

Are meanings of the same word competing with each other in-the-moment during statistical word learning?

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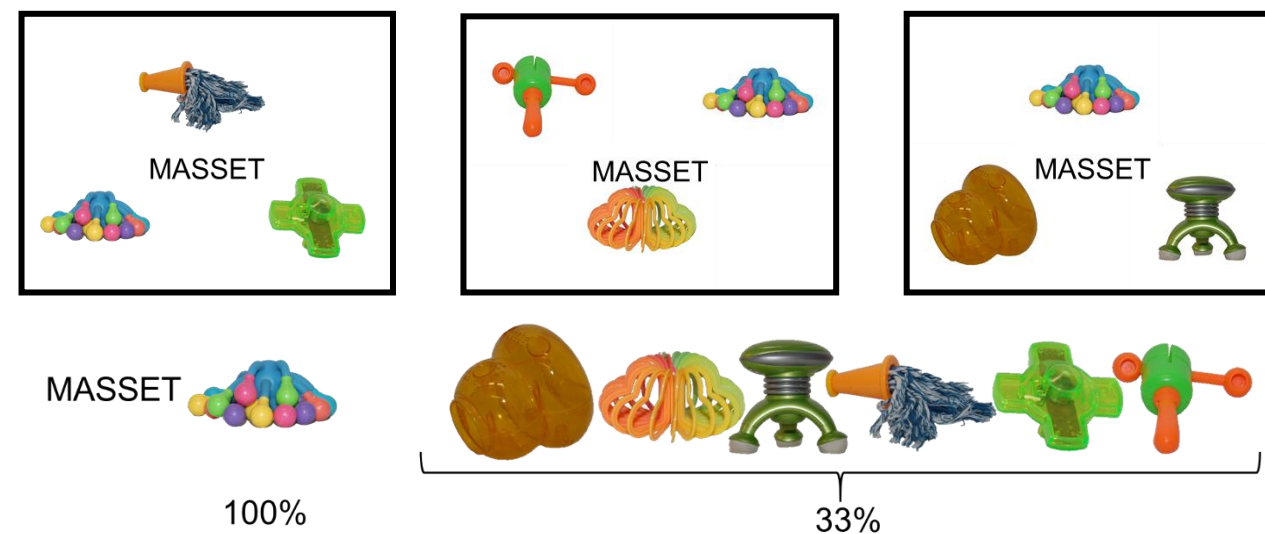
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Introduction

Cross-Situational Word Learning (CSWL)

If a **word** and its **meaning** have above baseline probability of co-occurring, this information can be used across situations to learn the correct mappings (Yu & Smith, 2007).



1:1 Mapping



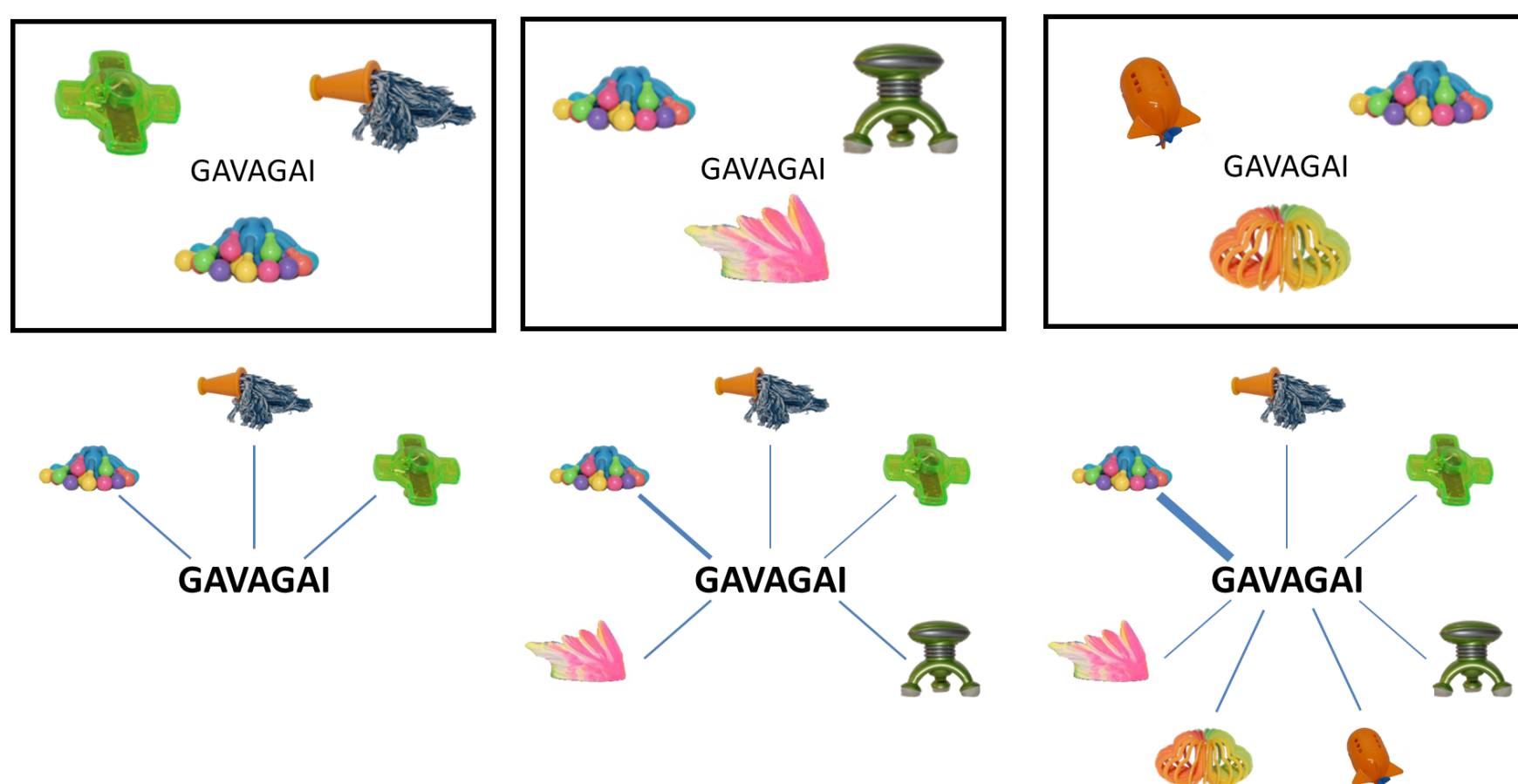
1:2 Mapping



What do we know?

Previous research (e.g., Benitez et al., 2016) has shown that:

- People can maintain multiple hypotheses and meanings for each word
- But some are stronger than others (the ones that co-occur)



Multiple meanings of a word are activated in the moment and **compete** with each other (e.g., Roembke & McMurray, 2016)

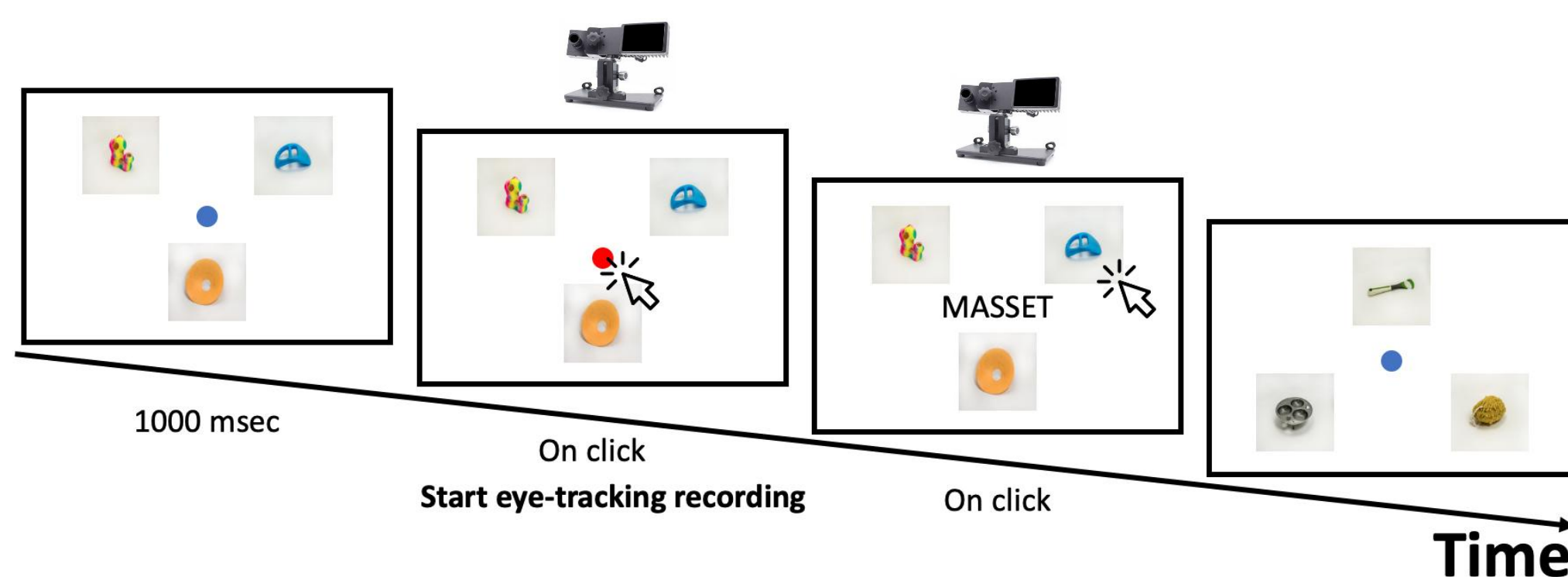
What DON'T we know?

It is currently not clear how **in-the-moment competition** between different meanings unfolds for more complex mappings and to what extent different meanings compete even when they are not presented at the same time

Thus, we will investigate in-the-moment competition between multiple referents for **1:2** mappings in CSWL using **eye-tracking**

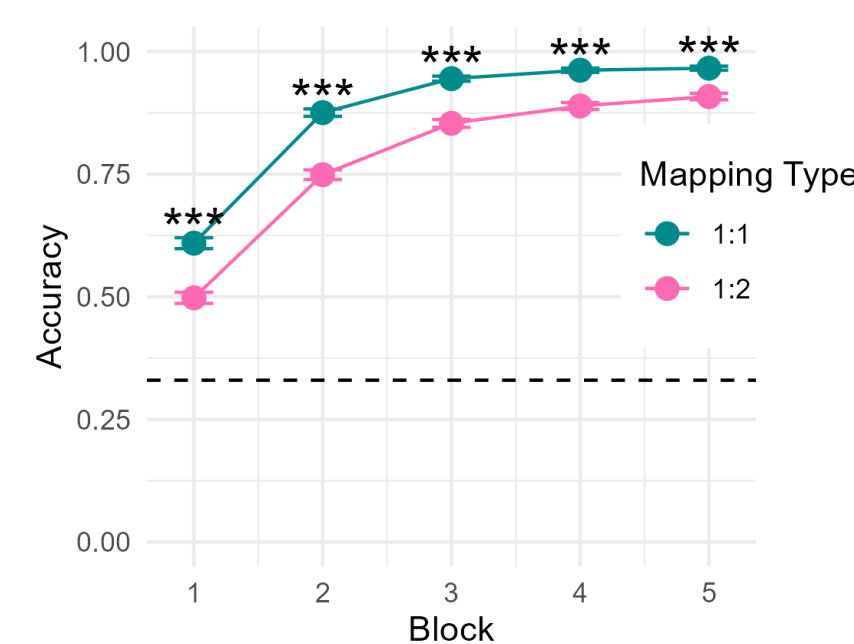
Methods

- **Participants:** 40 German-English Bilinguals
- **Mappings:** 6 **1:1** mappings and 6 **1:2** mappings
- **Trials:** 480 divided into 5 blocks



Results

Behavioural:



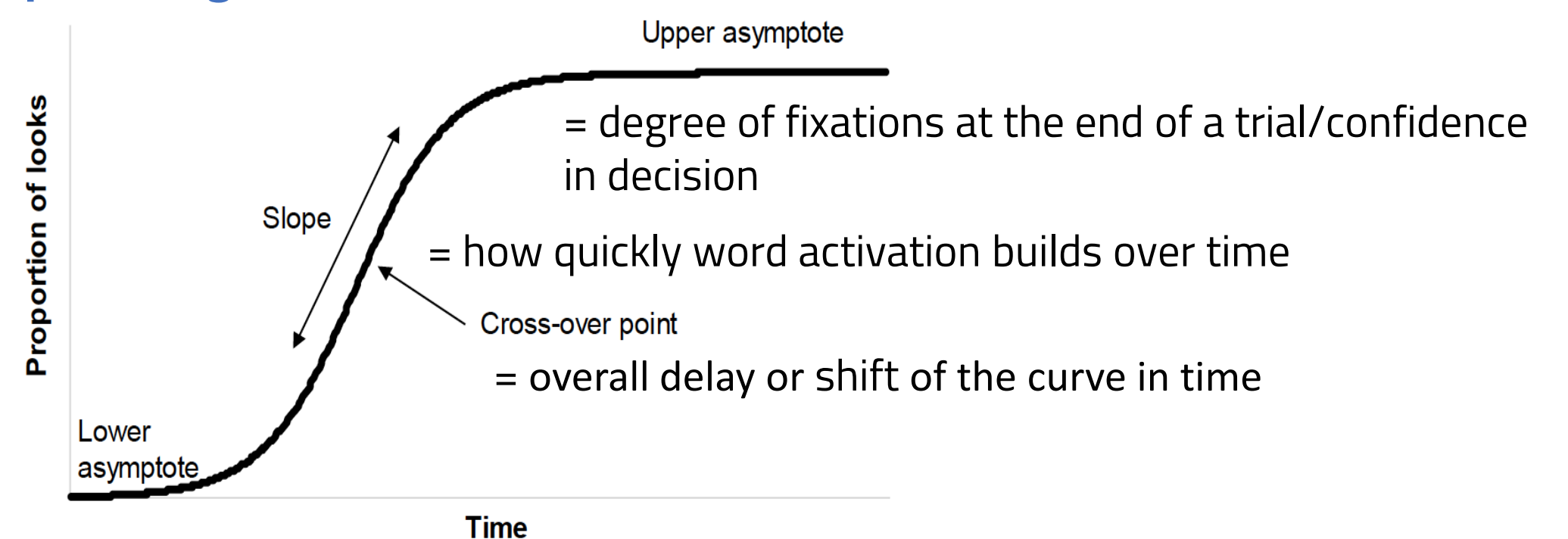
All analyses are conducted using (general) linear mixed models

Hypotheses:

- ✓ **H1:** Participants will be able to learn
- ✓ **H2:** It will be harder to acquire 1:2 than 1:1 mappings (replication of Simonetti et al. 2025).

Eye-tracking:

Eye-movements to the **target** object on **correct trials** were fit to a **four points logistic**

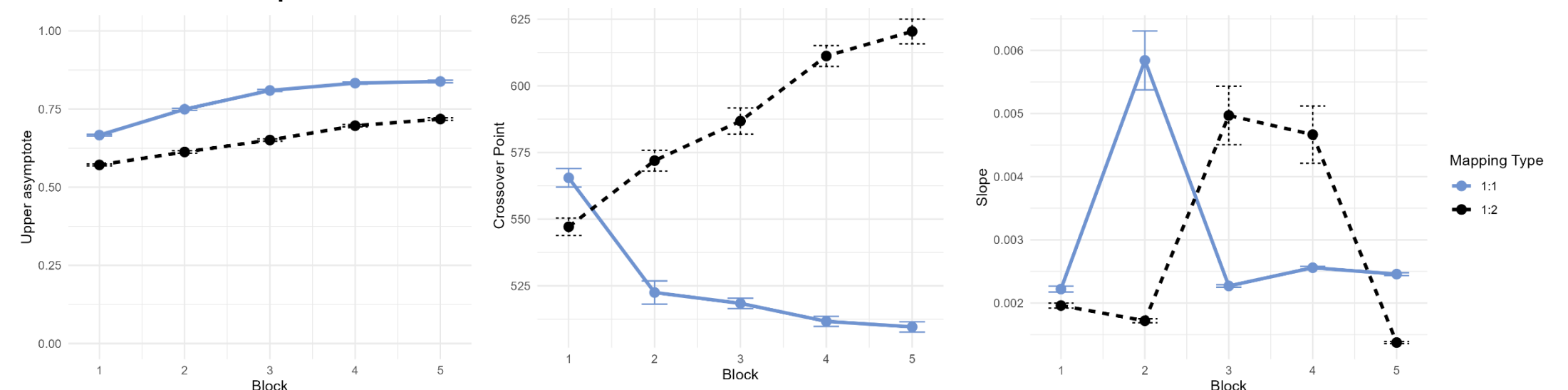
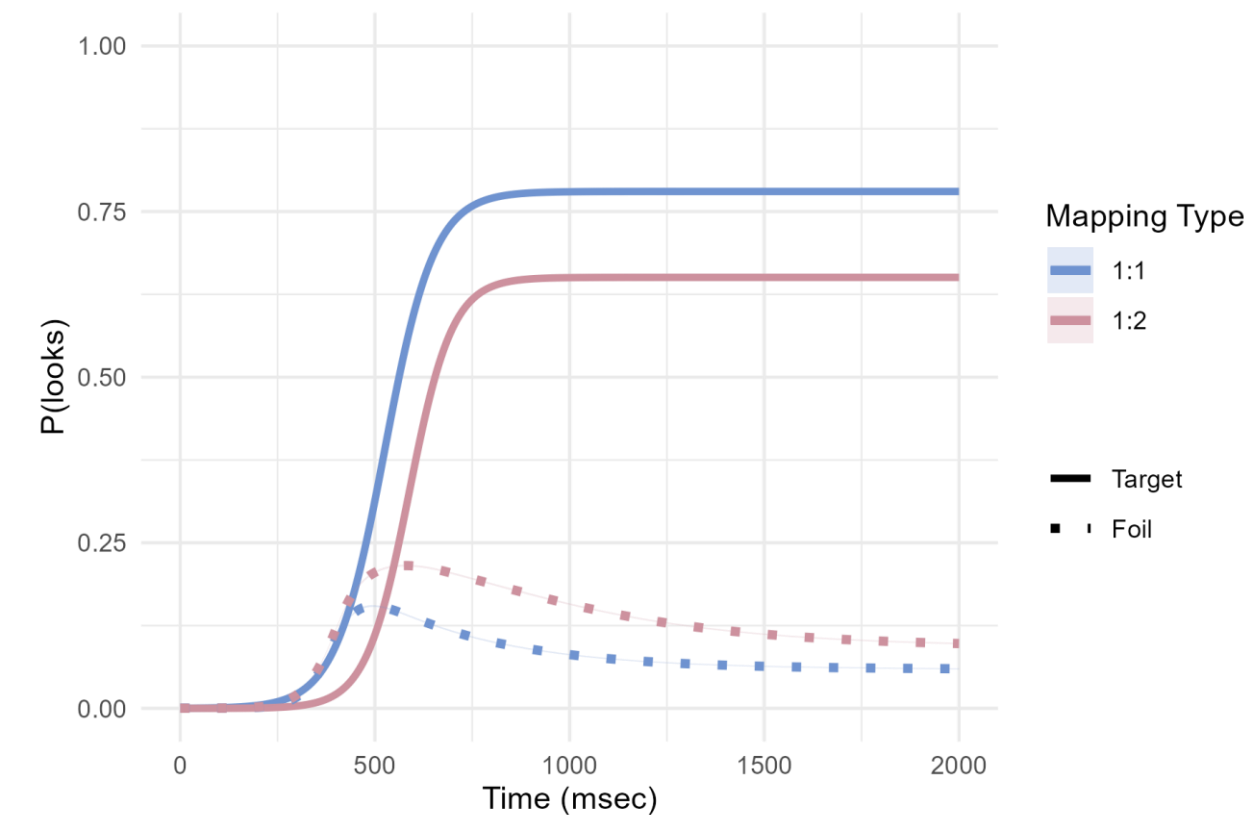


Hypotheses:

- **H3:** 1:2 mappings will result in more competition than 1:1 mappings

Resulting in:

- ✓ **H3a:** 1:2 mappings will have a lower upper asymptote than 1:1
- ✓ **H3b:** 1:2 mappings will have a higher cross-over point than 1:1
- ✗ **H3c:** 1:2 mappings will have a lower slope than 1:1



Discussion

We were able to replicate the behavioural results and see **more online competition** for 1:2 than for 1:1 mapping, even as the second meaning was not present during the trial

1:2 mappings had a **delayed fixation** and a **lower upper asymptote** than 1:1 mappings → suggesting **less confidence** in decision and that **activation builds more slowly** over time for these words, even when they select the correct referent

However:

Each individual meaning (object) for 1:2 mappings was seen only **half as often** as those in the 1:1 condition

Where does the competition arise from?

The different frequency or the mapping type?

In a **second experiment** (currently ongoing), each meaning in the 1:2 condition is presented just as frequently as in the 1:1 condition to distinguish between the two possibilities

References

- Benitez, V. L., Yurovsky, D., & Smith, L. B. (2016). Competition between multiple words for a referent in cross-situational word learning. *Journal of Memory and Language*, 90, 31–48.
- Roembke, T. C., & McMurray, B. (2016). Observational word learning: Beyond propose-but-verify and associative bean counting. *Journal of Memory and Language*, 87, 105–127.
- Simonetti, M. E., Koch, I., & Roembke, T. C. (2025). How do multiple meanings affect word learning and remapping? *Memory & Cognition*, 1–20.
- Yu, C., & Smith, L. B. (2007). Rapid word learning under uncertainty via cross-situational statistics. *Psychological Science*, 18(5), 414–420.