Listeners do not need an F1/F2 target to perceive vowel quality *or* regional accentedness

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Background

Silent centers (SC): listeners can identify vowel quality in a CVC syllable even with 65% of tense vowels and 50% of lax vowels removed (Strange & Jenkins, 2013). However, listeners may still require vowel centers to hear social information. Three complementary ideas in the literature suggest that social information in vowel centers may be *essential*:

1. **Primacy of F1/F2 at the vowel midpoint**, sometimes taken along with duration, e.g., sociophonetics, sound change, second language acquisition, etc. (Kelley & Tucker, 2020; Labov et al., 1972; Nycz & Hall-Lew, 2013; Thomas, 2014)
2. **Hybrid silent centers** (Rakerd & Verbrugge, 1987; Verbrugge & Rakerd, 1986): pairing SC syllable edges from different talkers does not undermine vowel perception so argue vowel edges do not carry social information
3. **Vowel normalization** (Johnson, 2005; Johnson & Sjerps, 2021) assumes that variation is problematic for listeners so models typically operate on vowel centers where contextual variation is least [c.f. (Barreda, 2025; Fruehwald, 2024)]

Methodology

- **Talkers**: Three non-Southern talkers from the Wildcat corpus (Van Engen et al., 2010) and two Southern talkers (KY)
- **Stimuli**: BVT syllables with [i, ɪ, e, ɛ, æ, u, ʊ, o, ʌ, ɔ, a]; **middle 50% for lax vowels** & **middle 65% for tense vowels** (Strange et al., 1983) excised with a custom Praat script (see Figure 3)
- **Procedure**: 2AFC; listeners heard a CVC word and answered either "what did you hear?" with a pair of words or "who did you hear?" and the maps in Figure 1. "What?" trials displayed a map congruent with the talker; "Who?" task trials displayed the word that was being spoken.

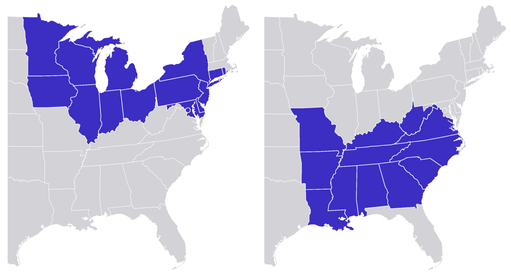

Figure 1: "Non-Southern" and "Southern" stimuli

- **Participants**: 60 US participants recruited via Prolific
- **Analysis**: BRMS logistic regression in R (Bürkner, 2017), NHST with bayestestR (Arel-Bundock et al., 2024; Makowski et al., 2019)

- Many studies have found that listeners perform poorly when asked to label regional accents (Campbell-Kibler, 2025; Clopper & Pisoni, 2004; Milroy & McClenaghan, 1977). Our simplified maps are intended to represent Clopper & Pisoni's "dialect clusters"
- While it is clear that listeners do not need vowel centers to perceive vowel quality accurately, it is not yet known whether listeners can perceive, for example, regional accent without the vowel center.

Predictions

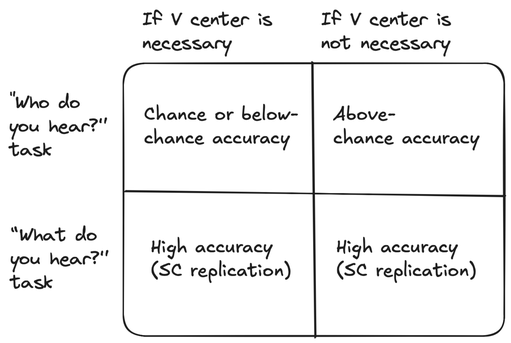

Figure 2: Predictions under two assumptions about social information

Silent Centers Visualized

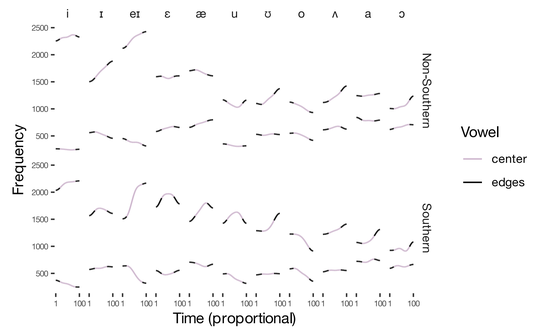

Figure 3: Vowel stimuli unnormed F1/F2 DCTS with excised portions indicated

Results

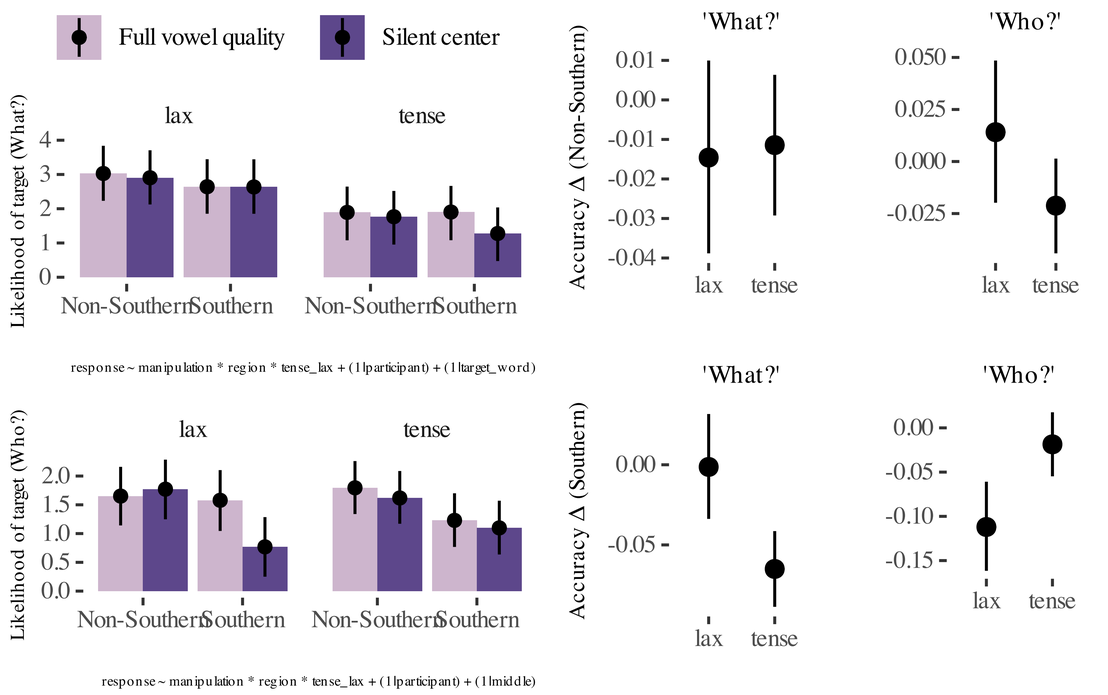

Figure 4: 'What?' (top left) and 'Who?' (bottom left) model predictions (95% HDI) and Accuracy differences for responses to Non-Southern (top row) and Southern (bottom row) talkers

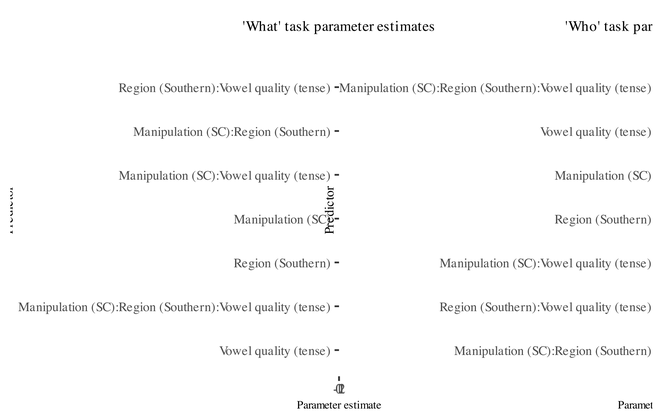

Figure 5

Discussion

- **Listeners do not need the vowel center to perceive vowel quality (replicated)**: Listener accuracy on the 'what?' trials is a straightforward, successful replication of the silent centers effect (Strange et al., 1983; Strange & Jenkins, 2013)
- **Listeners do not need the vowel center to perceive regional accentedness**: Contra hybrid silent-centers work that paired incongruous syllable edges(Rakerd & Verbrugge, 1987; Verbrugge & Rakerd, 1986), listeners to the 'who?' trials can, indeed, perceive regional accent from SC vowels
- **Regional differences for tense and lax vowel qualities**: different vowel qualities encode regional variation differently; some of this variation is captured by the tense/lax distinction

References

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