Structural constraints on pronoun resolution: Distinguishing early and late sensitivity to illicit antecedents
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Previous research on the role of grammatical constraints in real-time pronoun resolution has generated mixed results. Sometimes processing is sensitive to the presence of illicit antecedents [1,2], and sometimes not [3-5]. The apparent sensitivity in at least some circumstances has been taken as evidence for a deep difference in how grammatical constraints impact the real-time processing of pronouns and reflexives, since there is more consistent evidence that the processing of reflexives is faithful to the grammar [3,6,7]. However, it is important to distinguish between effects that reflect constraints on the initial retrospective search for an antecedent, and those that reflect subsequent processes. We argue that none of the existing results provide evidence that the initial search for an antecedent is unconstrained by the grammar. Rather, many of the findings of sensitivity to grammatically-illicit antecedents are attributable to repair processes triggered when the structurally constrained antecedent-retrieval process fails to identify a licit antecedent. This pattern of early influence of grammatical constraints and late influence of illicit antecedents would be parallel to that observed for reflexives [6]. We present the results of several novel experiments which are consistent with this hypothesis.

Constraints on the initial search. In order to determine whether the initial search is grammatically constrained, it is crucial to find evidence that clearly reflects the success or failure of the search itself, rather than the subsequent processes that depend on the output of that search. Assuming that the failure of a search has some directly observable cost, structurally unconstrained searches should be associated with a specific processing profile. The initial search should be successful if any potential antecedent in the preceding discourse feature-matches the pronoun. We should only see an increased processing cost from retrieval failure in discourses with no feature-matching NPs. By contrast, structurally constrained searches should fail to return an antecedent in cases where the only feature-matching NPs occur in structural positions that c-command the pronoun from within the same clause, and are thus ruled out as antecedents by Binding Principle B. (Following convention, we will refer to such structural positions as “inaccessible” to the pronoun.)

Thus, to distinguish the two hypotheses, we are looking for a particular kind of sensitivity to the illicit antecedent, which can be observed in the comparison between sentences with no feature-matching antecedents and those with a feature-matching antecedent in an inaccessible structural position. If the initial search is unconstrained, then we should see reduced processing costs (at least initially) when there is a feature-matching but inaccessible antecedent. If the initial search is constrained, there should be no difference between the two conditions. In three previous studies, there was no difference between the two conditions [1,4,5]: processing was insensitive to the presence of a feature-matching inaccessible antecedent in the absence of a structurally-accessible antecedent, suggesting that the initial search was grammatically constrained. A fourth study observed the reverse of the pattern predicted by the unconstrained search hypothesis: processing cost was higher when the inaccessible antecedent matched the pronoun in features, compared to when it did not [2].

Constraints on subsequent processes. Of course, pronoun resolution is not complete after the initial retrieval, and subsequent processes may be less constrained by the grammar. However, sensitivity to illicit antecedents at this stage should give rise to different patterns of processing cost. If the initial search yields no feature-matching accessible antecedent, the parser may launch a less constrained search in an attempt to repair an otherwise ungrammatical structure. This would cause an increase in later processing costs for sentences with an inaccessible feature-matching NP compared to those with no feature-matching NPs, as was
observed in [2]. In contrast, in the presence of a feature-matching accessible antecedent, sensitivity to inaccessible antecedents is not expected. Thus, the “multiple match” effect observed in [1] is somewhat surprising, and merits further scrutiny.

In Experiments 1a-1c (self-paced reading), we manipulated the feature-match between a pronoun (‘him’) and an Accessible NP (the matrix subject) and an Inaccessible NP (the local subject), as well as the complexity of the embedded subject, as in (1a–c).

(1a) Proper name: {Ethan/Paige} revealed that {Ronald/Marissa} had doubted him even after several successful performances of the show.
(1b) Common noun: {Ethan/Paige} revealed that the {producer/dancer} had doubted him even after several successful performances of the show.
(1c) Common noun with modifier: {Ethan/Paige} revealed that the {producer/dancer} who was involved in the show had doubted him even after several successful performances of the show.

With all three embedded subject types, we observed a significant main effect of Accessible Match at the region immediately following the pronoun. In Experiment 1c, when the embedded subject had a modifier, reading times were longer when the Inaccessible subject feature-matched the pronoun, compared to the No Match condition. Rather, this effect most likely reflects repair processes that only occur when no grammatical antecedent is present. Crucially, we observed no sensitivity to the Inaccessible antecedent in the presence of a feature-matching Accessible antecedent (a non-replication of the multiple match effect in [1]).

In Experiment 2, we adopted an identical design and procedure as in [1] (materials similar to Experiment 1a above) in an attempt to replicate the multiple match effect. We observed a significant main effect of Accessible Match in regions following the pronoun, but no effect of Inaccessible Match. This result is again inconsistent with an unconstrained search hypothesis, which predicts the reverse pattern. Furthermore, the lack of sensitivity to the inaccessible antecedent in any condition suggests that even post-retrieval processes were not affected by ungrammatical antecedents.

In four additional self-paced reading and eye-tracking experiments, we focused on sentences where a feature-matching accessible antecedent was present. We found no evidence for sensitivity to the Inaccessible antecedent in any experiment—a consistent failure to replicate the multiple match effect reported in [1].

We conclude that the processing of pronouns is constrained by the grammar to the same extent as the processing of reflexives. The initial search for an antecedent is faithful to the grammar, but subsequent processes need not be. Even so, evidence for any sensitivity to illicit antecedents is sporadic. Sensitivity to an illicit antecedent in the presence of a feature-matching licit antecedent has been observed in only one study (the multiple match effect in [1]), and that finding has not been replicable in any of our six experiments. Sensitivity to an illicit antecedent in the absence of a licit antecedent has been reported in several studies (our Experiment 1c, [2]), but it is sometimes not replicated in studies with extremely similar designs (Experiments 1a, 1b, 2, [1], [5]). Overwhelmingly, the parser is faithful to grammatical constraints at all stages.

References