguistic and geographical unit in their own right. Haas’s proposal reaches out to include languages as far south as Sierra Miwok; in Campbell’s (2017) terms, it combines half a dozen different “trait sprawl areas” to create a sort of Venn diagram, which Haas then calls an “area”.

8. I use “Northwest California” to distinguish this area from the larger Northwest linguistic area that extends as far north as Alaska.

9. The assumption, of course, is that geographical links between Washo, a Hokan language, and the more northern Hokan languages were broken in relatively recent times by the spread of Maiduan. Areal linguists often appeal to this sort of non-geographical understanding (Donohue & Whiting 2011 argue that this is appropriate and necessary).


11. Note that the k/q contrast is not reconstructed for Proto-Numic (Iannucci 1973; M. Nichols 1974). So it is possible that the k/q allomorphy in Mono and in Southern Paiute represents two independent developments, and not an inheritance of the PNUA allomorphy.

12. The vowel shift in Gabrielino-Tongva is probably quite recent. The Fernandeño dialect retains the central vowel, and several of Harrington’s Gabrielino speakers often had schwa instead of o as reflexes of the UA central vowel. The shift of ə to o, and the shift of *o to e, both exactly as in the Cupan language Luiseño, may reflect the influence of the latter language during the historic period. Contrary to Hinton’s (1991) claim that there is no influence from Yuman in Gabrielino-Tongva, the language does have k'ahoxal ‘red’, from Yuman ‘blood’, and qa'wt ‘eagle’, from Yuman ‘bird’, with a Takic augmentative suffix. Both of these loans are widespread in Takic.

13. The central vowel, ə, is the only one of the Diegueño vowels that does not have a corresponding long vowel, hinting that it is not wholly integrated into the system. Langdon (1976: 129) observes that “The underlying system is . . . clearly a three-vowel one”.

14. Golla interprets this as a low number. In fact, Lake Miwok has 11.4% loanwords in a 205-word list of basic vocabulary (Bowern et al. 2011). In a sample of 42 California languages, only three had a higher rate: Wappo (also in the Clear Lake area), Tübatulabal, and Bankalachi, a variety of Tübatulabal. Most California languages have no more than 5% of loan words in basic vocabulary. It must be recalled that documentation of the lexicon for most California languages is sparse; we might recognize many more loanwords if we had dictionaries of a size comparable to those for better known languages.

15. It must be noted that this characterization of the reversed borrowing hierarchy in California is impressionistic. While there are quantitative studies of lexical borrowing in comparative perspective (e.g., Haspelmath & Tadmor 2009), I am not aware of similar exercises for typological traits, so we have no standard for their relative importance. In addition, it is possible that much of the loanword signal from early stages of language contact in California is invisible to us due to sound change and vocabulary replacement.
16. ‘Dog’, at (84) on the Leipzig-Jakarta list of basic vocabulary (Hasepmaat & Tadmor 2009), is one of the least stable words on the list; that is, it is easier for a language to replace the word for “dog” than it is to replace 83 other items on the list.

17. While the resemblances here include only a very short phonetic sequence, their geographical coherence argues that they may be of historical significance, constituting a trait sprawl rather than a chance resemblance.

18. The brackets < > indicate that the shape assigned to the Wanderwort is not a formal reconstruction, but merely a rough estimate of the shape of the item. The German word Wanderwort is usually applied to lexical items with exceptionally extensive distribution; modern examples include the forms that show up in English as ‘tea’, ‘coffee’, ‘tobacco’, and ‘sugar’.

19. C. Hart Merriam Papers, Volume 1. Papers relating to work with California Indians 1850–1974. The Bancroft Library, University of California, Berkeley. Unfortunately, rather than adopting the standards for phonetic transcription suggested to him by linguists, Merriam preferred to use an English-based system of his own invention where, for instance, e stands for [i], and i stands for [ai]. In spite of this eccentricity, the Merriam materials are very useful. They often provide our only attestation for lexical items in the languages.

20. Recall that the Donner Party attempted to cross the Sierras in 1846 and was stranded in heavy early snowfall. The survivors resorted to cannibalism.

21. A “substratum” language is a historic mother tongue of a speech community that has adopted a new language, the “superstratum”, which replaces, either partially or completely, the substratum language.

22. Manaster-Ramer (1992) links Tubatulabal taatwal to Numic *taNwa forms, but this requires us to recognize reduplication in a singular. A link to Yokutsan is equally plausible. Regarding the Pomoan form, McLendon (1973: 53) observes that Proto-Pomoan *k “seem[s] to have been characterized by a rather palatal, pre-velar articulation in at least some environments”. I thank Eugene Buckley for contributing this example.

23. Campbell (1997: 307) notes forms with kaw- meaning ‘bark’ in Koasati and Natchez, and suggests that the form is onomatopoetic, so these resemblances may be due to chance, not diffusion. I give (15) because it has a geographical distribution similar to the examples in (8)–(14). The similar forms in Chimariko and Yuman hint that it may be a Hokan word.

24. Recent research shows that several of Sherzer’s proposals are clearly wrong. For instance, Proto-Yuman has *kʷ and Diegueño k is a reflex of that sound, not diffused from Takic. Incorporation is not a family trait of Uto-Aztecan, although it does appear in several of the languages.

References


Sylak-Glassman, John. 2013. The phonetic properties of voiced stops descended from nasals in Ditidaht. (Talk presented at the Linguistic Society of America, Boston, Massachusetts, 3 January 2013.)


Steriade, Donca. 1981. Parameters of metrical vowel harmony rules. Massachusetts Institute of Technology. (Ms.)
Steriade, Donca. 1983. Syllable templates and syllabification rules. (Lecture delivered at the 1983 Sloan Conference on Phonology, University of Massachusetts, Amherst.)
Travis, L. 2010. Phases and Navajo verbal morphology. McGill University. (Ms.)
Crook, Harold David. 1999. The phonology and morphology of Nez Perce stress. UCLA. (Dissertation.)


Kim, Michael Jinhwa. 1996. The tonal system of accentual languages. Chicago, IL: University of Chicago. (Doctoral dissertation.)


Caballero, Gabriela & Harris, Alice C. (2012). A working typology of multiple exponence. In Kiefer, Ferenc, Ladányi, Mária & Siptár, Péter (eds.), Current issues in morphological theory: (Ir)Regularity, analogy and


60


Murasugi, Kumiko. 2017. Direction marking in Inuktitut verbal agreement. (Poster presented at Inuktitut Language and Linguistics Workshop, University of Toronto, May 30.)


Wouk, Fay & Ross, Malcolm. 2002. The history and typology of western Austronesian voice systems. Pacific Linguistics, Research School of Pacific and Asian Studies, the Australian National University.


Langdon, Margaret & Munro, Pamela. 1979. Subject and (switch-) reference in Yuman. Folia Linguistica 13, 321–344.


de Reuse, Willem. 2017. Western Apache, a southern Athabaskan language. In Fortescue, M.
Cuoq, Jean-André. 1866. Montreal, QC: Dawson
Etudes philologiques sur quelques langues sauvages
Compton, Richard. 2012. The syntax and semantics of modification in Inuktitut: Adjectives and adverbs in a
A Choctaw reference grammar
Broadwell, George Aaron. 2006.
Lincoln and London: University of Nebraska


Huijmsman, Marianne. in prep. *Second-position clitics in ʔayʔaǰuθəm*. Ms, UBC.


both Indo-European and other relevant non-Indo-European linguistics families, 113–134. (Special publication of VELEIA, Revista VELEIA Aldizkaria Instituto de Ciencias de la Antigüedad, Vitoria-Gasteiz, Spain.)


Cline, Kevin. 2013. The tone system of Acatepec Me'phaa. Grand Forks: University of North Dakota. (Master’s thesis.)


Cruz, Hilaria. 2014. Linguistic poetics and rhetoric of Eastern Chatino of San Juan Quiahije. Austin: University of California. (Doctoral dissertation.)


Jansen, Maarten E. R. G. N.


Roldán, Bartolomé, O. P. 1580. *Cartilla y Doctrina Christiana, breve y compendiosa, para enseñar los niños: y ciertas preguntas tocantes a la dicha Doctrina: traduzida, compuesta, ordenada, y romançada en la lengua Chuchona del pueblo de Tepexic de la Seda, por el muy Reuerendo Padre Fray Bartholome Roldan, de la orden del glorioso Padre Sancto Domingo*. Mexico: Casa de Pedro Ocharte.


Bennett, Ryan & Tang, Kevin & Ajsivinae, Juan. 2017. Laryngeal co-occurrence restrictions as constraints on sub-segmental articulatory structure. Santa Cruz: University of California. (Unpublished Ms.)


Clemens, Lauren Eby. 2013. *Complement and purpose clauses in K’iche’*. Austin: University of Texas. (Doctoral dissertation.)

Clemens, Lauren Eby. 2015. *La topicalización en K’iche’: Una perspectiva discursiva*. (BA thesis.)


Hardy, Heather. 2005. *Alabama*. In Hardy & Scancarelli (eds.).


Mithun, Marianne. 2006. Voice without subjects, objects or obliques: Manipulating argument structure in Pragmatics of word order flex-
Mithun, Marianne. 1986b. On the nature of noun incorporation.
Mithun, Marianne. 2001. The difference a category makes in the expression of possession and inalienability.


Davis, Henry & Matthewson, Lisa. This volume. Quantification.


Bogal-Allbritten, Elizabeth. 2014. The decomposition of belief and desire. (Paper presented at SULA 8, Vancouver.)


Chee, Melvatha. 2017. *A longitudinal cross-sectional study on the acquisition of Navajo verbs in children aged 4 years 7 months through 11 years 2 months*. Albuquerque: University of New Mexico. (Doctoral dissertation.)


Starlight, Bruce & Donovan, Gary. 2008. Tsuǔt’ìnà pedagogical dictionary in printed and digital format. Tsuǔt’ìnà Gunaha Institute. (Ms.)


Welch, Nicholas. 2017. Structures et interprétations des phrases copulaires en langues dénéennes. Toronto: University of Toronto. (Ms.)

Welch, Nicholas. 2018. Differential grammaticalization of copulas in two Dene languages. Toronto: University of Toronto. (Ms.)

Whorf, Benjamin L. 1932. The structure of the Athabaskan languages. Sterling Memorial Library, Yale University. (Ms.)


N.B.: Quite a number of the older materials are out of print.


