Ungrammatical interpretations of reflexive anaphors: Online or offline interference?

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Recently the processing of reflexive anaphors has generated much insight into the parser. Studies investigating the online processing of reflexives suggest that syntactic cues act as a hard constraint on antecedent retrieval, such that syntactically illicit NPs do not result in early intrusion effects [1-3]. However, this conclusion is at odds with data suggesting that interfering NPs can produce ungrammatical reflexive interpretations in offline tasks [1,4], and data that suggests the possibility of late interference effects [1]. We hypothesize that this discrepancy is only apparent, and that during routine parsing, interpretation of the reflexive is strictly structurally guided. The offline data instead reflect a strategy for answering comprehension questions when a sentence is poorly understood. Such a strategy might cause participants to draw on verbatim memory of the sentence, using the reflexive's gender features to choose between presented alternatives at test. If so, then we predict that i) incorrectly answered trials should show no plausibility-related slowdowns, reflecting poor comprehension and ii) disruption of verbatim memory should eliminate or reduce offline intrusion effects.

The present study investigates this by jointly measuring processing time and reflexive interpretation. In a moving-window self-paced reading paradigm (Study 1; n=38), we presented participants with 24 sentences of the form in (1) and (2). We manipulated whether the reflexive matched the main clause subject's stereotypical gender (*congruent/incongruent* gender), and the gender of the embedded subject (*interfering/non-interfering*). Each critical sentence was followed by a question about the reflexive's interpretation.

Our results confirm that there is no illusion of grammaticality for reflexive anaphors [1-3] (main effect of *congruency* in the spillover region $F(1,37) = 19.1$, $p < 0.001$), and no interaction of *interference* and *congruency*. Additionally, we found significant decreases in comprehension accuracy when the interfering noun matched the reflexive's gender features, as reported by [1,4]. Linear-mixed effects modeling revealed that the congruency effect was driven by reading time on correctly answered trials, as shown by a significant interaction of *congruency* and *accuracy* (β = -62, *se* = 18, *pMCMC* = 0.001). This effect was not modulated by the gender of the interfering noun. Surprisingly, there was also a significant main effect of interfering gender (β = -11, *se* = 4, *pMCMC* = 0.02), such that *interfering* conditions were read more quickly, independently of the reflexive's gender.

This pattern of results supports the first prediction of our hypothesis: incorrect trials showed no implausibility-related slowdown, suggesting that on those trials comprehenders were not constructing robust interpretations of the sentence. An in-progress follow-up study tests the second prediction of our hypothesis: disruption of verbal memory should eliminate offline interference, because comprehenders would not be able to use verbatim memory of the reflexive's gender features to respond. In Study 2, before being presented with a comprehension question, participants were asked to complete a difficult arithmetic problem to disrupt verbatim memory of the target sentence.

Together these studies suggest that offline comprehension errors do not reflect online retrieval error for reflexive dependencies. Instead, incorrect responses stem from offline interference that is driven by a superficial representation of the sentence.

1) **Congruent:** *The ballet dancer* who {**Interfering:** *Emily*/ **Non-interfering:** *John*} danced with on stage introduced *herself* to the audience.

2) **Incongruent:** *The ballet dancer* who {**Interfering:** *Emily*/ **Non-interfering:** *John*} danced with on stage introduced *himself* to the audience.

Who was introduced to the audience? **John/Emily** **The ballet dancer**

References

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[4] Patil, Lewis & Vasishth. 2011. Presentation, 24th Annual CUNY Human Sentence Processing Conference.