Pronoun Interpretation in the Context of Dynamic Actions

Tiana V. Simovic (University of Toronto), Craig G. Chambers (University of Toronto)
tiana.simovic@mail.utoronto.ca

Pronouns (“she”, “they”. . .) are often thought of as the quintessential example of semantically underspecified expressions, as they convey minimal information about their intended referents. The interpretation of these forms is often described in relation to mental models that encode possible referents. On classic memory reinstatement accounts, this process was thought to involve “reactivating” a pronoun’s antecedent in this representation (Garnham et al., 1995; O’Brien et al., 1998). Contemporary work adopts a more indexical approach, combining referential interpretation with elements of attentional binding. On this account, the set of candidates is attentionally restricted, and the pronoun is interpreted as a cue to directly refer to one of these entities (Rohde & Kurumada, 2018; Smith & Federmeier, 2019). The goal of the current study was to explore and demonstrate a key element of the indexical account, namely the notion that there is no processing relationship (causal or otherwise) between the semantics of an antecedent expression and a subsequent coreferential pronoun. To do this, we used novel situations that have not been applied to this issue, where unfolding actions entail that a previous description for an object is no longer viable for that object.

A visual world methodology was used. Each trial involved a new set of objects within a 3×4 grid, whose squares were consecutively numbered from 1 to 12. Six objects occurred in each display containing object pairs as well as singleton objects (see Figure 1). On a given trial, participants (n = 24, 144 observations per condition) heard a sequence of instructions to move objects within the grid. The first instruction referred to a member of a pair using a locative modifier. Critically, the instruction could entail a change in the object’s relative position. For example, a participant might hear “Move the house on the left to **area 12**” (control condition for comparison: “Move the house on the left to **area 9**”). The move to area 12 creates a situation where the moved house is no longer on the left. The critical test involved a second sentence, e.g., “Now move it to **area 4**”. If the information expressed in the antecedent term still has any influence or relevance to the interpretation process (i.e., the semantics of the expression *house on the left*, as it is being processed), we should find momentary confusion because the semantics no longer characterize the intended referent, and instead apply to an as-yet unmentioned entity. In control conditions, the second sentence contained a full noun phrase, e.g., “Now move the other house/same house to **area 4**”. These conditions unambiguously referred to either the moved or unmoved house and provided key baseline comparisons.

As expected, we found a clear preference for the previously-mentioned object in the ambiguous pronoun condition through object selection measurements. The key questions, however, involve the real-time processing measures. Mouse-click reaction times showed no differences in the pronoun condition regardless of whether the antecedent term’s semantics were still relevant or not (see Figure 2). Likewise, eye-movement data showed no differences between the two pronoun conditions (see Figure 3). These data demonstrate the pronoun is effortlessly linked to the previously-mentioned object, even when semantic information about the antecedent (that was presumably encoded in the discourse model) no longer applies. These results dovetail with a range of studies highlighting the indexical-attentional nature of pronouns, where the information encoded in a linguistic antecedent is not canvassed in any direct way at the point of interpreting a pronoun. This framework also helps explain apparent domain shifts across antecedent-pronoun sequences (e.g., "A capybara? What’s that? How do you spell ***it***?", where ***it*** refers to orthographic construct, not taxonomic category), as discussed in some theoretical studies (e.g., Lyons, 1977).

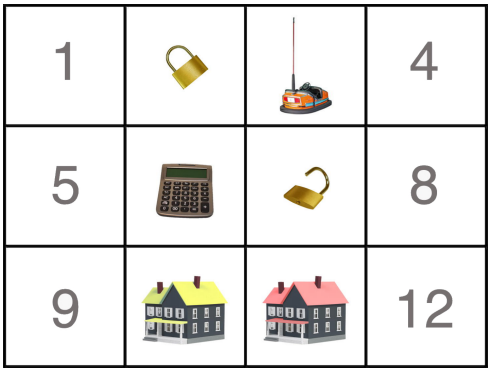

Figure 1: Display before the first sentence is heard.

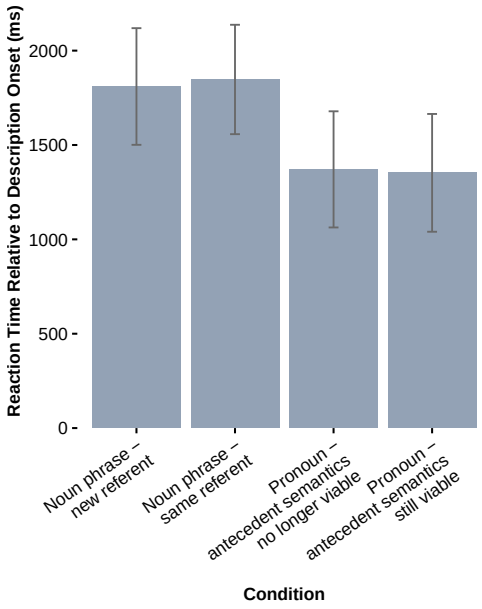

Figure 2: Mouse-click reaction times.

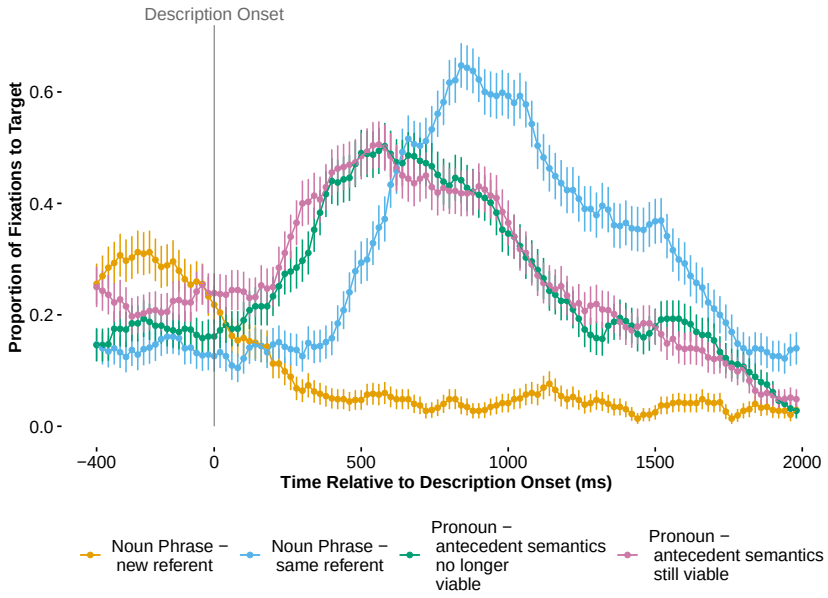

Figure 3: Proportion of fixations to previously-mentioned object over time.

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