

**This is the structure that we wonder why anyone produces it:  
Resumptive pronouns in English hinder comprehension**

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Speakers sometimes utter ungrammatical structures, but they tend to be unplanned errors. In English, which primarily uses gaps to form wh-dependencies (1a), resumptive pronouns (RPs; 1b) are not acceptable.<sup>[1,3,5,7]</sup> Yet, they are regularly produced,<sup>[2]</sup> particularly in structures where gaps are unacceptable<sup>[6]</sup> (*islands*), and they appear to be planned.<sup>[6]</sup> So why do speakers produce them?

Many researchers have suggested that RPs facilitate processing.<sup>[8]</sup> Hofmeister & Norcliffe (2013) investigated this possibility with a self-paced reading study and found faster reading times (RTs) after RPs as compared to gaps, which they took to indicate that RPs help readers understand sentences better.<sup>[1]</sup> A potential problem with this conclusion, however, is that their stimuli may have allowed readers to correctly infer intended meanings even without syntactic parsing simply based on pragmatics (e.g., *the prisoner that the guard helped \_\_ escape*). A speedup in RTs may alternatively be due to readers abandoning an ungrammatical parse.<sup>[4]</sup> Beltrama & Xiang (2017) had participants rate sentences for comprehensibility; sentences with RPs were rated as more comprehensible than those with gaps. Crucially, however, neither of these studies tested the hallmark prediction of the facilitation account: a more faithful interpretation of the sentence in the presence of RPs. Despite decreased reading times and increased subjective comprehensibility, the interpretations of sentences with RPs may actually be less correct than those extracted from analogous sentences with gaps.

To test this, we designed 48 sets of stimuli using 8 animal characters so that reasoning with world knowledge could not guide comprehension, and comprehenders instead had to rely on bottom-up syntactic processing. We manipulated two factors: 1. Whether there was an RP or a gap and, 2. clause type: We used non-island sentences like those in H&N (e.g., 1), which are almost exclusively produced with gaps; wh-islands (2), which elicit roughly 50% RPs; and adjunct islands (3), which elicit close to 90% RPs (production data from [6]). In three experiments using different paradigms (sentence-picture matching, self-paced reading, visual world), participants chose one of four options to answer the question, "Who did what to whom?". Possible responses included the three characters named in the sentence and one random fourth character in various roles. There were 60 fillers and no feedback was given for comprehension question responses.

All experiments found that RPs decrease rates of correct responses to comprehension questions (Fig.1). This decrease was complemented by an increase in responses where the pronoun is interpreted as the most local gender-matching referent. This may reflect participants' parsing a representation of the lowest two clauses in isolation, which form a locally coherent string (e.g., *Miss Rabbit said that Mr. Piggy tickled her with a feather* for (1)). In Exp.1 (N=300), a one-item picture matching task, participants saw the whole sentence for the duration of the trial and clicked on one of four pictures (Fig.2). In Exp.2 (N=96), a self-paced reading task, participants answered the comprehension question after the sentence had disappeared. Here, we replicated H&N's finding that RTs are faster following RPs than gaps (Fig.3). Preliminary data from Exp.3 (N=45/96; Fig.4) seem to indicate that in online processing, gaps induce more looks to the target interpretation than the local interpretation while RPs induce more looks to the local interpretation than the target interpretation.

In sum, we find that in the absence of pragmatic cues, RPs *hinder* comprehension by leading readers to locally coherent, but globally inaccurate interpretations, contrary to the facilitation hypothesis. This may be consistent with production proposals according to which English RPs are not a grammatical wh-dependency strategy, but instead a juxtaposition of two locally well-formed strings, the result of a mid-production change in syntactic planning.<sup>[6]</sup> In this case, the comprehender cannot solely rely on syntactic parsing to interpret RPs as it can with gaps. Presumably RPs are then interpreted as ordinary pronouns, which may have multiple potential referents, local and non-local.

Finally, our data reveal a weakness in processing studies that measure reading times but not interpretation: Faster reading times alone cannot be interpreted as facilitation; they may signal any number of other underlying features, such as abandoning the parse.

- It was Miss Dino who Miss Rabbit *said that* Mr. Piggy tickled \_\_\_ with a feather.
  - It was Miss Dino who Miss Rabbit *said that* Mr. Piggy tickled **her** with a feather.
- It was Miss Dino who Miss Rabbit *wondered why* Mr. Piggy tickled \_\_\_/her with a feather.
- It was Miss Dino who Miss Rabbit *slept while* Mr. Piggy tickled \_\_\_/her with a feather.

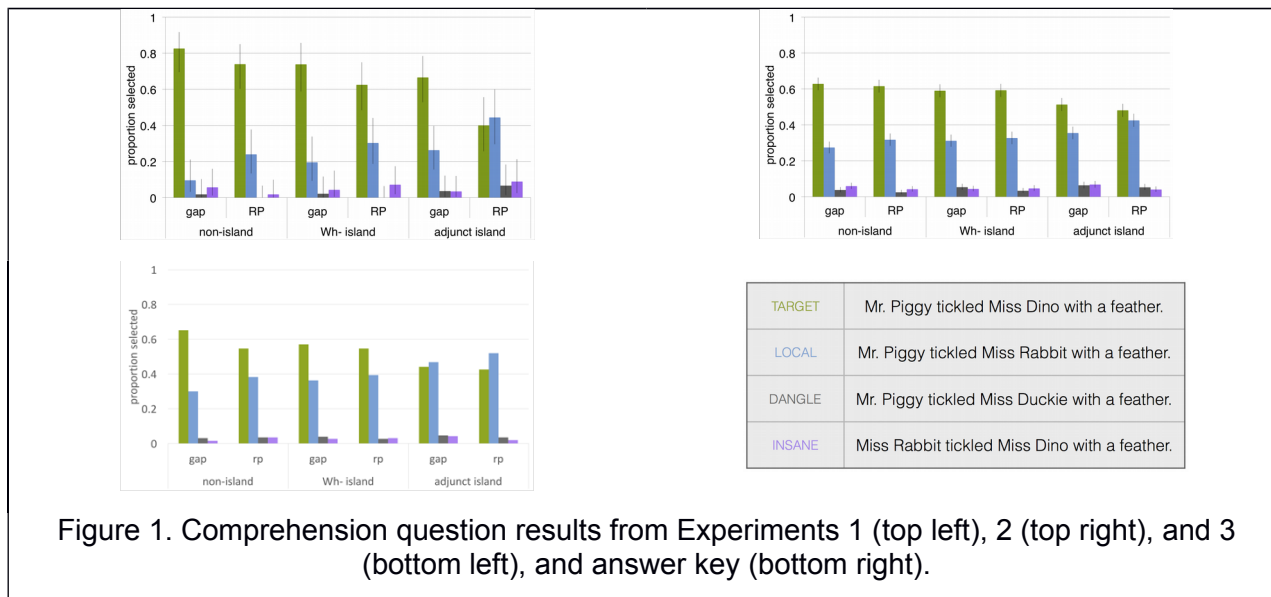


Figure 1. Comprehension question results from Experiments 1 (top left), 2 (top right), and 3 (bottom left), and answer key (bottom right).



Figure 2. Experiment 1 (one-item picture matching task) screenshot.

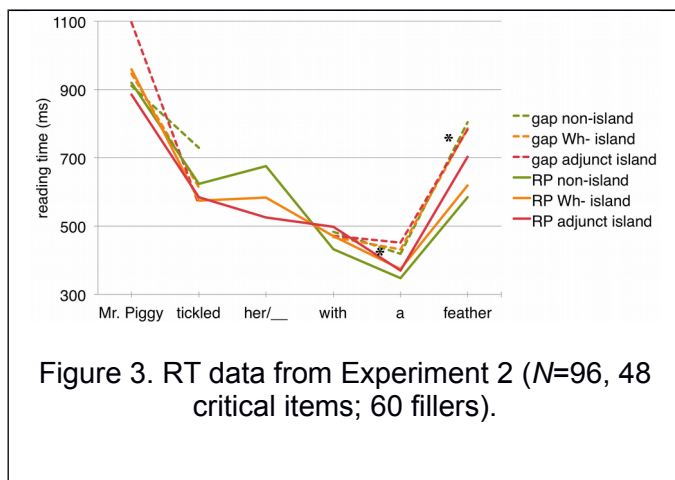


Figure 3. RT data from Experiment 2 (N=96, 48 critical items; 60 fillers).

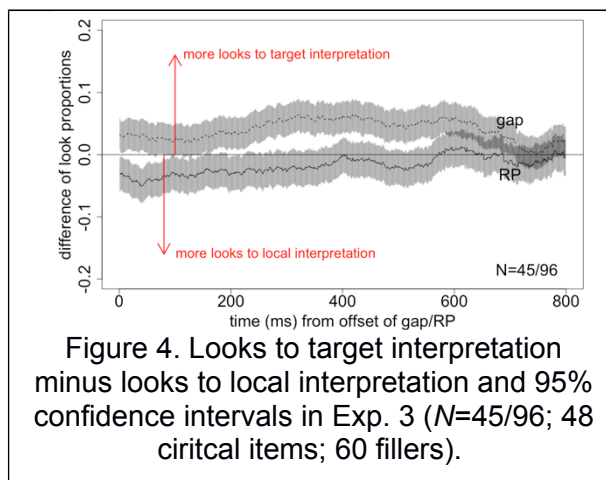


Figure 4. Looks to target interpretation minus looks to local interpretation and 95% confidence intervals in Exp. 3 (N=45/96; 48 critical items; 60 fillers).

## References

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