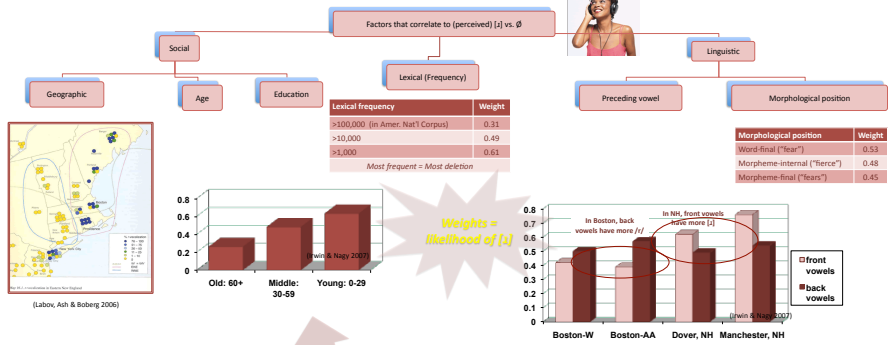


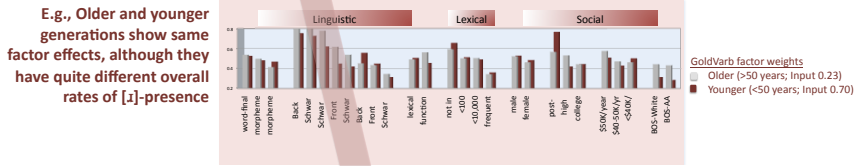
Perceptual Frequency and Formant Frequency in R speech

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Variation in surface form patterns with many factors.



Patterns get transmitted from speaker to speaker.



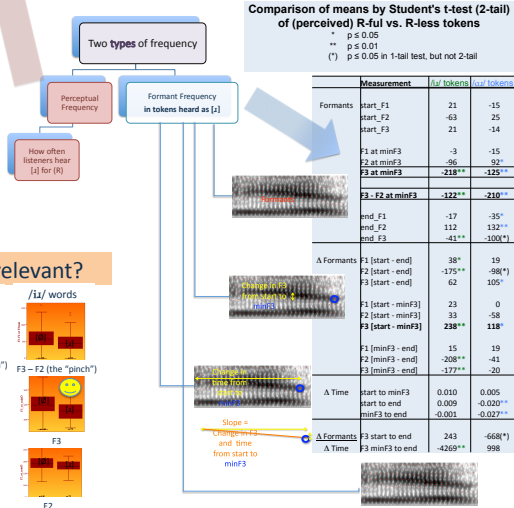
How? Patterns of Perceptual Frequency are supported by Formant Frequency.

Problem

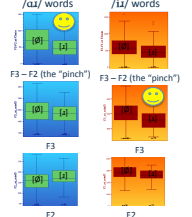
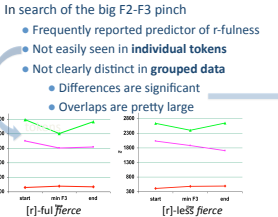
- Poverty of the Stimulus:
- How are stochastic patterns transmitted?

Solution, in a nutshell

- The kind of word that gets [ɹ] more often also gets stronger [ɹ]’s.
- “Kind” may be defined linguistically, socially, or lexically.
- In other words, the “strength” of [ɹ] can be meaningfully interpreted in two related ways:
 - how often [ɹ] is heard in a particular context (Perceptual Frequency)
 - how constricted the [ɹ] is in each production (Formant Frequency)

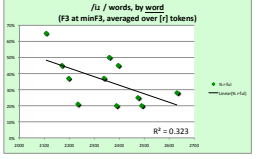
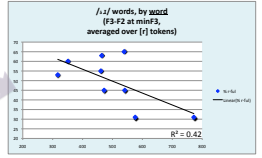
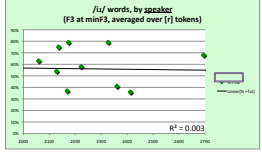
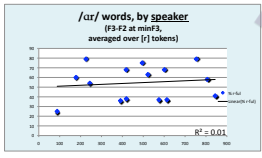


Which acoustic aspects are relevant?



Connections between Perceptual Frequency and Formant Frequency.

- Exemplar Theory predicts more constriction in:
 - Speakers who delete more often.
 - Social groups who delete more often.
 - Words that have a higher % [r]
 - Certain linguistic environments (not testable with these data)
- cf. Hay & Maclagan (to appear)
 - Examined New Zealand intrusive [ɹ]
 - Found greater constriction in contexts that favor [ɹ]
 - This study supports their findings



Age	Ave. F3 for /r/	Ave. F3-F2 for /ar/
<40 years	2420	476
>40 years	2211	509

Younger speakers are more r-ful, and have lower F3

Education completed	Ave. F3 for /r/	Ave. F3-F2 for /ar/
High school	2312	439
College	2399	612
Post-college	2326	329

Similarly, college-educated speakers are the least r-ful, and have the highest F3.

Method

Data collection: Reading passage

People who are new to New England often worry about how to get through New England’s fierce winters. Although don’t swinters might appear to be unpleasant, New Englanders have many ways of keeping warm. When asked the question, “How do you make it through the winter?” many natives in New England answered that they will be cold or frozen. In fact, snow is a part of the culture of New England, and many of us enjoy skiing and ice skating in many 19th-century winter sports and winter games.

Throw a 160-pint Get some 170-iced, 171 wear 172 summer clothes, and whip out the 173-iced, just like it was 174 summer.

Auditory

56 speakers from Boston and southern New Hampshire were digitally recorded reading a light-hearted story containing 224 words with post-vocalic /ɹ/. Environments were categorized according to morphological position, phonological context, and the interacting factors of word class (functional/lexical), word length, and lexical frequency. Two coders listened to each token a number of times and coded it as r-ful or r-less. Factors were submitted to multivariate logistic regression analysis. All linguistic factors except word class proved significant, with perceived [ɹ] vs. [ɹ̥] as the independent variable. Social factors, including age, sex, ethnicity, education, location, and income were also significant.

Acoustic

Data for 20 of the speakers (10 White, 10 African-American, all Bostonian) and 20 words (of similar lexical frequency and containing /ɹ/ or /aɪ/ in a stressed syllable closed by another coronal consonant, e.g., “fierce”, “card”) were selected. Formant at various points and duration of the /ɹ/ were measured. Linear regression analyses were conducted to examine the relationships between these continuous acoustic measurements and the independent variables above. Similar patterns of significant effects were found in the binary and scalar approaches.

References

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