1pSCb6. English listeners categorize murmured stops based on aspiration, not prevoicing

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Overview

How do English speakers perceive conflicting voicing cues?
• Murmured stops have cues similar to both voicing and voicelessness in English.
• Native English listeners rated them on a scale from “d-t” and “g-k”.
• Murmured stops rated closer to d/g, but with high variability due to aspiration.
• Aspiration should be treated separately from other cues, especially in L2 learning.

Results

In the following graphs, a lower rating indicates similarity to an English voiceless stop, while a higher rating indicates similarity to an English voiced stop.

- Voiceless aspirated and voiced unaspirated ratings are very consistent, similar to expectations of English stop perception.
- Voiced aspirated stops are generally perceived as more voiced, but there is wide variation in ratings.
- How can we explain this variability?

Stop voicing in English and Marathi

Marathi
• Voice onset time (VOT) is positive for voiceless stops, negative for voiced.
• Pre-vocalic interval (PVI, right) is long for aspirated stops, short for plain (1).
• Murmured stops (a.k.a. voiced aspirates) can have aspiration or murmured (breathy voice)

English
• VOT is long for voiceless stops, short or negative for voiced stops.
• Voiceless stops are aspirated.

Method & analysis

• Ran study using Figure Eight (crowdsourcing platform, www.figure-eight.com)
• Participants rated sounds on a 6 point scale from “d-t” or “g-k.”
• Non-native English participants (n = 6) and partially completed jobs (coronal n = 16 and velar n = 13) were excluded.
• Stimuli annotated for prevoicing, burst, aspiration, murmured, and modal voicing.
• Used linear regression to predict rating based on acoustic measures. p-values adjusted for multiple tests.

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Summary of results

- VOT is sufficient to predict discrimination of English-like categories (Marathi /p/, /k/, /h/, and /d/).
- VOT cannot account for the large amount of variability in ratings for these stops, but does have an effect (the general trend of perceiving voice).
- PVI accounts for little of this variability.
- Periodicity of aspiration/murmur accounts for a large part of this variability.

Discussion

• English listeners are more likely to judge a consonant as voiceless when its aspiration/murmur is more similar to English aspiration.
• English listeners’ knowledge of English aspiration influences their perception of gradient voicing in Marathi.
• Similar to Perceptual Assimilation Model’s (PAM) [2] prediction that L1 listeners perceive L2 sounds using native phonetic-phonological categories.
• This study evinces an uncategorized stop. Previous PAM work focuses almost only on uncategorized vowels.

Implications and future research

• Aspiration is rarely analyzed apart from VOT, but learners must separate aspiration and VOT to successfully learn languages like Marathi, Hindi, etc.
• Do L1 listeners whose native language lacks aspiration (e.g. French) more easily categorize voiced aspirates?
• Does contrastive aspiration in an L1 facilitate L2 learning of voiced aspirates?

References