Hear no evil or speak no evil: Lengthening of phonological competitors

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Speakers dynamically update the duration of words depending on the words' discourse status. Repeated words tend to be acoustically reduced compared to new words, while similar-sounding words tend to be lengthened. There are several theories for this latter effect: First, words may be lengthened because speakers tailor confusing utterances to be easier for listeners (Buz, Tanenhaus, & Jaeger, 2015). Second, planning to produce similar-sounding words may lead to interference (Sevald & Dell, 1994; Watson, Buxó-Lugo, & Simmons, 2015). Third, some theories propose that repetition reduction occurs only when speakers have access to an auditory representation of what they've recently produced (Jacobs, Yiu, Watson, & Dell, 2015). It may be the case that this auditory memory component is necessary for lengthening competitors as well.

We conducted two event description task experiments to test whether speakers lengthen the durations of referent labels that sound similar to a previously named referent (e.g. *candle* and *candy*). We manipulated whether a referent that was confusable with the target (i.e. a 'cohort') was present or not, and mentioned or not. This allowed us to disentangle audience design, production-internal, and auditory memory accounts of lengthening. Participants saw displays of four potential referents, and described a **prime** (e.g. cohort: "The candle shrinks"; non-cohort control: "The church shrinks") followed by a **target** event (e.g. "The candy flashes"). We were interested in target word durations across the following four conditions:

1. **Control**: Non-cohort control prime with no cohort present (e.g. "The church shrinks")
2. **Cohort unnamed**: Non-cohort control prime (e.g. "The church shrinks"), but the cohort (candle) is also present in the display.
3. **Cohort heard first**: Cohort prime that is mentioned in a recording (e.g. "Make the candle shrink")
4. **Cohort said first**: Cohort prime that is mentioned by the participant (e.g. "The candle shrinks")

If speakers lengthen (e.g. hyperarticulate) similar-sounding referent labels to aid listeners, then we expect longer durations in all three experimental conditions. If speakers lengthen only when they encounter difficulty in production, then we expect lengthening only when they themselves have previously uttered the cohort. Finally, the auditory memory hypothesis predicts that the simple presence of the cohort will not lead to lengthening, but hearing or saying it will.

In Experiment 1, we found that speakers **only** lengthened phonologically related targets when they heard or named the competitor (Figure 1). We conducted Experiment 2 to rule out the possibility that speakers did not lengthen target labels in the cohort unnamed condition because they had not yet retrieved the phonological form associated with that referent. To test this, before each trial in Experiment 2, participants mouthed the names of each referent in the display before the start of each trial to ensure that they had retrieved the phonological form of each referent label. Despite this, participants still only lengthened the durations of the labels when the competitor had been named out loud or had been heard, as in Exp. 1 (Figure 2).

The lack of lengthening in the cohort unnamed condition suggests that speakers do not always disambiguate similar-sounding referents, ruling out the audience design account of lengthening. The results also suggest that hearing a label is as effective as saying a label for eliciting lengthening by speakers, which rules out purely production-internal mechanisms. Instead, our results provide further evidence that having access to an auditory memory of referents that have been named (e.g. Jacobs et al., 2015) impacts phonological encoding.
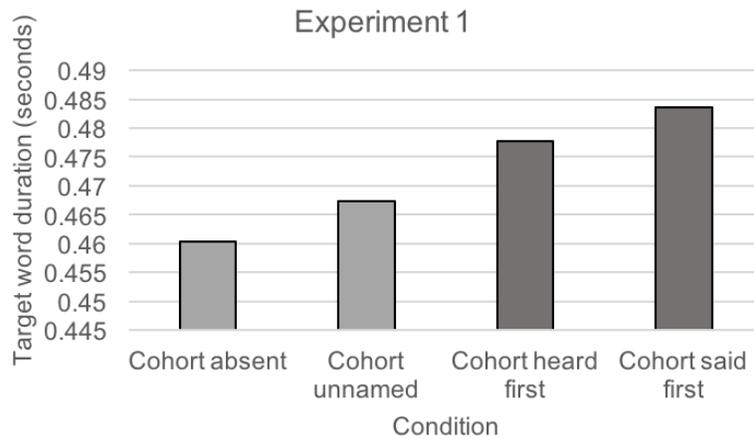
Experiment 1

Figure 1: Speakers do not lengthen the durations of referents that are confusable but unnamed. Significant differences from control ("cohort absent") indicated by darker bars.

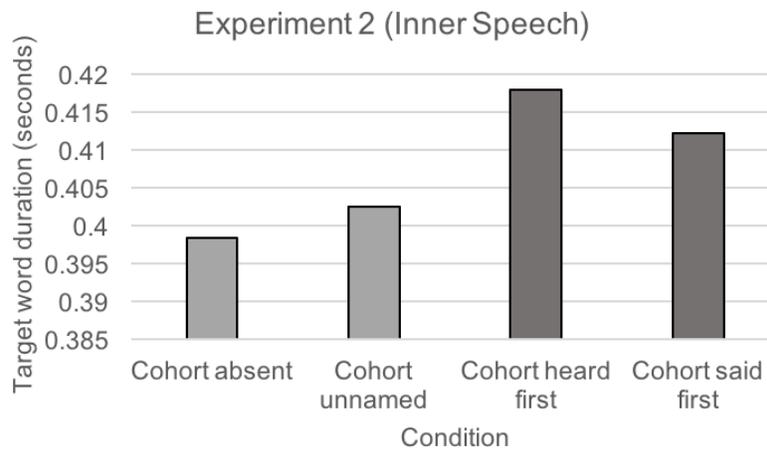## Experiment 2 (Inner Speech)

Figure 2: Replication of Experiment 1 despite participants naming all referents in inner speech before trial begins. Significant differences from control ("cohort absent") indicated by darker bars.

References

Buz, Tanenhaus, & Jaeger (2016). Dynamically adapted context-specific hyper-articulation: Feedback from interlocutors affects speakers' subsequent pronunciations. *JML* 89.

Jacobs, Yiu, Watson, & Dell (2015). Why are repeated words produced with reduced durations? Evidence from inner speech and homophone production. *JML* 84.

Sevald & Dell (1994). The sequential cuing effect in speech production. *Cognition* 53.

Watson, Buxó-Lugo, & Simmons (2015). The effect of phonological encoding on word duration: Selection takes time. In *Explicit and implicit prosody in sentence processing*.

Yiu & Watson (2015). When overlap leads to competition: Effects of phonological encoding on word duration. *PB&R* 22.