

Implicit Causality Affects Pronoun Use in Both Spoken and Written Tasks

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When referring to somebody or something, the speaker needs to choose between explicit expressions (e.g., “the girl in red dress”) or attenuated ones (e.g., “she”). An unresolved debate questions whether speakers tend to use less-specific referential expressions, like pronouns, when the referent is predictable within the context. Several theories suggest that they do (e.g., Aylett & Turk, 2004; Tily & Piantadosi, 2009). However, while some studies find that predictability supports pronoun use, others don’t.

One context where this conflict is apparent is when implicit causality makes one character more predictable (i.e., more likely to be mentioned next). For example, in *Linda amazed John because...*, Linda is predictable because she is considered the likely cause of John’s amazement – i.e., she is the implicit cause – and “because” signals an upcoming explanation (e.g., Kehler et al., 2008). By contrast, for verbs like “admire” (e.g., *Linda admired John because...*), the object (John) is the implicit cause.

One line of work examines these contexts using a written fragment completion task, where participants make up the end of the sentence. They show that the implicit cause tends to be re-mentioned (i.e., it is predictable), but people do not use pronouns to refer to the implicit cause more than for the other character (e.g., Fukumura & Van Gompel, 2010; Kaiser et al., 2011; Kehler et al., 2008; Rohde & Kehler, 2014; Demberg et al., 2023 exp. 1). Rather, pronouns are used more for the subject. However, another line of work shows that implicit causality does affect reference form (e.g., Bott & Solstad, 2023). In a different task, Weatherford & Arnold (2019) used an interactive spoken storytelling task with a live experimenter. Participants memorized facts about characters and provided the more plausible fact to finish the sentence (e.g., *The maid and the cook put away the dishes on the top shelves. The cook appreciated the maid because {the maid/she} was tall.*) Critically, people used more pronouns when referring to the implicit cause than the other character.

What explains these conflicting findings? We hypothesize that experiments vary in the degree to which they encourage participants to establish rich mental representations of the events in the story and their relation to each other, which are necessary to calculate predictions about referential predictability. If participants only shallowly process the story, semantically-based predictions may not be available for reference production decisions.

Support for this comes from Ye & Arnold (HSP 2023), who reported that implicit causality only affected pronoun use in a spoken version of the fragment completion task, which was conducted with a live and interactive experimenter. By contrast, a crowd-sourced written version of the task yielded no effect of implicit causality, although both tasks used richly contextualized stories. This raises a question: what supports predictability use during production – it is the spoken modality of the task, or the fact that it was socially interactive? We tested this question, using Ye & Arnold’s materials in an interactive but written study.

Participants were introduced to the story setting and 6 characters (3 male, 3 female) with pictures. Then they read fragments (see Table 1) and typed in a natural ending. Each story included a context sentence and a fragment with an implicit causality verb. For half the items the implicit cause was in subject position, and half in object position. We underlined one name and required participants to begin their continuation with this character. The underlined character was manipulated to appear in one of the four conditions (subject-cause; subject-noncause; nonsubject-cause; nonsubject-noncause).

Results: people used pronouns more for subjects than nonsubjects, as expected ($p < .001$). They also used numerically more pronouns for the implicit cause than for the non-cause, but this narrowly failed significance ($p = .08$). A comparison analysis with the spoken experiment in Ye & Arnold showed an effect of implicit causality ($p = .01$), and no effect or interaction with modality (spoken vs. written). Thus, the effect of implicit causality is not different across modalities, even though in a separate analysis it was not quite significant for the written task. This finding supports the idea that implicit causality can increase the use of pronouns in production, but the effect is fragile. The presence of a live addressee may increase audience design calculations about predictability. We speculate that the spoken interaction may boost attention to the discourse context and the effect size.

Table 1. Examples of experimental stimuli from Ye & Arnold (2023), also used here.

Context Sentence: Non-subject & cause continuation: The <u>duke</u> and the butler played pool.	Context Sentence: Subject & Non-cause continuation: The duke and <u>the butler</u> played pool.
Prompt: The butler admired the duke because...	Prompt: The butler admired the duke because...
Sample Response: He/the duke played well.	Sample Response: He/the butler could never beat the duke.

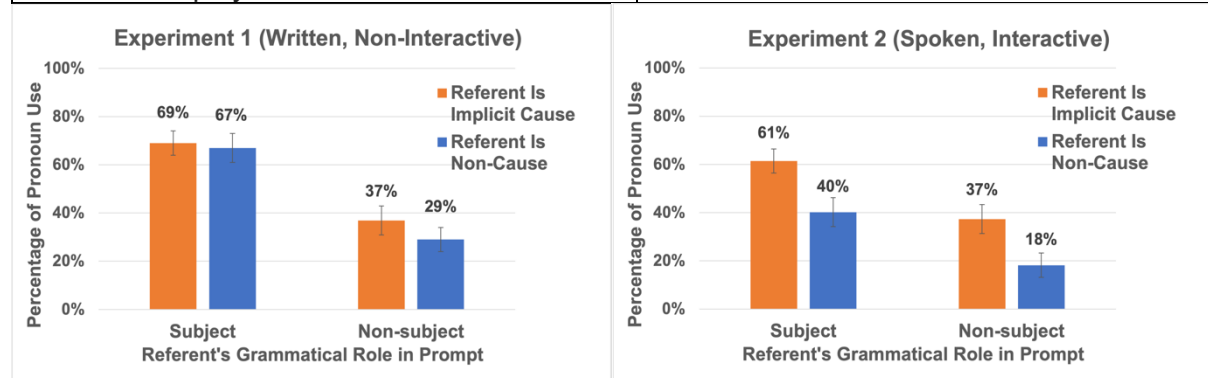


Figure 1. Results from Ye & Arnold (2023): Percentage of pronoun use for the underlined character (target) in prompt as subject vs. nonsubject and implicit cause vs. non-cause.

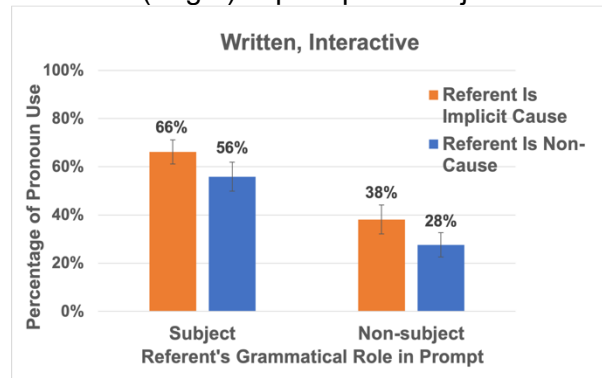


Figure 2. Our experiment: Results from a written and interactive task: Percentage of pronoun use for the underlined character (target) in prompt as subject vs. nonsubject and implicit cause vs. non-cause.

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