Retrieval interference in the resolution of anaphoric PRO

Dan Parker, Sol Lago, & Colin Phillips (University of Maryland, College Park)
dparker3@umd.edu

Anaphor resolution; Memory retrieval; Self-paced reading; Acceptability judgments; English

Recent research on the memory mechanisms used in real-time language comprehension has revealed a selective profile for retrieval interference effects. Subject-verb agreement shows facilitatory interference, predicted by cue-based (mis-)retrieval in a content-addressable architecture [1,2]. By contrast, reflexive anaphors do not show facilitation effects: previous studies have either found (i) no effects of structurally inaccessible antecedents [3,4,5], or (ii) inhibition effects [3,6,7], which are not predicted by the cue-based model. The reasons for this contrast remain unresolved. The contrast may reflect the interpretive status of agreement vs. anaphora, or differential use of non-structural features as retrieval cues. Licensing PRO provides a good test of the candidate retrieval mechanisms because it shares properties with both agreement and reflexive binding. Results from three studies confirm the structural constraints on licensing PRO, but show an on-line interference profile similar to agreement, suggesting the use of non-structural cues for PRO retrieval. These results provide the first case of facilitatory interference in anaphora resolution.

Licensing PRO in adjunct clauses is subject to structural constraints. The controller must be the subject of the next higher clause (1). This constraint suggests that retrieval might consider only structurally appropriate controllers, similar to reflexive licensing. However, PRO shares two properties with subject-verb agreement: the search for a controller is triggered by a verb rather than an independent anaphoric element, and selectional restrictions from the gerundive verb (e.g. [+animate] subject bias) might provide additional retrieval cues. Given that agreement shows strong facilitatory interference, if PRO behaves like agreement, then facilitatory interference from structurally inaccessible antecedents should occur.

We compared agreement and adjunct control sentences (8 conditions, 48 sets, (2)). Both cases contained a grammatical subject (underlined) and a structurally inappropriate subject ("attractor", in []). In the agreement conditions (2a-d) we manipulated the number of the attractor such that it either agreed or disagreed with the highlighted verb, testing for "illusions of grammaticality". In the adjunct control conditions (2e-h), the animacy of the attractor was independently manipulated. An emphatic reflexive requiring an animate, gender matching NP antecedent as the local subject (PRO) served as a probe to determine whether an animate NP had been retrieved as the subject of the adjunct clause.

Experiment 1 (off-line acceptability ratings, n=24) confirmed the structural requirements on PRO licensing. Experiment 2 used the ACT-R parser to establish predictions from a cue-based retrieval theory [8,9]. Simulations predict facilitatory interference for both agreement and adjunct control. Experiment 3 (self-paced reading, n=32) tested the predictions of the model. Linear mixed-effects modeling revealed facilitatory interference effects for both agreement and adjunct control, due to reduced disruptions for ungrammatical conditions in the presence of a plural attractor (agreement) and interfering animate NP (adjunct control) at the post-verbal and post-reflexive regions respectively.

These results indicate that the contrasting interference profiles seen in previous studies cannot be due to the interpretive status of anaphora vs. agreement. We propose instead that susceptibility to interference is a consequence of the use of specific content cues (such as animacy) in retrieval.

1a. John read the report after PRO, drinking his coffee. 1b. *The report confused John, after PRO, drinking his coffee.
2a/b: The doctor that the [researcher/reports] evaluated extensively was commended [after PRO disproving the controversial theory at the research institute in Europe].
2c/d: The experiment that the [researchers/report] evaluated extensively were commended [after PRO disproving the controversial theory at the research institute in Europe].
2e/f: The doctor that the [researcher/report] evaluated extensively was commended [after PRO disproving the controversial theory himself at the research institute in Europe].
2g/h: The experiment that the [researcher/report] evaluated extensively was commended [after PRO disproving the controversial theory himself at the research institute in Europe].