



Vowel Perception Across States of Degradation and Consonantal Contexts

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Goal: Investigate the impact of audio degradation and variable consonants on the perception of English vowels.

Hypotheses

1. Vowel identification accuracy will remain high even when vowel centers are attenuated to silence
2. Vowel identification accuracy will be higher when the initial consonant is voiced as opposed to voiceless
3. Vowel identification accuracy will be higher when the length of the vowel center is reduced.

Major findings:

1. Listener's did not demonstrate the expected accuracy levels in silent center conditions or in voiced consonantal contexts.
2. Listener's demonstrated slightly higher accuracy levels in silent center and initial only conditions when the vowel center was shortened.

Background

Vowel Perception in Degraded Contexts

- Listeners are able to accurately identify vowels even when the vowel center is attenuated to silence (Strange *et al* 1983)
- Listeners use 3 primary acoustic cues for vowel identification
 - Vowel Duration
 - Vowel Sound
 - Transitional cues gleaned from the consonant

Consonantal Variations

- Listeners can identify vowels preceded by a voiced consonant with higher accuracy than those preceded by a voiceless consonant (Francis *et al* 2008)

Methods

Experiment

Vowel Identification Task: modified from Strange *et al* (1983)

Recruited through Amazon Mechanical Turk

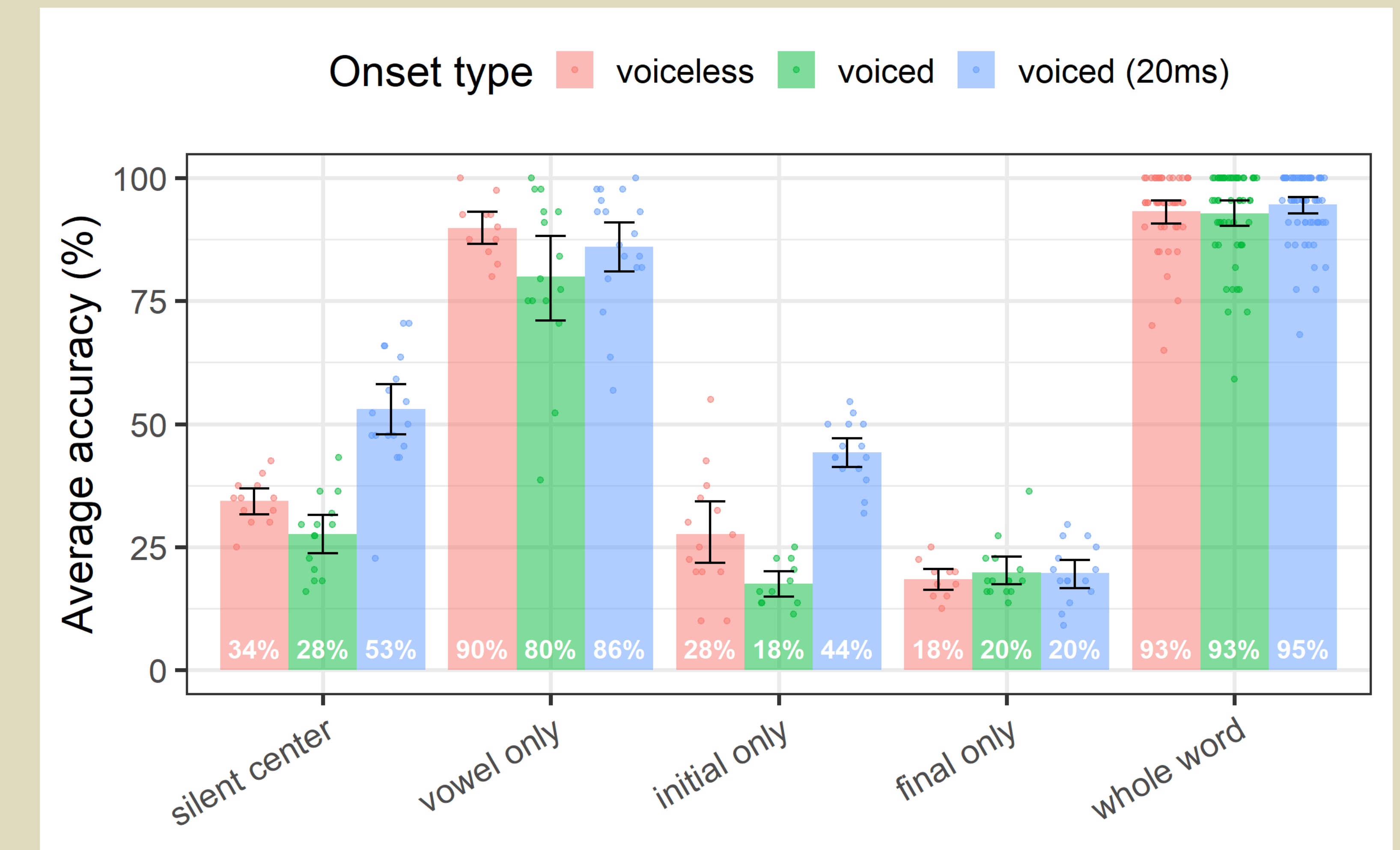
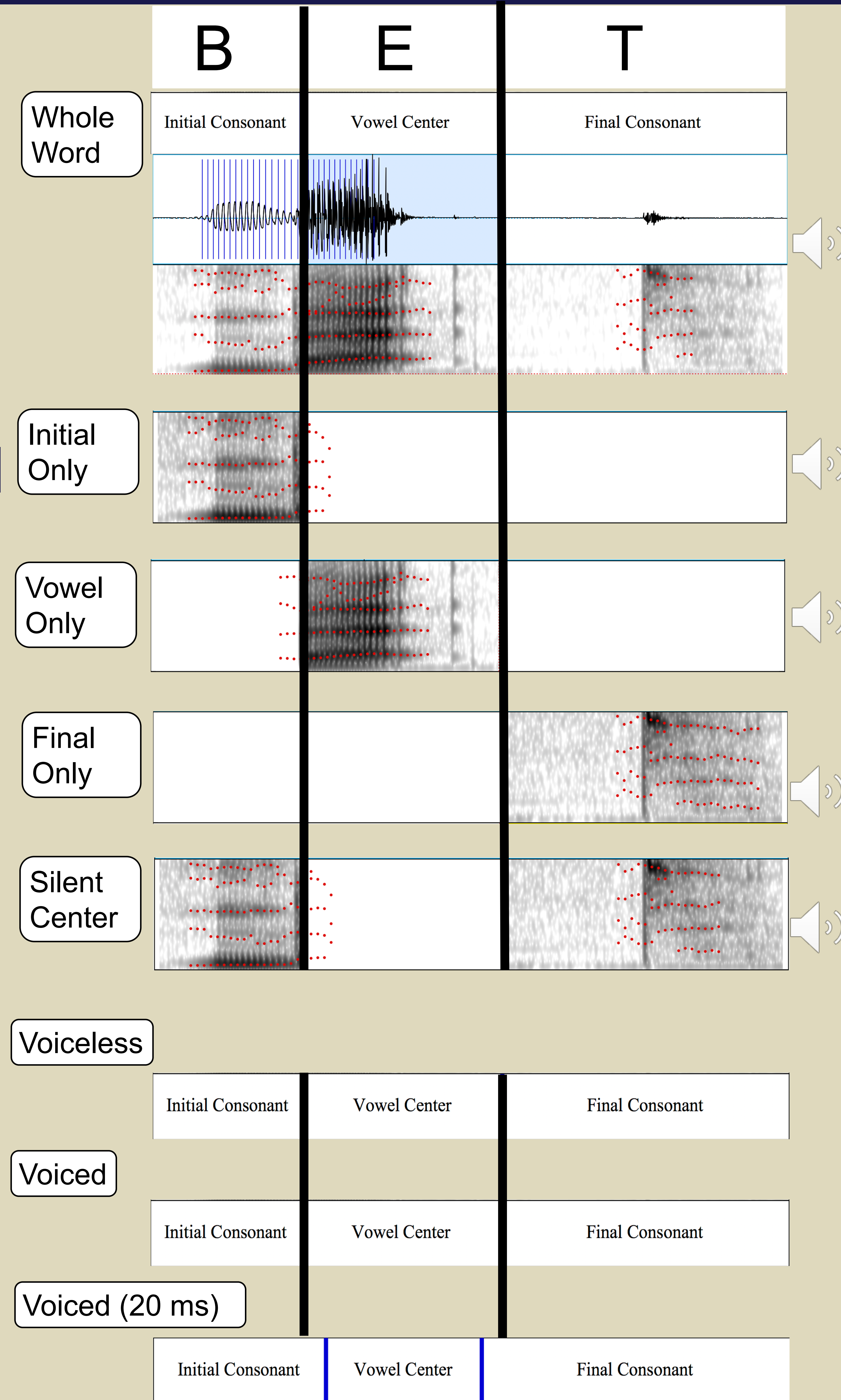
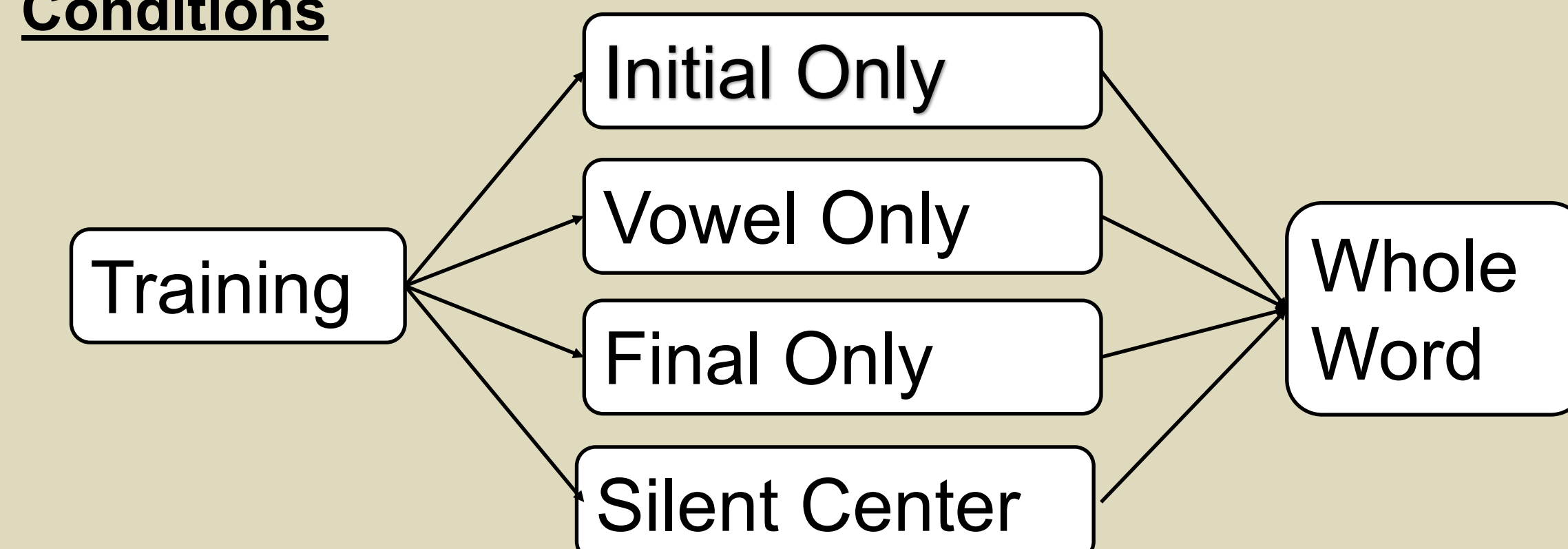
Experiment 1: N = 79, Experiment 2: N = 101, Experiment 3: N = 100

Stimuli

- CVC word recordings
- 5 Vowels
- Mid-Western, female speaker

Pit	Pat	Pet	Heat	Hate
Bit	Bat	Bet	Beat	Bait

Conditions



Hypothesis 1 not confirmed

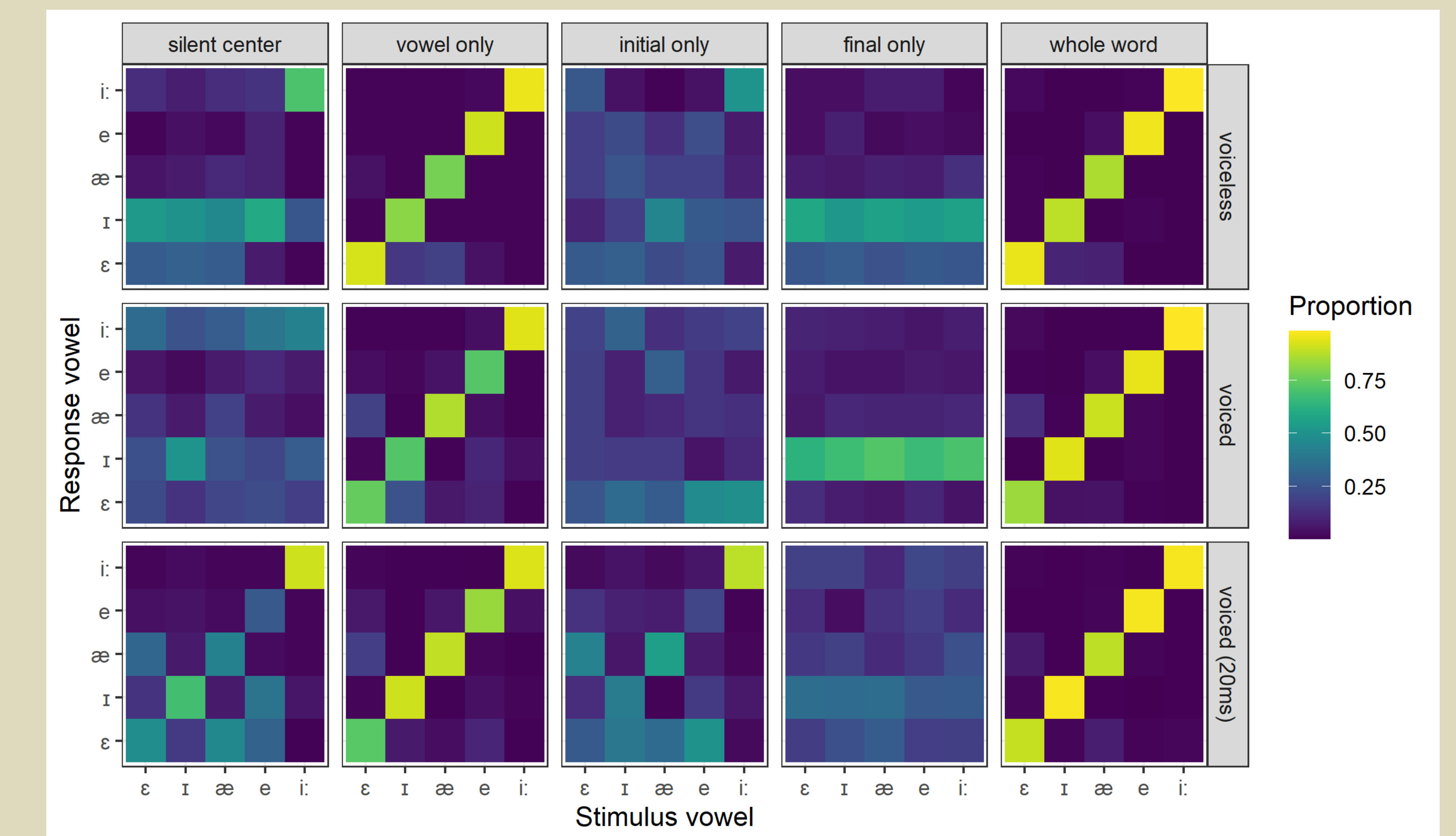
- Vowel identification accuracy was low in silent center, initial consonant, and final consonant conditions
- Counter to what previous studies found in the silent center condition
- Likely a function of amount of information available in stimuli when compared to previous research

Hypothesis 2 not confirmed

- No difference in accuracy rates between voiced and voiceless initial consonants
- Potentially also a function of information made available in our stimuli

Hypothesis 3 partially confirmed

- Accuracy was higher in "silent center" and "initial only" conditions but not as high as anticipated



Confusion Matrix

- Displays proportion of responses for each prompt/stimulus vowel
- Vowel only and whole word conditions have "staircase" trends which indicate accurate vowel identification
- Silent center and initial only conditions show preference for /i/ and /I/
- Predict it is function of frequencies and how stimuli were cropped