

Effects of interlocutor feedback on speaker phonetic production in a simulated-communication task

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Introduction

Is language production organized for robust communication?

- Speakers hyper-articulate contextually confusable words [1, 2]
- Some accounts argue this is partly due to production being organized to take into account perceived success of previous articulations [3, 4]
- Alternative accounts argue articulation differences are due to production ease or comprehension processes [1, 5 – 8]
- Determining whether speakers' articulations change based on interlocutor feedback is crucial for distinguishing between accounts

Can we use the web to study phonetic change?

- Usage of web-based paradigms allows for faster data collection but open question if phonetic data is feasible

Our Questions

1. Do we find contextually confusable hyper-articulation?
2. Does explicit listener feedback result in more hyper-articulation?

Study Design

Web-based speech collection

Participants

- 60 self reported native speakers of American English

Materials

- 36 critical target words with /k, p, t/ stop onsets with voiced minimal pairs (e.g. *pig*, stimuli from Kirov & Wilson 2012, study 2)
- Critical target words presented with or without minimal pair (context manipulation, Figures 1a)
- Between participants trials ended with three types of feedback (feedback manipulation, Figures 1c): None, positive only or Mixed
 - No feedback – trial ended and next began
 - Positive only – partner always picked cued target
 - Mixed – partner picked competitor on subset of trials (5 critical, 1 filler)

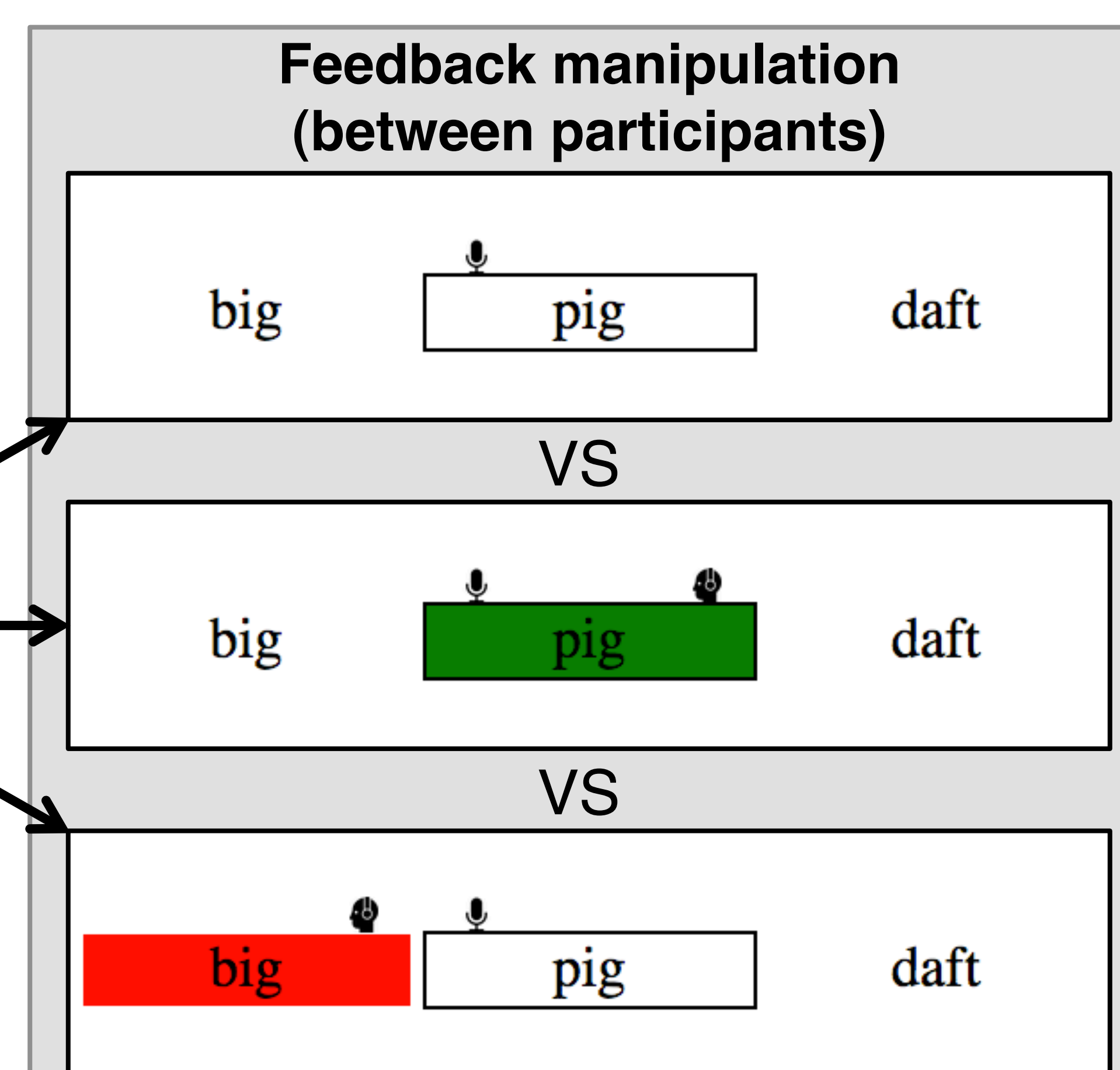
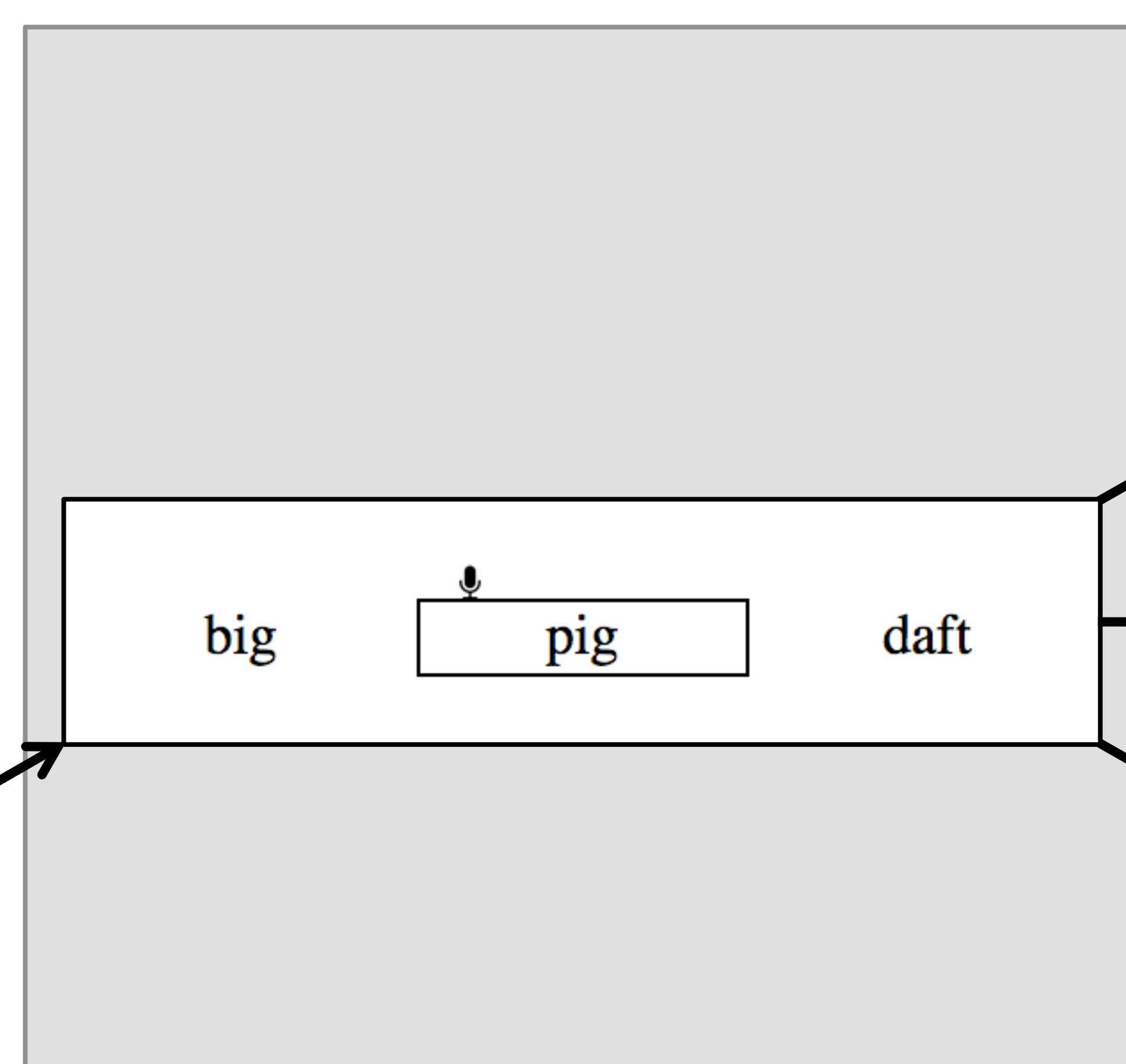
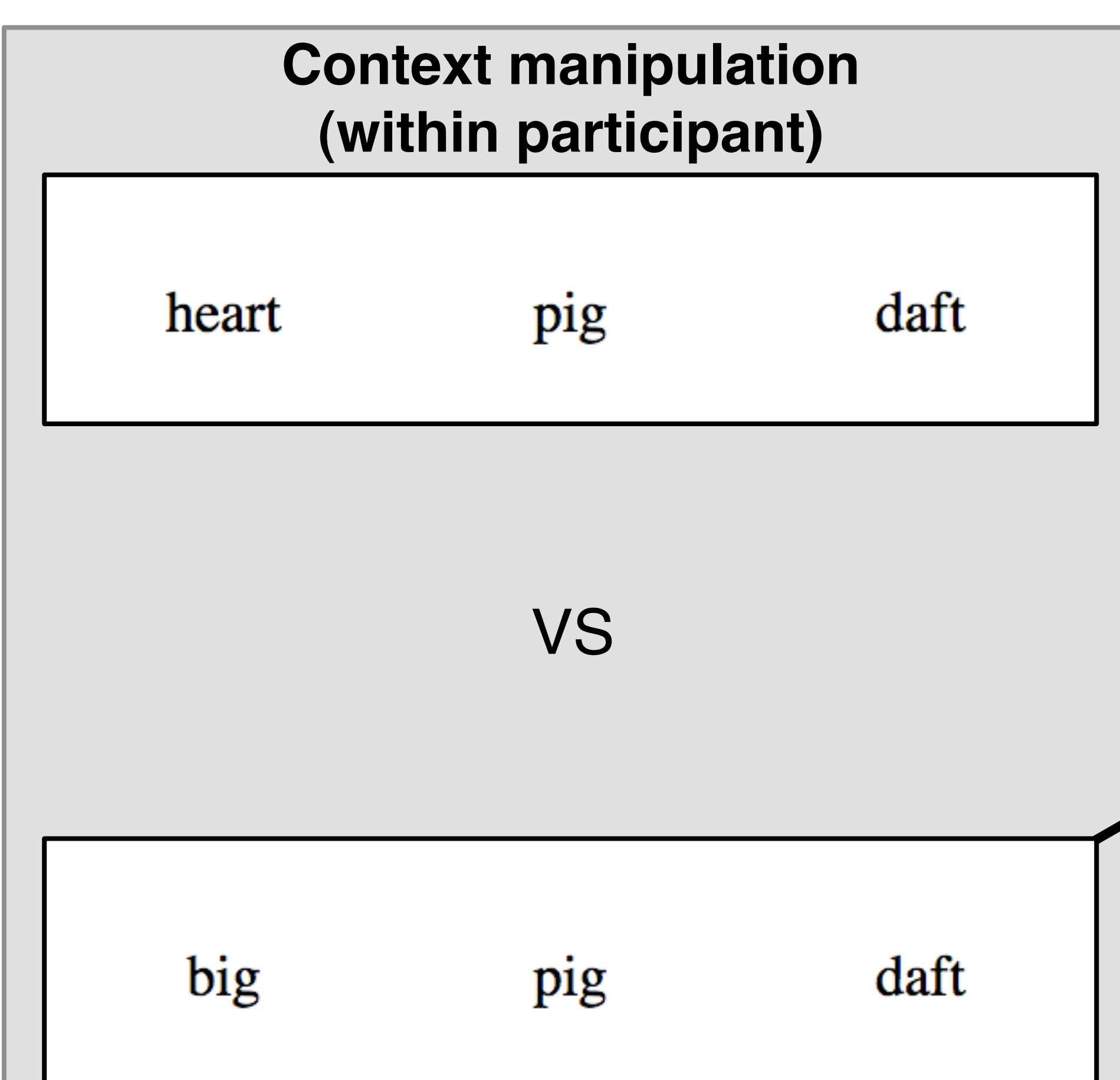


Figure 1. Experimental trial timeline (trial preview, target cue, then feedback).

Study Results

Believability of simulated-partner design

- 4 participants, unprompted, did not believe partner existed
- When told they might have interacted with a computer or human, partner 'human-ness' ratings were middling
- Experiment cover story plausibility was rated as good

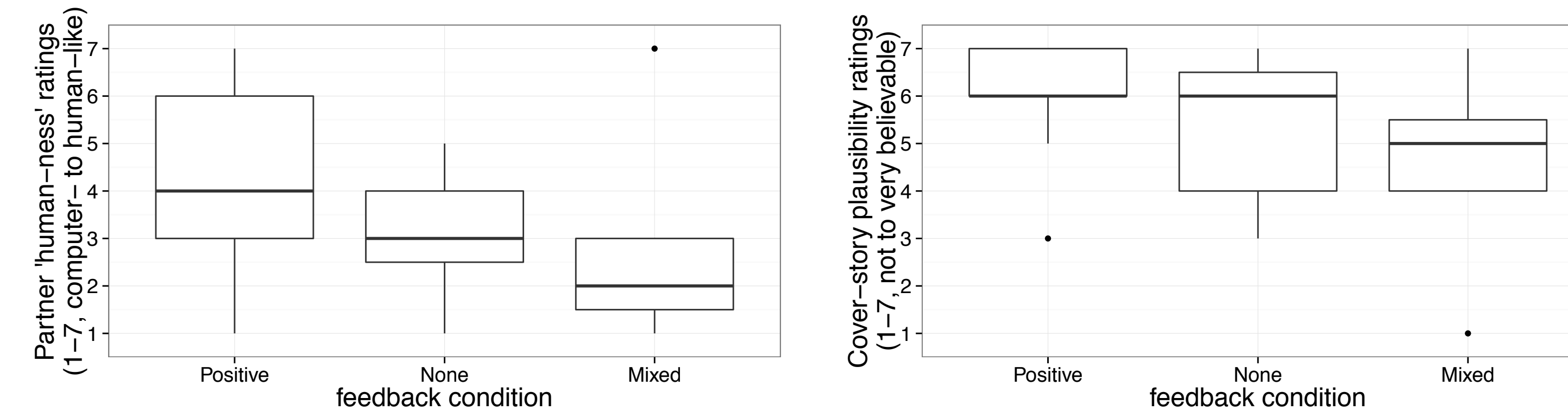


Figure 2. Post test survey measures.

Acoustic analysis

- 27 participants hand annotated for voice onset timing
 - 13 female, 14 male; mean age = 28.74 yrs; remaining annotations ongoing
- Linear mixed effects modeling predicting VOTs

Design results

- Longer VOTs for targets with co-present minimal pair ($p < 0.01$)
- Nominal but non-significant VOT difference across feedback types, non-significant interaction (p 's > 0.6)

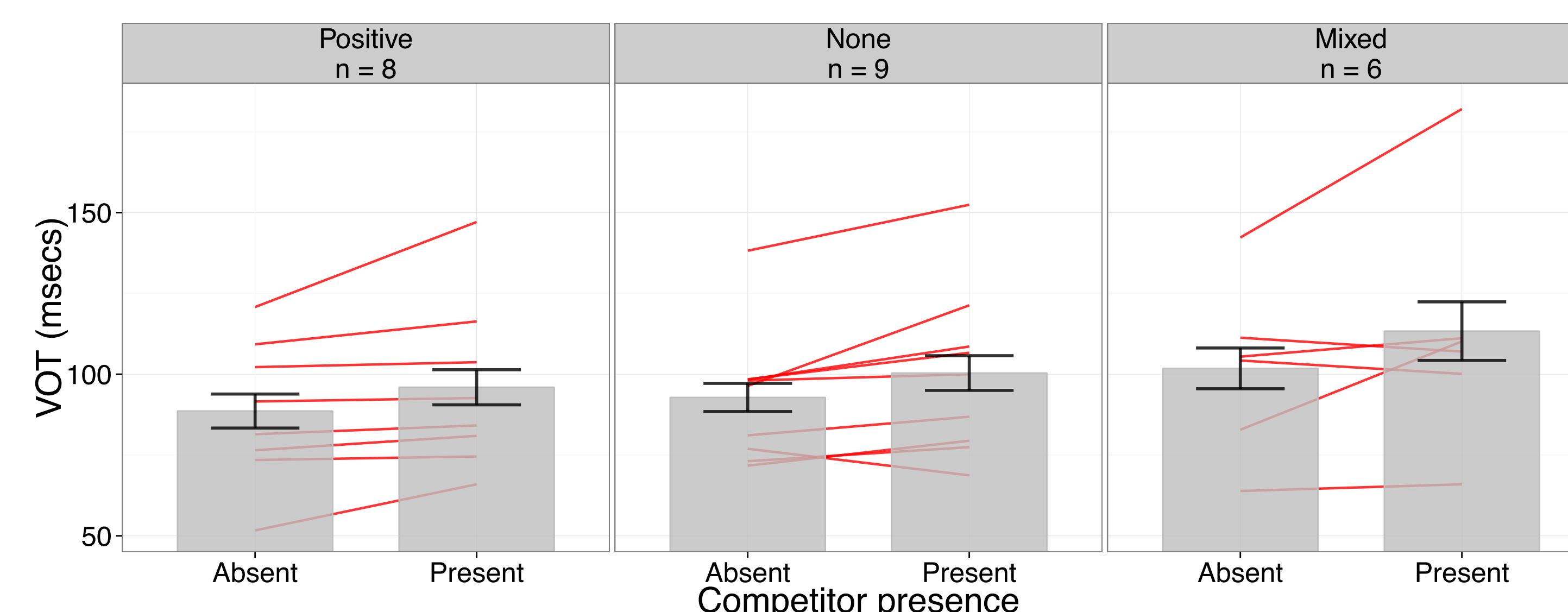


Figure 3. VOT by condition by feedback. Error bars are ± 1 SE after by-participant aggregation. Red lines connect means across contexts.

Results (cont'd)

(No) ease of production effect

- Follow-up analysis modeling VOT change by log latency
- No significant effect of log latency on VOT ($p > 0.32$)

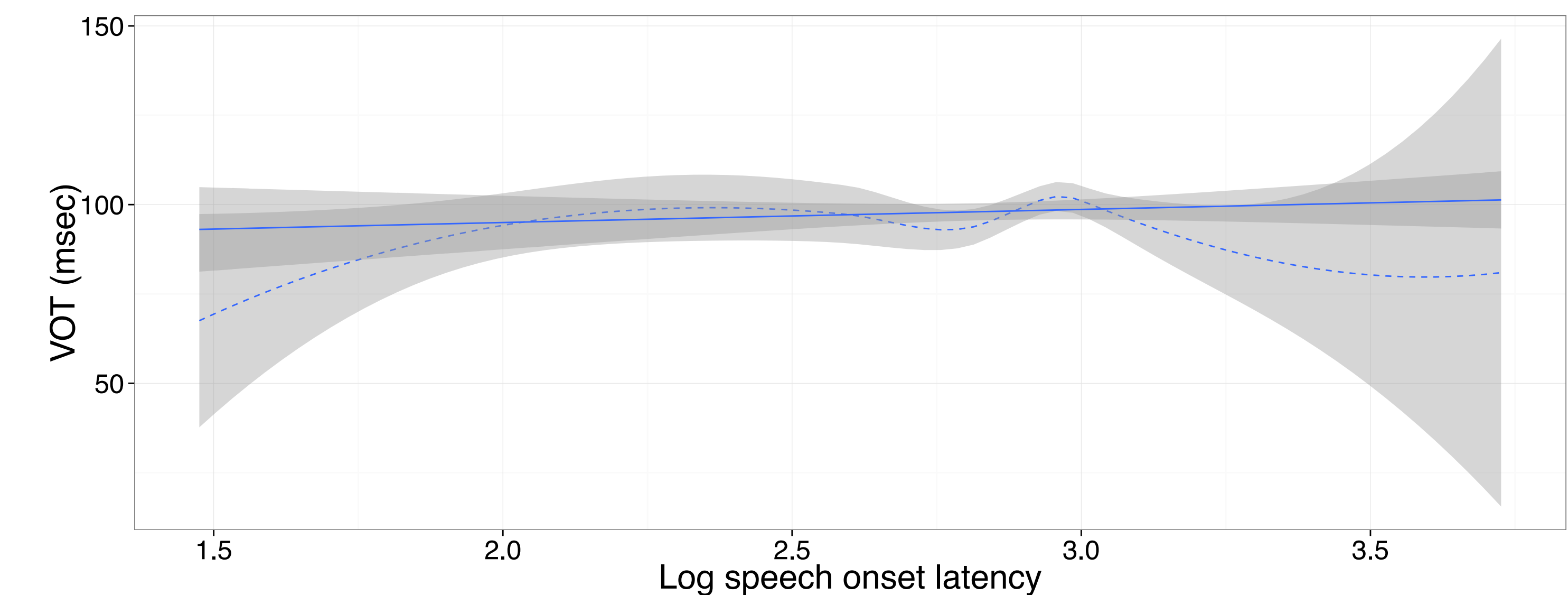


Figure 4. Effect of speech onset latencies on VOTs. Solid line is linear fit, dashed is non-parametric fit.

Time course effects

- Follow-up analysis modeling VOT change by log trial
- Significant trial effect, VOTs longer at end of experiment ($p < 0.01$)
 - Significant linear term, marginal negative quadratic term (β s = 74.17, -53.21, $t = 3.4, -1.9$)
 - Context effect still significant ($p < 0.01$), feedback still non-significant ($p = 0.68$)

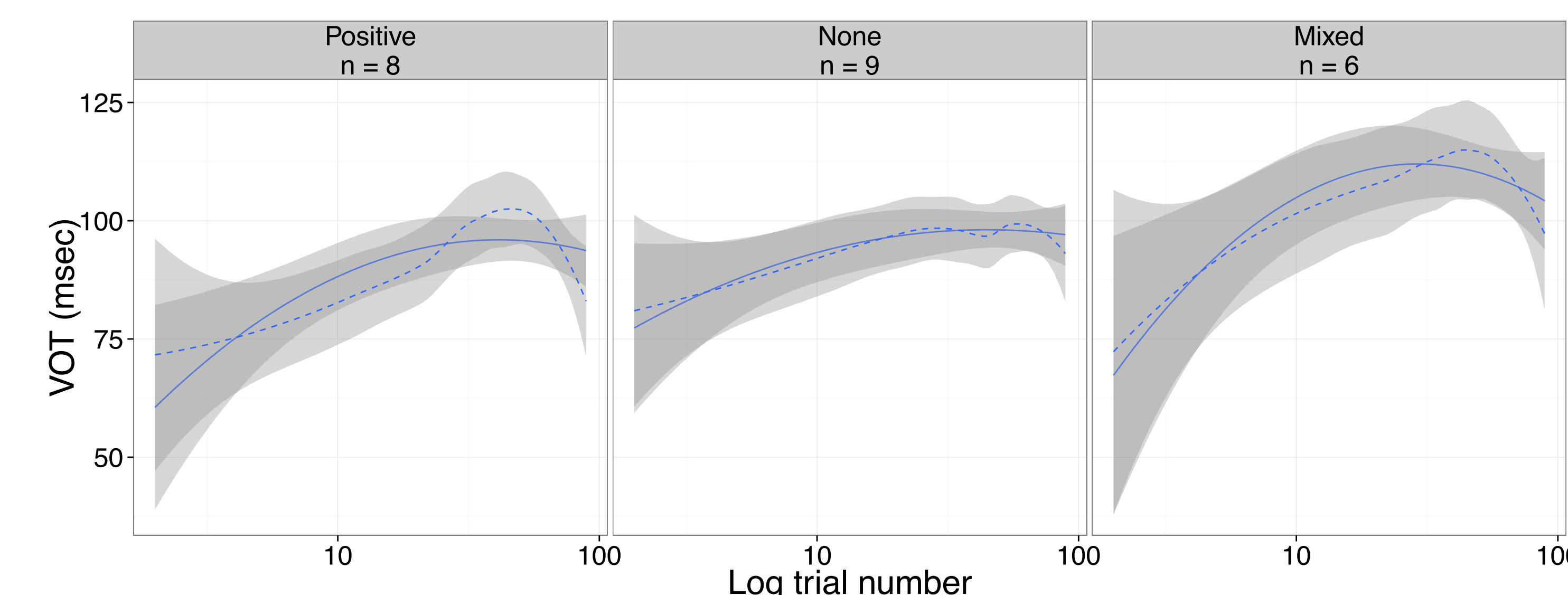


Figure 5. VOT across trials by feedback. Solid line is quadratic fit, dashed is non-parametric fit.

Discussion

- We replicate findings of phonetic change with web-based design
 - Encouraging for future large scale web-based phonetic experiments with simulated interactions
- We find nominal but non-significant change based on feedback
 - Suggests possible role of feedback on phonetic change (**caveat:** contingent on remainder of the data)
 - Suggests support for the robust communication view
 - No evidence that production ease (latency) affects VOT
- Post-hoc we find significant trial effects
 - Suggests phonetic changes may be partly contingent on *experience* with context
 - Production ease accounts *do not* predict this effect
 - Quadratic effect may be due to perceived partner behavior (always correct toward end of study)

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