Structural versus contextual biases in the resolution of temporal adjunct control

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Previous research has shown that in temporal adjuncts such as in (1), subject control, whereby the understood subject of the adjunct clause is coreferential with the matrix subject, is both highly preferred[1,2] and easy to process[3]. However, control by a non-subject is also possible[4,5]. This includes control by the matrix object if given a strongly supporting context[6], although object control may still cause processing slowdowns relative to subject control[7]. The current study investigated potential sources of that processing difficulty by examining participants' real-time reference resolution when listening to sentences containing non-finite temporal adjuncts biased toward subject- or object-control interpretations.

(1) Mickey$_i$ talked to Minnie$_j$ before [PRO$_{i/?j}$ putting on a hat].

Methods— Experiment 1: Participants listened to English sentences (Table 1) containing an implicit causality (IC)[8] predicate followed by a temporal adjunct. IC was manipulated to bias toward coreference of the adjunct's subject with either the matrix subject or object. The adjunct contained either a control ("PRO") structure or an overt pronominal subject. In a visual-world eyetracking paradigm, participants determined whether the sentence they heard matched an image on the screen (Fig. 1). The images and the gender on the overt pronouns for critical items were always consistent with the subject of the adjunct being coreferential with the matrix subject. Experiment 2 was similar to Experiment 1, except that the images and overt pronouns were always consistent with the interpretation favored by IC bias, rather than only favoring subject coreference.

Predictions— Participants were expected to be able to use the gender on the pronoun to rapidly resolve reference[9], but to experience processing difficulty in Experiment 1 when the pronoun was inconsistent with IC bias[10]. In adjunct control sentences, participants were predicted to have more looks to the object when IC biased toward the object. However, if structural biases outweigh IC bias, they were expected to show a preference to look toward the subject character regardless of bias.

Results and discussion— Experiment 1 (n = 42): participants indicated a high degree of match between the image and the sentence for items with subject bias. With object bias, "match" responses were significantly reduced (to around 72%; $p < .001$). There was no effect of reference form ($p = .09$) or an interaction ($p = .80$). By contrast, eyetracking results (Fig. 2) revealed only an effect of form ($p < .001$), not of IC bias ($p = .55$), again with no interaction ($p = .17$). Participants' online looks therefore appear to be driven more by morphosyntactic biases, while their offline judgments were influenced by IC. However, because the critical images always matched subject-control interpretations, participants may have simply been led within the experiment itself to favor structural information over IC.

Experiment 2 (n = 44): there was a significant interaction between IC and form both offline and online (ps < .001). PRO items with object control bias had a match rate of 73%, which is similar to the non-match rate in the same condition in Experiment 1, suggesting that object-control that is consistent with IC bias is just as acceptable as subject-control that is inconsistent with IC bias. Online, participants looked to the correct referent of the pronoun consistently, whether that was the subject or the object. For subject-biased PRO items, participants showed a preference to look at the subject character, but with object-biased PRO items, they looked at the two characters equally.

These results suggest that structural and contextual biases on PRO's interpretation may have equal weight in both online and offline processing, which has implications for theories of adjunct control[4,11]. The difference between the eyetracking results of the two experiments suggests that participants may also be rapidly influenced by within-experiment effects. This will be further discussed in the presentation.

Table 1: Sample item set. Critical words in bold.

Experiment 1	
Subj bias	Donald really upset Minnie in front of the big sandcastle after **{taking/he took}** the only round orange frisbee on the beach.
Obj bias	Donald was really upset with Minnie in front of the big sandcastle after **{taking/he took}** the only round orange frisbee on the beach.
Experiment 2	
Subj bias	Donald upset Minnie in front of the big sandcastle after {**taking/he took**} the only round orange frisbee on the beach without sharing.
Obj bias	Minnie was upset with Donald in front of the big sandcastle after {**taking/he took**} the only round orange frisbee on the beach without sharing.

Figure 1: Sample visual stimulus.

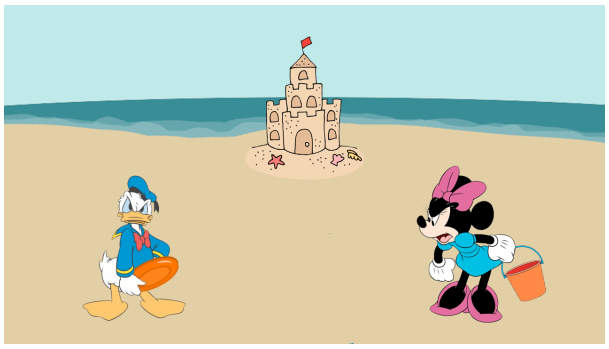


Figure 2: Eyetracking results, Experiment 1.

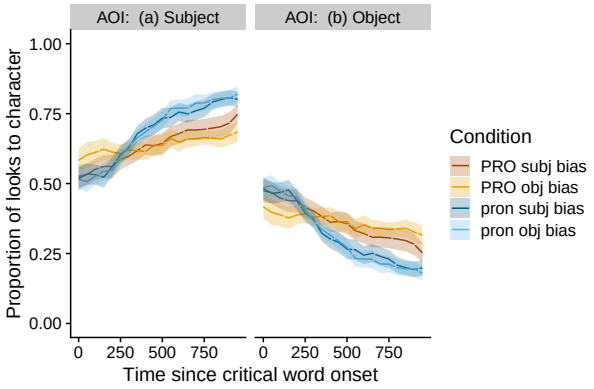
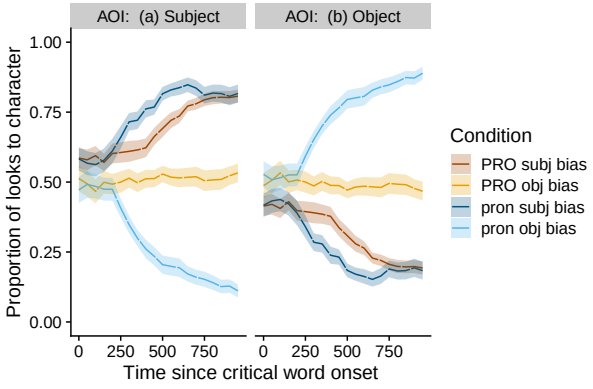


Figure 3: Eyetracking results, Experiment 2.



References

[1] Hornstein, N. (1999). *Linguistic Inquiry*. **[2]** Pires, A. (2007). *Syntax*. **[3]** Green, JJ, … Williams, A. (2020). *Glossa-an International Journal of Linguistics*. **[4]** Landau, I. (2021). *A selectional theory of adjunct control*. **[5]** Green, JJ. (2019a). *Proceedings of the Fifty-Fourth Annual Meeting of the Chicago Linguistic Society*. **[6]** Janke, V, & Bailey, LR. (2017). *Journal of Linguistics*. **[7]** Green, JJ, & Coito-Paz, E. (2024). *HSP 2024*. **[8]** Garvey, C, & Caramazza, A. (1974). *Linguistic Inquiry*. **[9]** Arnold, JE, … Trueswell, JC. (2000). *Cognition*. **[10]** Koornneef, AW, & Van Berkum, JJA. (2006). *Journal of Memory and Language*. **[11]** Green, JJ. (2019b). *Glossa-an International Journal of Linguistics*.