Consequences of Implicit Causality Mispredictions for Pronoun Interpretation

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Introduction. The present study investigates the outcomes of incorrect predictions in discourse, specifically in the context of implicit causality. Implicit causality (IC) verbs generate expectations about upcoming reference in discourse [1, 2, 3]. For example, verbs such as *annoy* lead comprehenders to expect the subject of the verb to be re-mentioned (Ex 1), whereas verbs such as *admire* bias them toward expecting re-mention of the verb's object (Ex 2). Such predictions facilitate processing by guiding the resolution of pronouns that are otherwise ambiguous at the point of encounter, similar to how prediction facilitates other types of linguistic processing [4, 5]. However, in cases of misprediction, expectations instead impede processing [e.g., 6]. Encountering an unexpected pronoun in the context of an IC-biased verb (Ex 3) similarly leads to decreased processing efficiency [7, 8, 9, 10], even when the context provides gender information, which strongly constrains pronoun interpretation [11]. However, while effects on processing efficiency are well documented, consequences for final sentence interpretation have received less attention. A sentence repetition study found that language users are less accurate at repeating sentence prompts when IC-based expectations conflict with pronoun gender [12], suggesting that the processing problems noted by previous studies are not always resolved in line with the speaker's intended meaning. However, because the study used sentence repetition, the reduced accuracy could reflect either incorrect comprehension or failures in recall. The present study addresses this ambiguity by isolating comprehension, asking whether gender is sufficient to support accurate pronoun interpretation when it conflicts with IC-verb generated discourse expectations.

Methods. In an online experiment, English speakers (N=23) completed an auditory pronoun-interpretation task in which they selected with a button-press the referent of a gender-marked pronoun in two-clause sentences (n=144), e.g. Ex 4. Names were normed to ensure the intended gender interpretation, and the two entities mentioned in the sentences were either of the same or different genders. In different-gender trials, the pronoun reference was either congruent or incongruent with the verb's IC bias. Verbs were either biased towards the first entity (NP1), the second (NP2), or were unbiased control verbs.

Results and discussion. We analyzed accuracy in a series of mixed-effects logistic regression models. Same-gender trials were less accurate than different-gender trials (β=–2.72, SE=0.34, z= –7.97, $p < .001$)), confirming the role of gender information in pronoun resolution. In different-gender trials, control verb trials were less accurate than IC-verb trials (NP1: β=0.65, p= .007; NP2: β=0.61, p=.011, Fig 1), confirming that participants used and benefitted from making predictions. Finally, analyzing different-gender trials with IC-biased verbs revealed the critical effect of congruency: congruent trials yielded significantly higher accuracy than incongruent trials (β = 0.58, SE = 0.22, z = 2.62, p = .009, Fig 2). Thus, the results demonstrate that mispredictions can result in lasting interpretation errors, and that the results of Frederiksen and Kroll [12] were not simply due to inaccurate recall in the sentence repetition process. More broadly, the results confirm that gender, while an important cue, cannot fully override the effects of prediction. Even where gender marking is explicit, interpretation depends critically on the interaction between bottom-up gender information and top-down discourse expectations. Failures of alignment between IC-based prediction and pronominal gender have measurable consequences for ongoing discourse.

1) Lisa annoyed Mary because she [=Lisa]…
2) Lisa admired Mary because she [=Mary]…
3) Lisa annoyed Mark because he…
4) Kara/David resented Eric because she/he…

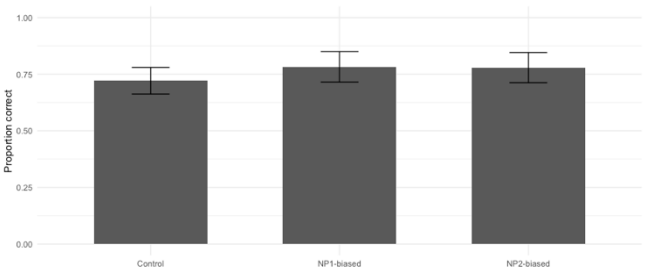

Figure 1.Pronoun interpretation accuracy in different-gender trials

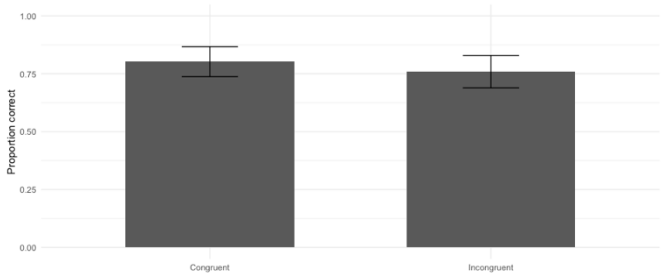

Figure 2. Pronoun interpretation accuracy in different-gender trials as a function of verb-bias - pronoun congruency

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