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Self-paced reading time as a measure of learning novel constructions
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Background

In a series of self-paced reading experiments, Kaschak and Glenberg (2004; Kaschak, 2006) examined how readers coped with a novel construction (needs V-ed). Compared with a control group that read standard constructions, participants read the downstream words slowly on the first few exposures, but reading times were similar to the control group's for the 8th-10th exposures to needs V-ed. Compared with the control group, the needs V-ed group also read new forms of the construction faster in the second half of the experiment, generalizing to a new verb (The cat wants petted) or a new syntactic formulation (John thinks that what the meal needs is cooked). Readers seemed to quickly learn to comprehend the novel construction and generalize that learning to other variants of the construction. Since then, other labs have shown similar learning effects (e.g., Fine et al., 2013). Our three experiments explore further the nature of the generalization that occurs when readers are confronted with a high concentration of a novel construction.

Goals

1. Replicate rapid learning effect w/diverse participant pool
   - Collect information on prior familiarity with construction
2. Test limits on generalization by using ill-formed stimuli during Phase 2.
   - Do participants learn to distinguish well-formed & ill-formed versions of the novel construction?

Experiment 1: MTurk, isolated sentences

Experiment 2: MTurk, naturalistic dialogues

Experiment 3: FSU Subject Pool, unrelated ungrammatical VP in Phase 2

General Method

- Word-by-word self-paced sentence reading, w/comprehension Qs
- Sentence Type is manipulated between subjects
- Analyze residual reading times at "given"

Phase 1, TRAINING: 10 sentences like A or B, mixed w/15 fillers
- **A. needs V-ed:** The meal needs cooked given that dinner is in an hour.
- **B. standard:** The meal needs to be cooked given that dinner is in an hour.

Phase 2, GENERALIZATION: 10 sentences like C or D, mixed w/15 fillers
- **C. well-formed "needs V-ed":** Ellen wondered if the file needs completed since the case is closed.
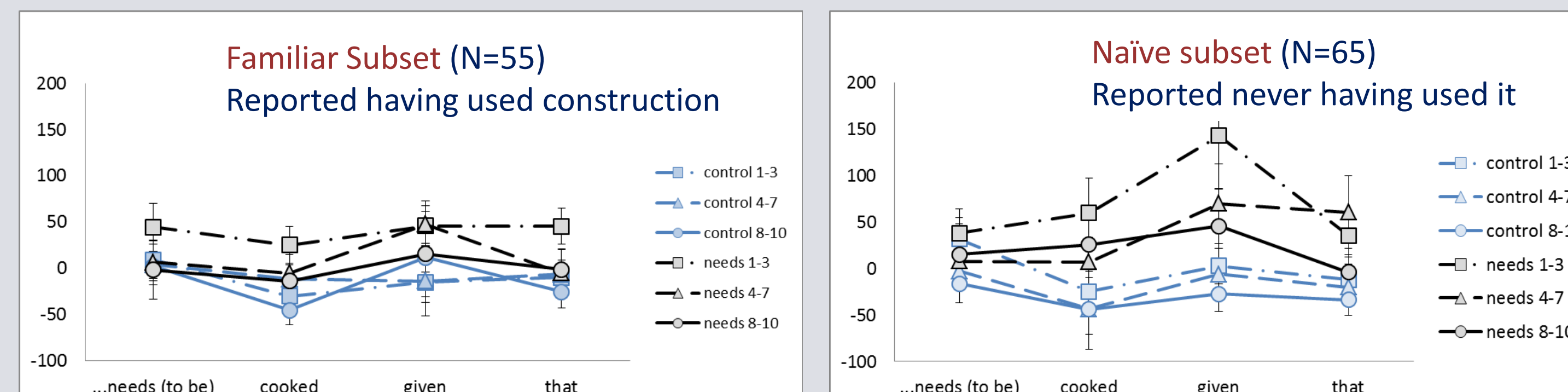- **D. ill-formed "needs V":** Ellen wondered if the file needs *complete since the case is closed.

Corpus Analysis

The needs V-ed construction is semantically restricted and most common in informal spoken language. Because the construction may have been infelicitous in Experiment 1, we embedded the critical stimuli in conversational narrative for Experiment 2.
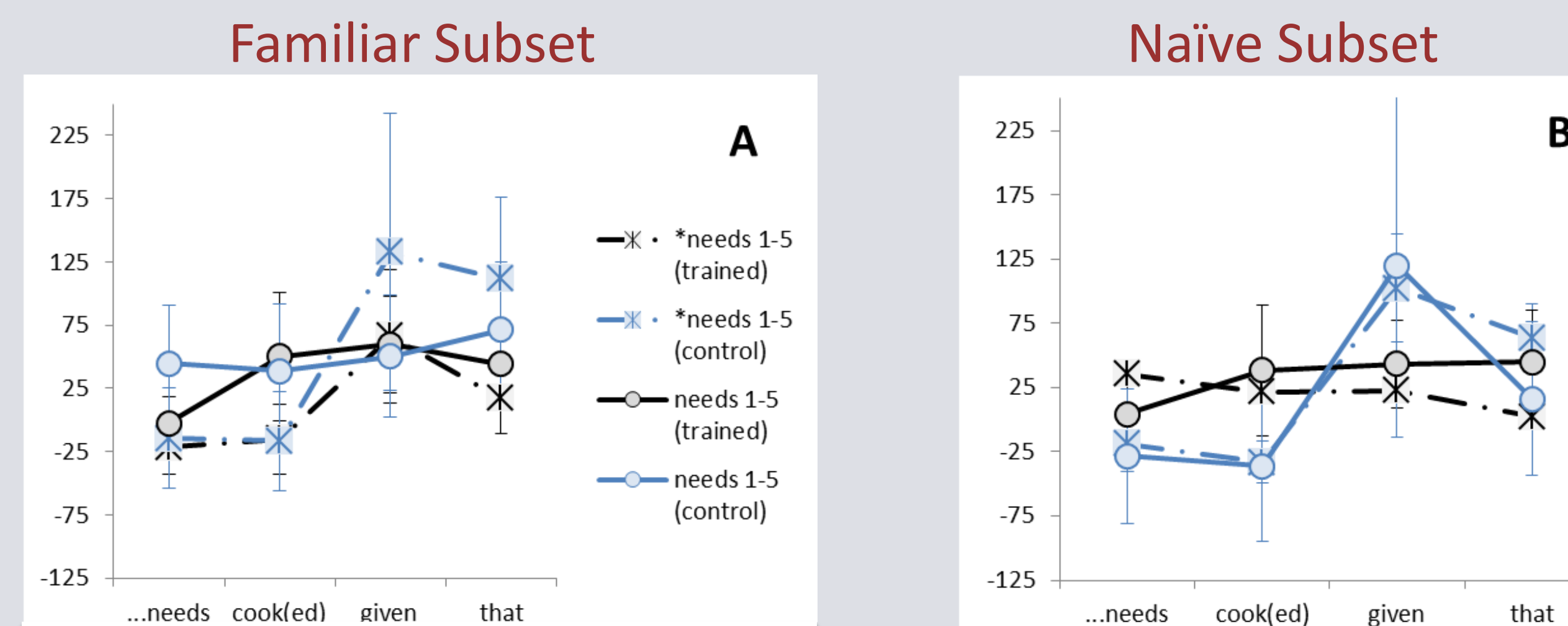
Experiment 1

Participants. 120 adults in the US, mean age 34 (20-68), 67 female; 94% correct on comprehension questions

Phase 1 Results: Training effects, especially for naïve participants

Familiar Subset (N=55) Reported having used construction

Naïve subset (N=65) Reported never having used it

Phase 2 Results, First 5 Trials: Participants trained on needs V-ed construction read ill-formed items as quickly as the well-formed items.

Familiar Subset

Naïve Subset

Experiment 2

When Bob finally showed up, Susan went over the list she had made. "I've already fed the dog today, but he will need fed every morning around 8:00. Then stand back—he really wolfs it down," she warned. He will also need walked in the mornings and the evenings." Bob smiled, "Dogs are so awesome! What's his name?" Susan returned the smile. "Max. Just don't teach him any bad habits."
   Did Susan make a list of chores?
   Does Bob need to walk the dog around 2:00 p.m.?

Participants. 118 adults in the US, mean age 34 (18-72), 61 female; 92% correct on comprehension questions.

Results. Training effects in Phase 1, but less distinction between familiar and naïve subsets. In Phase 2, participants with either prior familiarity or Phase 1 training were somewhat sensitive to grammaticality, but effects were not statistically robust.

Phase 1, All Participants
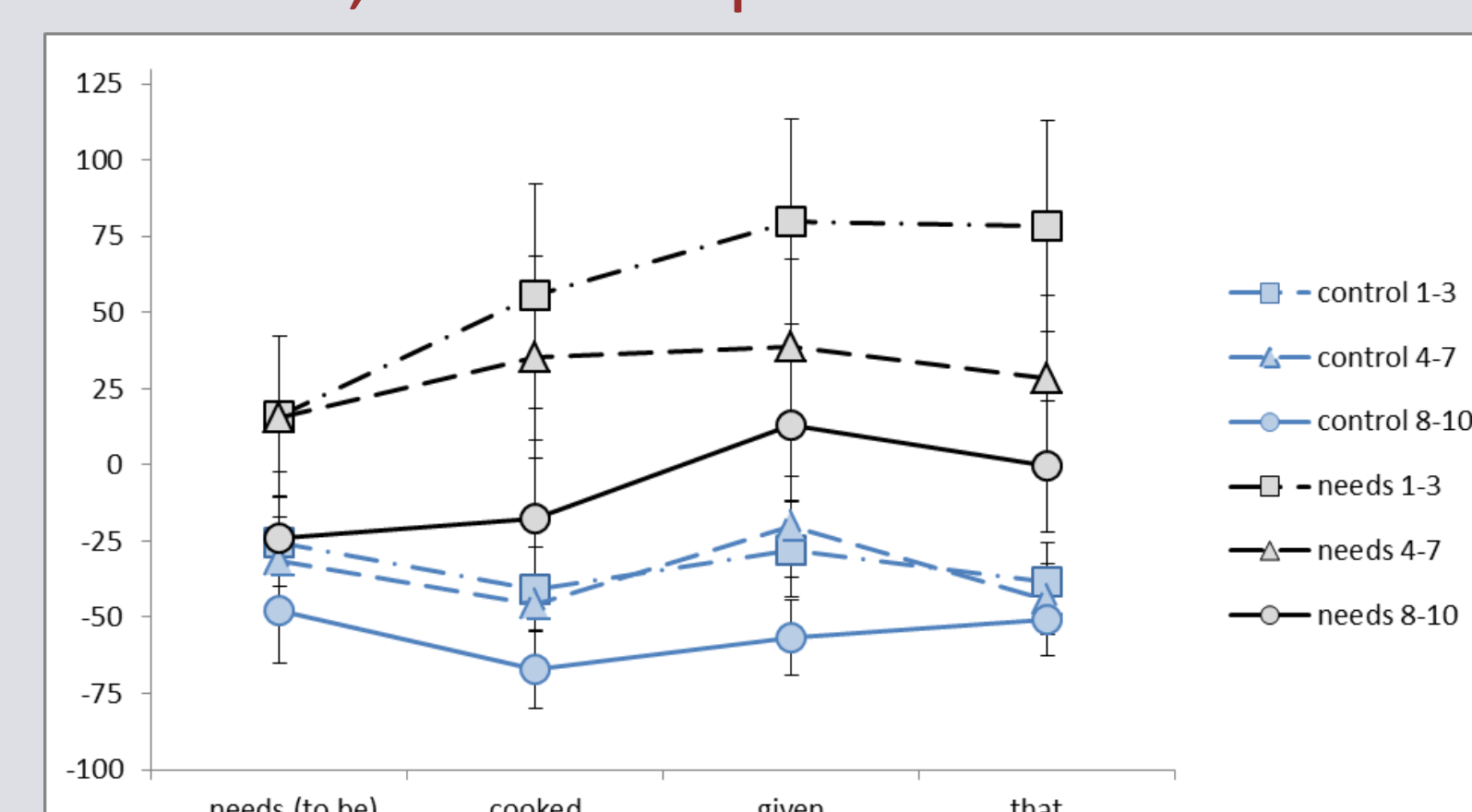
Phase 2, Familiar
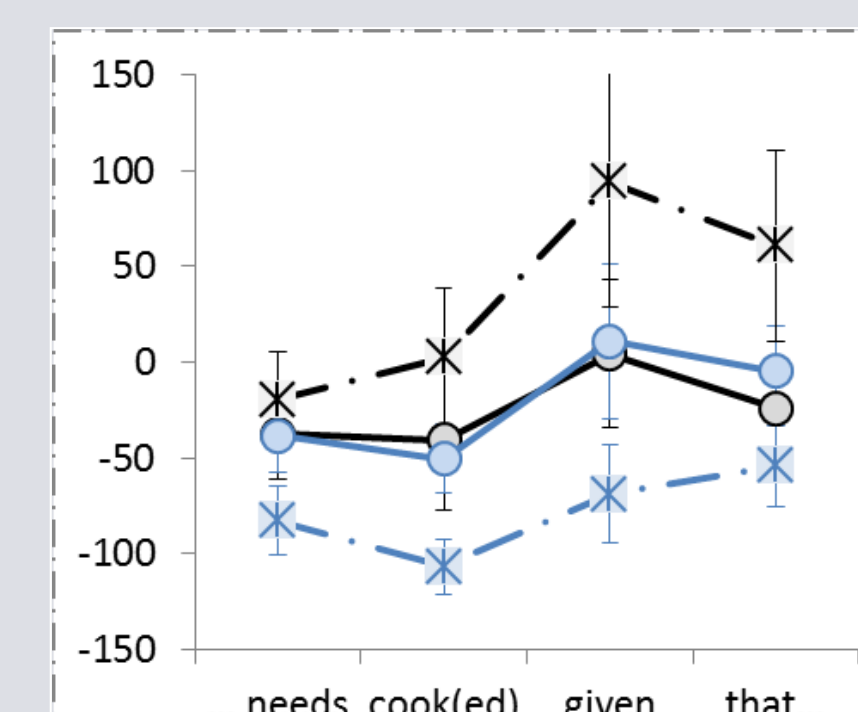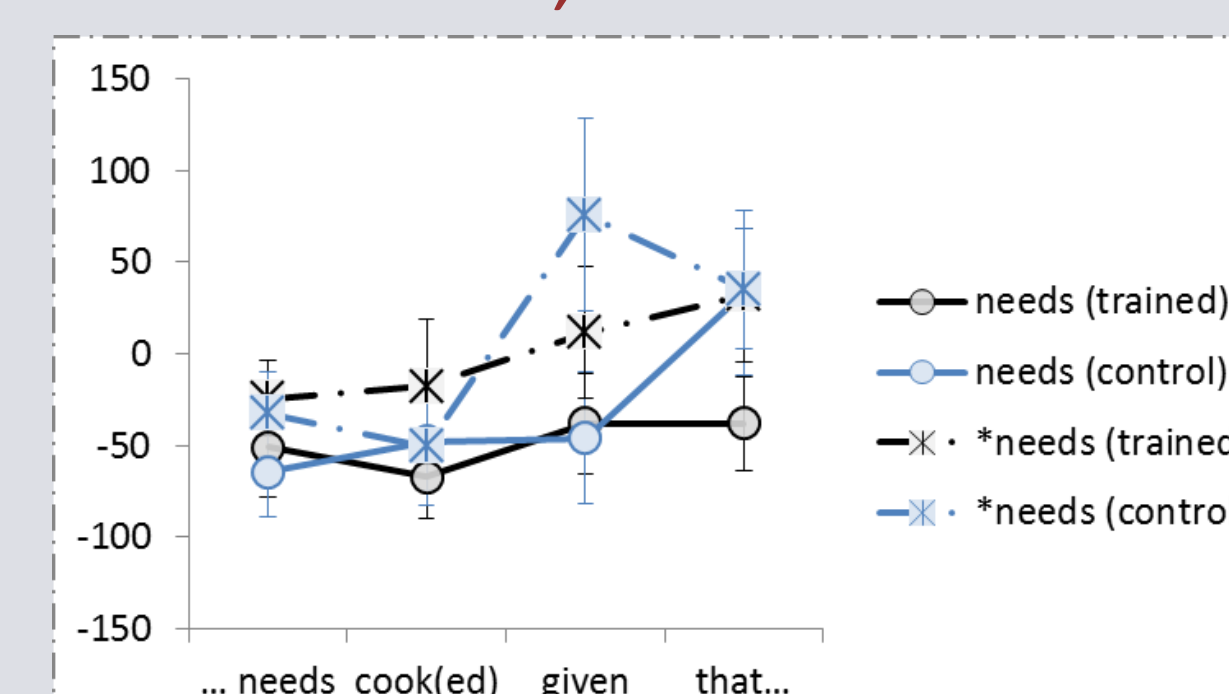
Phase 2, Naive

Experiment 3

Does exposure to novel construction impact reading times for unrelated ungrammatical sentences in Phase 2?

Harry knows that he will (be) the winner.

Phase 1 was identical to Experiment 1.

Participants. 89 undergraduates (65 female) from Florida State University

Phase 1 Results. Training effect from first two experiments replicated
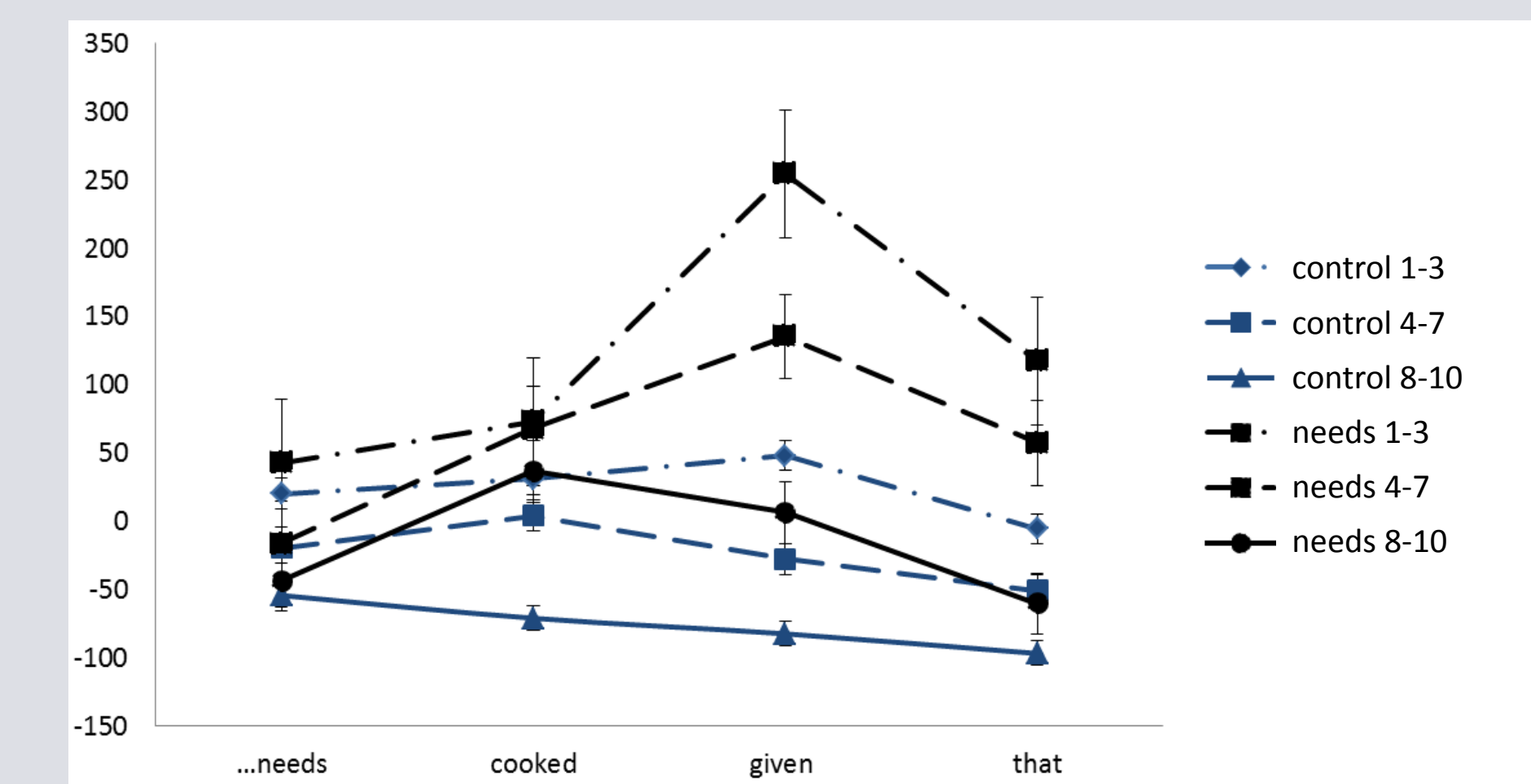
Phase 2 Results, First 5 Trials. Participants trained on the needs V-ed construction show less processing cost when reading the ungrammatical sentences in Phase 2.
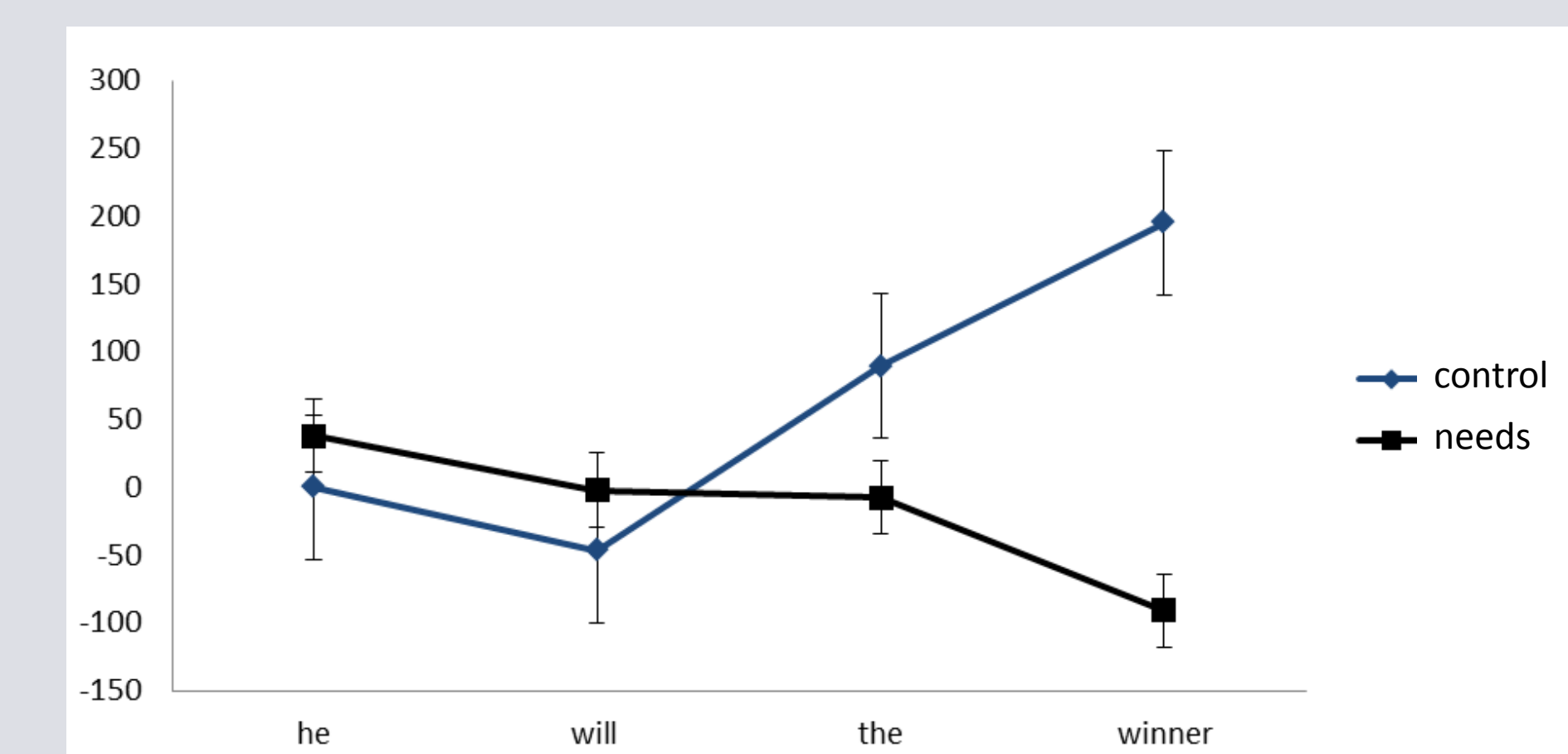
Conclusions

Readers may adapt to novel constructions by relaxing their grammatical constraints. In contrast to participants in the control condition, participants trained on the novel construction did not exhibit processing difficulty when subsequently reading either ungrammatical versions of the novel construction (Exp. 1 & 2) or ungrammatical sentences unrelated to the novel construction (Exp. 3). Whereas participants may gain facility in comprehending deviant sentence forms, our data suggest that this facility does not necessarily indicate the development of new, abstract syntactic representations that support intuitions about grammaticality of the new construction. On a broader level, these findings provide some insight into how readers (and possibly listeners) cope with non-standard input. Readers may have processing strategies that allow the comprehension of unusual or ungrammatical sentences without having developed complete, well-formed syntactic representations for those sentence types.

References

Fine, A. B. & Jaeger, T., Farmer, T. A., & Qian, T. (2013). Rapid expectation adaptation during syntactic comprehension. PLoS ONE, 8: e77661, DOI: 10.1371/journal.pone.0077661

Kaschak, M. P. (2006). What this construction needs is generalized. Memory and Cognition, 34, 368-379.

Kaschak, M. P. & Glenberg, A. M. (2004). This construction needs learned. Journal of Experimental Psychology: General, 133, 450-467.

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