The Reverse Production Effect: Is it Language Specific?

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Background

Production Effect

- Adults show better recognition for words they produced compared to words only heard (Icht & Mama, 2015) or read silently (MacLeod et al., 2010)
- 5-year-old children show higher recall for words that were produced over "look" and "heard" conditions (Icht & Mama, 2015)
- 7-10 year old children showed higher recognition for both real words and non-words that had been read aloud opposed to studied silently (Pritchard et al., in press)

Reverse Production Effect (RPE)

- Effect of production is dependent on **stimuli** (Grohe & Weber, 2018; Kaushanskaya & Yoo, 2011) and **task** (Baese-Berk & Samuel, 2016; Kaushanskaya & Yoo, 2013, 2012; Cho & Feldman, 2016)
- Children (ages 4 to 6) showed better recognition for items that were heard vs produced when tested with non-words (Zamuner et al., 2018)

Current Study

Is the Reverse Production Effect caused by speech-related actions (language specific) or overall task complexity?
- In both cases the learning task is made more difficult by the addition of actions while learning.
- Linguistic factors specific: RPE triggered by language-related actions only, for example saying a word or movement of articulators.
- Task complexity: performing an action, like moving or producing while learning, triggers RPE (not language specific).

Method

Adaptation and extension of Zamuner et al. (2018) study.

Added new non-verbal learning conditions to investigate non linguistic factors for reversal of Production Effect.

Participants

- Participants ages 5 to 6-year-olds (*n*=21 *M*= 5.45)
- Monolingual English speakers (at least 70% overall English exposure)
- Participants recruited at Canada Science and Technology Museum

References

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Icht, M., & Mama, Y. (2015). The production effect in memory: A prominent mnemonic in children. *Journal of Child Language, 42*, 1102-1124.
Kaushanskaya, M., & Yoo, J. (2011). Rehearsal effects in adult word learning. *Language and Cognitive Processes, 26*(1), 121–148.
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Zamuner, T. S., Morin-Lessard, E., Strahm, S., & Page, M. P. (2016). Spoken word recognition of novel words, either produced or only heard during learning. *Journal of Memory and Language, 89*, 55-67
Zamuner, T., Strahm, S., Morin-Lessard, E., & Page, M. (2018). Reverse production effect: Children recognize novel words better when they are heard rather than produced. *Developmental Science, 21*(4)
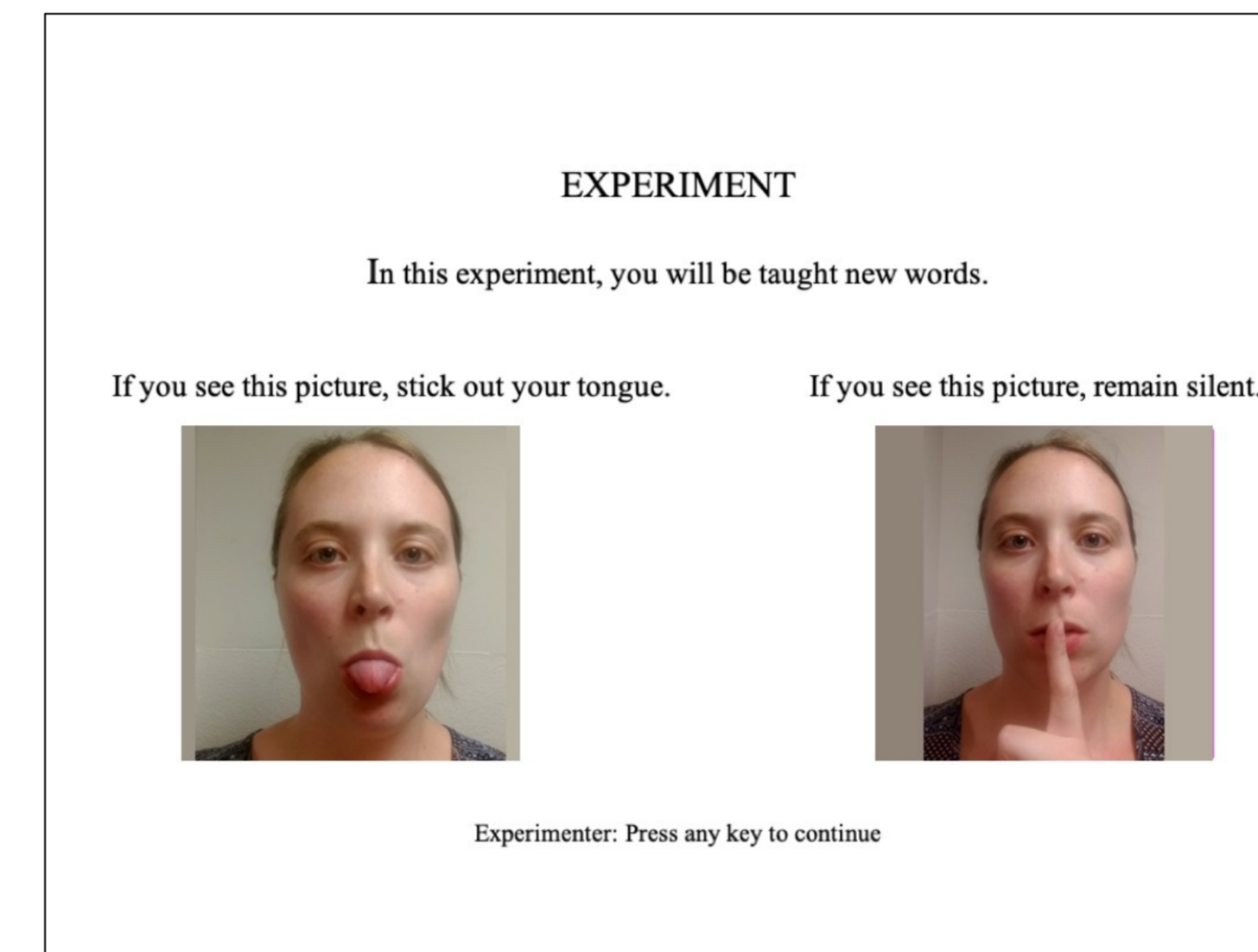
Materials and Design

- 16 monosyllabic non-words paired with coloured cartoon images (e.g "wis, zel, vup, bos")

- 3 Learning condition pairs, blocked

Heard vs Produced
Heard vs Tongue
Heard vs Nose

EXPERIMENT

In this experiment, you will be taught new words.

If you see this picture, stick out your tongue.   If you see this picture, remain silent.

Experimenter: Press any key to continue

Procedure

Training
- Participants presented with 8 practice trials (4 training, 4 testing) and 16 testing trials (8 training, 8 testing).
- Training with previously known words (e.g "apple, strawberry").
- Testing with non-words.
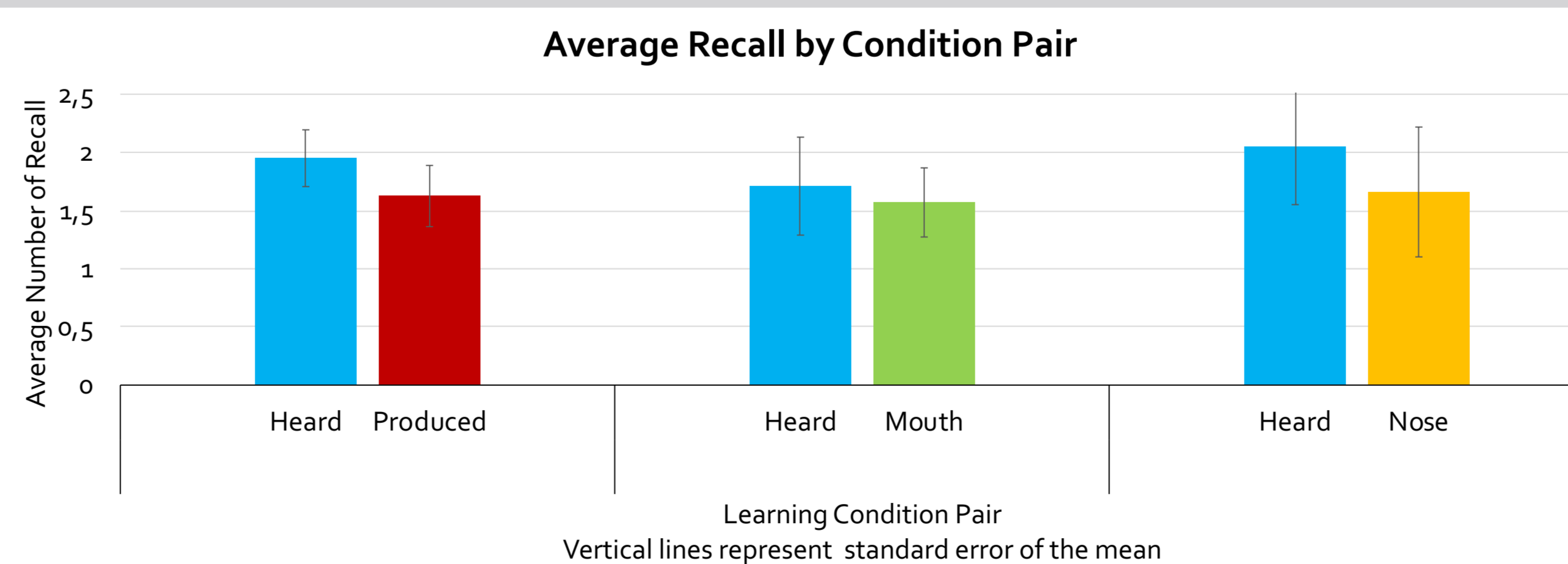- Procedure repeated with other training condition.

Test
- Recognition: Two images, target and distractor.
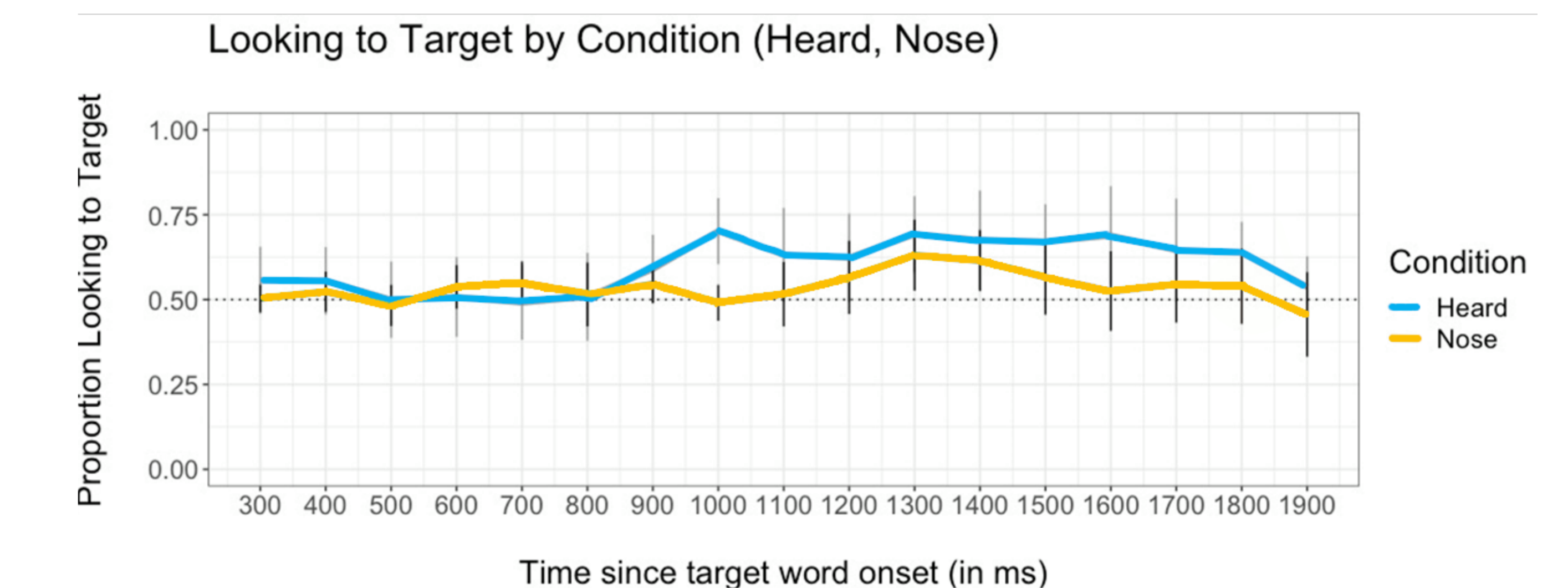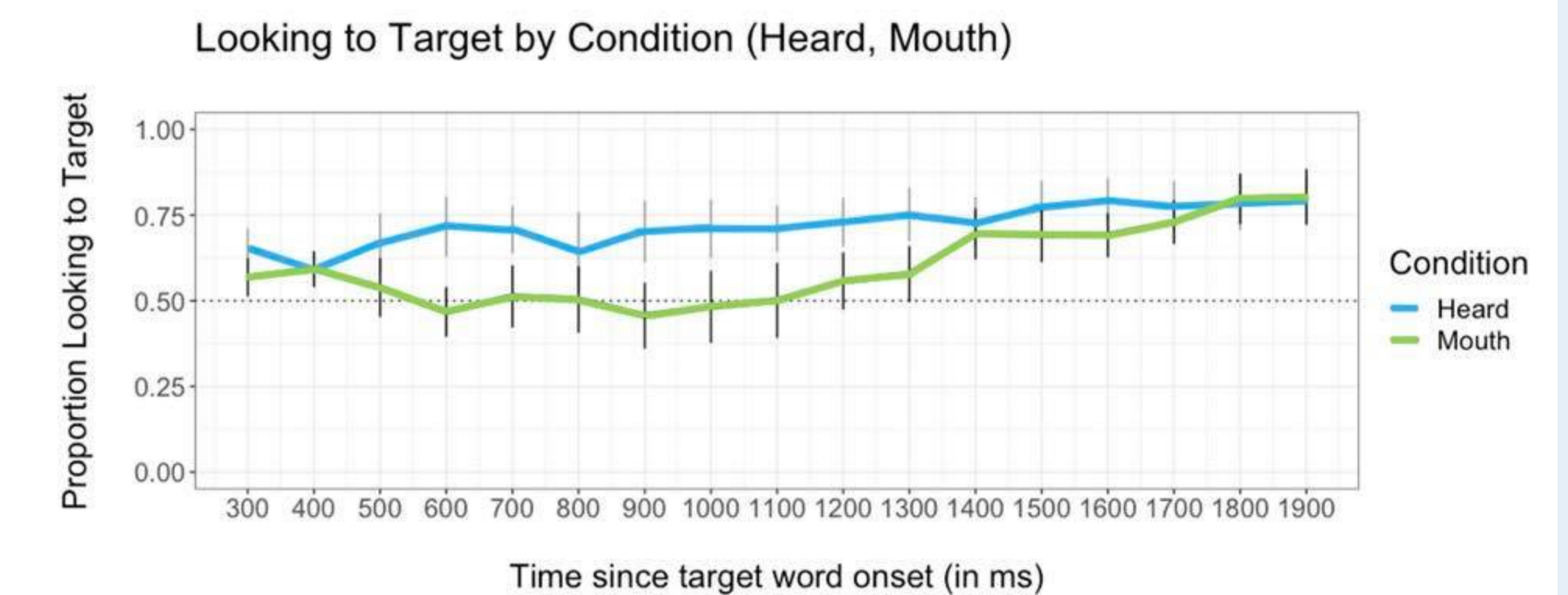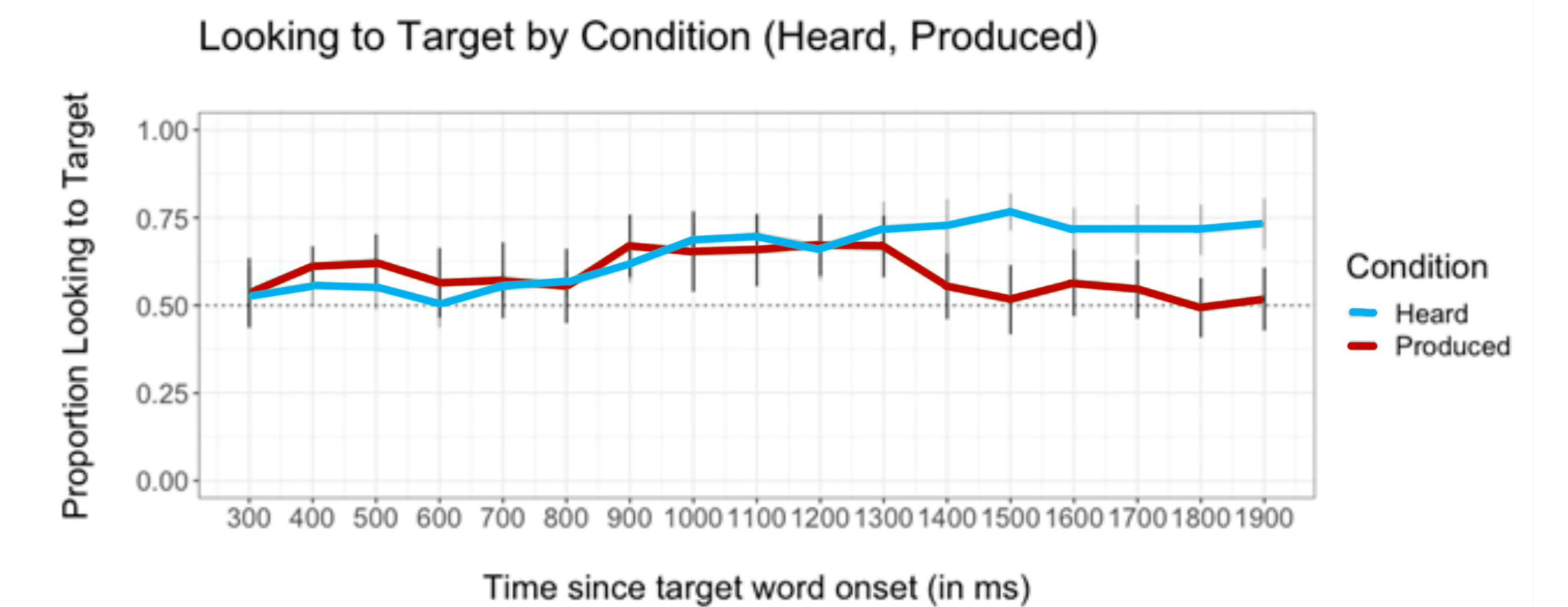- Recall: Asked to say newly learned words.

Analysis
- Average time spent looking to target: time window 300 ms after word onset to end of trial.
- Average number of recalled words

Results: Recall

Average Recall by Condition Pair

Learning Condition Pair
Vertical lines represent standard error of the mean

Results: Recognition

Looking to Target by Condition (Heard, Produced)

Looking to Target by Condition (Heard, Mouth)

Looking to Target by Condition (Heard, Nose)

Conclusions

- Reversal or null advantage of Produced items: same results as in Zamuner et al. (2018)
- Lower or equal performance seems to hold for all action-related tasks.
- Results at this stage suggest influence of task difficulty for possible reason of the RPE. Heard condition has overall higher recall/recognition. Nose condition seems to be triggering the RPE despite non-speech relation.
- Results support previous explanation for RPE, processing resources in action conditions are destined to both word mapping and performing the action, compared to the same resources being destined to word mapping exclusively in heard condition.
- Role of linguistic factors cannot be excluded, speech-related actions still hinder recall & recognition.