A first attempt at modeling social preferences in perceptual learning

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May 3, 2017
Abstraction, Diversity, & Speech Dynamics IPS Workshop

Acknowledgements

- Research participants: thank you!
- Funders (SSHRC, CFI, UBC): thank you!
- Members of the Speech in Context Lab (especially Stephanie Chung and Christine Banzon) and Kodi Weatherholtz: thank you!

Learning how to listen

- We learn the perceptual categories in our native languages (e.g., Werker & Tees, 1984)
- This is finely tuned: infants' perceptual contrasts relate to degree contrast in caretakers' productions (Cristìa, 2011).
- As adults, listeners with different language backgrounds attend to and prioritize different parts of the phonetic signal (e.g., Francis & Nusbaum, 2002).

Variation in listening

- Not all input has the same influence on all listeners.
- We can also engage in different styles of listening – e.g., perception-oriented or comprehension-oriented attentional sets (e.g., Culter et al., 1987; McAuliffe & Babel, 2016).

Weighing information

- Listeners do not weight all incoming phonetic information equivalently (Johnson, 1997; Sumner, 2015).
- Clopper et al. (2016) argue that familiar accents benefit from improved encoding.
- There have been claims that listeners attend less to dispreferred accents (Lippi-Green, 1997).

Laboratory of Life: selective patterns in children

- Acquisition of gender-specific speech patterns before major anatomical differences surface (Sachs et al. 1973).
- Children tend to adopt local dialect patterns (e.g.,Trudgill, 1981)
- Are kids learning selectively or do social preferences surface in the process of selecting production variants?

Our broader questions

- We learn our linguistic contrasts, and we learn cultural and social meaning.
- Does this affect what we get out of a voice linguistically?
- Do we learn how to listen based on social preferences?

Our really simple test

- Is there more perceptual learning for socially preferable voices?

What is perceptual learning?

- Perceptual learning in speech is the updating or retuning of linguistic categories based on novel input.
- It is suggested that this is one of the processes listeners use to manage variation in talker and accent.

Classic Example: Norris, McQueen, & Cutler (2003)

- Shifts in s/f categorization based on the lexical content.
- No learning when ambiguous sound is heard in non-words.

D. Norris et al. / Cognitive Psychology 47 (2003) 204–238 217

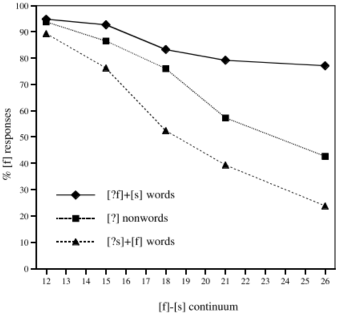
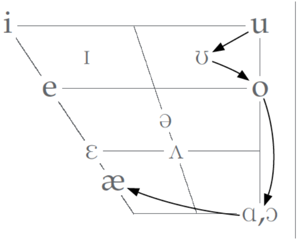


Fig. 2. Experiment 1: total proportion of [f] responses in each of the three training conditions: that with ambiguous [f]-final and natural [s]-final words ([?f] + [s] words); that with ambiguous [s]-final and natural [f]-final words ([?s] + [f] words); and that with [?]-final nonwords ([?] nonwords).

Our approach is based on Weatherholtz (2015)



Weatherholtz (2015)

- Exposure was ∼5 minute excerpt from *The Adventures of Pinnochio*.
  - Snippet of the Control Passage: **click me!**
  - Snippet of the Shifted Passage: **click me!**
- Test included lexical decision.
  - Filler words with no back vowels: e.g., queen
  - Filler nonwords: e.g., dring
  - Back vowel shifted items from exposure: e.g., m[ɑ]rning
  - Back vowel shifted items **not** heard: e.g., c[ɑ]bra

Weatherholtz (2015): Learning and Generalization

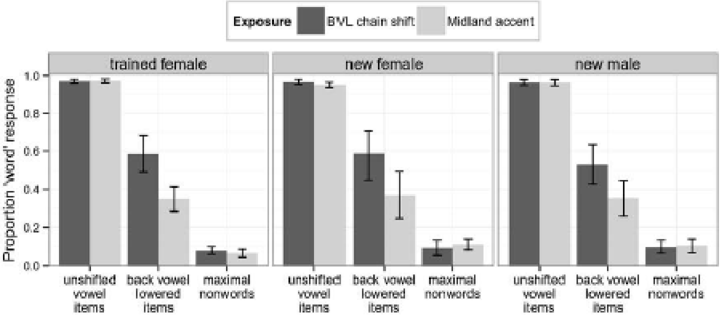


Figure 2.6: Experiment 1. Mean proportion of 'word' responses by item type, exposure condition (BVL = back vowel lowered), and test talker. Error bars indicate bootstrapped 95% confidence intervals.

Attempting to introduce social preferences

- A challenge here is tapping into social preference while avoiding familiarity.
- Replication of Weatherholtz with a new voice and an additional condition.
  - Snippet of the Control Passage: **click me!**
  - Snippet of the Shifted Passage: **click me!**
  - Snippet of the Unpleasant Shifted Passage: **click me!**
- Do listeners adapt less to the less pleasant voice?

Measures of learning

Lexical Decision Following the methods in Weatherholtz (2015).

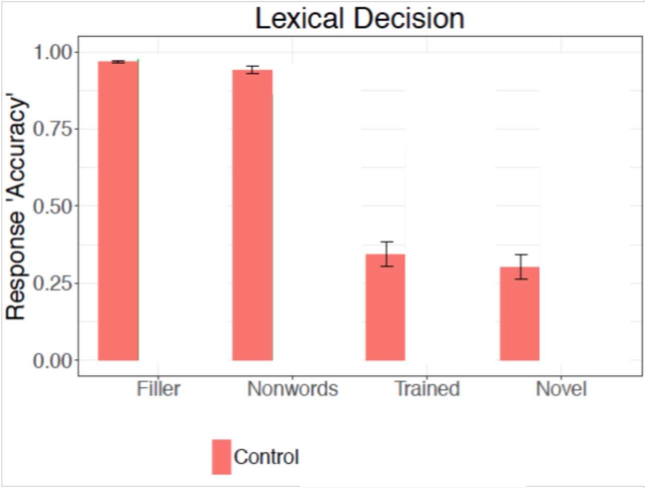
Priming Cross-modal priming comparing standard pronunciations and shifted pronunciations of back vowel items, generally following methods of Witteman et al. (2013).

Participants We have 18-25 participants in each condition.

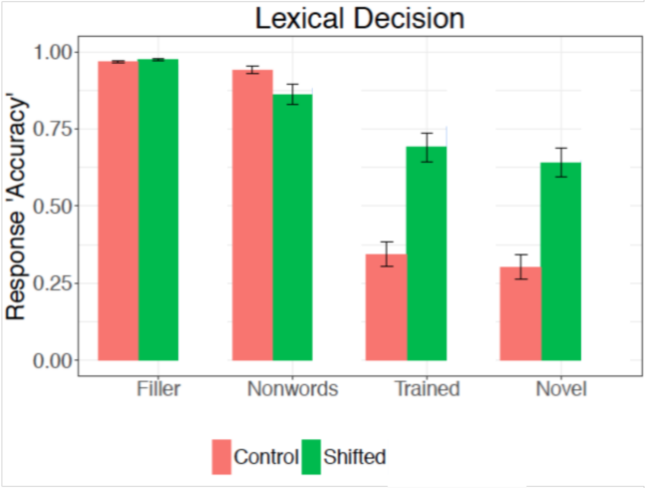
Predictions

- Listeners who are exposed the “pleasant" shifted voice should show perceptual learning relative to the control condition.
- Listeners exposed to the “unpleasant" shifted voice
  - If they listen *less*, they should show reduced learning for **trained** items.
  - If social effects stem from weighting in memory (e.g., Sumner & Kataoka, 2013), listeners should show reduced learning for **novel** items.

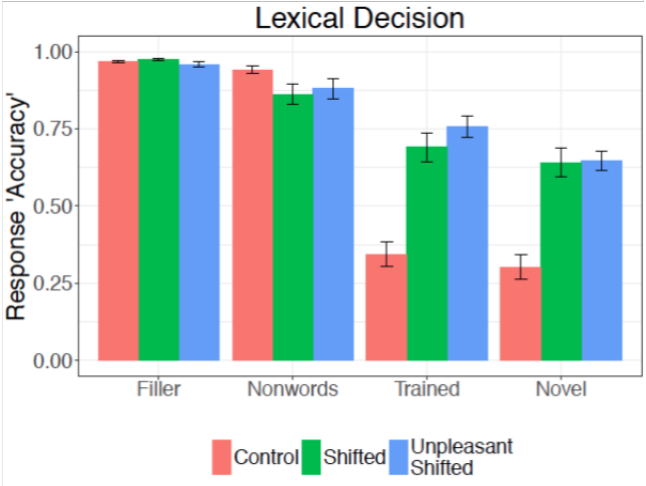
Lexical Decision: Results



Lexical Decision: Results



Lexical Decision: Results



Lexical decision: glmers

Binomial mixed effects models with item type (word fillers, nonwords, trained, novel) were run for each condition.

- Novel pronunciations
  - Listeners in the shifted conditions had higher rates of word endorsement than the control condition
  - No differences between trained and novel items.
- Nonwords
  - Listeners in the shifted conditions had lower accuracy on nonwords.

Results thus far

- Exposure to the novel back vowel dialect elicits perceptual learning (in word endorsement threshold).
- The pleasantness of the voice doesn't appear to matter.

Priming: Trial types

	Auditory Prime	Visual Target
Filler	word	nonword
Filler	word	word
Filler	nonword	nonword
Filler	nonword	word
Unrelated	word	back vowel word
Critical	back vowel word	same back vowel word

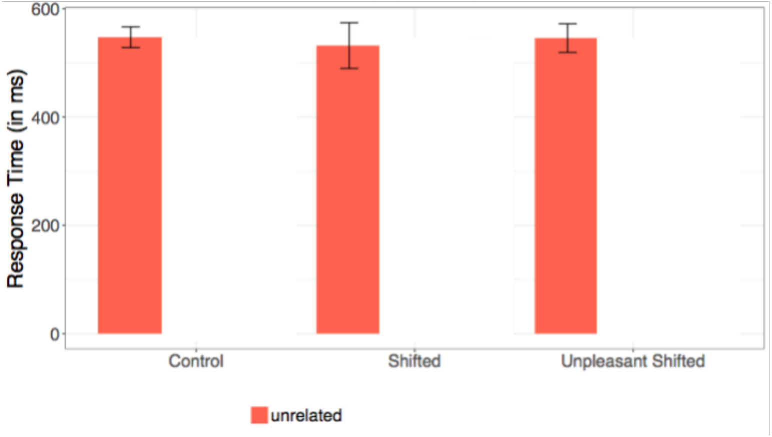
Nonwords included those with back vowels.

Priming: Important trial type examples

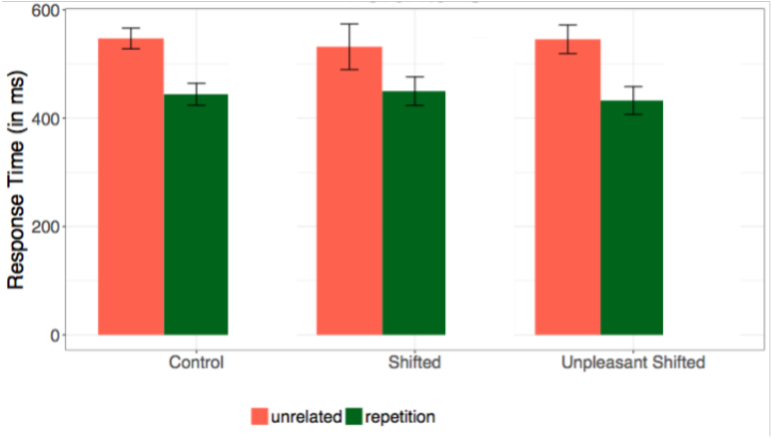
	Auditory Prime	Visual Target
Unrelated	paper	nose
Repetition	n[o]se	nose
Shifted Repetition	n[ɑ]se	nose

These trial types were used for both Trained and Novel items.

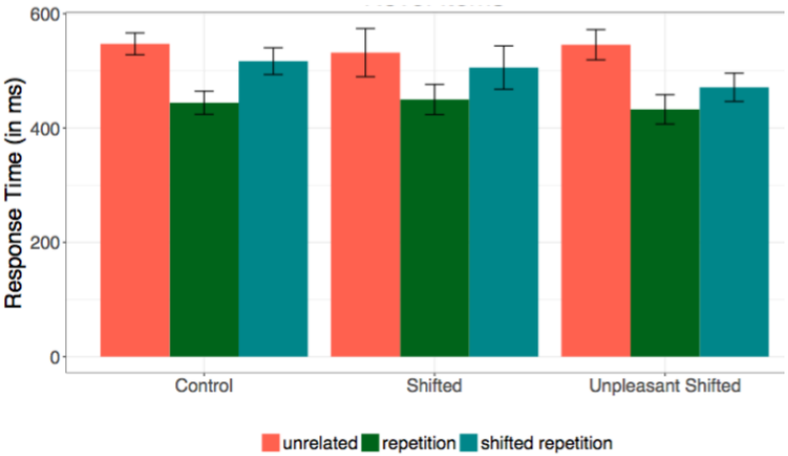
Priming: Results



Priming: Results



Priming: Results



Priming: lmers

Linear mixed effects models with item type (unrelated, repetition, shifted) and exposure (trained, novel) were run for each condition.

- **Control**: Shifted items do not prime.
- **Shifted**: Shifted items do not prime.
- **Unpleasant Shifted**: Shifted items prime.

Returning to our question

Do listeners perceptually learn less from an unpleasant voice?

Do listeners perceptually learn less from an unpleasant voice?

- Doesn't look like it.
- **Lexical Decision:** changes in endorsement rates for those who were exposed to either shift.
- **Priming:** only shows learning for the Unpleasant Shifted condition.
- When there is learning, it generalizes from the trained items to novel items.

Crucial caveats

- The voice was designed to be unpleasant, but we did not actually pre-test it.
- Perhaps listeners find any non-canonical pronunciation unpleasant?
  - We know that familiarity and pleasantness are connected concepts in voices (Babel & McGuire, 2015).
  - Perhaps both shifted voices are unpleasant?
- Unpleasant and novel items might draw listeners' attention, facilitating learning, with the less pleasant voice triggering more attention.
  - Disentangling familiarity and social preference is tricky.
- “Unpleasant" does not carry the same social meaning as real dialects and accents.

Alternatively...

Perhaps social weighting simply does not affect perceptual learning.

- Clarke-Davidson et al. (2008) suggest perceptual learning is a phonetic retuning effect and not a decision bias.
- Perhaps social evaluations affect post-perceptual decisions and not lower level phonetic processes.
- Novelty (pronunciation and voice quality) may guide attentional resources, facilitating learning of unfamiliar accents.

Assessing learning: lexical decision vs. priming

- Lexical decision tasks allow for more meta-linguistic influence than priming paradigms.
- At this point we don't want to say that priming paradigms are a better way to assess learning, but in determining whether and how social preferences affect learning of novel pronunciations, we need to use tests that assess phonetic knowledge from different angles.

Take aways.

- Less pleasant voices do not inhibit perceptual learning.
- Lexical decision tasks and priming might assess different components of perceptual learning.
- Separating social preference from novelty is challenging.

The End

Thanks for listening!

A concern with lexical decision.

- Are listeners changing a post-perceptual acceptability threshold or actually changing perception?
- One way we might examine this is to look at how categorical the changes in word endorsement rates are.
- We can look at the distribution of listener performance to explore this.

Lexical Decision: Distributions