

Perceptual warping of phonetic space applies beyond known phonetic categories: evidence from the perceptual magnet effect

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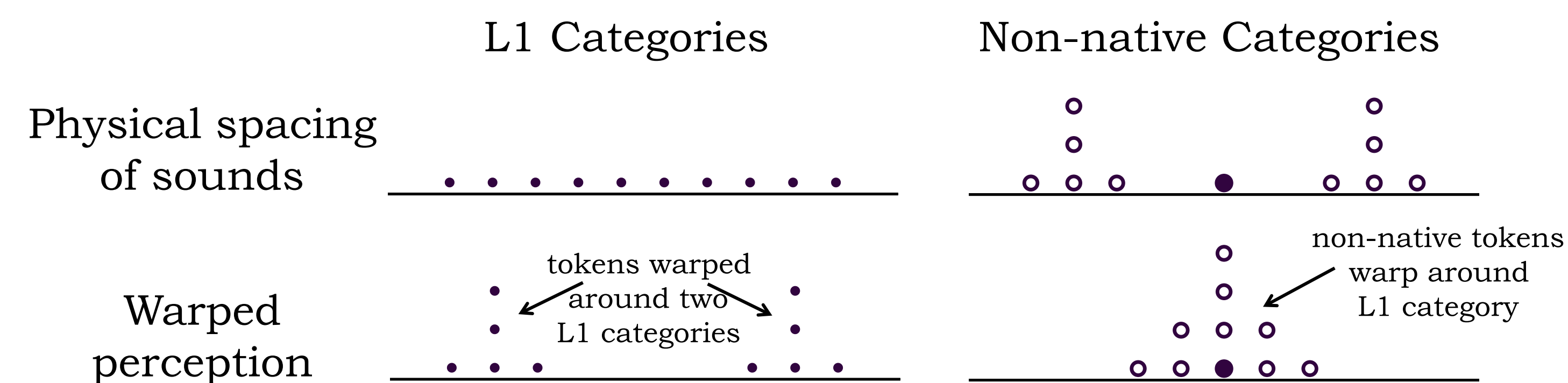
Background

Perceptual Reorganization (Eimas, 1978)

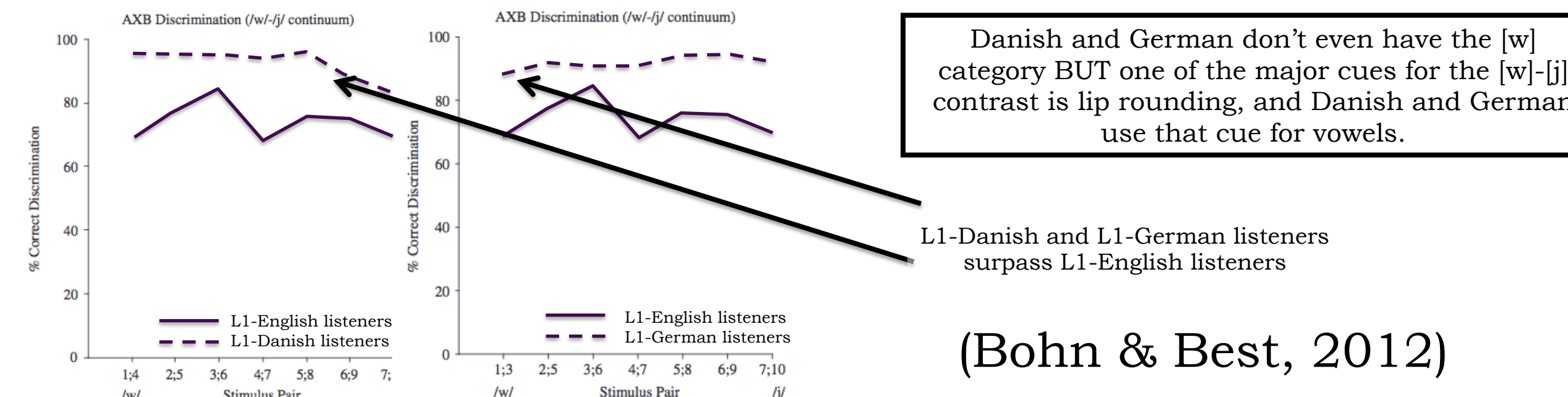
At first, infants discriminate almost all sounds → As age, enhanced sensitivity to L1 phonetic categories



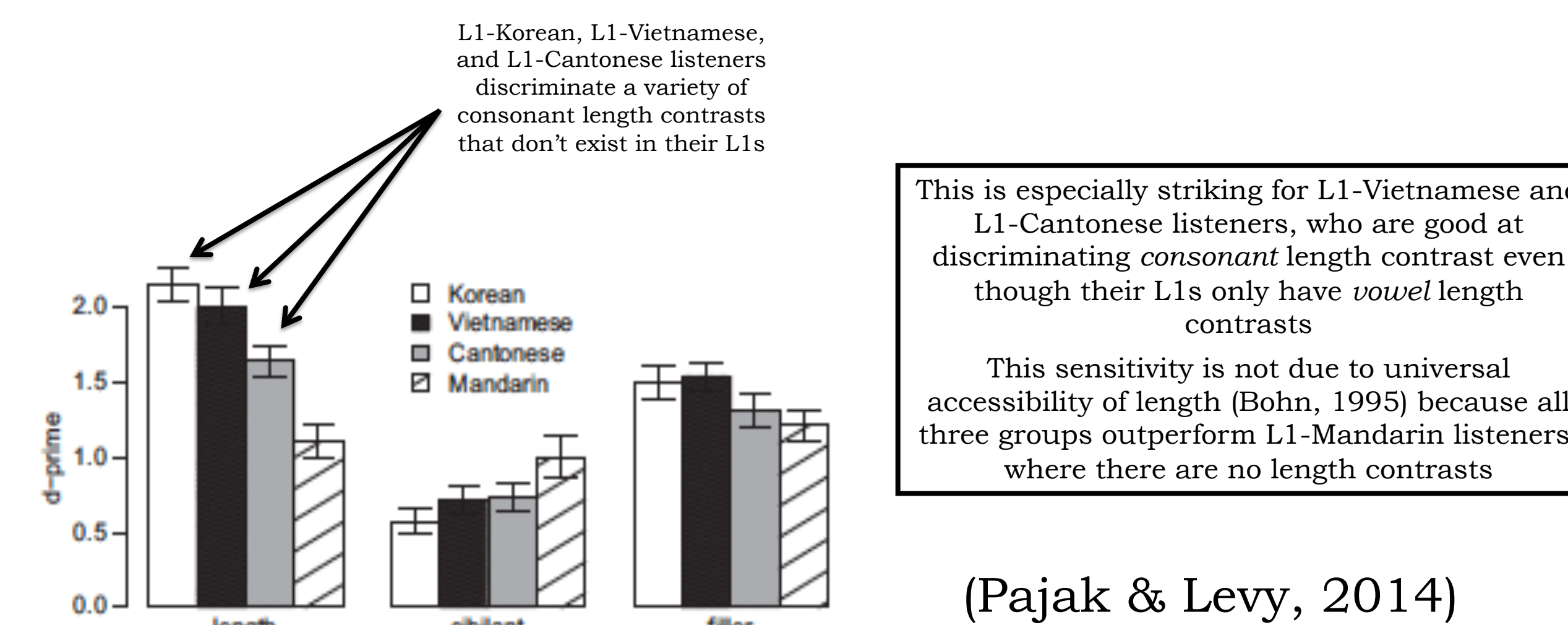
Perceptual Magnet Effect (Kuhl, 1991, 2000; Kuhl & Iverson, 1995)



Perceptual Data that Don't Fit in



(Bohn & Best, 2012)



(Pajak & Levy, 2014)

Challenge: How do we explain listeners' perceptual sensitivities that don't fit our current understanding of perceptual reorganization?

❖ Non-native speech perception may be affected by general phonological principles that operate in L1 (Bohn & Best, 2012; Pajak & Levy, 2014)
 ○ e.g., whether or not a cue is overall informative for distinguishing between L1 categories

Question

❖ Is perceptual warping entirely specific to L1 category inventory?
 ❖ Or does it apply to a broader range of category distinctions that are non-native, yet discriminable due to being defined by phonetic dimensions informative in the listener's L1 (Bohn & Best, 2012; Pajak & Levy, 2014)

- ❖ Here we address this question by studying *perceptual magnets* along the dimension of segmental *length*
- ❖ Segmental length is known to yield L1-specific perceptual magnets
 - L1-Finnish listeners show the perceptual magnet effect for the Finnish /t/ and /tt/ categories (Heeren & Schouten, 2008)
 - But speakers of languages that lack (exclusively) length-based contrasts do not show any perceptual magnets along the length dimension:
 - no magnet for vowel tokens along the length dimension for L1-English or L1-Spanish listeners (Kondaurova & Francis, 2010)
 - no magnet for stop consonant tokens for L1-Dutch listeners (Heeren & Schouten, 2008)

Experiment

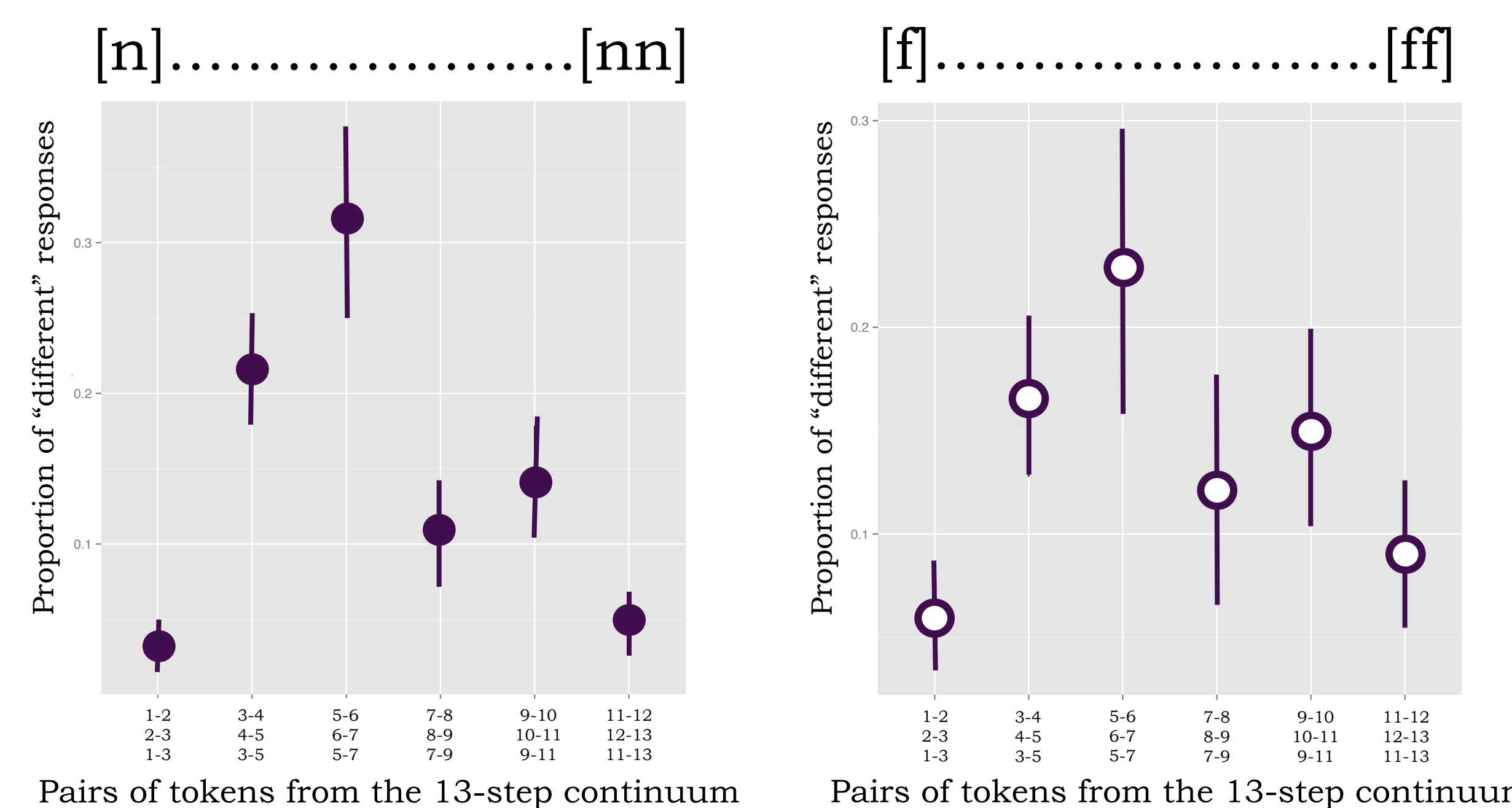
- ❖ Participants:
 - 31 L1-Korean listeners
 - moved to the US at age 15 or later
 - still use Korean regularly
- ❖ Materials – 13 tokens along two length continua:
 - 45 [n] duration in msec → 258 [anna] → [n] & [nn] exist in Korean
 - 95 [fa] duration in msec → 335 [affa] → [f] & [ff] don't exist in Korean
- ❖ Task:
 - AX same-different discrimination of tokens from either the [n]-[nn] or the [f]-[ff] continuum (between-subjects design)
 - 156 'different' trials: all possible token combinations
 - 52 'same' trials: 4 trials for each token

Results

Multidimensional scaling:



Discrimination of "different" tokens:



Perceptual warping observed for both continua!

Take-home message

- ❖ Perceptual warping goes beyond the specific L1 categories
- ❖ When a phonetic dimension is informative for some L1 categories, perceptual warping applies
 - ❖ not only to the tokens from those categories...
 - ❖ ... but also to that dimension more generally
- ❖ These results suggest that we need to revise our theories of perceptual reorganization and non-native speech perception

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