# KNOWLEDGE AND LEARNING OF VERB BIASES IN AMNESIA

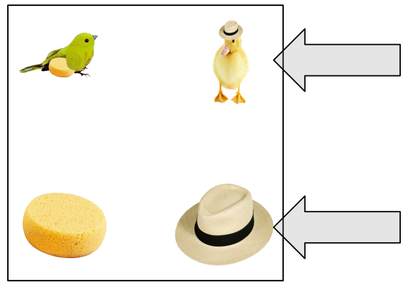
Rachel Ryskin[1,2], Zhenghan Qi[1], Natalie Covington[3], Melissa Duff[3] & Sarah Brown-Schmidt[3]
1.Massachusetts Institute of Technology, 2. Boston University, 3. Vanderbilt University

- Listeners rely on verb-structure co-occurrence frequencies—verb biases—to disambiguate sentences on-line (e.g., Snedeker & Trueswell, 2004).
- Listeners dynamically update representations of verbs based on exposure to new verb-structure co-occurrence statistics (Ryskin, Qi, Duff, & Brown-Schmidt, 2016).
- The hippocampal declarative memory system plays an important role in the flexible binding of representations during on-line language processing (Brown-Schmidt & Duff, 2016)

**Question: What is the role of the declarative memory system in the use and dynamic updating of verb bias?**

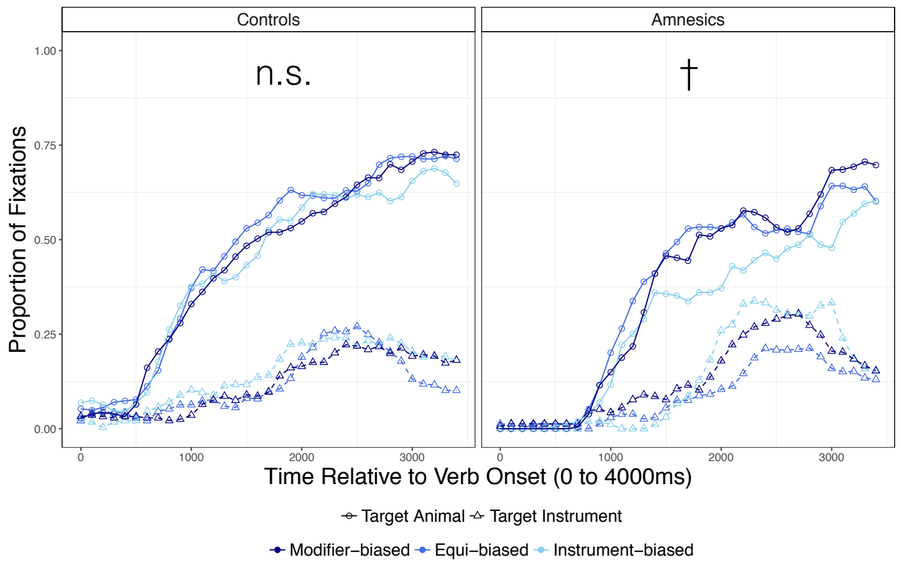
"<Verb> the duck with the hat."

Verb = Modifier- | Equi- | Instrument-biased



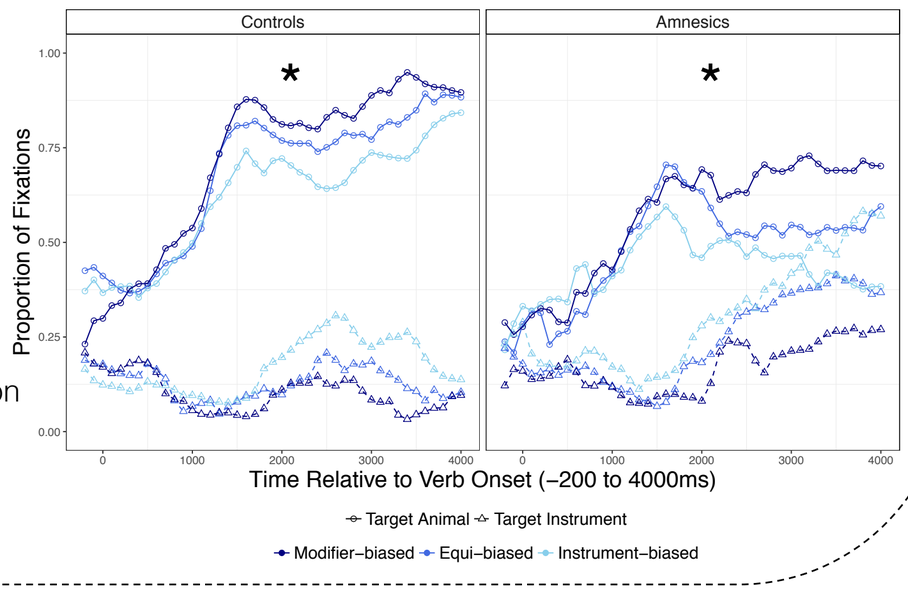

## Experiment 1: Verb bias effect in Amnesia with real objects

N=4 patients with lesions to the hippocampus + 4 demographically-matched comparison participants




## Experiment 2: Verb bias effect in Amnesia on a computer

N=3 patients with lesions to the hippocampus + 3 demographically-matched comparison participants

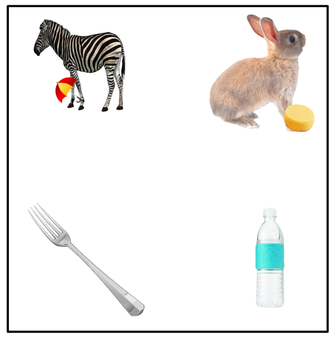



## Experiment 3: No verb bias learning in patients with amnesia or healthy comparisons

8 initially equi-biased verbs are repeatedly paired with either **Modifier** or **Instrument** constructions.
If they learn new verb biases:

- More fixations to Target Animal when the verb is Modifier-trained than Instrument-trained
- More fixations to Target Instrument when the verb is Instrument-trained than Modifier-trained.

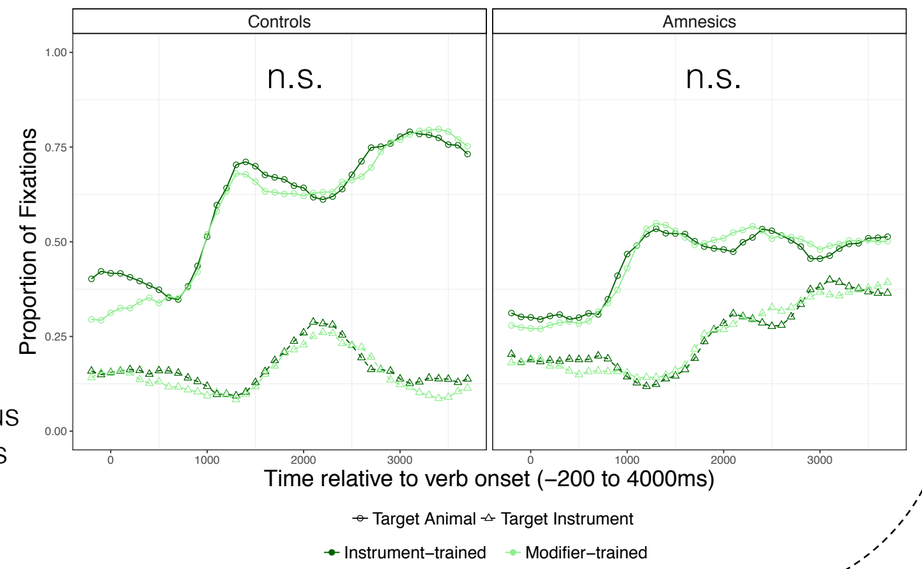
clean cuddle
hug feel
pinch knock on
squeeze rub



**Modifier Training:** "Hmm, what animal should you hug? I know! You should hug the bunny with the sponge."
**Instrument Training:** "Hmm, what should you use to hug the bunny? I know! You should hug the bunny with the bottle."

N=3 patients with lesions to the hippocampus + 3 demographically-matched comparison participants

512 training trials (over multiple sessions) and 256 globally ambiguous test trials (same as Expt. 1 and 2)




- Patients with hippocampal amnesia and healthy counterparts used verb bias in on-line interpretation, but neither group updated these biases in response to recent exposure, as opposed to young adults (Ryskin et al., 2016).
- Using existing representations of verb bias does not necessitate involvement of hippocampal declarative memory, but the ability to update representations of verb-specific biases may require hippocampal engagement.
- Declines in functional declarative memory and hippocampal volume among healthy older adults, may explain why comparison participants failed to update their biases.

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