Phonology of multiple types of vowel devoicing in Cheyenne:

a featural approach

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52nd Algonquian Conference
Oct. 23, 2020

Outline

- Vowel devoicing cross-linguistically
- Cheyenne background
- Cheyenne vowel devoicing and featural analysis
  - Prepenultimate devoicing
  - Penultimate devoicing
  - Phrase-final devoicing
- Conclusion

Overview of vowel devoicing cross-linguistically

- Vowel devoicing is common areal feature in the Plains region of North America where Cheyenne is spoken

  (Ladefoged and Maddieson 1996; Oberly and Kharlamov 2015)
- Also attested across a wide range of language families and regions of the world (Greenberg 1969; Gordon 1998)

Overview of vowel devoicing cross-linguistically

- Vowel devoicing typically fits into one of two categories in terms of the environments in which it occurs (Greenberg 1969; Gordon 1998):
  - Adjacent to voiceless consonants
  - Adjacent to the right edge of a prosodic domain

Overview of vowel devoicing cross-linguistically

- Phonological analyses often attribute devoicing to a laryngeal feature
  - Spreads from adjacent voiceless consonant
  - Or is inserted onto vowel

(e.g., Lipski 1990; Cho 1993; Tsuchida 1997; 2001)

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Phonological features in vowel devoicing

- Voicelessness of obstruent consonants (stops, fricatives) usually attributed to [-voice] or absence of [voice] feature in Feature Theory
- In analyses of vowel devoicing, two laryngeal features proposed:
  - [-voice]
  - [spread glottis]

(e.g., McCawley 1968; Cho 1993; Tsuchida 1997, 2001)

Phonological features in vowel devoicing

- Generally assumed that only one feature is relevant at least within a single language

Phonological features in vowel devoicing

- Choice between [-voice] and [spread glottis] should come primarily from phonological evidence

  i.e. what feature predicts the environments in which devoicing occurs

Cheyenne

- Algonquian, spoken in Montana and Oklahoma
- Vowel devoicing, described by Leman and Rhodes 1978
- Data in talk from pre-existing materials:
  - grammar, Leman 2011
  - online dictionary with audio, Fisher et al. 2017
  - papers, e.g., Leman and Rhodes 1978
  - archival recordings of narrative texts, Olson 1965; Leman 1980

Consonants					
	bilabial	**dental**	**post-alveolar**	**velar**	**glottal**
stops	p	t		k	’
affricates		(ts)			
fricatives	v		š	(x)	h
nasals	m	n			

Vowels		
e		o
	a	

Word-internal devoiced vowels shown with dot

e.g., **ȧ**

(Inventory from Leman 2011)

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All voiceless consonants are **obstruents**

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e.g., **ȧ**

All voiceless consonants are **obstruents**

Two contrastive tones: high (´) and low

(Inventory from Leman 2011)

Word-internally, multiple consonants permitted in a row

[mȧ**ht**ao**’k**eme] ‘coffee bean’

[he’éka’ė**šk**óne] ‘girl’

(Fisher et al. 2017)

Morphological evidence for word-final consonants

[póeson-o] ‘cats’ /póésón/ ‘cat’

[šé’šenovot-o] ‘snakes’ /šé’šenovot/ ‘snake’

[hóhkóx-ėstse] ‘axes’ /hóhkóš/ ‘axe’

(Leman 2011; Fisher et al. 2017)

But on the surface, word-final codas avoided

- Final sonorants are deleted (Leman 2011)

  [póeso**n**-o] ‘cats’ [póéso] ‘cat’

- Final obstruents are followed by epenthetic <e> (Leman 2011)

  [šé’šenovo**t**-o] ‘snakes’ [šé’šenovȯ**ts**<u>**e**</u>] ‘snake’

  [hohko**x**-ėstse] ‘axes’ [hohkȯ**x**<u>**e**</u>] ‘axe’

(Fisher et al. 2017)

Notation

- Extensive vowel devoicing due to three main processes
- Examples may include multiple devoiced vowels due to different processes

Pink vowels (a̰) = devoiced by the process I am discussing at the moment

Blue vowels (**a**) = voiced when we'd otherwise expect them to devoice

Prepenultimate devoicing

- Affects low tone vowels before voiceless fricatives

  [k**á**hamaxe] ‘stick’

  [m**ó**xéheo’o] ‘broom’

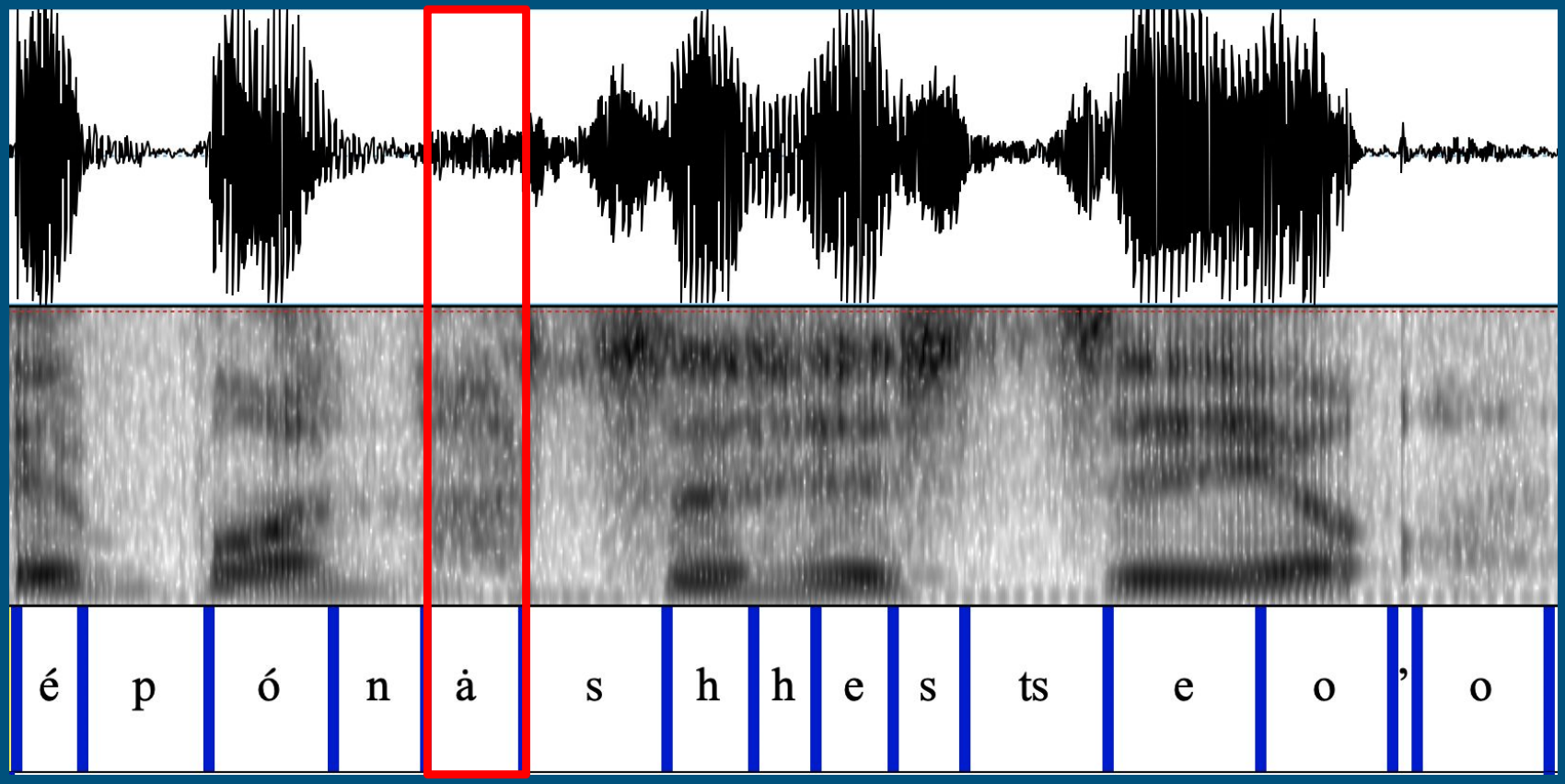
- Can occur in most positions in a word and multiple syllables in a row

  [m**á**hn**ó**hts**é**stovó̀tse] ‘when you ask him’

  → *relatively restricted segmental environment and free prosodic environment (domain span process)*

(Leman and Rhodes 1978; Fisher et al. 2017)

Épónáséhestseo'o ‘they slap their bellies’ (Fisher et al. 2017)



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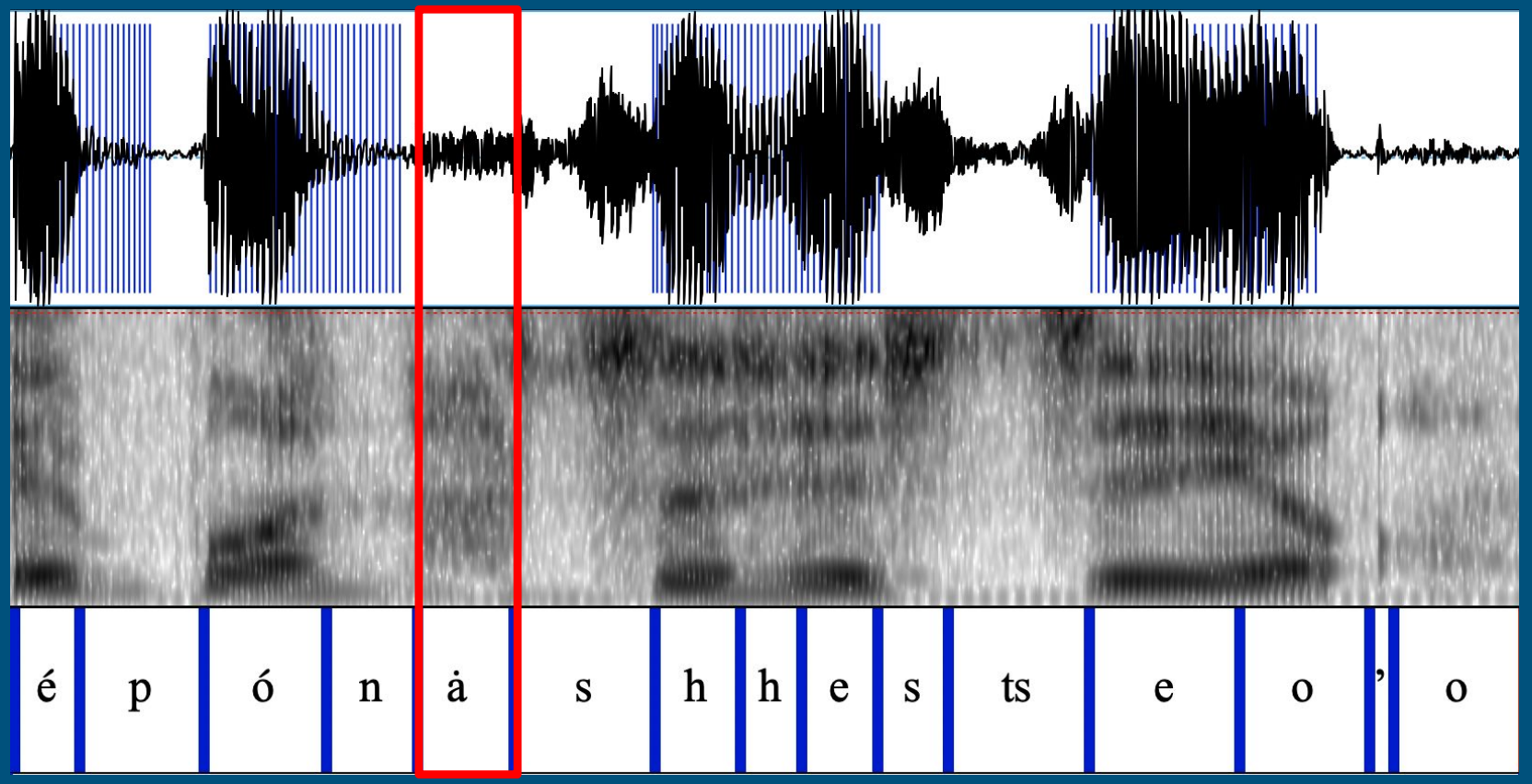

Prepenultimate devoicing

- Can occur in multiple syllables in a row
- But not in penultimate syllable

  [k**á**ham**a**xe] ‘stick’

  [ép**é**hév**a**he] ‘he is good’

- In words with final <e> epenthesis, blocked in surface antepenultimate syllable (underlying penult)

  [n**é**he?onáx**e**stóts<e>] ‘napkin’

(Leman and Rhodes 1978; Fisher et al. 2017)

Cannot occur before all voiceless consonants

- Occurs before voiceless fricatives

  [k**á**hamaxe] ‘stick’ [ém**á**séhé'ko] ‘it’s very narrow’

  [m**ó**xéheo’o] ‘broom’ [he’éka’**é**škóne] ‘girl’

- But not before other voiceless consonants

  [óm**o**tóme] ‘breath’ [m**a**tsénėstse] ‘kingfisher’

(Leman and Rhodes 1978; Fisher et al. 2017)

Penultimate devoicing

- Surface penultimate vowels devoice before voiceless consonants in some words ending with an [e]

  [he'o̥tse] 'neck' (Leman 2011)

  [náme'tatónėšévémḁse] 'what in the world should I do?' (Olson 1965; Leman 1980)

  → *relatively restricted segmental and prosodic environments*

  (domain limit process)

Penultimate devoicing

- Not in every penultimate vowel followed by voiceless consonant + e

  [vóhpoma'ȯhtse] 'salt' vs. [nenėhe'ohtse] '(you) go there' (Leman 2011)

- Only in underlying word-final syllables followed by epenthetic <e> on the surface (Leman and Rhodes 1978)

  [seo'ȯtse] 'ghost' [séot-o] 'ghosts' (Leman 2011)

  [nótaxe] 'warrior' [nótȧxe-o'o] 'warriors' (Fisher et al. 2017)

Prepenultimate and penultimate devoicing as feature spreading

- Spreading of laryngeal feature from consonant to preceding vowel

[mo̱xéheo'o] 'broom' *(prepenultimate devoicing)*

Prepenultimate and penultimate devoicing as feature spreading

- Spreading of laryngeal feature from consonant to preceding vowel

[mo̥xéheo'o] 'broom' *(prepenultimate devoicing)*

[F]

[he'ot] → [he'o̥t] → [he'o̥tse] 'neck' *(penultimate devoicing)*

[F] [F] [F]

Prepenultimate and penultimate devoicing as feature spreading

- But, sets of consonants triggering devoicing in preceding vowels are different for the two processes
  - Only voiceless fricatives in most of the word (prepenultimate devoicing)
  - All voiceless consonants in word-final syllable (penultimate devoicing)
- Same featural analysis cannot work for both processes

Laryngeal feature for prepenultimate devoicing

- Must be specified for voiceless fricatives but not other voiceless consonants (stops/affricates)
- No reason to expect [-voice] to be specified only for fricatives
- Must be ***[spread glottis]***
  - argued to be specified by default for voiceless fricatives but not other voiceless consonants (Vaux 1998; Vaux and Miller 2011)

Laryngeal feature for penultimate devoicing

- Occurs before any voiceless consonant not just fricatives, so cannot also involve [spread glottis]
- Instead, may involve ***[-voice]***, specified for all voiceless consonants

Interim summary

- Two vowel devoicing processes before different sets of voiceless consonants
- Devoicing before voiceless fricatives throughout most of the word

  → *domain span; involves* ***[spread glottis]*** $[\ldots\ \ldots\ \ldots]_{wd}$
- Devoicing before any voiceless consonant in underlying word-final syllable

  → *domain limit; involves* ***[-voice]*** $[\ldots\ \ldots\ \_\_\ ]_{wd}$

Phrase-final devoicing

[névóohtáhe] ‘Do you see it?’

[névóohtáhe mahpe] ‘Do you see the water?’ (Leman & Rhodes 1978)

Phrase-final devoicing

- Unlike other two processes, can occur without adjacent voiceless consonant

  [návóoma] ‘he saw me’ (Fisher et al. 2017)

  → *restricted prosodic environment but free segmental environment (domain limit process)*

Phrase-final devoicing as feature insertion

- Cannot involve feature spreading
  - can occur without adjacent [-voice] or [spread glottis] feature
- Instead, must involve *feature insertion* at phrase boundaries

Laryngeal feature for phrase-final devoicing

- Since this process does not depend on local segmental environment, feature specification of adjacent consonants is not informative
- What if, both penultimate and phrase-final devoicing are due to same preference for [-voice] feature on vowels at right edge of prosodic domain?

Conclusion

- New featural analysis of three types of vowel devoicing in Cheyenne
- Proposal:
  - 1 domain span process: occurs across the word and involves [spread glottis]
  - 2 domain limit processes: occur at right edge of word and phrase and involve [-voice]
- Implications:
  - Vowel devoicing is not one unitary phenomenon - we can have multiple types even within one language
  - Evidence that both [-voice] and [spread glottis] are active in Cheyenne

Thank you!

Though all data in this paper comes from pre-existing materials, I would like to acknowledge the Cheyenne speakers and the Cheyenne language, as well as those who have done work to document it.

References

Fisher, L., W. Leman, L. Pine Sr., & M. Sanchez. 2017. Cheyenne Dictionary. Chief Dull Knife College.

Gordon, Matthew (1998). The phonetics and phonology of non-modal vowels: A crosslinguistic perspective. In Annual Meeting of the Berkeley Linguistics Society (BLS) 24, pp. 93–105

Greenberg, Joseph H. 1969. Some methods of dynamic comparison in linguistics. In Substance and structure of language, pp. 147–203

Ladefoged, Peter and Ian Maddieson. 1996. The sounds of the world's languages. Vol. 1012. Blackwell, Oxford

Leman, W. 2011. A Reference Grammar of the Cheyenne Language. Lulu Press.

Leman, W. & R. Rhodes. 1978. Cheyenne vowel devoicing. In C. Cowan (ed), Papers of the Ninth Algonquian Conference, 3-24.

References

Lipski, John. 1990. Aspects of Ecuadorian Vowel Reduction. In Hispanic Linguistics. 4.1, pp. 1-19.

Myers, S., and Padgett, J. 2014. Domain generalisation in artificial language learning. Phonology, 31(3), 399-433.

Oberly, Stacey and Viktor Kharlamov. 2015. The phonetic realization of devoiced vowels in the Southern Ute language. In Phonetica 72.1, pp. 1–19.

Olson, Donald. 1968. Cheyenne Texts and Grammar Notes. Mimeographed ms. Philadelphia, PA.

Tsuchida, A. 2001. Japanese vowel devoicing: Cases of consecutive devoicing environments. Journal of East Asian Linguistics, 10(3), 225-245.