Phonetically conditioned vowel devoicing in Chahar Mongolian

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Research Question

What predicts vowel devoicing in Chahar?

- Vowel height is a poor predictor
- Current study examines consonant environment

Background

About Chahar Mongolian
- Dialect of Peripheral Mongolian (ISO 639-3: mvf)
- Basis for Standard Mongolian in China; historically spoken in south-central Inner Mongolia

Vowel devoicing in other languages
- Widespread: Andean Spanish, French, Cheyenne, Comanche, Japanese, Korean; see [9] for review
- Most typical environment is a high, short vowel flanked by voiceless consonants
- Usually gradient and variable, associated with fast speech and ends of prosodic domains
- More often found in unstressed/unaccented syllables

Initial-syllable devoicing in Chahar?

Surprising because:
- Mongolian initial syllables are phonologically prominent: initial syllable is the sole locus of the full range of vowel quality & length contrasts
- Devoicing would yield onset clusters (not otherwise permitted in Mongolian)
- Formal wordlist-reading task should disfavor reduction

Expected because:
- Mentioned in passing in the literature
- Though initial ñongV are stressed, initial short V can be unstressed if followed by a long vowel
- Vowel harmony reduces the information load on individual vowels

References


Methods

Wordlist and recordings
- 6 native speakers of Chahar (3 male); recorded by Yurong in Hohhot
- All attested word-initial CV_C sequences; short vowels only; words are di- or tri-syllabic
- Full list read 3x per talker in sentence frame (piː __ kətʃ xələw) 1 said
- 21558 tokens; 1204 unique words; 845 initial syllable types

Identifying devoiced vowels
Each initial-syllable vowel coded as unreduced, partially-devoiced or fully-devoiced by native Mongolian-speaking phonetician (Yurong).
- Partially devoiced: aperiodic waveform; discernable formants; audible vocalic segment
- Fully devoiced: vowel segment cannot be distinguished from adjacent consonants

Statistical model
Degree of reduction modeled with proportional-odds mixed ordinal regression:

\[ \logit\{P(Y \leq j)\} = \alpha + \beta x + \gamma u \]

Parameterization constrained by “rare events” problem (see mosaic plots below; about 4% of vowels reduced). Consequently, consonant manner is only parameterized for obstructions (fricatives, affricates, stops); in Chahar “obstruents” is coextensive with the set of voiceless consonants.
- Random effects: talker, word, vowel quality
- Fixed effects: aspiration, obstruent manners of C1 & C2; whether C2 is in a cluster

Caveats
- Consonant & vowel features are based on phonemic transcriptions (i.e., they do not vary across talkers or utterances)

Discussion

Devoicing as coarticulation

Results are largely consistent with an explanation of devoicing as the overlap of consonant laryngeal gestures (aspiration, voiceless frication) with the vowel.

Questions for further investigation
- The varying effect of cluster C2s in our results suggests a relationship between devoicing and syllable structure. Research on different prosodic environments is needed; a new spontaneous speech corpus may offer answers.
- Anecdotal, native speakers still “hear” fully-devoiced vowels. What compensatory factors allow vowels to be devoiced while preserving intelligibility?

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