Is pronoun comprehension driven by coarse or fine-grained discourse status categories?
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It is well known that discourse status guides language processing, for example pronouns tend to be assigned to the prior topic (Chafe, 1976), often the prior subject in English. For example, in *Maria had lunch with Paige. She ordered pasta,* people often think "she" is Maria. Other contexts lead to an object bias, e.g. in *Maria admired Paige because she …,* people expect that Paige was the likely cause of admiration, increasing assignment of "she" to Paige (Kehler & Rohde, 2013). However, there is no consensus about what discourse status categories are relevant. According to Centering theory, discourse entities are ranked based on grammatical function: Subject > Obj > ObjPP (Brennan et al., 1987). Does this mean that the discourse status of Paige is different as an object (*admired Paige*) than as a prepositional object (ObjPP; *had lunch with Paige)*? Alternatively, discourse entities may be represented with coarse-grained categories, contrasting only the topic (Maria) from all other discourse referents, without distinguishing objects and ObjPPs.

We test this question with a priming paradigm (e.g., Contemori, 2021; Johnson & Arnold, 2023; Kaiser 2009). Following several primes where the pronoun refers to the second person (*Ana went hiking with Will. He…*), ambiguous pronouns are more likely to be assigned to the second person (*Ana had lunch with Liz. She*…; Johnson & Arnold, 2023). This means people must represent the most frequent category of antecedent. But what are the relevant categories? This paradigm offers a technique for testing which types of antecedents are grouped together.

One question is whether antecedents are grouped separately by thematic role. Does priming from *Ana went hiking with Will. He…*, where Will has the thematic role of concomitant, influence pronoun interpretation in *Liz sent an email to Ana. She….*, where Ana is the goal? Ye and Arnold (2023) showed that it does, suggesting coarse-grained categories that lump different thematic roles together. Another question is whether referential links are grouped separately by coherence relation. Does priming from *Emily liked Brian because he was a good person,* where the second sentence describes an explanation, influence pronoun comprehension in non-explanation sentences like *John met Paul while he …?* Contemori (2021) showed that it does, suggesting coarse-grained categories that generalize across coherence relation.

But one limitation of prior work is that it has never examined primes and targets with different syntactic roles (e.g. objects vs. objPPs). The current project tests whether cross-role priming occurs by examining "implicit causality" (IC) contexts with a strong object bias.

First question: Can pronoun comprehension in these contexts can be primed at all? IC contexts create strong semantic constraints that might be immune to local frequency patterns. **Exp. 1** asked 113 participants to read short stories and answer questions that probed pronoun interpretation (Table 1). All stimuli used object-biased implicit causality contexts and an unambiguous pronoun. The 32 exposure stories had either all subject- or all object-antecedents, manipulated between-subjects. 16 target items had ambiguous pronouns. Each story had two questions of various types that obscured the goal of the study. We found a strong priming effect: more subject interpretation for the subject- than object-exposure condition (Fig. 1). This also shows that implicit causality biases stem from frequency-based expectations and not just semantic inferences calculated on the fly. **Second (critical) question:** Does priming from IC inputs (with a direct object) also affect interpretation for targets with an ObjPP? **Exp. 2** (n=61) tested both IC and joint action targets (*Ana had coffee with Liz and then she…)*. **Exp. 3** (n=118) tested both IC and source-goal targets (*Will handed the flowers to Matt and then he…*). If priming is specific to antecedent grammatical function, it should occur only for the IC targets and not the joint action or source-goal targets. This is exactly what we found (Fig. 1).

Thus, priming effects are limited to antecedents with the same syntactic role. Our IC and SG/JA contexts differed in other ways (coherence relation, pronoun bias, thematic role), but previous work shows that priming still occurs across these categories (Contemori, 2021; Ye & Arnold, 2023). This suggests we represent fine-grained categories based on syntactic role.

Table 1: Example Stimuli

TARGET (AMBIGUOUS) STORY – IMPLICIT CAUSALITY (all experiments)

Will and Matt painted the house together. Will adored Matt because he wanted to get the job done quickly. (Who wanted to get the job done quickly? (Will / Matt))

TARGET (AMBIGUOUS) STORY – JOINT ACTION (Exp. 2)

Ana and Liz were having their lunch break. Ana had coffee with Liz and then she ordered a sandwich. (Who ordered a sandwich? (Ana / Liz))

TARGET (AMBIGUOUS) STORY – SOURCE-GOAL (Exp. 3)

Matt and Will were at a flower shop. Matt handed the flowers to Will and then he walked up to the counter. (Who walked up to the counter? (Matt/Will))

SUBJECT EXPOSURE STORY (all experiments)

Liz and Will went hiking together. Liz teased Will because she was more athletic. (Did Will seem more athletic? (Yes/No))

OBJECT EXPOSURE STORY (all experiments)

Liz and Will went hiking together. Liz teased Will because he was too slow. (Did Will hike too slowly? (Yes / No)).

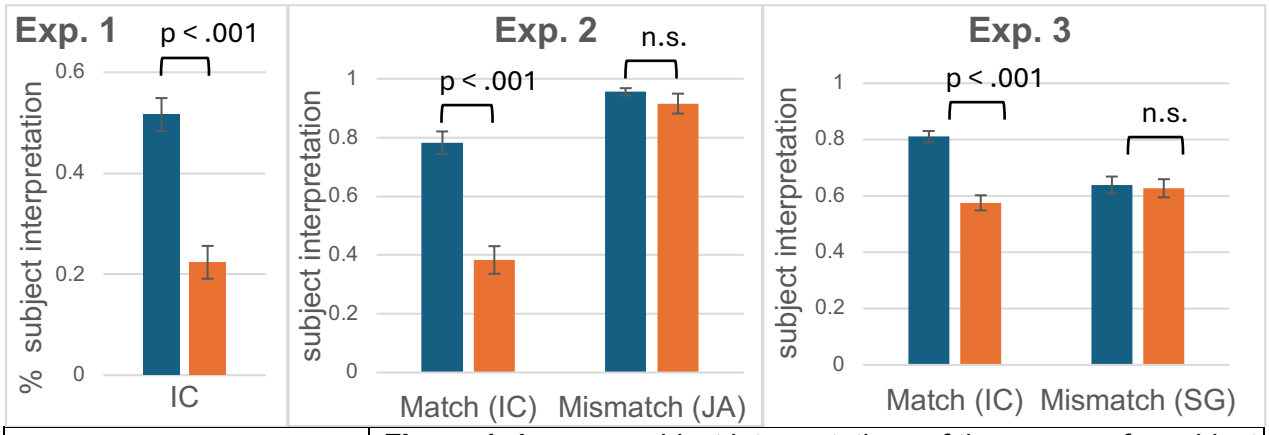

Figure 1. Average subject interpretations of the pronoun for subject and object exposure conditions. Test items in Exp. 1 were all implicit causality (IC) contexts; in Exp. 2 were either IC or joint action (JA) and in Exp. 3 were either IC or source-goal (SG). Illustrated statistical patterns stem from a mixed effects logistic regression with maximal random effects.

References: ♦ Brennan, Friedman & Pollard (1987). A centering approach to pronouns. In *Proceedings of the 25th annual meeting on association for computational linguistics*. ♦ Chafe (1976). Givenness, contrastiveness,…. In Charles N. Li (Ed.), *Subject and topic*, (pp. 25-56). New York: Academic Press Inc. ♦ Contemori (2021). Changing comprehenders' pronoun interpretations… *Second Language Research*, *37*. ♦ Johnson & Arnold, (2023). The frequency of referential patterns …. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *49*. ♦ Kaiser (2009). Effects of anaphoric dependencies and semantic representations on pronoun interpretation. *Anaphora Processing and Applications*. ♦ Kehler & Rohde (2013). A probabilistic reconciliation of coherence-driven and centering-driven theories of pronoun interpretation. *Theoretical Linguistics, 39*. ♦ Ye & Arnold (2023). Learning the statistics of pronoun reference: By word or by category? *Cognition*, *239*.