

Characteristics of non-pre-vocalic ejectives in Yakima Sahaptin

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NoWPhon, UO, Eugene, 5-13-16

Organization

- Ejective background
- Sahaptin
- Word-final ejectives
- Pre-consonantal ejectives
- Conclusions and further research

Ejectives

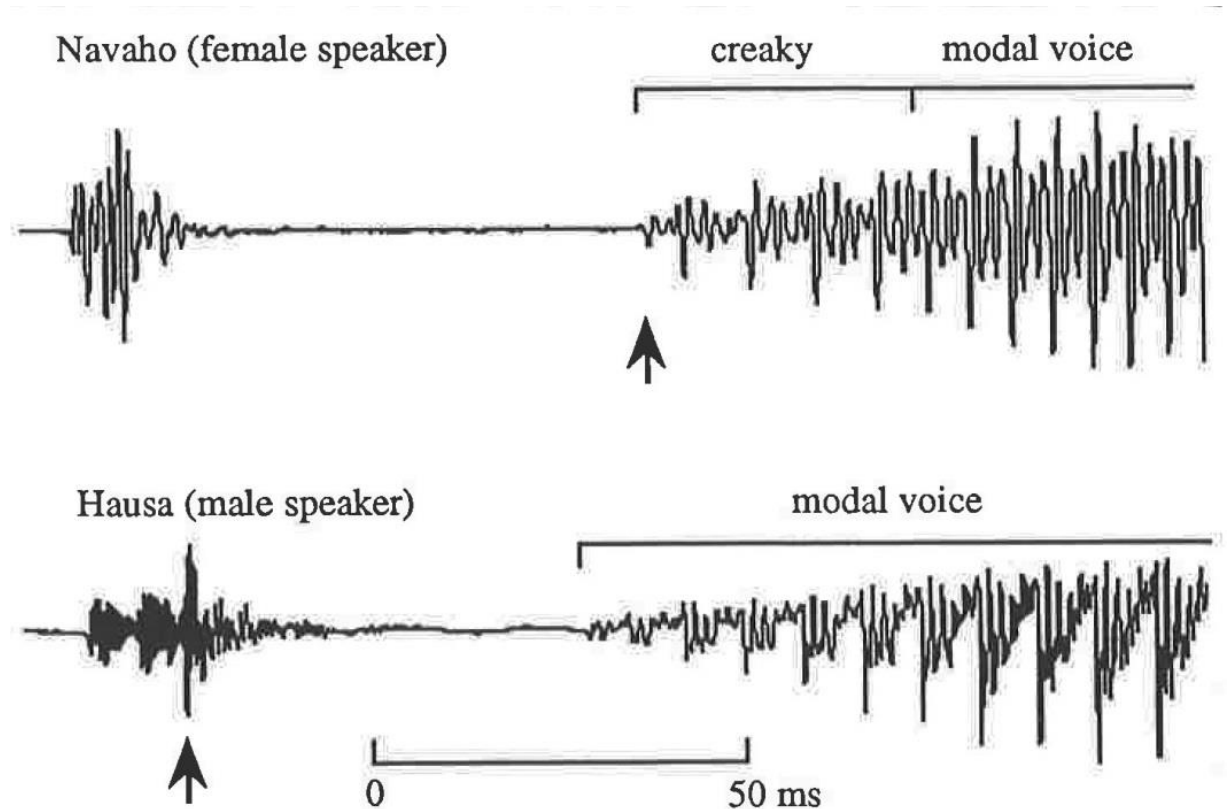


Ejective types

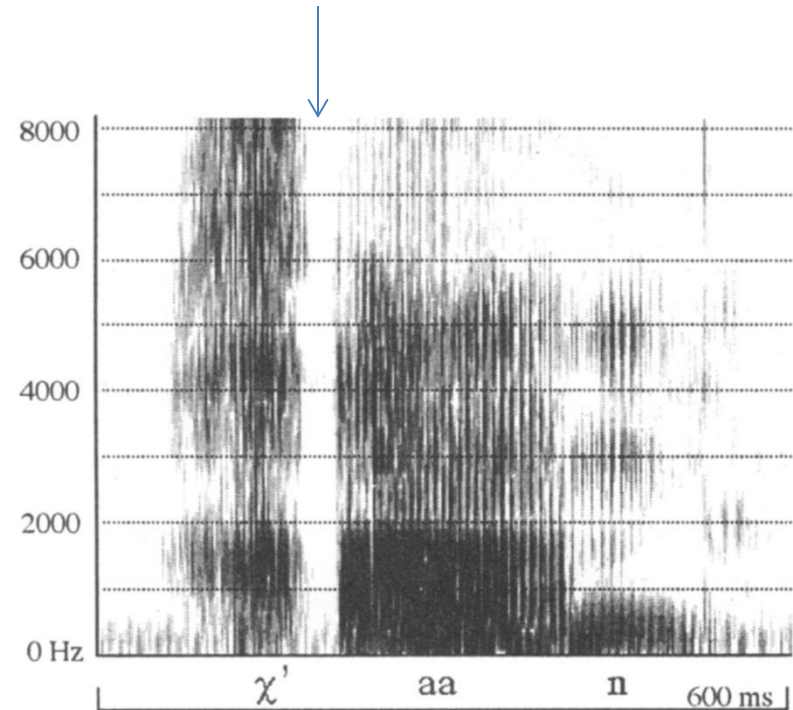
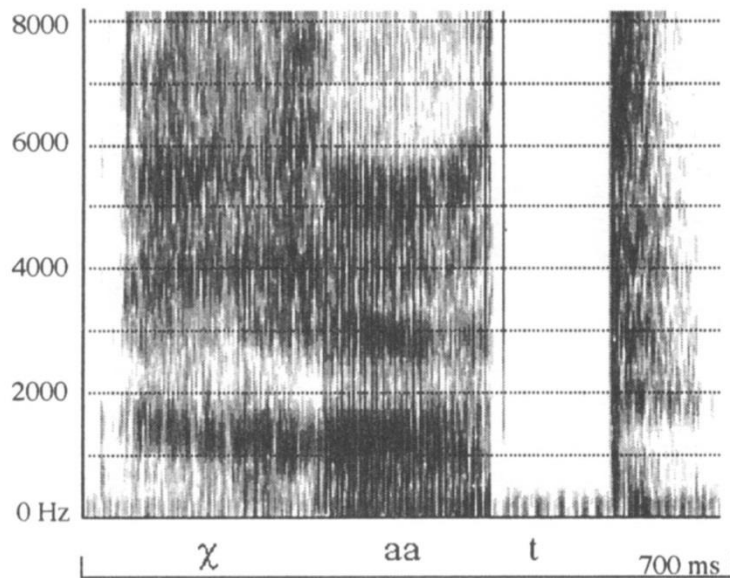
- Plosives [t']
- Affricates [ts']
- Fricatives [s']

Some properties of pre-vocalic ejectives

- f_0 low or high at vowel onset
- Silent period
- Slow rise time



Tlingit /χ/ vs. /χ'/'



• /χa:t/ 'spruce roots'

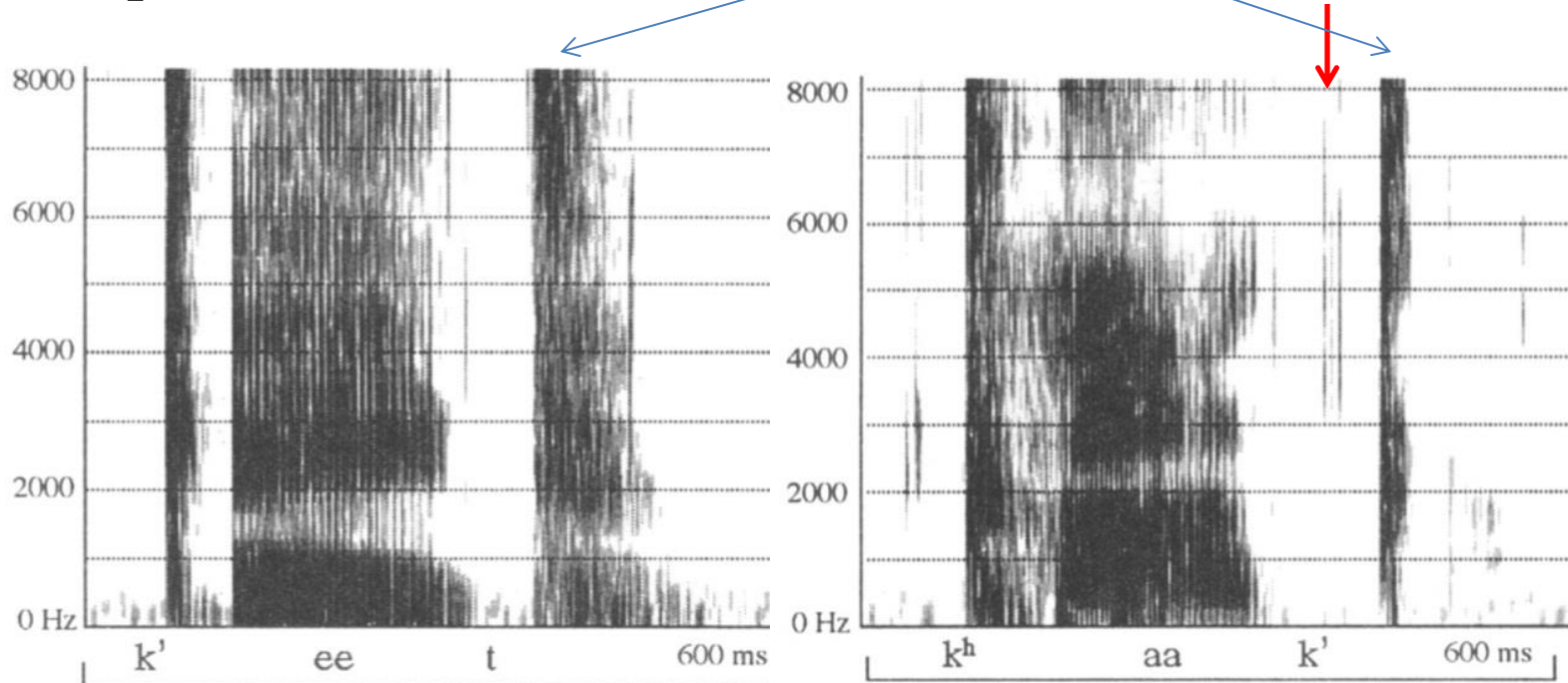
/χ'a:n/ 'fire'

Ejective distribution

- In most languages, ejectives only occur before vowels
 - Chipewyan, Witsuwit'en, etc.
- In some languages, ejectives also occur before consonants and/or word-finally
 - Tlingit, Gitksan, Coast Tsimshian, Montana Salish, Ahtna, etc.
 - Ejectives in these environments less well described

Tlingit word-final ejective stops

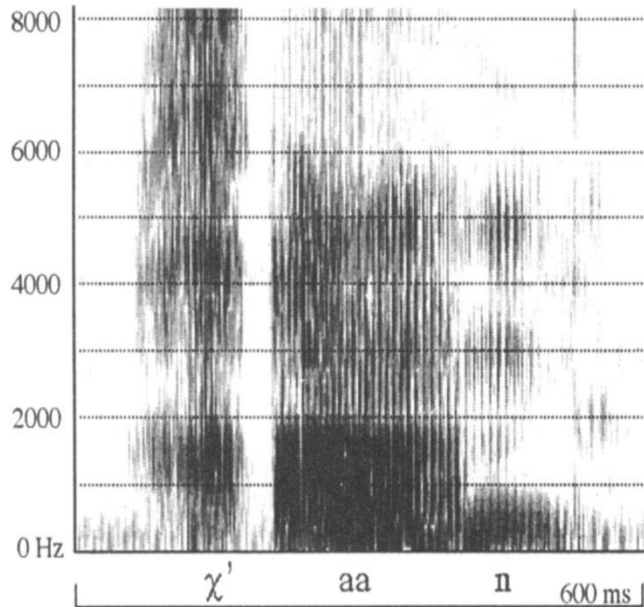
- “shorter and higher-amplitude noise than the pulmonic stops”



- $/k'ɛ:t/$ ‘salmonberry bush; sprouts’ $/k^h a:k'/$ ‘forehead’

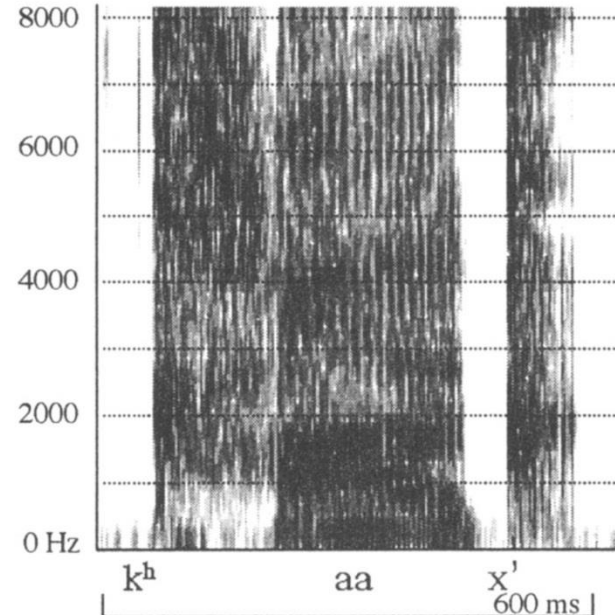
Tlingit ejective fricatives

- Pre-vocalic:
- post-glottalized



[χ'a:n] 'fire'

- Post-vocalic:
pre-glottalized



[k^ha:χ'] 'chicken, grouse'

Coast Tsimshian

- Post-vocalic ejective stops and affricates are pre-glottalized: < 'k, 'k̲, 'p, 't, 'ts >
 - hanaa'k̲ 'woman'
 - ~ hana'a

Ahtna

- “In all dialects of Ahtna except Mentasta, ejectives occur finally in some form---usually, however, not as canonical ejectives with a glottal release.” (Tuttle 2015)

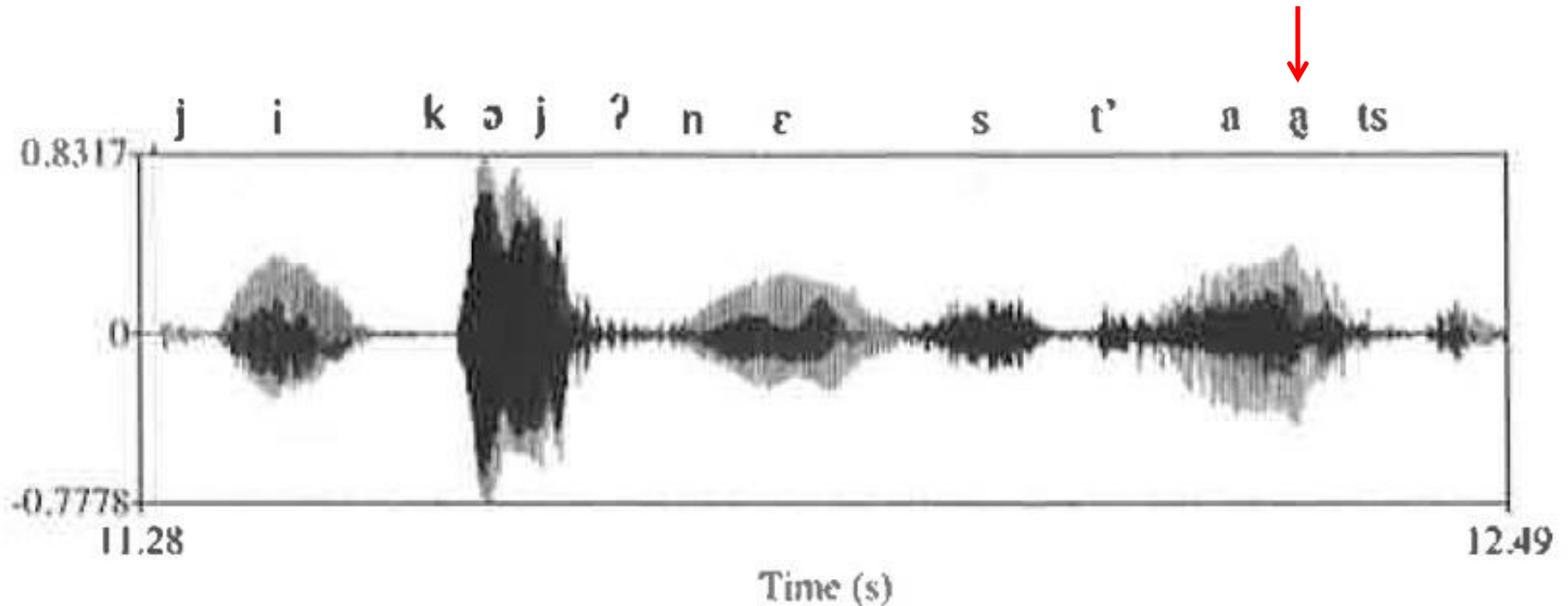
	Western	Central	Lower	Mentasta
‘liver’ /c’ezet’/	[c’εzεt’]	[c’εzε̣t]	[c’εzεɬ]	[c’εzεt]
‘mittens’ /cets’/	[cεts’]	[cε̣s], [cε̣s]	[cε̣s]	[cεts]

after Kari
1990

Kari, James. 1990. *Ahtna Athabaskan Dictionary*. Fairbanks: Alaska Native Language Center, University of Alaska Fairbanks.

Tuttle, Siri G. 2015. 'Stem-Final Ejectives in Ahtna Athabaskan.' In *Laryngeal Features of Native American Languages*, ed. by Matt Coler, Leo Wetzels and Heriberto Avelino. Leiden: Brill. 51-70.

Central Ahtna word-final [tsʰ]



Ik'ey'nest'aats' /ik'ejnest'a:tsʰ/ 'he cut it apart by accident'

“Ejectives” are pre-glottalized stops

- Word-finally in Tlingit
- Word-finally in Ahtna
- Post-vocalically in Coast Tsimshian

Sahaptin ejectives



Sahaptin consonants

	lab	alv	pal- alv	pal	velar	lab vel	uvu	lab uvu	glot
plosive	p	t			k	k ^w	q	q ^w	ʔ
affricate		ts	tʃ						
lat affricate		tɬ							
ejective pl	p'	t'			k'	k ^w '	q'	q ^w '	
ejective affr		ts'	tʃ'						
lat eject affr		tɬ'							
nasal	m	n							
fricative		s	ʃ		x	x ^w	χ	χ ^w	h
lat fricative		ɬ							
approximant				j		w	(ɸ)		
lat approx		l							

Previous instrumental study of Sahaptin ejectives

- /p p'/, /t t'/, /k k'/, /q q'/, /k^w k^w'/, /q^w q^w'/
- Prevocally

	VOT	post-release silent dur	f0 at vowel onset
plosives	38 ms.	--	211 Hz
ejectives	103 ms.	43 ms.	224 Hz

]*

]*

Sahaptin

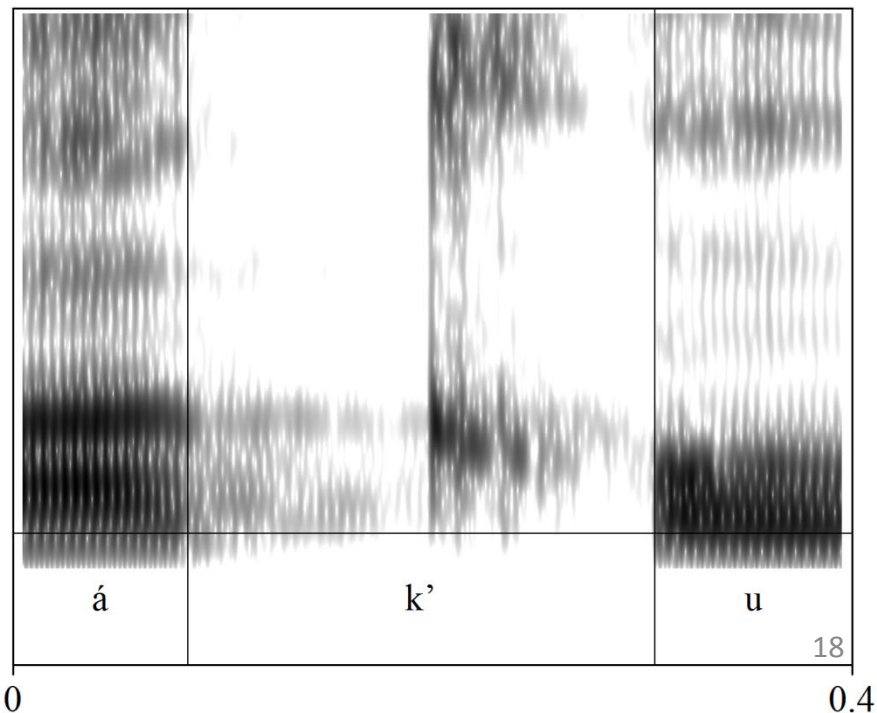
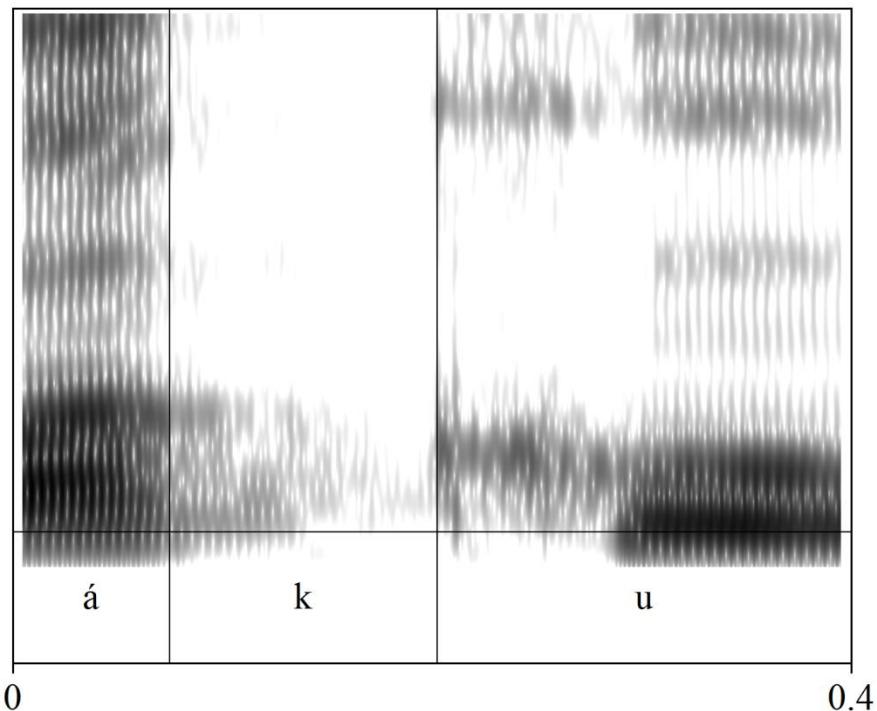
/k/ vs. /k'/'



páku 'have
sex'



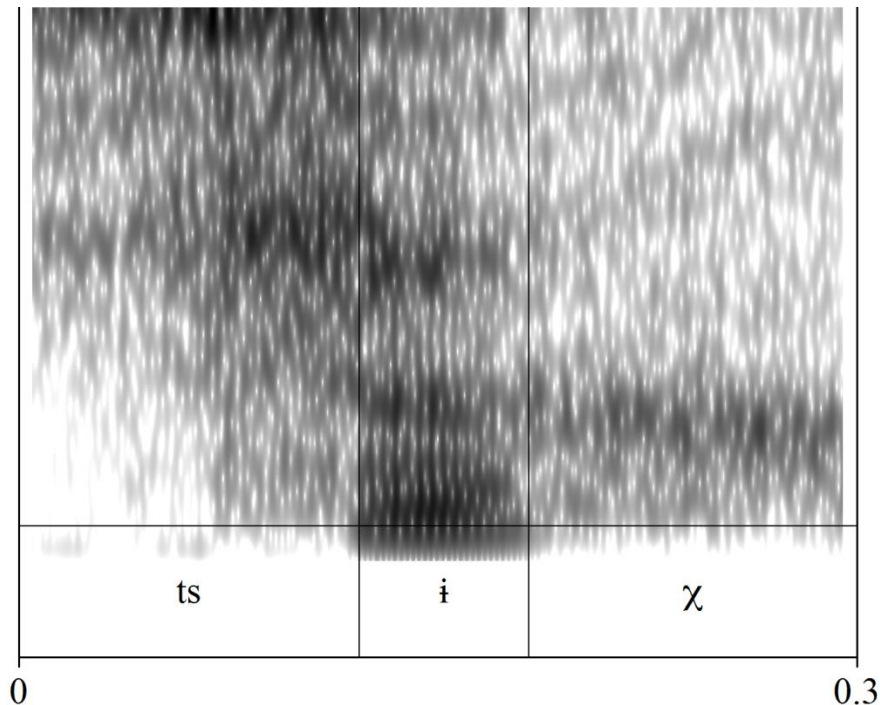
pák'u
'council'



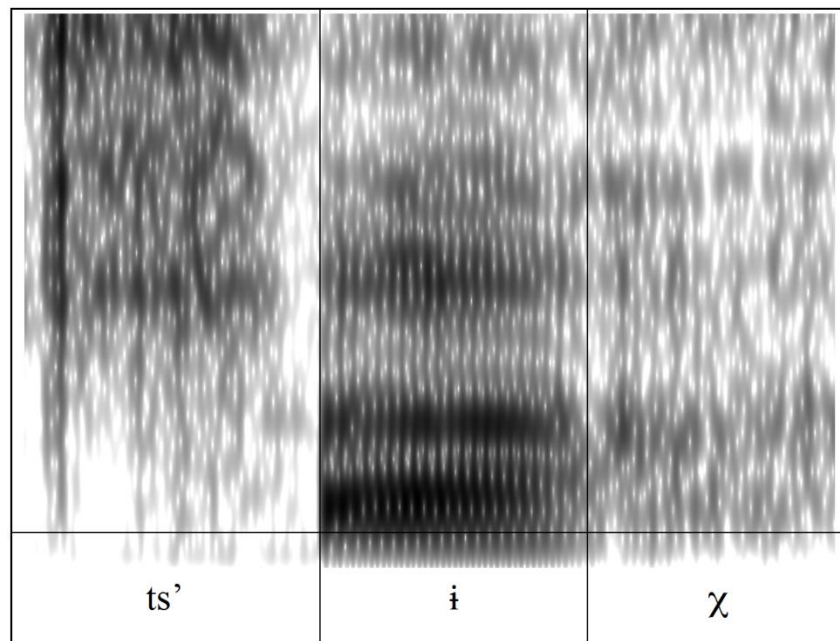
Sahaptin

/ts/ vs. /ts'/'

- *tsíχ* [ˈtsiχ] ‘sting’



- *ts'íχ* [ˈts'íχ] ‘defecate’



Sahaptin phonotactics

- Abundant consonant clusters

- *pshxú* [ˈpʃχu] ‘sagebrush’



- *shtxní* [ˈʃtχni] ‘horsefly’



- *pstxłá* [ˈpstχła] ‘blacksmith’



- *ílkwsh* [ˈilk^wʃ] ‘fire’



- *pákwchtk* [ˈpaq^wtʃtk] ‘plug in’



Hargus, Sharon, and Virginia Beavert. 2002. 'Yakima Sahaptin clusters and epenthetic [i].' *Anthropological Linguistics* 44:1-47.

Hargus, Sharon, and Virginia Beavert. 2006. 'Word-initial clusters and minimality in Yakima Sahaptin.' *Phonology* 23:21-58.

Distribution of Sahaptin ejective stops

- Pre-vocalic

- k'úxł [ˈq'uχł] 'knee'



- Pre-consonantal

- Before obstruent k'sháash [ˈq'ʃá:ʃ] 'curly'

- Before sonorant k'míł [ˈq'mił] 'rock'



- Word-final (rare)

- huk'húk' [huq'huq'] 'pig'



- *C'C'; *C'/__ affr




Ejective stops before stops

	p	t	k	k ^w	q	q ^w
p'					p'q	p'q ^w
t'			t'k	t'k ^w	t'q	
k'	k'p	k't				
k ^w '	k ^w 'p		k ^w 'k			
q'	q'p	q't				
q ^w '	q ^w 'p	q ^w 't	q ^w 'k			

Ejective stops before fricatives

	s	ʃ	ʒ	x ^w	χ	χ ^w
p'	p's	p'ʃ	p'ʒ		p'χ	
t'			t'ʒ	t'x ^w	t'χ	t'χ ^w
k'	k's		k'ʒ			
k ^w '	k ^w 's		k ^w 'ʒ			
q'	q's		q'ʒ		q'χ	q'χ ^w
q ^w '		q ^w 'ʃ	q ^w 'ʒ			

Distribution of Sahaptin ejective affricates

- Pre-vocalic
 - *ts'áa* [ʰts'a:] ‘near’ 
- Pre-consonantal 
 - Before obstruent: *ts'xwíi* [ʰts'x^wí:] ‘conical’
 - Before sonorant: *ts'míst* [ʰts'míst] ‘9’ 
- *Not* word-final

Ejective affricates

	p	k	k ^w	q
ts'	ts'p	ts'k	ts'k ^w	
tʃ'	tʃ'p	tʃ'k		tʃ'q
tʃ'		tʃ'k		

	x ^w	χ	χ ^w
ts'	ts'x ^w	ts'χ	ts'χ ^w
tʃ'			tʃ'χ ^w
tʃ'		tʃ'χ	







Questions about Sahaptin ejectives

- As compared with (non-ejective) plosives and affricates, what are the phonetic properties of ejectives
 - before voiceless consonants?
 - word-finally?

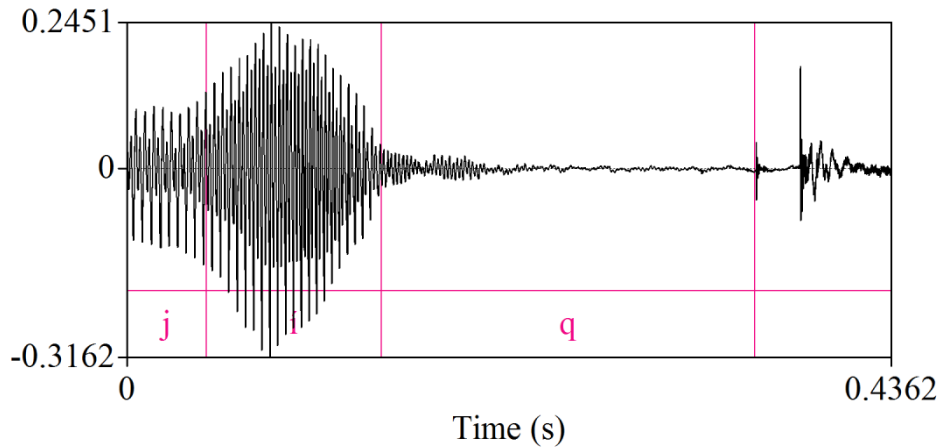
Word-final ejectives



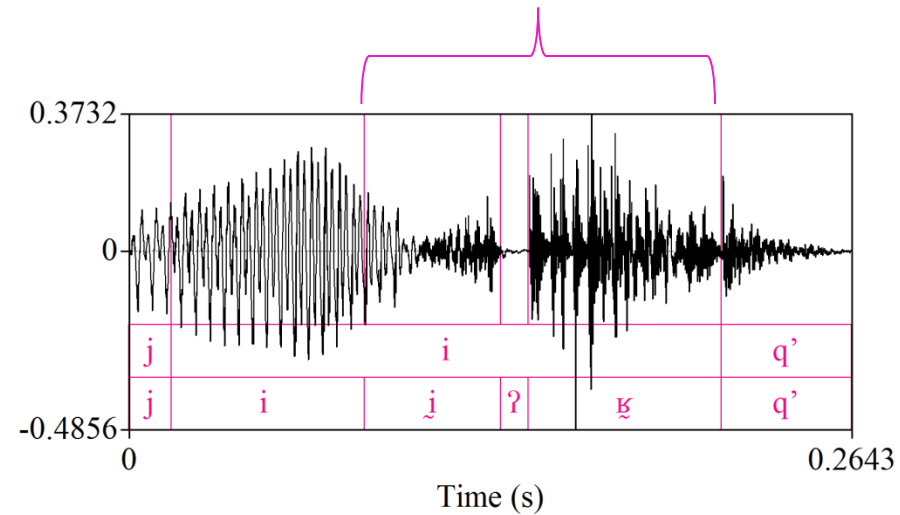
Inventory and characteristics

	C	C'
q	jiq'jiq (creaky sound) 	jiq'jiq' (especially creaky sound) 
		huq'huq' 'pig' 
		juq'juq' 'unstable, wobbly' 
		'χi:q' 'hoot' (by owl)
t	'k'att 'steep' 	t't't't' (noise of rain) 

Word-final [q] vs. [q']

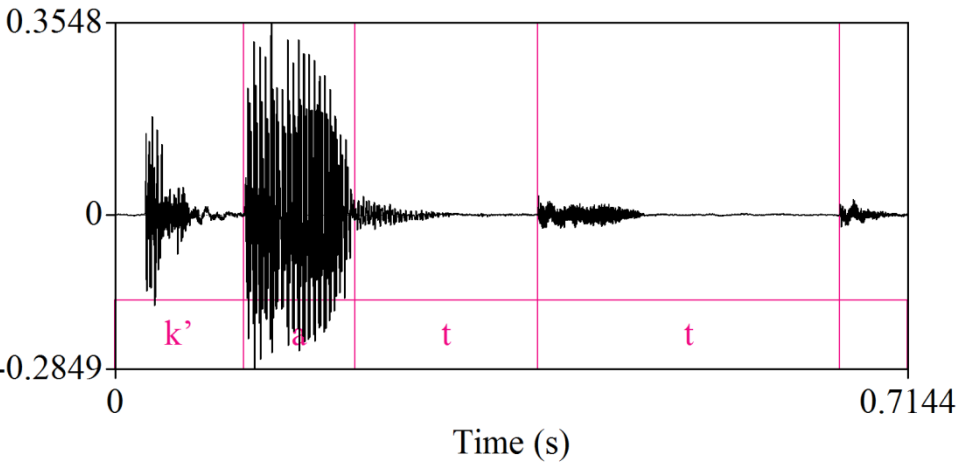


[jiq'jiq]
'creaky sound'

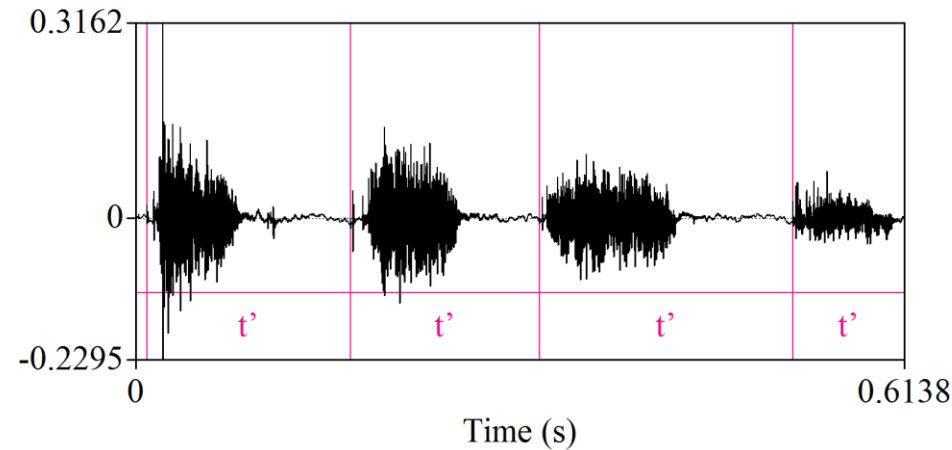


[jiq'jiq']
'especially creaky sound'

Word-final [t] vs. [t']



[¹k'att] 'steep'



[¹t't't't'] (sound of rain)



Word-final ejective characteristics

- High intensity stop burst
and/or
- Preceded by creaky voice

Pre-consonantal ejectives



Observations

<i>Ku</i>	<i>kwlák</i>	<i><u>k'</u><u>xlípa</u></i>	<i>íkushpaynk</i>
Ku	'k ^w lak	'q'χlipa	'ikuʃpajnk
and	there	on tule mat	like this

iyáwitamaasha

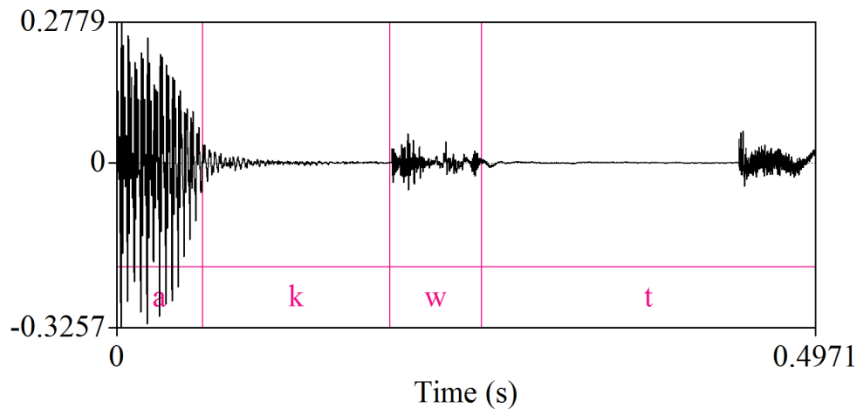
i'jawitama:ʃa.

'it (lying) is floating'

'Then here was something lying on top of on one of the floating tule mats.'

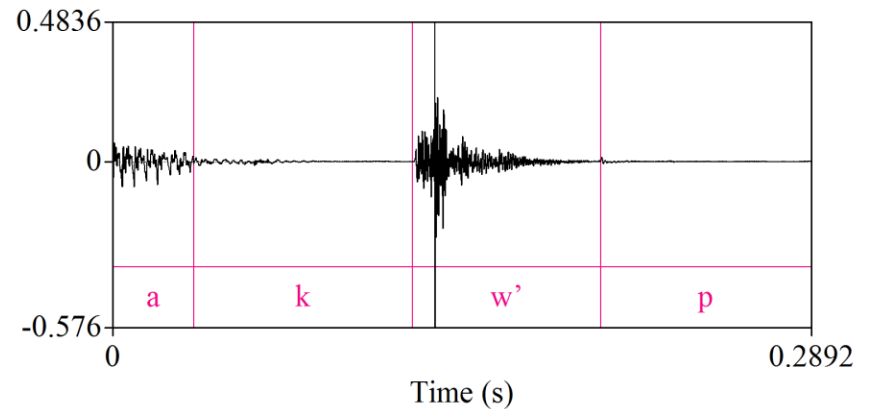


Stops before stops



[a¹nak^wt]

‘separated, divorced’

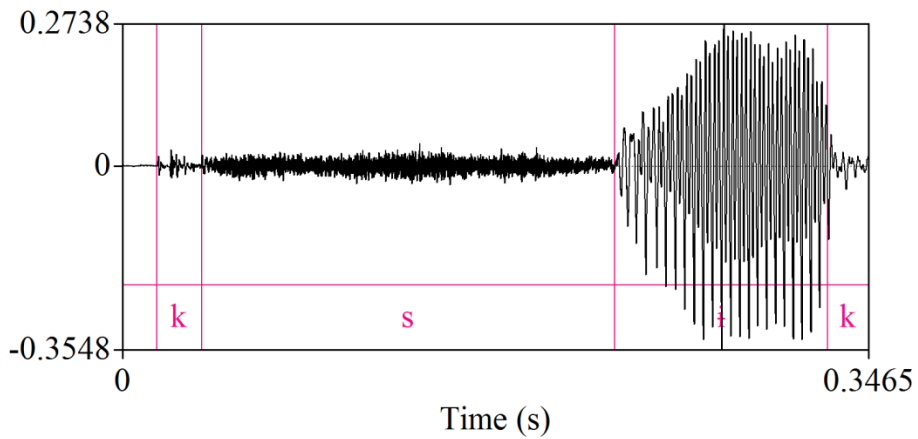


[ta¹mak^w'p]

‘behead, knock top off’

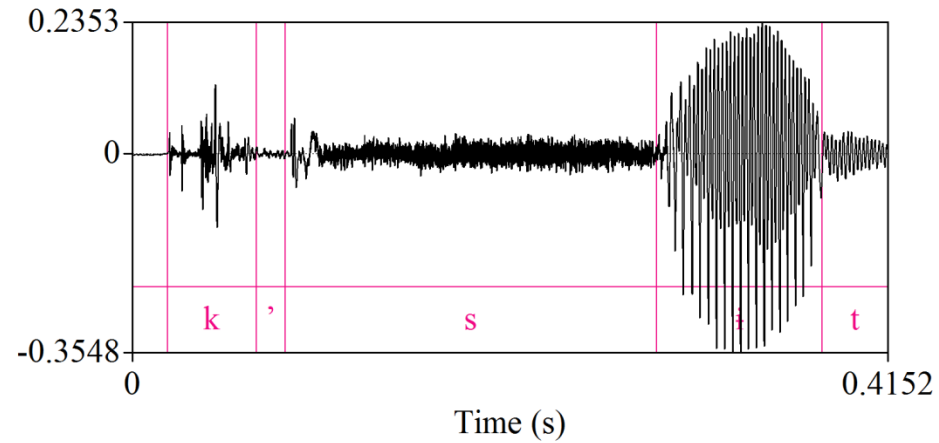


Stops before fricatives



[¹'ksɪk]

'stink'

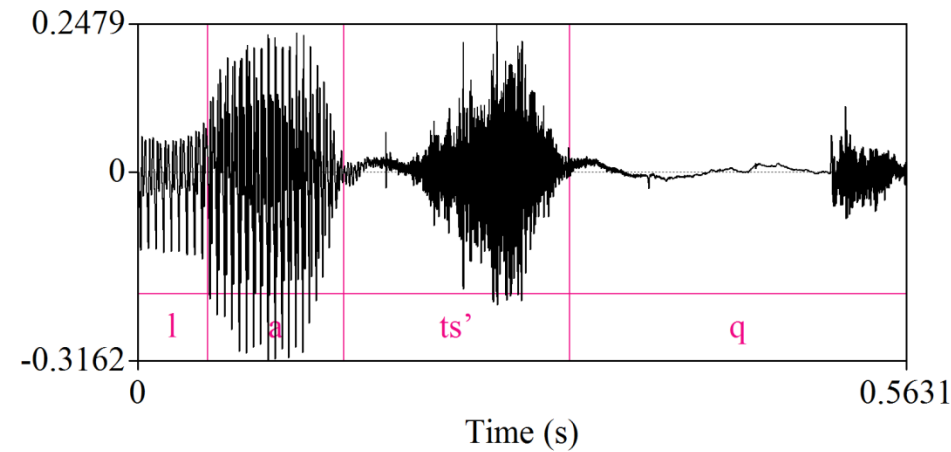
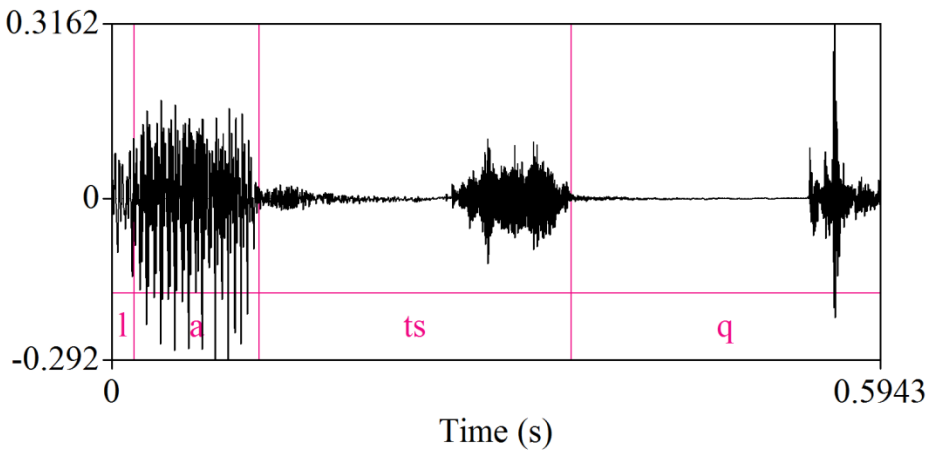


[¹'k'ʰsɪt]

'cold'



Affricates before stops

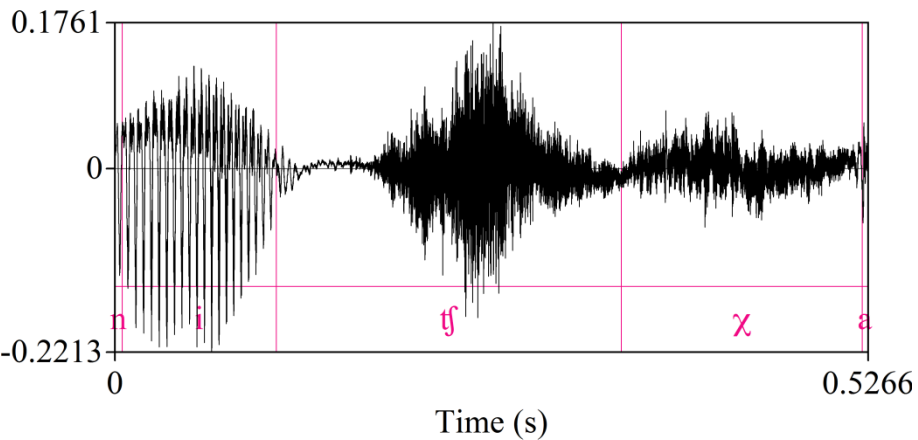


[¹latsq]-
'daydream'

[¹lats'q]-
'snap, crack, spark'

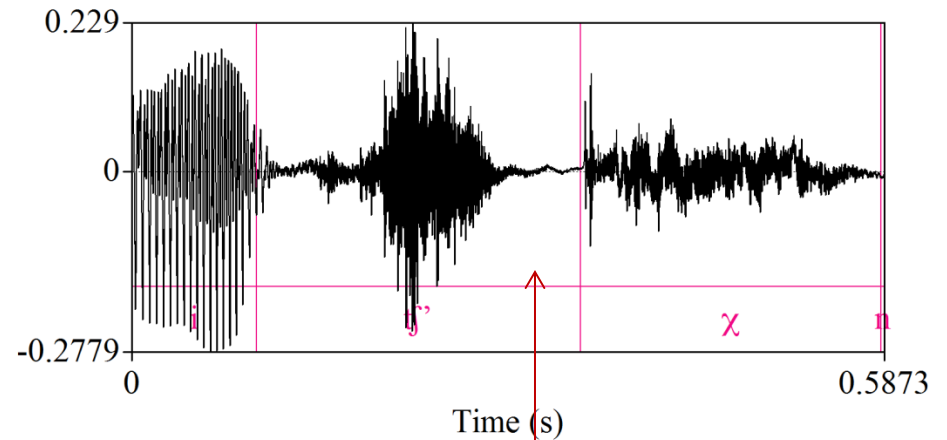


Affricates before fricatives



[i'niʧχa]

'(3sg) places'



[i'wiʧ'χna]

'(3sg) shredded (pl.)'



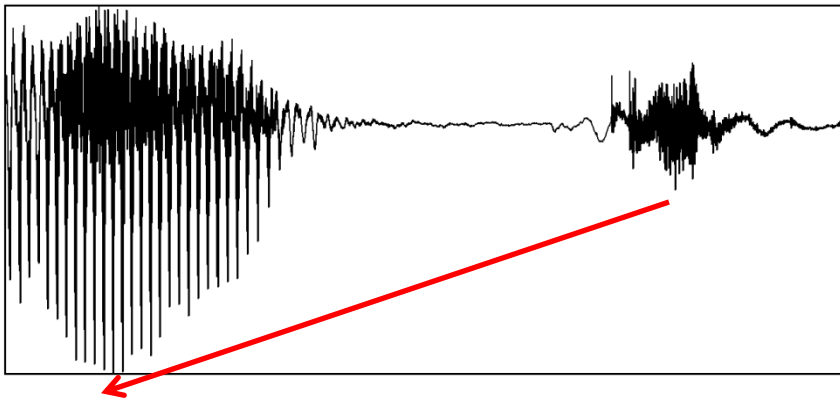
Hypotheses

Relative to non-ejective:

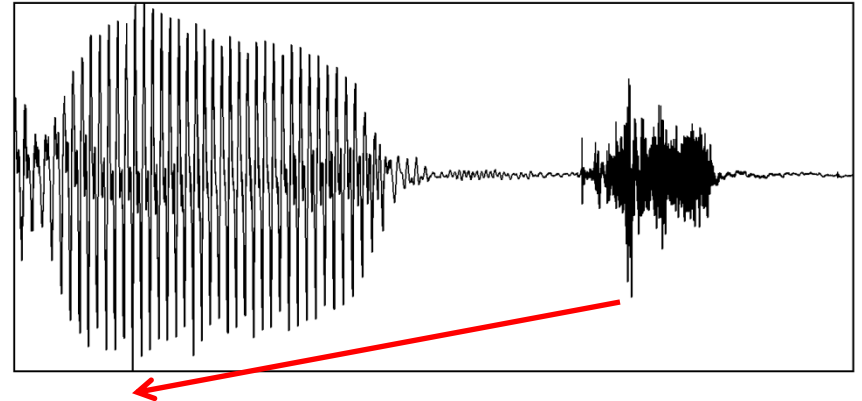
	__stop	__fricative
ejective stop	<ul style="list-style-type: none">•high intensity burst	<ul style="list-style-type: none">•high intensity burst•silent interval
ejective affricate	<ul style="list-style-type: none">•high intensity fricative	<ul style="list-style-type: none">•high intensity fricative•silent interval

Intensity measure

- Stops: $\text{Intensity-max}_{\text{vowel}} - \text{Intensity-max}_{\text{release}}$



[tí:t^w'k] 'advise'



[ʔí:t'k] 'nasal mucus, snot'



Intensity of release burst in other languages

- C' vs. C
 - Gitksan stops
 - Ingush stops
 - Georgian stops } did not distinguish
- Deg Xinag lateral affricates: did distinguish

Hargus, Sharon. 2008. Deg Xinag lateral affricates: Phonetic and historical perspectives. Paper presented at Poster presented at annual meeting of Society for the Study of the Indigenous Languages of the Americas, Chicago.

Ingram, John, and Bruce Rigsby. 1987. 'Glottalic stops in Gitksan: An acoustic analysis.' In *Proceedings of the XIth International Congress of Phonetic Sciences*, ed. by Keel ja Kirjanduse Instituut. Tallinn, Estonia: Academy of Sciences of the Estonian SSR. 134-137.

Vicenic, Chad. 2010. 'An acoustic study of Georgian stop consonants.' *Journal of the International Phonetic Association* 40:59-92.

Warner, Natasha. 1996. 'Acoustic characteristics of ejectives in Ingush.' In *Proceedings of the International Conference on Spoken Language Processing, Oct. 3-6, 1996, Philadelphia*. New York: Institute of Electrical and Electronics Engineers. 1525-1528.

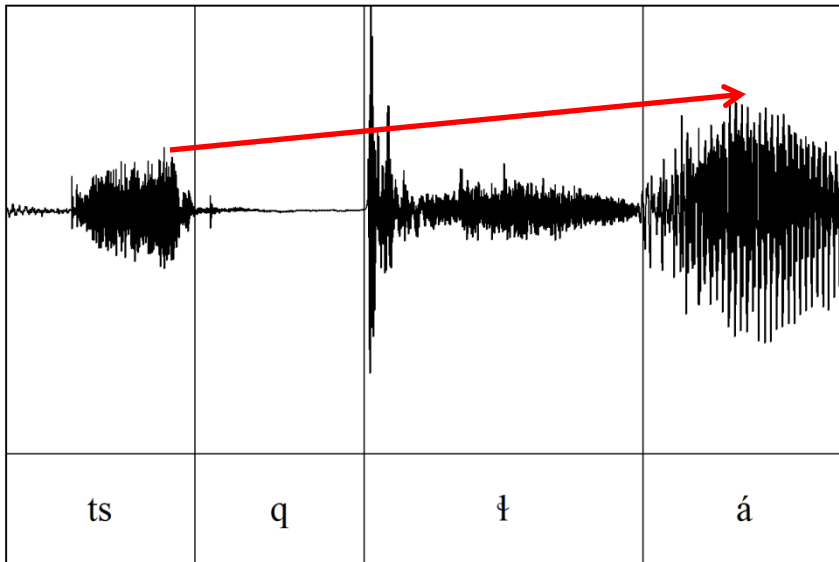


Intensity measure

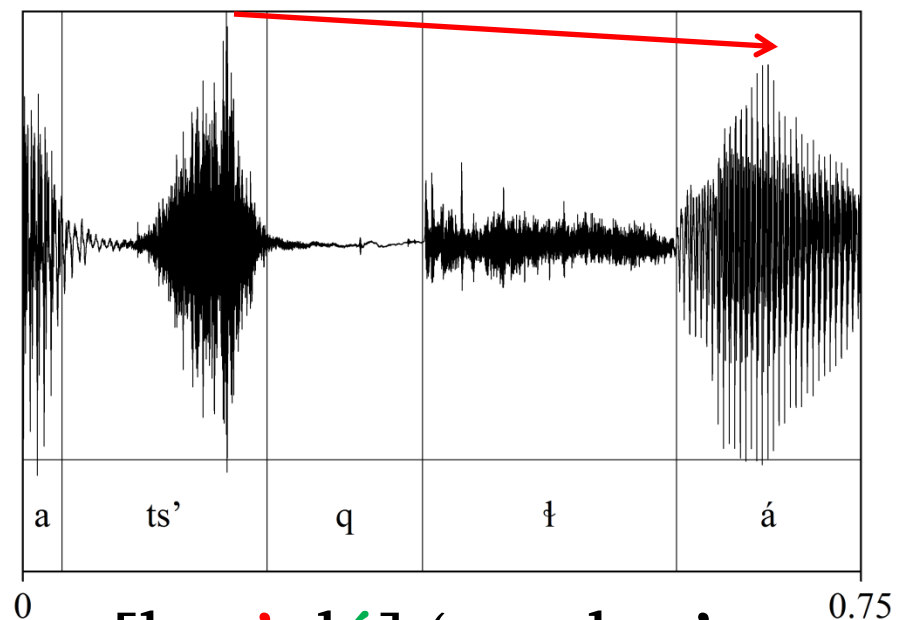


- Affricates

– Intensity-max_{vowel} – Intensity-max_{fricative}



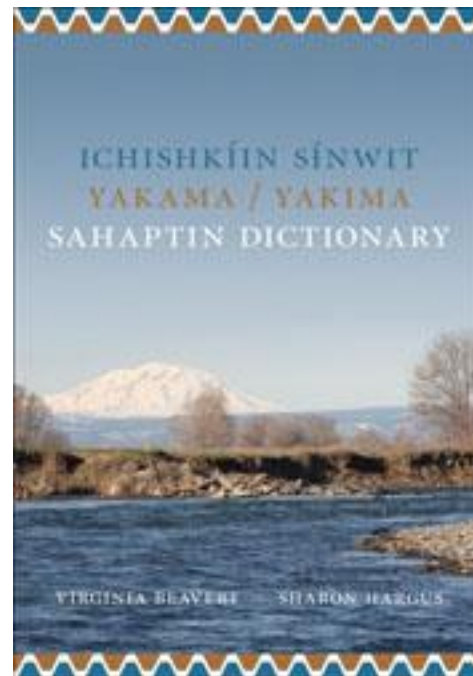
[latʃqɬá] 'day-dreamer'





[latʃ'qɬá] 'sparker'

Materials

- Words and sentences
- 9,830 with published (2009) dictionary
- 12,972 currently



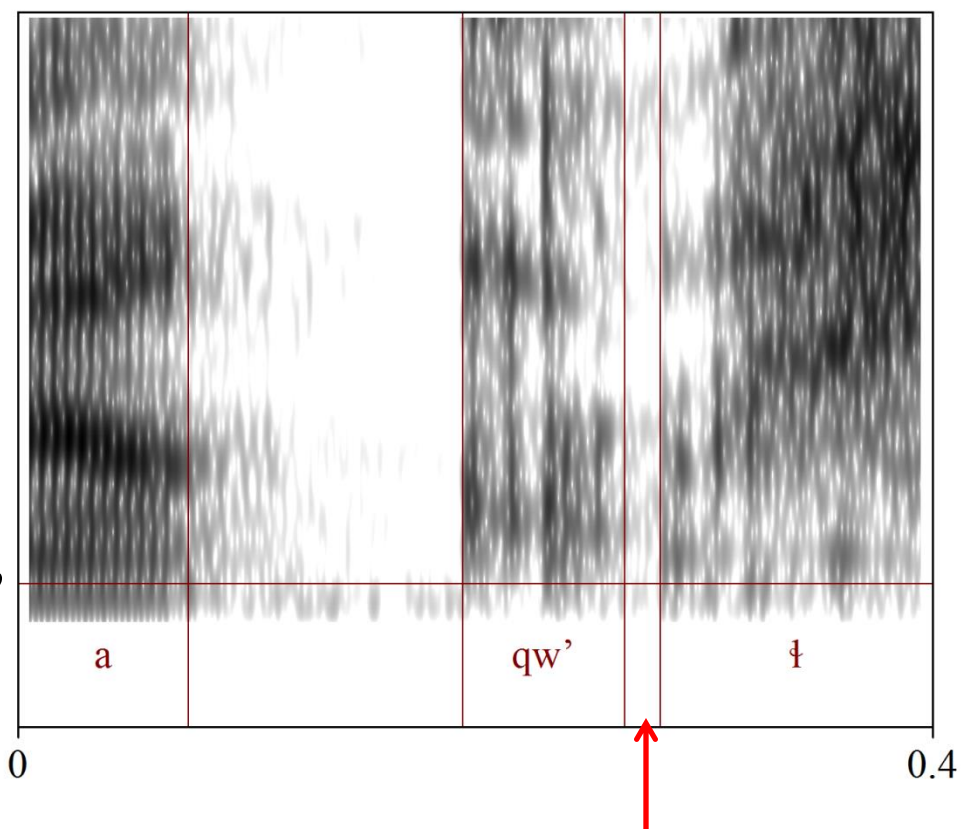
Word lists

pairs	release		pairs	C	C'
31	stop	p	7	'χapʃanajk- 'pile up'	'χap'ʃnak- 'collapse'
		t	10	i'atχa he goes out	i'lat'χa 'it sparked'
		k	5	'ksik 'stink' 	'k'sit 'cold' 
		q	9	'tʃaqpt- 'pull tight'	'tʃaq'p- 'tie down'
14	labialized	k ^w	8	wa'pak ^w ʃtik- 'grab at and miss'	sa'pak ^w ʃtik- 'wipe'
	stop	q ^w	6	ʃa'paq ^w tk- join together	ti'naq ^w tk- sprain
15	affricate	ts	5	'latsq- 'daydream'	'lats'q- 'crack, snap, spark'
		tʃ	5	'qatʃχatk- 'get used to'	iw'jatʃχ ^w a 'it ended'
		tʃ	5	i'niitʃχa 'he places it'	i'witʃχna 'he stripped, shredded it'
50					

Silent interval before fricative?

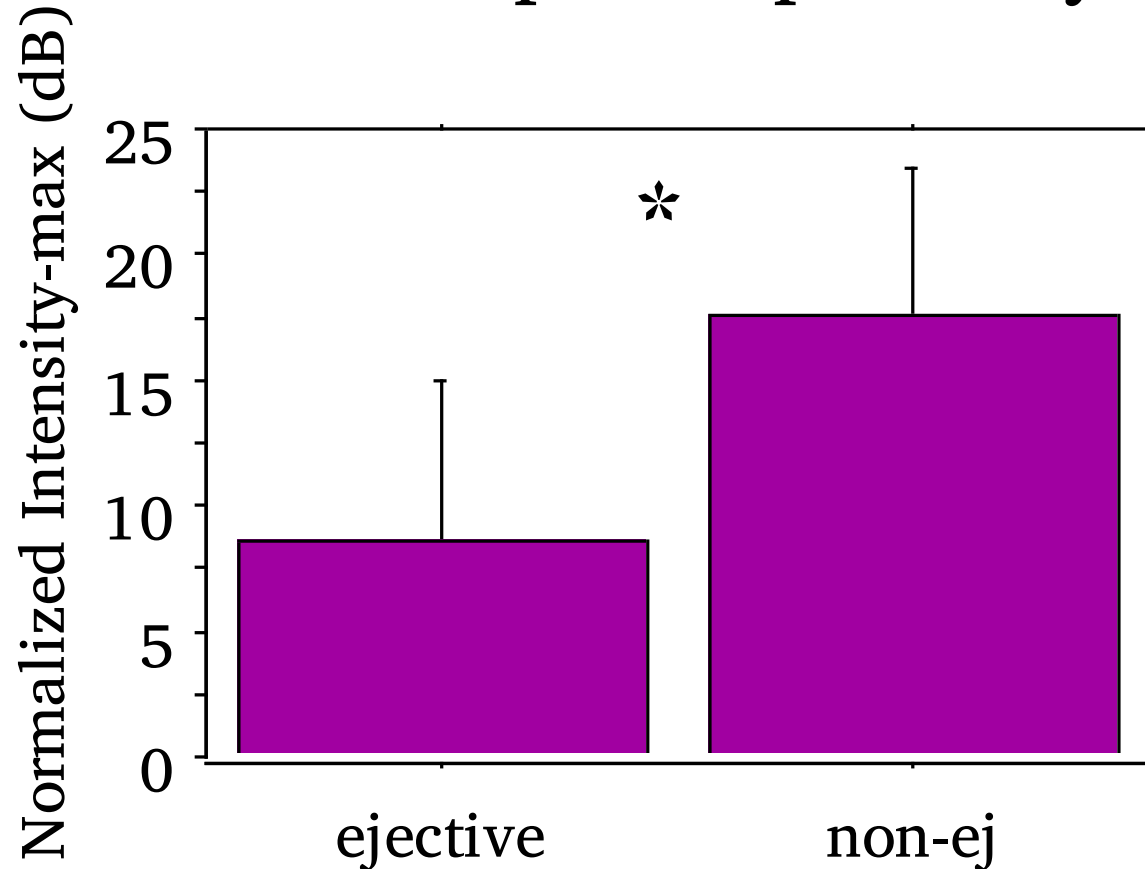
- 28 pairs
- Yes. Mean duration: .031 sec (s = .019)

[pináq^wʔtaj-] ‘win back’



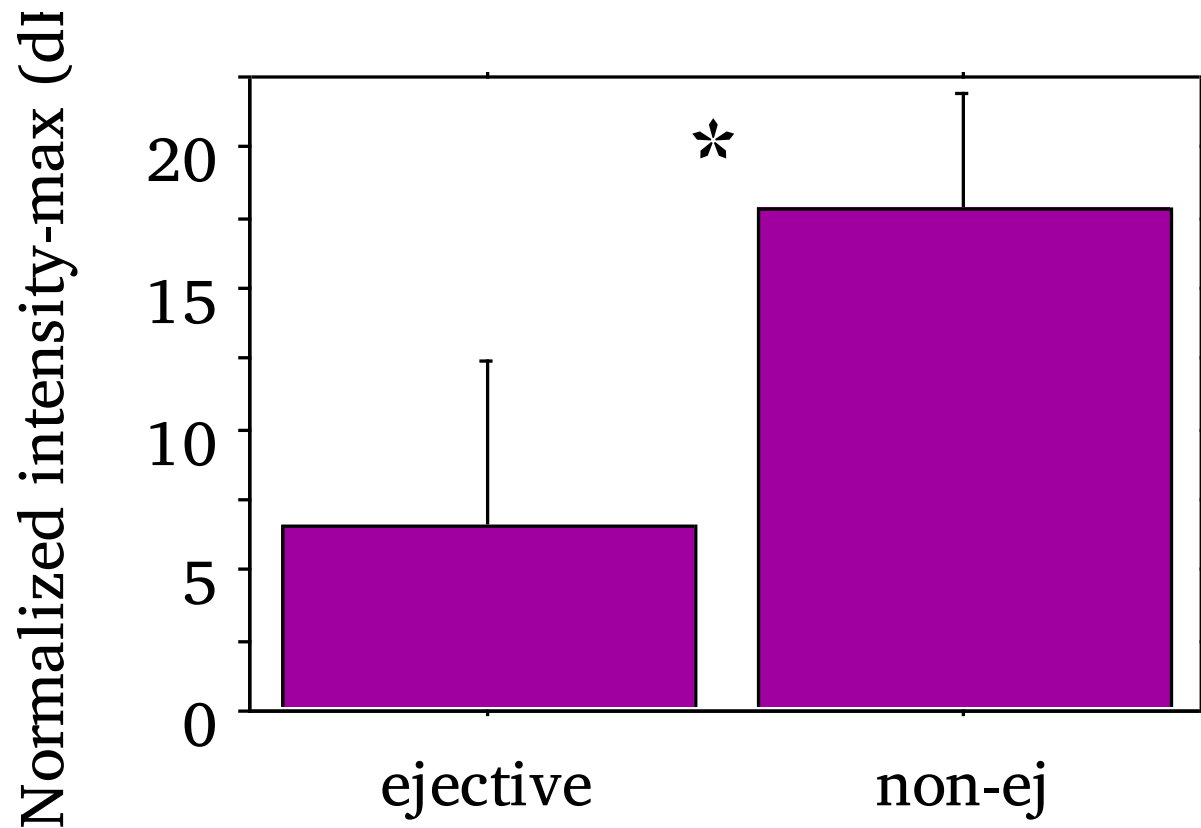
Higher-intensity release?

- Non-labialized stops (31 pairs): yes



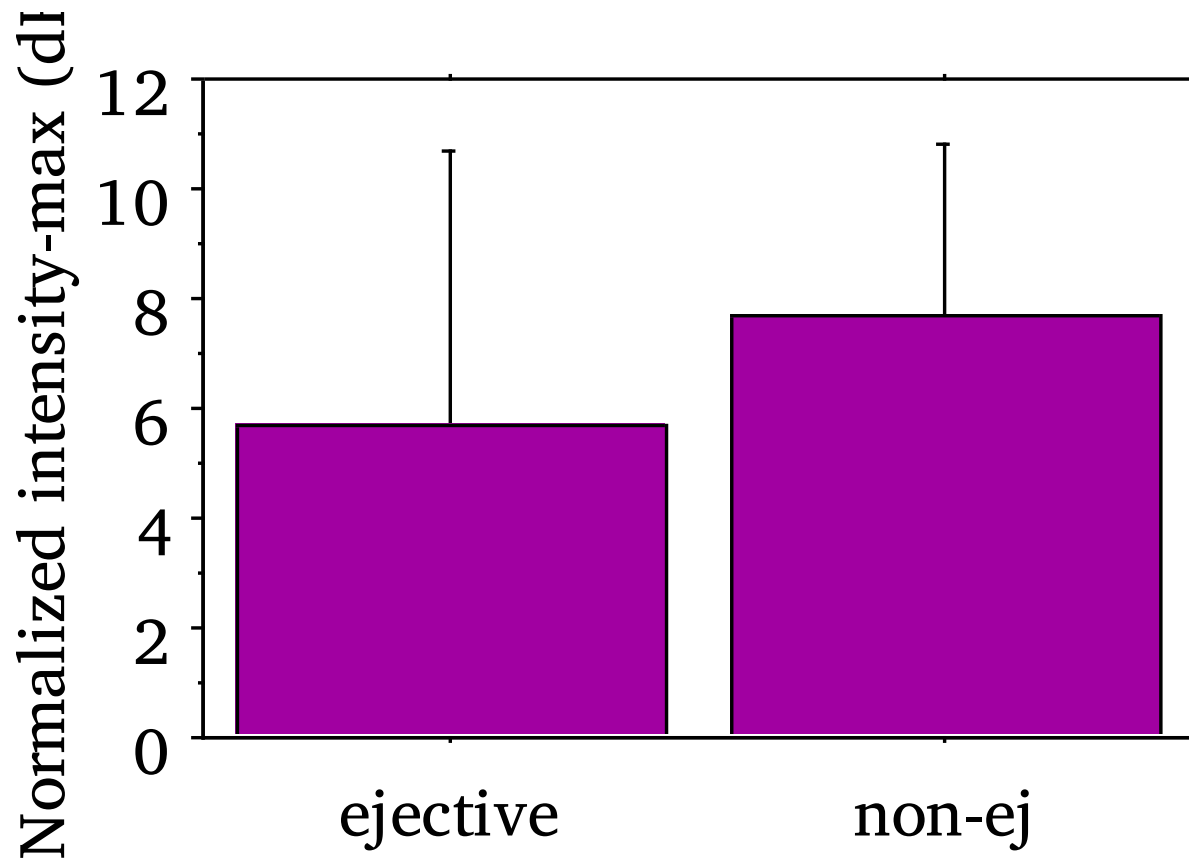
Higher-intensity release?

- Labialized stops (14 pairs): yes



Higher-intensity release?

- Affricates (15 pairs): no

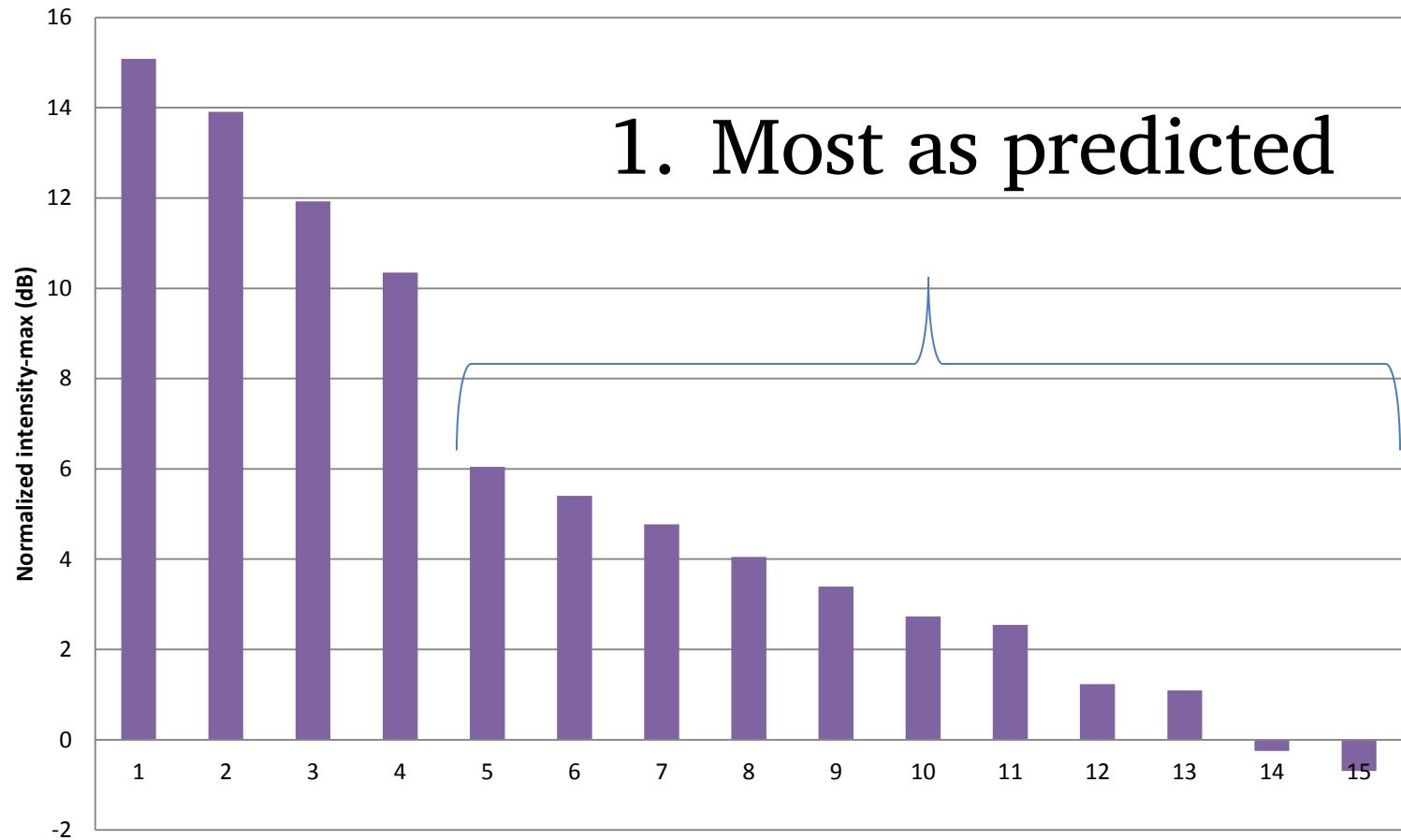


Fate of hypotheses

Relative to non-ejective:

	__stop	__fricative
ejective stop	✓high intensity burst	✓high intensity burst ✓silent interval
ejective affricate	X high intensity fricative	X high intensity fricative ✓silent interval

Ejective affricates



Ejective affricates, cont.

2. In Turkish Kabardian, ejective fricatives had significantly less intensity relative to non-ejective fricatives

- < narrower supralaryngeal constriction (reduces airflow and noise)
- < narrower glottal constriction



Conclusions



Sahaptin C'

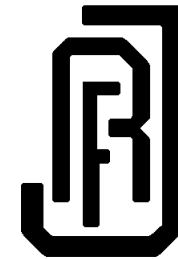
- Word-final
 - High intensity release
 - Pre-glottalized
- Before voiceless C
 - High intensity release
 - Stops—always
 - Fricatives—often but not always
 - Silent period discernible before fricative

Further research

- Compare pre-consonantal and pre-vocalic ejective properties
- Scrutinize previously transcribed geminate affricates
 - 'ts'ts'u:p 'thaw, melt' 
 - 'tʃ'tʃ'umχ 'red-wing blackbird' 

Funding acknowledgements

- Jacobs Research Funds



- Native Voices Endowment

