CONSONANT CONFUSABILITY AND SIMILARITY AVOIDANCE PATTERNS

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Goals
1. Establish confusion rates between pairs of Bengali consonants (Cs) in quiet, noise, and babble.
2. Explore if confusability reflects similarity as applied in fixed segment (FS) reduplication.

Background: C inventory

-4-way [voi] & [asp] contrast
-3 MajPlaces: coronal, dental, alveolar
-3 MinPlaces: labial, velar, alveopalatal

Background: FS reduplication

Fixed segment (FS) reduplication (FSR)
-Substitution of a C with a FS in RED (e.g., [asp-], [aC])
-Bengali FSR (reduplication)

In most cases, use FS /t/; [d̪ʰ] 'dent' → [d̪ʰɔ̌̄]pul" in FS place

Gradient behavior for words starting with /t/-like C:
- [d̪ʰ] 'base' → [d̪ʱ]pul" in place of /p/ → [d̪ʰɔ̌̄]pul"
- [d̪ʱ]pul" in place of /p/ → [d̪ʰɔ̌̄]pul"

Rate of /t/-avoidance related to similarity?

If /t/-avoidance reflects confusability, the most least confusable frts would be:

[asp], [voi], MinPl, [cont], MajPl, [son]

Question:

Does confusability reflect the notion of similarity used in FSR?

What are the highest similarity scores between each C and /t/, as derived from confusions of /C t/?

Similarity = (C + t + t) / (C + C + t)

Methods

- Multiple Forced Choice experiment in Praat
- 24 listeners
- Heard os via headphones
- Clicked on letter perceived

- 3 added noise conditions from NOISEX database
- Babble: multi-talker speech
- Pseudorandomized

- 54 legal Cs: [Ca], [aC]
- 3 noise blocks, 3 reps
- Noise: pink noise
- Clear: no noise

Confusability rates

Clear (92.0% accuracy)
- Most errors in [voie], [asp]

Babble (59.2% accuracy)

Noise (69.7% accuracy)
- Errors reflect percept of loud, high-fq burst
- Confusions of /C t/

Confusability in FSR is best correlated with coda similarity (r² = .69-.75)

Conclusions and comparisons

First confusion matrices for Bengali [voie], [asp], [cont] confused in onsets [asp], [voie], MinPl confused in coda

Coda confusions are best correlated with FSR /t/-avoidance rates; surprising as FSR targets onset!

/t/-avoidance may reflect confusability across positions, noise contexts

Compare to confusability in other lgs:

English
- Onset: Place, [voie]/[asp], [son]
- Onset/coda: [voie]/[asp], Place, [cont]/[son]

Hindi
- Onset: Place, [voie], [voie], [voie], [asp], [son]
- Coda: [voie], [voie], Place, [voie], [voie]

References and acknowledgments


