Individual differences in perceptual adaptation to unfamiliar speech sound categories

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Research Questions

1. Do listeners up-weight a secondary cue (i.e. duration) when a primary cue (i.e. spectral differences) to vowel category is not informative?

2. Are individual differences in phoneme categorization gradience linked to secondary cue use and cognitive abilities?

3. Do individual differences in gradience and cognitive abilities predict patterns of perceptual adaptation?

Background

Can listeners adapt to unfamiliar speech by using secondary acoustic dimensions? If so, what makes some listeners better adaptors?

Perceptual adaptation in acoustic-phonetic perception

- Listeners may adapt to unfamiliar speech categories by increasing reliance on a secondary cue when confronted with an uninformative primary cue (e.g. non-native English vowels) [cf. 1].

Categorization gradience in speech perception

- Listeners who have more gradient categorization patterns are more sensitive to secondary acoustic cues [2, 3].

Cognitive abilities in speech perception

- Cognitive abilities (e.g. inhibitory control, working memory) play a role in adaptation to unfamiliar speech [4, 5].

Methods

Participants

- 36 monolingual speakers of Canadian English

Perceptual adaptation

- **Baseline**: a subset of stimuli from the VAS task
- **Exposure**: 6 tokens at the most ambiguous spectral step and adjacent ambiguous tokens
- **Test stimuli** ( | & )
- **2AFC**: head or hand

Phoneme categorization gradience

- 7 spectral (TANDEM-Straight [6]) x 7 duration steps (PSOLA in Praat)
- **Visual Analogue Scaling** (VAS)

Cognitive abilities

- **Inhibitory control** (Stroop), **Working memory** (Corsi), **Cognitive flexibility** (Berg Card Sorting), **Sustained attention** (Continuous Performance) [7]

Results

**RQ1**: Listeners flexibly adapted to unfamiliar vowels by up-weighting reliance on a secondary cue when a primary cue is not informative.

**RQ2**: Individuals varied widely in categorization gradience and this variability was linked to their use of a secondary cue and working memory capacity.

**RQ3**: Individual differences in inhibitory control was linked to the amount of adaptation.