Gradient dissimilation in Mongolian: Implications for diachrony

"Or take Grassmann's law, so-called. (...) There is absolutely no reason why the champions of graduality could not have this deaspiration occur in a perfectly gradual manner." Hoenigswald (1964)

Adèle Jatteau

Université Paris 8
a.jatteau@gmail.com

Míša Hejná

Aarhus University
misprdlina@gmail.com

1. Dissimilation in the typology of sound changes

- **Dissimilation** : process whereby two similar segments become less similar within a given domain

- only long-distance dissimilation

  e.g. *tʰrepʰɔː > trepʰɔː 'Grassmann's Law' in Ancient Greek

- Traditionally classified separately in the typologies of sound change :

  - Neogrammarians : not a *Lautwandel* ('change'), but a *Lautvertauschung* ('transposition') (Sievers 1901, Paul 1920)

  - 'Minor' sound change (Hoenigswald 1964)

  - Bloomfield (1933) : "changes like these are very different from those which are covered by the assumption of sound change"

1. Dissimilation in the typology of sound changes

- **lexically sporadic**
  - Limited Grassmann's Law In Latin (Weiss 2009)
    *$b^h ard^h eh_2$ > *barba*, not ***farba*

...or regular
  - Quechua **t'ant'a* > *t'anta* (Orr & Longacre 1968)
  - synchronic co-occurrence constraint:
    one C' per root (MacEachern 1999, Gallagher 2016)

- **phonetically abrupt**
  - a feature is categorically deleted (e.g. Hock 1991)
  - a "replacement"

- **mechanism?**
  - 'unnatural', 'puzzling' for Ohala (1981, 1987)
    → action at a distance
    → if assimilation is natural, dissimilation is not.

1. Dissimilation in the typology of sound changes

lexically sporadic
phonetically categorical
sound change

Lexical
diffusion?

a few words
show dissimilation

lexically regular
phonetically categorical
synchronic constraint

2. Gradient dissimilation

- Two languages have been reported to present a synchronic pattern of **'Gradient dissimilation'**: a feature is reduced (not deleted) when in the vicinity of the same feature

- **Halh Mongolian** (Svantesson et al. 2005, Svantesson & Karlsson 2012)

C1 VOT is shorter in [tʰaʰtax] ('to pull', 50 ms)
and in [tʰɔs] ('fat', 49 ms)

than in [tʰaɮ] ('steppe', 72 ms)

- gradient dissimilation
- regressive
- triggered by /s/ and /Tʰ/

- **Aberystwyth English** (Jatteau & Hejná 2016)

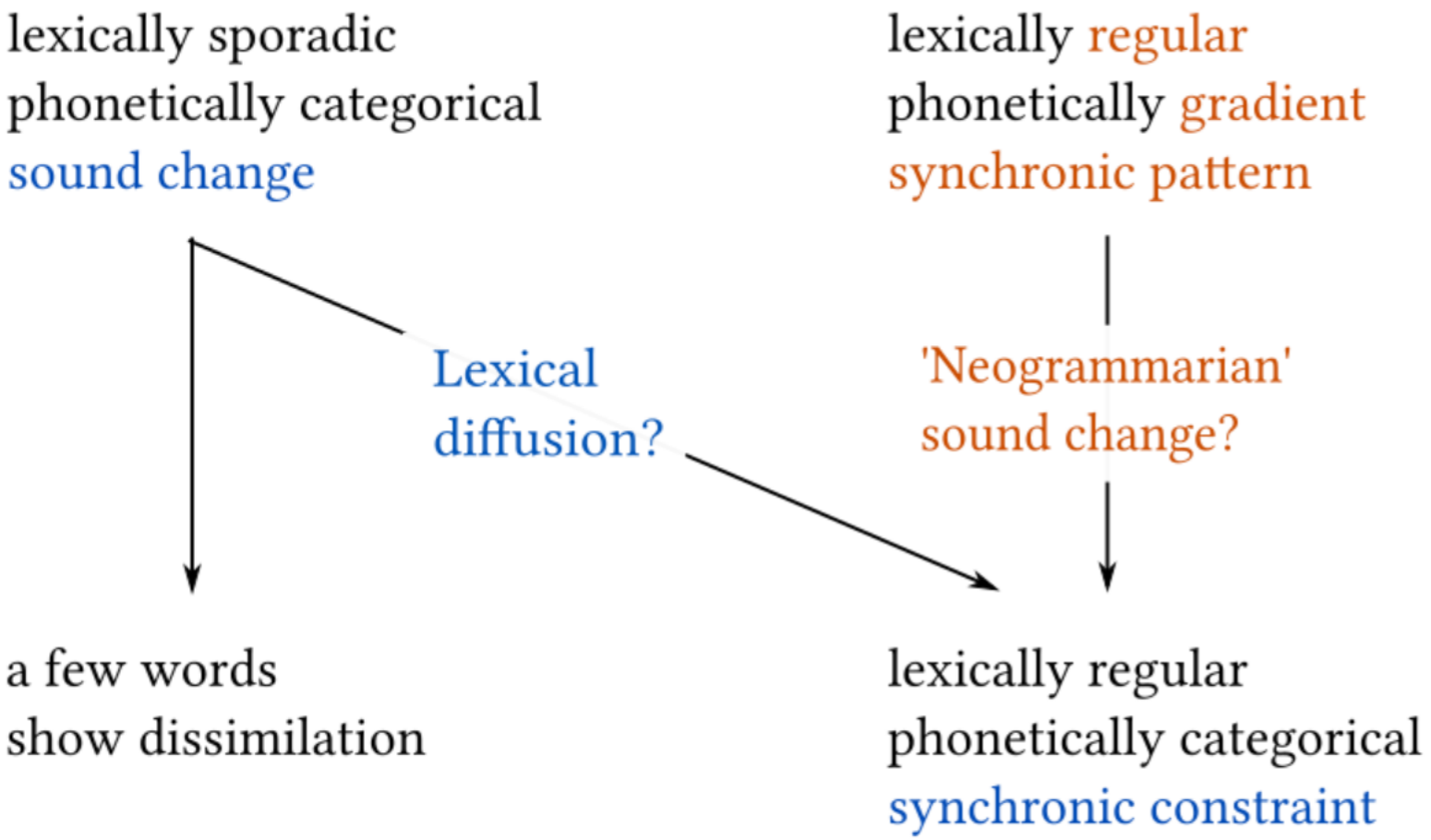
C2 pre-aspiration is shorter
in CʰVʰC words like *patter* (26ms)
than in CVʰC words like *batter* (40ms)
or *latter* (36ms)

- gradient dissimilation
- progressive
- triggered by /Tʰ/ and /h/
- lexically regular

- The Halh pattern is based on little data: 1 speaker, 3 words repeated 4 times (Svantesson p.c.)

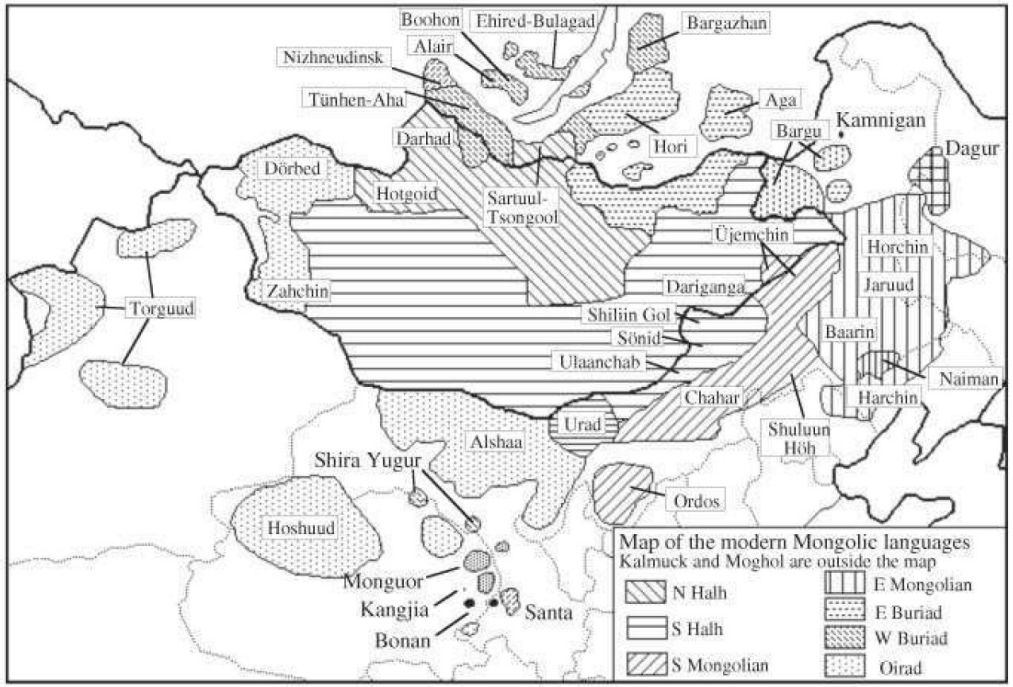
→ Goal today: investigate the Halh pattern of gradient dissimilation

2. Gradient dissimilation



3. Complete dissimilation in Mongolian: the Chahar type

- Many dialects of Mongolian have undergone complete dissimilation, e.g. Chahar (Svantesson et al. 2005)



Dissimilating areas: *t^hat^h- > tat^h-

Southern Halh

Chahar, Naiman, Ordos

Non dissimilating areas: t^hat^h- preserved

Northern Halh

East: Horchin, Harchin, Baarin

3. Complete dissimilation in Mongolian: the Chahar type

- **The Chahar-type dissimilation**
  Nb. *kʰ > x

	Old Mongolian	Chahar	North. Halh	
a.	*tʰatʰa	**t**atʰ	tʰatʰ	'to pull'
	*kʰøkʰe	**k**ox	xox	'blue'
b.	*tʰosun	**t**ɔs	tʰɔs	'fat'
c.	*kʰautʃʰin	xʊʊtʃʰəŋ	xʊʊtʃʰəŋ	'old'
	*kʰamtʰu	xamtʰ	xamtʰ	'together'

- **complete** dissimilation: nothing remains of the 1st aspiration feature
- regressive
- triggers: aspirated stops (a) and /s/ (b)
- domain: only over a short vowel (c)

3. Complete dissimilation in Mongolian: the Chahar type

Chahar	**Halh**
• completed dissimilation	• synchronic gradient dissimilation
• regressive	• regressive
• triggered by /s/ and aspirated stops	• triggered by /s/ and aspirated stops
• over a short V only	• ?

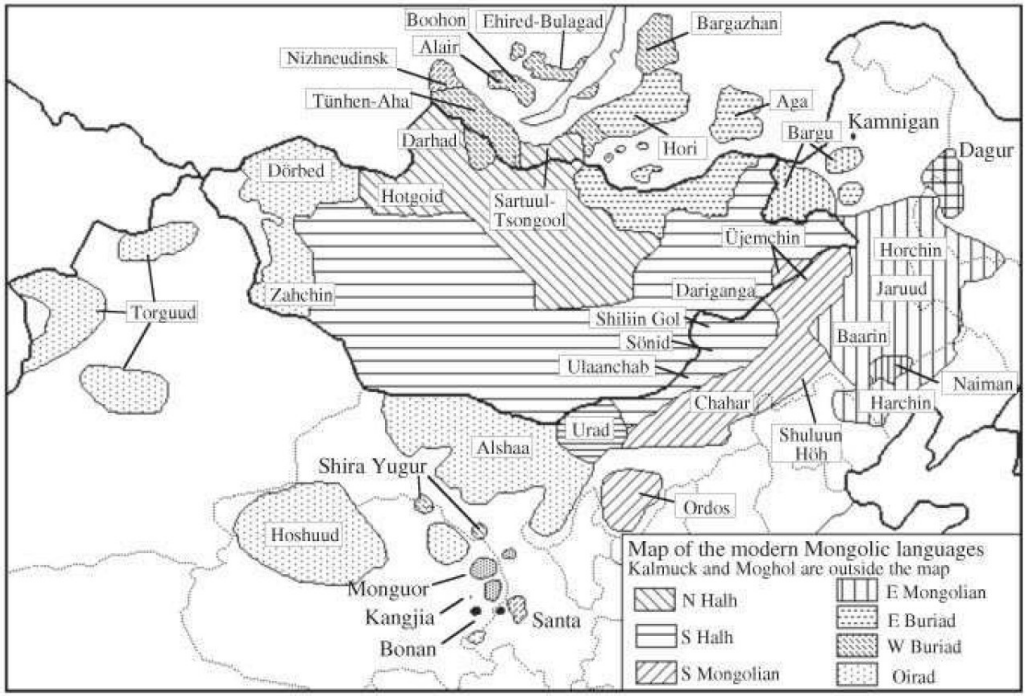
⇒ Garrett (2015): "This reduction of aspiration duration is obviously the precursor to complete deaspiration as in the Chahar dialect"

→ does the gradient dissimilation in Standard Halh reflect the phonetic precursors of the Chahar-type dissimilation?

- How general is the pattern in Halh?
- Does it happen across long vowels?

4. Complete dissimilation in Mongolian: the Monguor type

- Another Mongolic language, Monguor, has undergone another type of complete dissimilation, this time progressive



Progressive dissimilation:

- Regular in Monguor
- Irregular in Bonan, Santa, Kangjia, Shira Yugur dialects

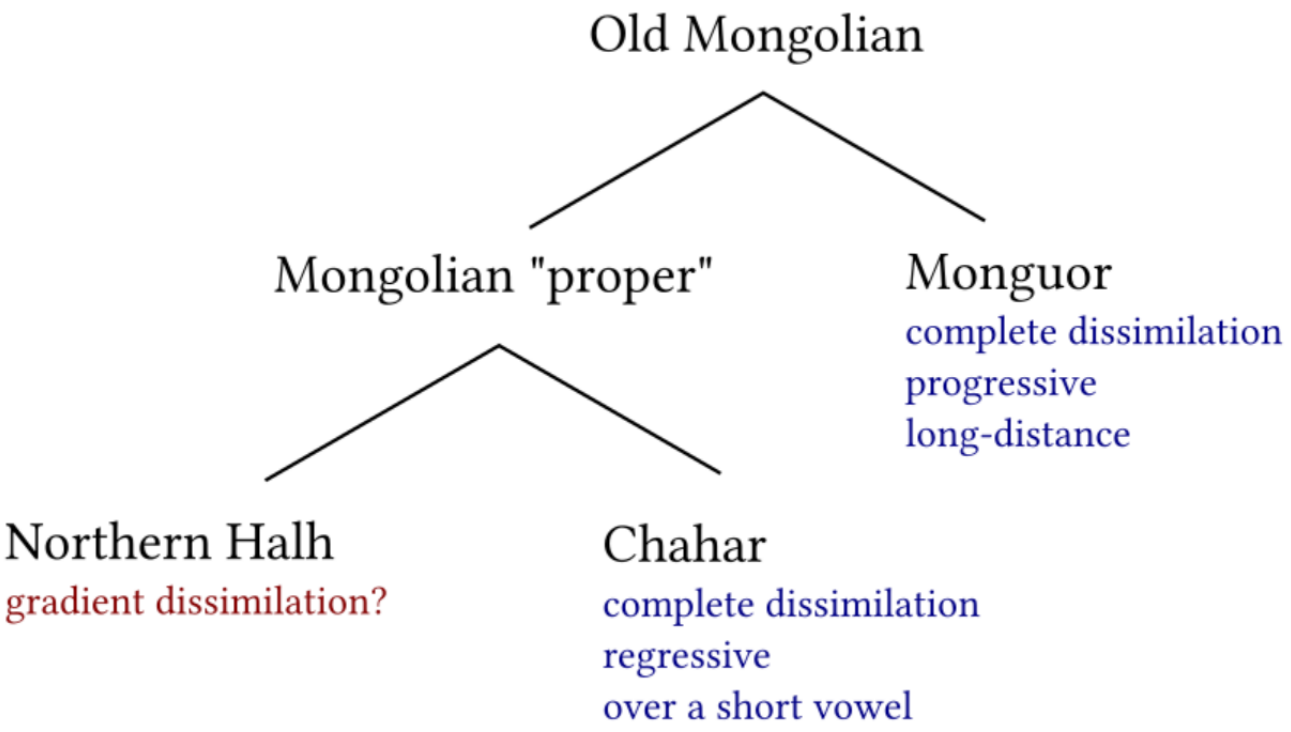
4. Complete dissimilation in Mongolian: the Monguor type

- **The Monguor-type dissimilation**
  (Svantesson et al. 2005, Mostaert & de Smedt 1930, Georg 2003)

	Old Mongolian	Monguor	North. Halh	
a.	*tʰatʰa	tʰi**t**a	tʰatʰ	'to pull'
	*kʰøkʰe	kʰu**k**o	xox	'blue'
b.	*sykʰe	su**k**o	sux	'axe'
	*hykʰer	xu**k**or	uxer	'ox'
c.	*kʰautʃʰin	xau**tʃ**in	xʊʊtʃʰəŋ	'old'
	*kʰamtʰu	xam**t**i	xamtʰ	'together'

- **complete** dissimilation
- progressive
- triggers: aspirated stops, /s/, /h/ (b); /f/ and /x/ for M&dS (1930)
- domain: the word (?): occurs across complex rhymes (c)
- *'leftness effect'* (MacEachern 1999) 'Aspiration flip-flop' *to**tʰ**ara > **tʰ**utor

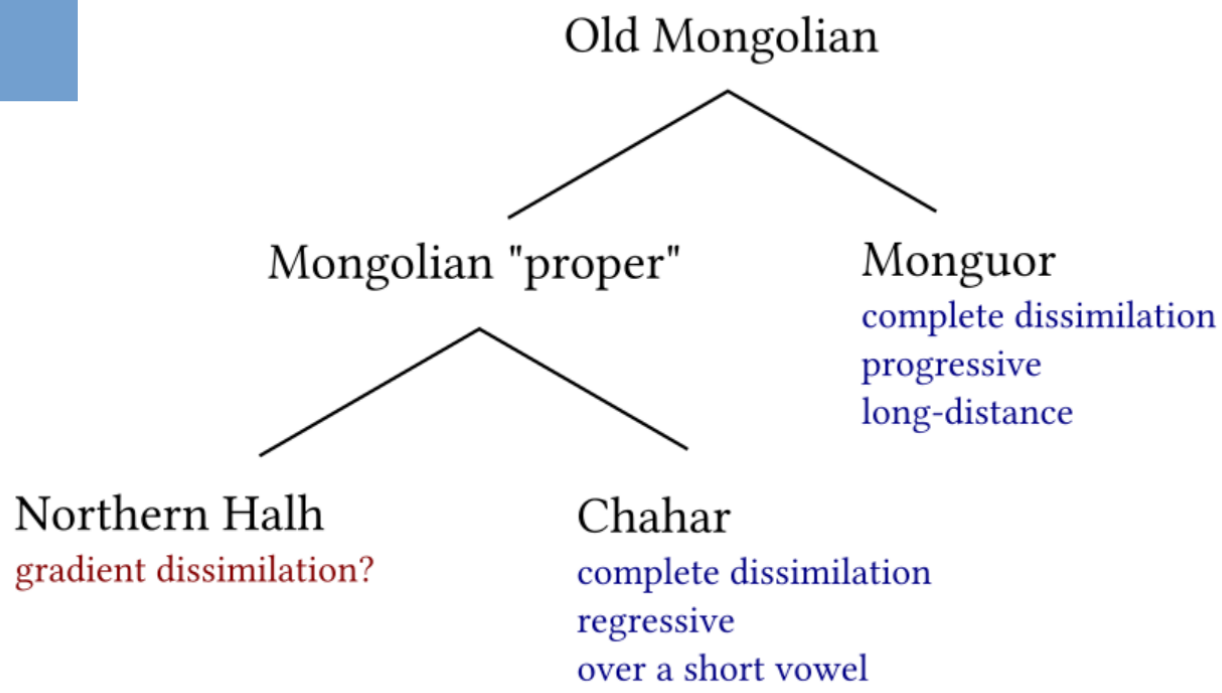
4. Complete dissimilation in Mongolian: the Monguor type



→ Could the gradient dissimilation in Northern Halh reflect the phonetic precursors of **both** the Chahar and Monguor-type dissimilations?

- Is the gradient dissimilation also progressive? $\underline{T}^{h}V\underline{^{h}T}$
- If yes, we may be able to explain why both progressive and regressive dissimilations occurred within the same language family.

5. Interim summary



Overall question: could the gradient pattern of dissimilation be the phonetic precursors of (some) complete dissimilation sound changes?

Does Halh gradient dissimilation:

- reflect the precursor to the Chahar pattern?
  → How general is the pattern? What is its domain?

- reflect the precursors of both the Chahar and Monguor patterns?
  → Is it both regressive and progressive?

5. Interim summary

- To answer these questions, we gathered and analyzed **new data from Standard Halh**

1. Dissimilation in sound change typologies
2. Gradient dissimilation
3. Complete dissimilation in Mongolian: the Chahar type
4. Complete dissimilation in Mongolian: the Monguor type
5. Interim summary

Remainder of the talk:

6. Methodology
7. Results
8. Discussion
9. Directions for further research

6. Methodology

- 8 speakers (6 F, 2 M), all born in Ulaan-Baatar (1 exception), 37-47 year old
- Word-list: 61 Mongolian words, read in isolation, repeated 3 times
- Structures:

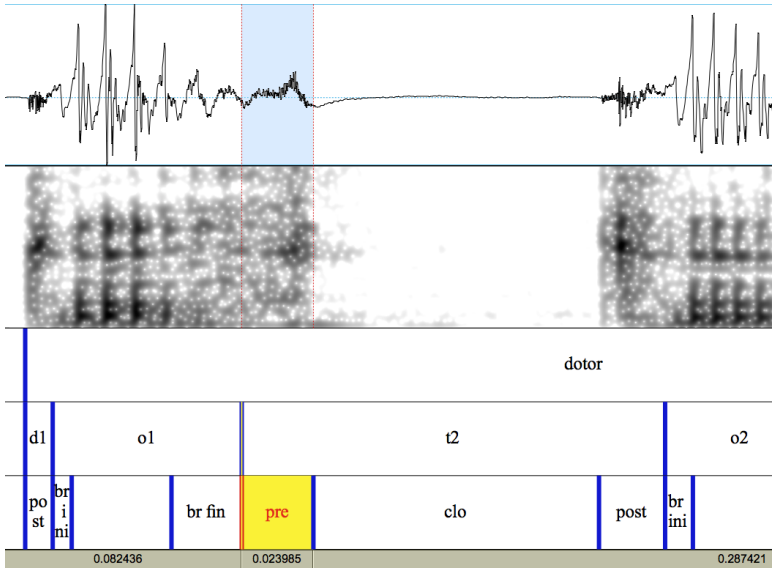
C1	V	C2	(V)
/pʰ, tʰ/	/a, aː/	/pʰ, tʰ, tʰʲ/	
/s/	/ɔ, ɔː/	/s/	
/p, t, g/		/p, t, g, gʲ, ɢ/	
/m, n/		/m, n, ɫ, r, rʲ, w/	

- Standard Halh consonant inventory
  Svantesson et al. (2005)

pʰ	pʲʰ	tʰ	tʲʰ			
p	pʲ	t	tʲ	g	gʲ	ɢ
		tsʰ	ʧʰ			
		ts	ʧ			
		s [sʰ]	ʃ [ʃʰ]	x	xʲ	
m	mʲ	n	nʲ	ŋ		
		ɫ	ɫʲ			
		r	rʲ			
w	wʲ			j		

6. Methodology

- Narrow definition of 'aspiration' (see ref. in Jatteau & Hejná 2016)
  - **Aspiration**: period of voiceless glottal friction
  - **Breathiness**: phonation during which the vocal folds vibrate and during which glottal friction is generated



- The amount of glottal friction varies a lot

→ We also measured the degree of **noisiness** of the vowel through Cepstral Peak Prominence (CPP) analyses.

1. Phonetic implementation of phonemic categories

Aspirated stops

According to Svantesson & Karlsson (2012), Halh /Tʰ/ are:

- post-aspirated in initial position (51ms)
- pre-aspirated in medial position (40ms)
  - VOT in /Tʰ/ is not significantly different from /T/

- In our data, /Tʰ/ are
  - post-aspirated in medial position:

    medial VOT for intervocalic /Tʰ/: 26ms
    medial VOT for intervocalic /T/: 18ms
    The difference is significant.

  - pre-aspiration is realized mostly as breathiness
    - The difference arises from annotation criteria (most explicit in Karlsson 2005)

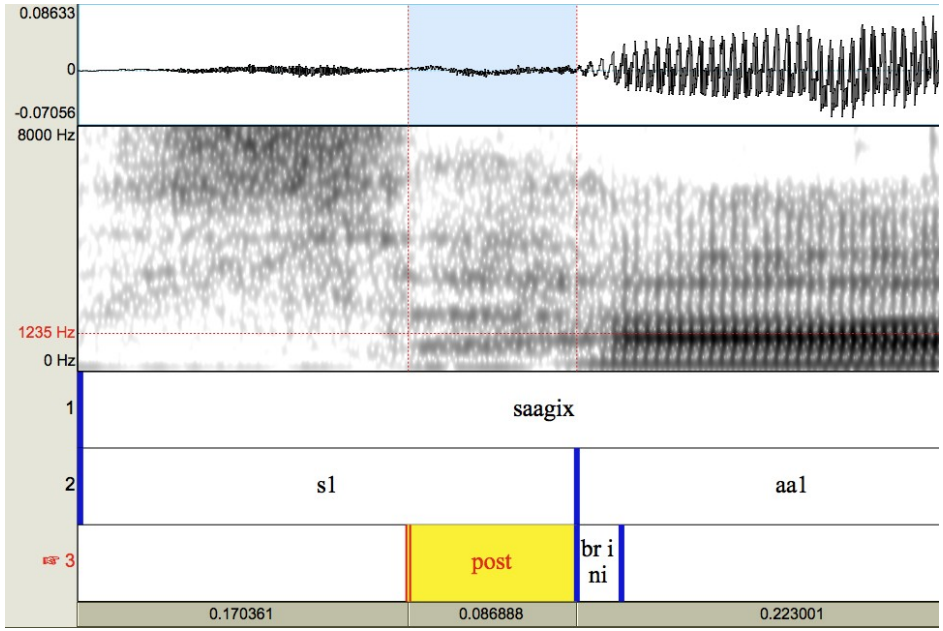
- Nb. Lenis stops have a rather long VOT.

1. Phonetic implementation of phonemic categories

/s/

- always post-aspirated in initial position (27ms)

- infrequently post-aspirated in medial position (30% of the cases) ;
- post-aspiration when it applies is shorter (13ms)



7. Results

1. Phonetic implementation of phonemic categories

/g/, /ɢ/, /ɣ/

- /g/and /ɢ/ are sometimes spirantized in intervocalic position, and may be voiceless

- /ɣ/ is often a voiceless fricative

- These variations were not taken into account in the present results.

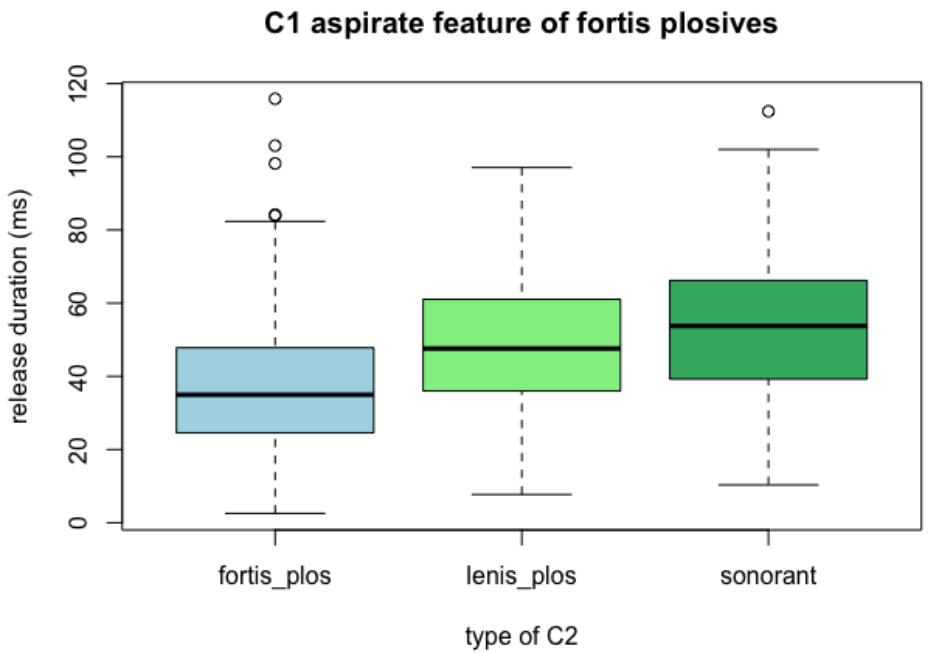
  /g/ and /ɢ/ were coded as lenis stops

  /ɣ/ was coded as a sonorant.

7. Results

2. Is there gradient regressive dissimilation between /Tʰ/?
→ Yes

in TʰVTʰ-, C1 VOT is shorter than in TʰVT or TʰVR.



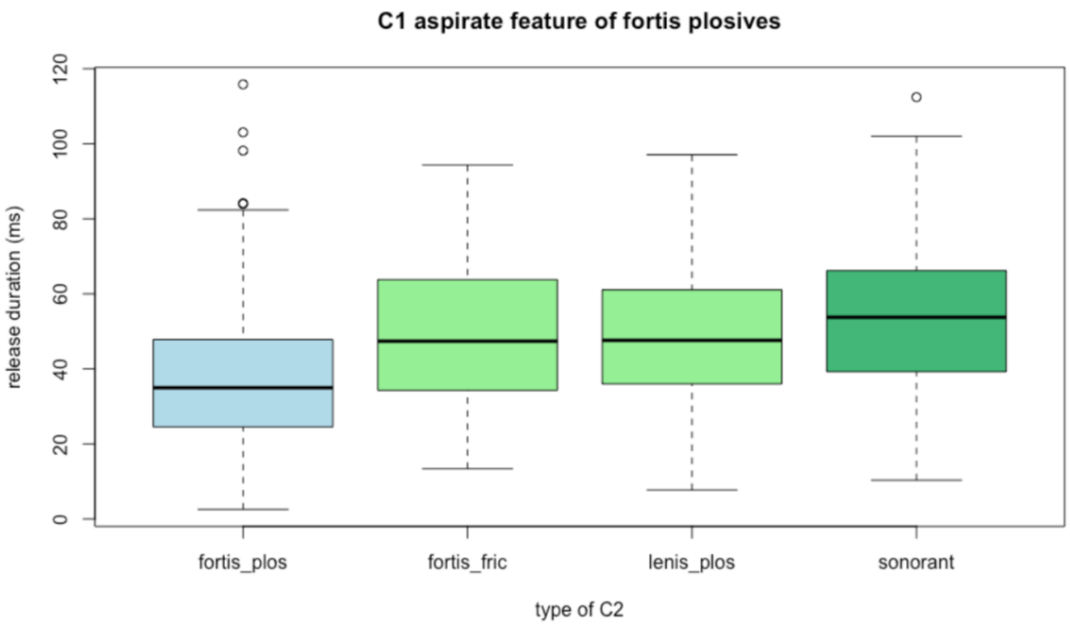
e.g.	[tʰaʰt]	43ms	'to pull'
	[tʰag]	53ms	'cap'
	[tʰaɮ]	63ms	'steppe'

7. Results

3. Does /s/ trigger this gradient dissimilation?

→ **Yes and no**

- /s/ seems to trigger a degree of dissimilation:
- In our data, /s/ patterns with lenis stops: it triggers a slight C1 VOT reduction
- This aspiration reduction is not statistically significant.



	S & K 2012 (1 speaker)	Our data (8 speakers)
[tʰaʰtax]	50ms	34ms
[tʰɔs]	49ms	52ms
[tʰag]	–	53ms
[tʰaɮ]	72ms	63ms

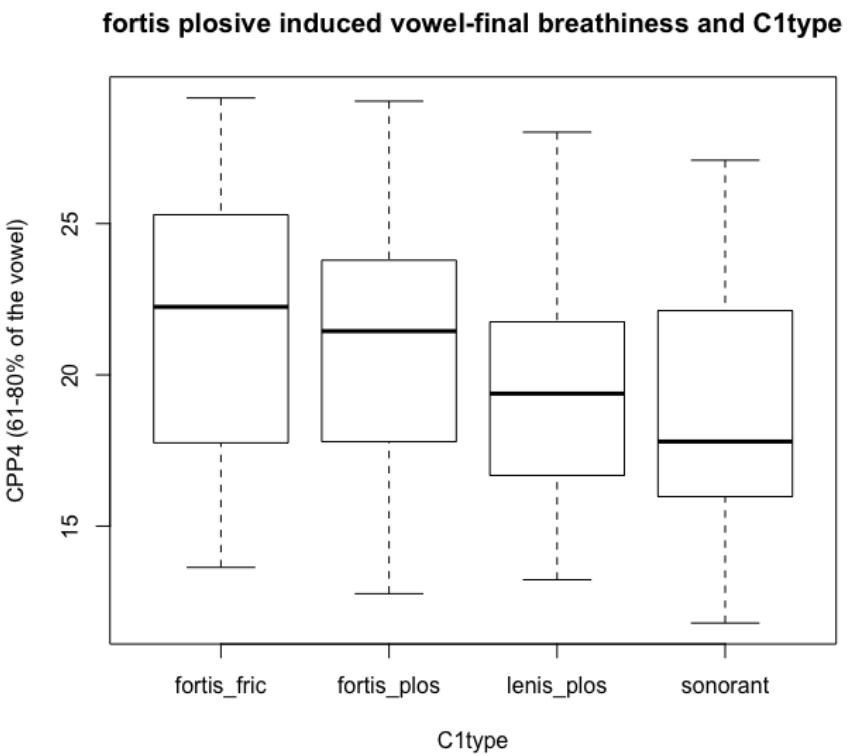
4. Is the gradient dissimilation also progressive?

→ **Maybe**

- C2 post-aspiration in CV^{h}T^h is not affected by dissimilation
- C2 pre-aspiration is *not* reduced in T^{h}VT and sVT compared to TV^{h}T and RV^{h}T
- However, C2 pre-aspiration is **less noisy** in T^{h}VT and sVT than in TVT and RVT

  → Pre-aspiration is less intense in dissimilatory contexts.

- But this differnce in noise is not statistically significant.
  → to be confirmed with a larger corpus



7. Results

5. Do long vowels differ from short vowels?

→ No

- Long /aː/ and /ɔː/ trigger gradient regressive dissimilation like short /a/ and /ɔ/
- Pre-aspiration is overall less frequent and shorter with long vowels e.g. shorter duration of pre-asp. in [paːʰt̪ʰar] than in [maʰt̪ʰar]
    - This is what we expect based on cross-linguistic comparison (Hejná 2015)
    - But it is not statistically significant.

8. Discussion

Does the gradient dissimilation in Northern Halh reflect the phonetic precursors of the Chahar-type dissimilation?

→ Overall, yes; but:

Chahar	Northern Halh	
	Svantesson et al.	Our data
• completed dissimilation	• synchronic gradient dissimilation	✓
• regressive	• regressive	✓
• triggered by aspirated stops	• triggered by aspirated stops	✓
• and /s/	• and /s/	✗
• over a short V only	• ?	over long vowels too

8. Discussion

Does the gradient dissimilation in Northern Halh reflect the phonetic precursors of the Chahar-type dissimilation?

→ Overall, yes, but:

- /s/ triggers a degree of regressive dissimilation, but
  - it's not statistically significant
  - it patterns with lenis stops rather than aspirated stops

[t͡haht]	43ms
[t͡has]	54ms
[t͡hag]	53ms
[t͡haɮ]	63ms

- This is unexpected because
  - /s/ is realized with post-aspiration
  - /s/ is involved in the patterns of complete dissimilations in Chahar and Monguor
  - /s/ and lenis stops do not form a natural class

- We need to enlarge the database to confirm it.

- In our data, intervocalic lenis stops and /s/ have comparable VOT: resp. 18ms and 13ms on average
- Dissimilation seems to be directly linked to the duration of the VOT

8. Discussion

Does the gradient dissimilation in Northern Halh reflect the phonetic precursors of the Chahar-type dissimilation?

→ Overall, yes, but:

- Gradient dissimilation also occurs across **long vowels**.
  [t̪ʰaːʰtʰai] 'pleasant' ≈ [t̪ʰaʰtʰax] 'to pull'

- Hyp.1 Long vowels are associated with shorter pre-aspiration, regardless of C1 type [tʰaːʰt̪ʰai], [paːʰt̪ʰar]
  → There may be less pressure to dissimilate with long vowels.
  - This tendency appears in our data, but it's not significant
  → We need to check with more data.

- Hyp.2 The quality of short vowels in TʰVʰT contexts is more jeopardized by the surrounding aspiration features than the quality of long vowels in TʰVːʰT contexts.
  ⟶ Speakers are more likely to perceive the aspiration reduction on short V's and may use it to enhance the perception of the vowel.

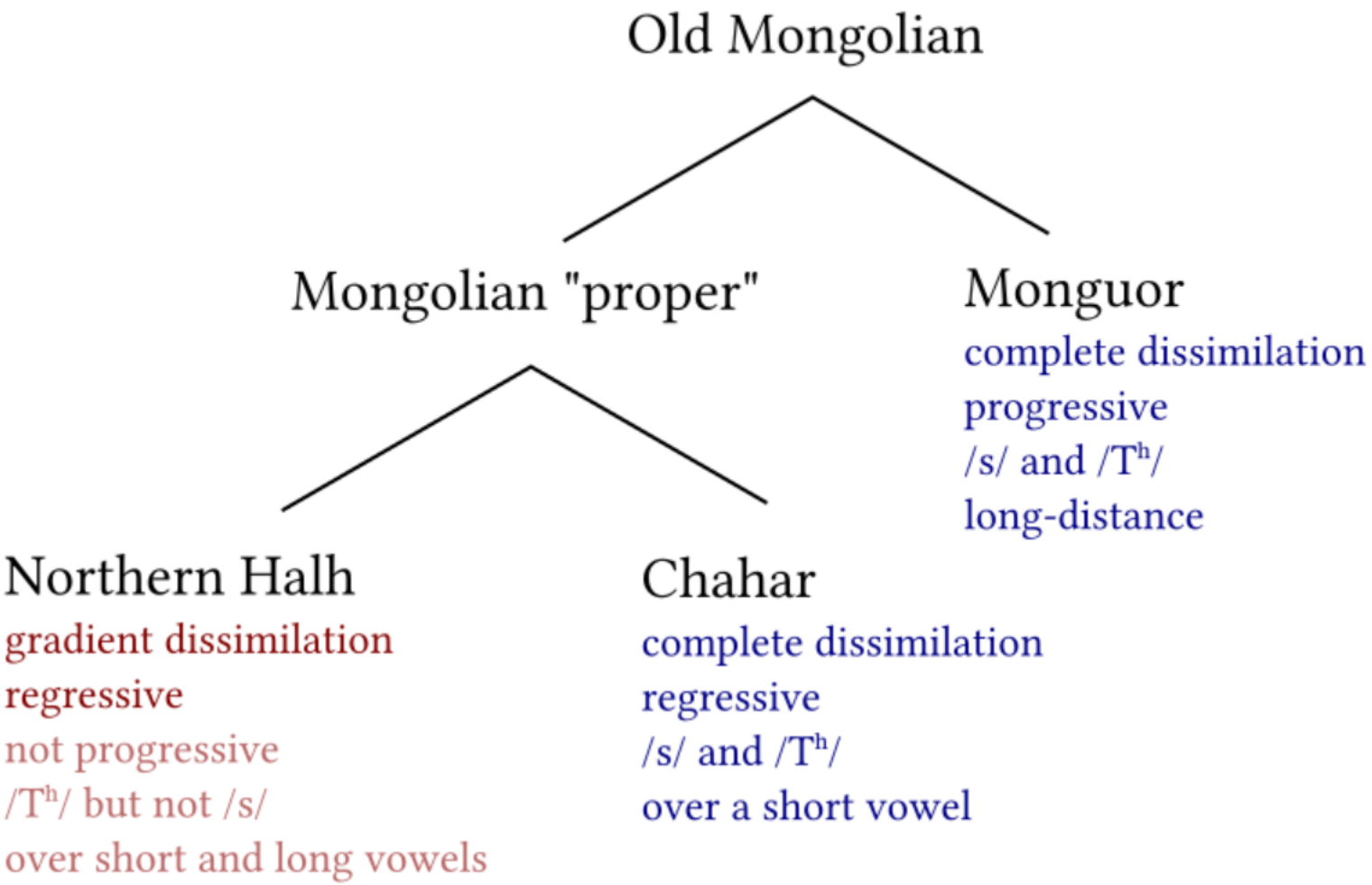
8. Discussion

Finally, does the gradient dissimilation in Northern Halh reflect the phonetic precursors of both the Chahar and Monguor-type dissimilations?

→ Maybe

- Prediction: gradient dissimilation would be both regressive and progressive.
- In our data, the regressive dissimilation is clear, the progressive dissimilation is not. This trend needs to be confirmed with more data.
- The typology of completed dissimilations suggests a comparable asymmetry:
  - Regressive: Ancient Greek, Sanskrit, Basque, Ofo, Kashaya, Makhuwa, Chahar Mongolian
  - Progressive: Quechua, Monguor
    But frequent 'leftness effects' in synchronic co-occurrence constraints

8. Discussion



9. Directions for further research

- Investigate whether /g/, /ɢ/ and /ɣ/ pattern differently when they are voiceless fricatives
- Analyse more data in Mongolian, to see whether:
    - /s/ still patterns with lenis stops
    - there is a progressive effect or not
- Run perceptual tests to investigate short and long vowels differences
- Investigate the Aberystwyth data in more detail, to see whether there is also a regressive effect.

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Additional slides

How similar are the patterns of gradient dissimilation in Halh and Aberystwyth English?

- At the moment we can only compare pre-aspiration effects; new AE data has been collected to investigate $\underline{T^h}V^hT$.

  → The progressive dissimilation is clearer in AE than in Halh

- In AE, pre-aspiration is shorter and less frequent in $T^hV^h\underline{T}$ than in $TV^h\underline{T}$ or $RV^h\underline{T}$
- In Halh, there seems to be an effect but it's not significant
  → to be confirmed with a bigger dataset

  → But AE and Halh also implement aspirated stops differently

- pre-aspiration in AE is longer, and consists of both voiceless and breathy parts
- pre-aspiration in Halh is shorter, and mostly realised through breathy voice

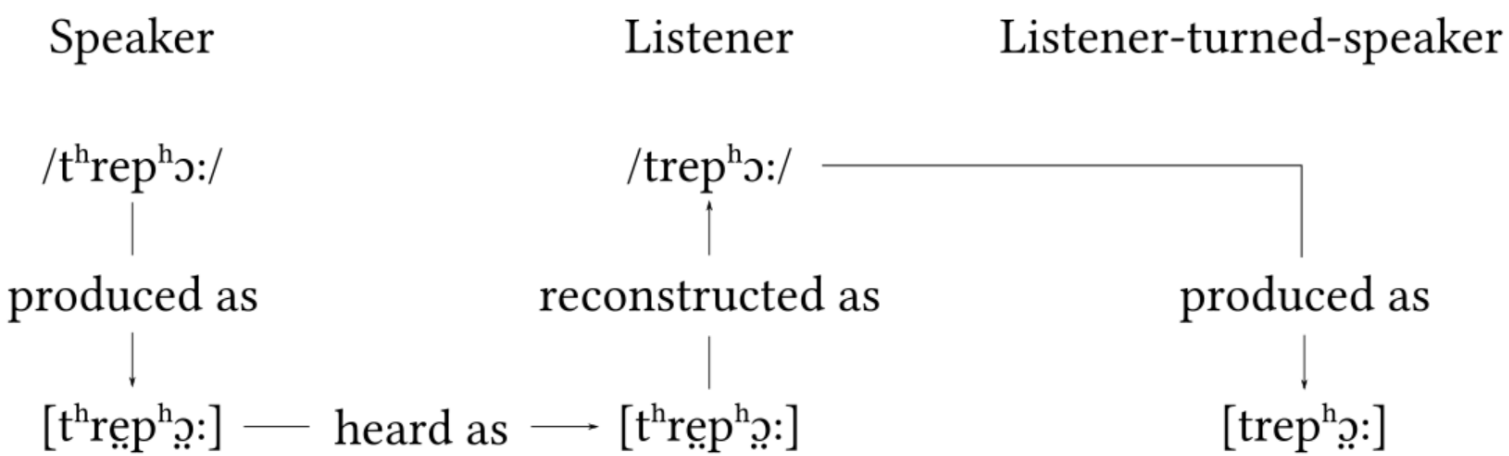
→ Different dissimilatory effects may be linked to different phonetic implementations of the aspirated stops.

Functional accounts of dissimilation

- **Problem**: why does dissimilation happen?

- Ohala (1993) : “These are 'unnatural' sound changes in the sense that, first, we are unable to invoke any principles of speech production that would predict changes in this direction.”
- → A 'psychological', not 'mechanical' sound change

1. Dissimilation by hypercorrection Ohala (1981)



- Dissimilation is lexically irregular
  phonetically abrupt

Functional accounts of dissimilation

2. 'Repetition is difficult'

- handbooks (Anttila 1989, Crowley & Bowern 2010)
- linked to speech errors

→ **Motor planning inhibition** Garrett & Johnson (2013)

- "planning elements (syllables, segments, gestures, etc.) influence each other through priming or coactivation, or through the inhibition of one segment by the activation of another"

she sells sea shells by the seashore [ʃ…s…s…ʃ…s…ʃ]
tends to be reagularized to [s…ʃ…s…ʃ]-like alternations.

→ **Neural networks** Frisch (2004)

- encoding a segment involves node 'firing' and inhibition. "If a sequence involves a repeated segment, the periods of inhibition and excitation may overlap and disrupt encoding of the correct sequence"

Directionality

- One of the crux of functional accounts of dissimilation is **directionality:** What determines the direction of dissimilation?

- Aspiration dissimilation seems to be more frequently regressive

  - Regressive: Ancient Greek, Sanskrit, Basque, Ofo, Kashaya, Makhuwa, Chahar Mongolian

  - Progressive: Quechua, Monguor
    But frequent 'leftness effects' in synchronic co-occurrence constraints

- **Ohala** (1992): the frequency of regressive dissimilation "can be traced back to *assimilation* being more commonly anticipatory than perseveratory (...) (...) but for the most part we do not have any explanatory account of assimilation or its direction".

- **Motor planning**: the most salient position wins

- **Neural networks**: predictions?