Methods for detecting prosodic structure

Microparametric variation in prosodic structure: case studies from Algonquian

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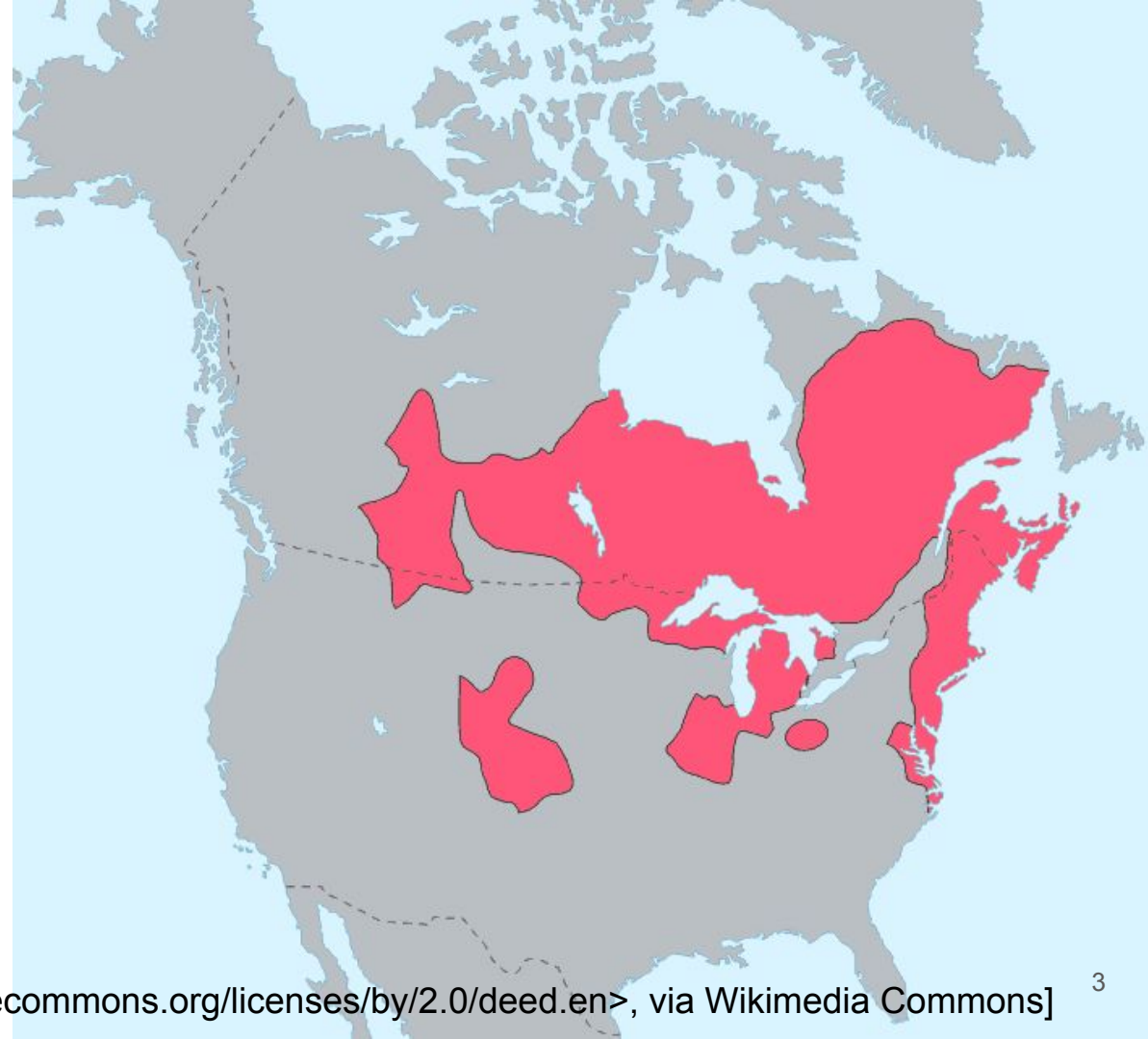
Goals of the project

- Prosodic structure is related to syntactic structure, but can mismatch (cf. Kaisse 1985; Nespor and Vogel 2007 [1986]; Selkirk 1986)
- Variation in prosodic structure may derive from
  - different syntactic structures
  - different phonological grammars
- Solution? Languages with similar morphosyntactic template!
  - examine parametric variation in prosodic structure
  - very likely to be specific to prosody, not syntax*
- **Micro**parametric = within a single language family.

* future work: how does syntax map to the morphosyntactic template?

Algonquian family



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Current working group members

Plains Algonquian

- Blackfoot — Natalie Weber (Yale)
- Cheyenne — Sarah Murray (Cornell); Rachel Vogel (Yale)
- Arapaho — Andrew Cowell (Boulder); Ksenia Bogomolets (Auckland)

Central Algonquian

- Plains Cree — Rose-Marie Déchaine (UBC); Antti Arppe (Alberta)
  Katherine Schmirler (Alberta/Lethbridge)
- Ojibwe — Chris Hammerly (UBC)

Eastern Algonquian

- Passamaquoddy *(in progress)*

Why Algonquian?

- Polysynthetic (Baker 1996; Duponceau 1819; Mattissen 2004; Nichols 1986, 1992; a.o.)
  - strongly head-marking
  - extensive agglutinative morphology
  - multiple “lexical” morphemes or roots within a morphological “word”, incl. adjuncts (Mathieu, Fry, & Barrie 2017; Newell & Piggott 2014; Piggott & Newell 2006; Piggott & Travis 2013)

- Theories of prosody-syntax correspondence remain poorly tested on polysynthetic languages (Elfner 2018; but see Miller 2018; Miller & Sande 2021; Weber 2020, 2021, 2022; and case-studies in Bogomolets & van der Hulst *to appear*)

Why now?

- Long history of diachronic linguistic analysis (cf. Aubin 1975; Bloomfield 1925, 1946; Goddard 1979; Hewson 1993; Hockett 1942; Michelson 1935; Miller 1959; Pentland 1979; Siebert 1941, 1975; Silver 1960; Voegelin 1941)
- Less on synchronic phonological generalizations
- Recent resources:
  - descriptive grammars and dictionaries for all languages in the study
  - large textual and spoken corpora for many languages!
  - multiple data structures to probe for prosodic structure

Roadmap

Four 15-minute talks (including discussant)

1. Methods for detecting prosodic structure **(current)**
2. Phonological alternations at morphological edges
3. Determining prosodic constituency from morpho-phonological generalizations
4. Discussant: Emily Elfner (York University)

Q&A session: 30 minutes

Overview

Prosodic structure

- “Interface” categories: derive from, but are not isomorphic to, syntax.

PPh = Phonological Phrase
|
CG = Composite Group
|
PWd = Prosodic Word
|
PStem = Prosodic Stem

“prosodic” in this talk refers to interface categories, not metrical structure or stress

(Downing 1999; Hayes 1989; Itô and Mester 2012; Inkelas 1990; Kiparsky 1982; Nespor & Vogel 2007; Pierrehumbert & Beckman 1988; Selkirk 1984, 1986, 2011; Vogel 2008)

Indirect Reference Hypothesis

- Prosodic units (not syntactic units) define the domains for phonological processes and generalizations.
  (Downing 1999; Hall 1999; Inkelas 1990; Nespor & Vogel 2007 [1986]; Selkirk 1984, 1986)

- e.g. primary word stress and phrase level stress readjustment in English

This is [the cat that caught [the rat that stole [the cheese]]]

$((($ˈðɪsɪz$)_{PWd}$ $($ðəˈkæt$)_{PWd})_{PPh})_{IPh}$ $((($ˌðætˈkɔt$)_{PWd}$ $($ðəˈɹæt$)_{PWd})_{PPh})_{IPh}$ $((($ˌðætˈstol$)_{PWd}$ $($ðəˈtʃiz$)_{PWd})_{PPh})_{IPh}$

(Chomsky & Halle 1968: 372; broad IPA added)

Algonquian template [Plains Cree]

- aimed at language comparison and reconstruction of the Algonquian family
- template slots named by their positions
- “preverbs” = mixed bag, including event modifiers (adjuncts)

person–	preverbs–	[initial	–final]$_{stem}$	–suffixes	
		pim	–ohtê	–w	‘s/he walks along’
	sâpo–	pim	–ohtê	–w	‘s/he walks past’
ki–	sâpo–	pim	–ohtâ	–n	‘you walk past’

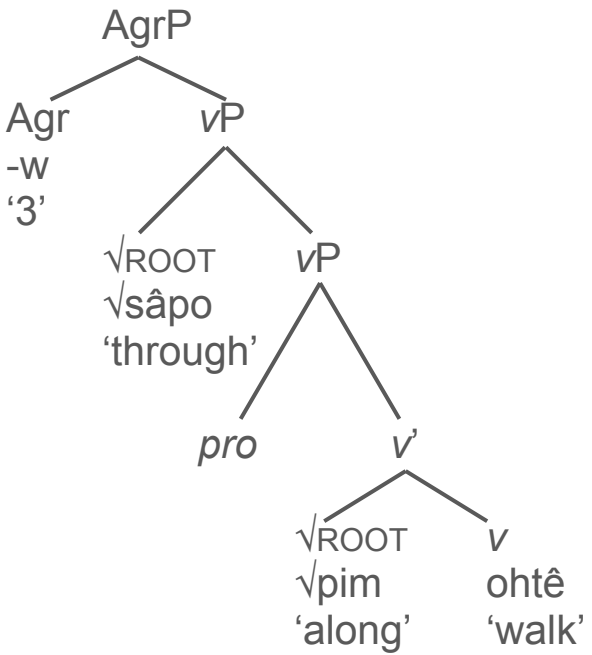
(For Plains Cree see Wolvengrey 2001; for Algonquian see Bloomfield 1946: 111, #269; Goddard 1990)

Mapping the Algonquian template to phrasal syntax

√pim –ohtê –w
√along –walk.AI –3
‘s/he walks along’

√sâpo –hâ –w
√through –fly.AI –3
‘s/he flies through’

√sâpo– √pim –ohtê –w
√through– √along –walk.AI –3
‘s/he walks past’



(Bruening 2001:122; Brittain 2003; Hirose 2003; Branigan et al. 2005; Piggott and Newell 2006; Mathieu 2007; Slavin 2012)

Central questions for this project

1. How does morphological template correspond to prosodic structure?
2. How does prosodic structure vary across languages?

H1 ((prefixes– preverb– initial –final –suffixes)$_{\text{PStem}}$)$_{\text{PWd}}$

H2 (prefixes– preverb– (initial –final –suffixes)$_{\text{PStem}}$)$_{\text{PWd}}$

H3 (prefixes– (preverb–)$_{\text{PStem}}$(initial –final –suffixes)$_{\text{PStem}}$)$_{\text{PWd}}$

Comparison to previous work

- Previous work on Algonquian prosodic structure focuses on the mapping of syntax to prosodic structure (Branigan et al. 2005; Mathieu, Fry, & Barrie 2017; Newell & Piggott 2014; Piggott & Newell 2006; Piggott & Travis 2013; Russell 1999; Russell & Reinholtz 1997)

- In contrast, we focus on building up the prosodic structure from basic phonological generalizations
  - generalizations (distribution, phonotactics, alternations)
  - hold across prosodic constituents or at prosodic boundaries
  - templatic positions within the same prosodic unit should pattern alike

Methodological toolkit

Methodological toolkit

Data comes from:

- Annotated textual corpora
  - Systematic, based on dictionary entries
  - But relies on orthography
- Speech corpora
  - Unsystematic, but natural speech
  - Lends itself to computational methods

Annotated text-based resources

- Types of documentation differ across languages (wordlists, grammars, dictionaries)
- Dictionaries often stem-based, with stem-internal morphology unmarked
  - creating annotations within spreadsheets
  - able to build paradigms on the fly
  - sort by any position within template
- (Some confirmation of previous observations; some new observations.)

(Blackfoot: Frantz & Russell 2017; Genee & Junker 2018; Weber et al. *forthcoming*; Cheyenne: Fisher, Leman, Pine, and Sanchez 2006; Arapaho: Cowell & Moss 2011; Salzmann 2012; Plains Cree: https://itwewina.altlab.app [Arppe & al, 2022]; https://korp.altlab.app [Arppe et al. 2020]; Wolvengrey 2001; Ojibwe: Ojibwe People's Dictionary 2022)

minwate *vii* ES Listen

it is a nice house, is a nice room; it (a dwelling) is in good order

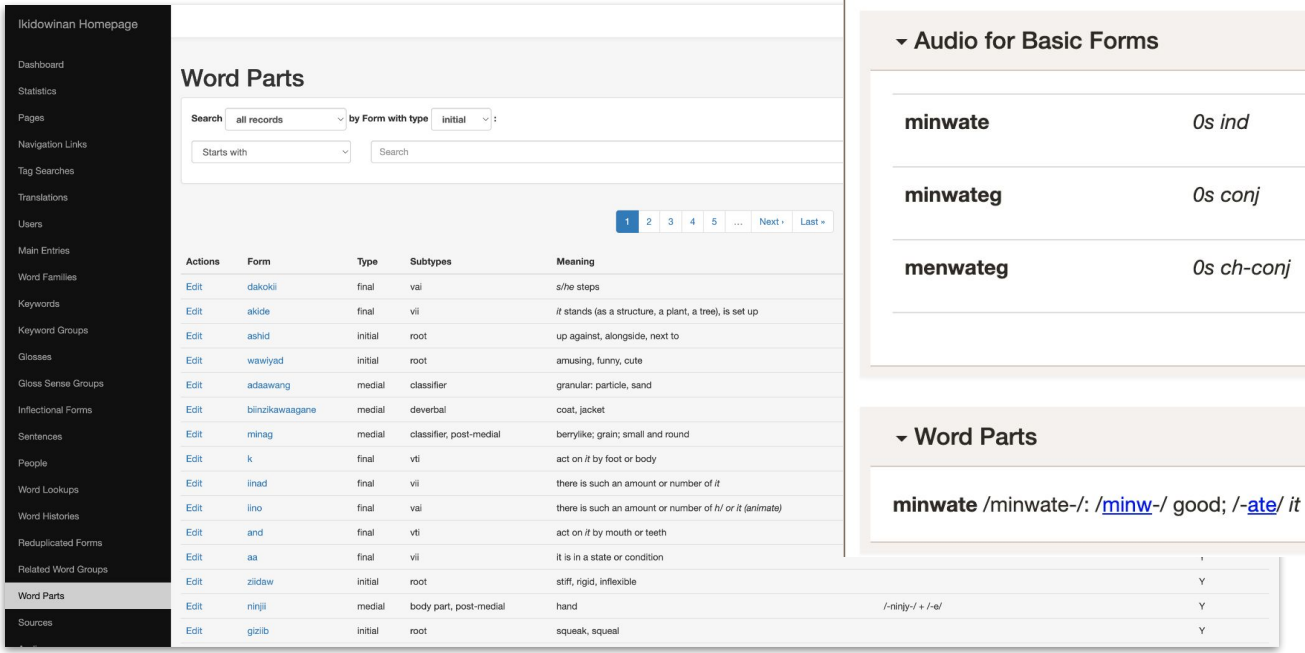
minwate *0s ind*; **minwateg** *0s conj*; **menwateg** *0s ch-conj*; *Stem:* /minwate-/

Audio for Basic Forms

minwate	*0s ind*	ES Listen
minwateg	*0s conj*	ES Listen
menwateg	*0s ch-conj*	ES Listen

Word Parts

minwate /minwate-/: /minw-/ good; /-ate/ *it* is or is in an interior space, a room, a house



[Ojibwe] Annotated spreadsheet by initial

1	Initial UR	Initial Gloss	Final UR	Final Gloss	Morphemic analysis (surface)	Original Word	Gloss
142	madwe-	heard, audible	-aasin	it is blown by the	madwe-bag-aasin	madwebagaasin	the leaves can be heard blowing in the
143	madwe-	heard, audible	-am	act on h/ by mou	madwe-_m	madwem	chew it (animate) audibly
144	madwe-	heard, audible	-and	act on it by mout	madwe-_nd-an	madwendan	chew it audibly
145	mane-	scarce, lack, need	-izi	s/he, it (animate)	mane-zi-n	manezin	s/he is in need of, is short of (it)
146	mang-	big	-izi	s/he, it (animate)	mang-ade-zi	mangadezi	s/he is wide
147	minw-	good	-aabi	s/he looks, has s	minw-aabi	minwaabi	s/he has good eyesight, sees well
148	minw-	good	-ate	it is or is in an i	minw-ate	minwate	it is a nice house, is a nice room; it (a
149	minw-	good	-bii	s/he or it (anim	min-o-bii	minobii	s/he drinks and is merry
150	minw-	good	-enim	act by thought o	minw-enim	minwenim	like h/
151	minw-	good	-gaabawi	h/ stands	min-o-gaabawi	minogaabawi	s/he stands well; s/he is in good stand
152	minw-	good	-taw	hear h/	min-o-taw	minotaw	like hearing h/, like how s/he sounds
153	misaw-	desire	-enim	act by thought or	misaw-enim	misawenim	want, desire h/
154	misaw-	desire	-n	see it	misaw-i-n-an	misawinan	wish to have it
155	misaw-	desire	-naw	see h/	misaw-i-naw	misawinaw	wish to have h/; be envious of h/
156	miskw-	red	-aa	it is in a state or	misk-o-bag-aa	miskobagaa	there are red leaves

[Ojibwe] Annotated spreadsheet by final

1	Initial UR	Initial Gloss	Final UR	Final Gloss	Morphemic analysis (surface)	Original Word	Gloss
89	agaas-	small	-ate	it is or is in an in	agaas-ate	agaasate	it is a small house or room
90	biin-	clean	-ate	it is or is in an in	biin-ate	biinate	it is a clean house or room
91	dak-	cool, chilly, cold	-ate	it is or is in an in	dak-ate	dakate	it (a room or house) is cold
92	giizhoo-	warm	-ate	it is or is in an in	giizhoo-_te	giizhoote	it is warm inside
93	minw-	good	-ate	it is or is in an in	minw-ate	minwate	it is a nice house, is a nice room; it (a
94	waase-	clear, light	-ate	it is or is in an in	waase-_te	waasete	it is or gets bright inside
95	dwaa-	going through the	-bide	it moves without	dwaa-bid-e	dwaabide	it drives through ice
96	akw-	a certain length, s	-bii	s/he or it (animat	ak-o-bii	akobii	s/he is so far into the water
97	akw-	a certain length, s	-bii	liquid, water, slus	ak-o-bii	akobii	it has water or liquid in it so high
98	deb-	enough, adequate	-bii	it is or does relat	deb-i-bii	debibii	it fits (of liquid); it adequately holds (s
99	gaw-	prostrate, down ar	-bii	s/he or it (animat	gaw-i-bii	gawibii	s/he falls down drunk
100	minw-	good	-bii	s/he or it (animat	min-o-bii	minobii	s/he drinks and is merry
101	naad-	fetch, go get, appr	-bii	s/he or it (animat	naad-oob-ii	naadoobii	s/he goes to get water or other liquid;
102	naad-	fetch, go get, appr	-bii	s/he or it (animat	naaz-i-bii	naazibii	s/he goes down to the water, goes aft
103	dwaa- [NW]	going through the	-bii [NW]	liquid, water, slus	dwaa-'-i-bii	dwaa'ibii	s/he makes a water hole in the ice

Challenges

- Reference materials may be developed for non-phonological purposes.
- Orthography may obscure phonology or phonetics.
- Phonological and morphological analyses presented in grammars may be more surface-oriented (in materials developed for indigenous communities for ex.) vs. more abstract and depth-oriented, and this may lead to differing analytical results concerning prosody and edge effects.
- Solution (in-progress): utilize audio resources to transcribe in IPA and investigate suprasegmental prosody…

Audio-based resources

- Talking dictionaries (e.g., https://itwewina.altlab.app [Arppe et al. 2022]; Fisher, Leman, Pine, and Sanchez 2006; Genee & Junker 2018; Ojibwe People's Dictionary 2022)
- Speech corpora (e.g., Spoken Dictionary of Maskwacîs Cree, cf. https://speech-db.altlab.app/maskwacis/entries [Arppe et al. 2022])
  - Create transcriptions in the International Phonetic Alphabet (IPA)
  - Create phonological generalizations based on transcriptions
  - Possibility to study other phenomena like stress
- Working with speakers to record datasets based on orthography

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