Cue-based memory retrieval and Maximize Parallelism in phrasal comparatives

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This paper explores the nature of structural parallelism effects in English phrasal comparatives like (1). The semantics of such comparatives is potentially difficult to recover from the context, as it can be resolved to either the subject or oblique complement reading. Among strategies available for disambiguation are Verb Phrase Ellipsis (VPE) for the subject reading (*than Ana does*) and a preposition for the oblique complement reading (*than on Ana*). Both of them add content to the remnant *Ana* but still employ ellipsis. Another strategy involves changes to the form of a nominal remnant to match its correlate. Example (1) illustrates the name *Ana* matching the oblique complement *Sandra*, but not the pronoun in subject position; this parallelism should support the oblique complement reading over the subject reading. While it's known that comparatives and other elliptical constructions show structural parallelism effects (e.g. Carlson 2002, Carlson & Harris 2018, Kim et al. 2020, Chia & Kashak 2022, Nykiel et al. 2023), Carlson's (2020) corpus data suggests that the form-changing strategy is the most common in phrasal comparatives depicted in (2) and trumps any other biases speakers might show in interpreting such comparatives. The question we ask here is how general and significant are structural parallelism effects in phrasal comparatives, given that processing elliptical constructions has been argued to engage a cue-based search for an appropriate antecedent (Martin & McElree 2008, 2011), while at the same time recovery of the antecedent can be optimized by increasing structural parallelism between it and the material present at the ellipsis site (Hawkins 2004). We report on (a) the results of an online experiment that probes the interpretation of phrasal comparatives under conditions of sentence-internal parallelism and (b) on word surprisal measures extracted from GPT2 that probe sentence-external parallelism.

Online experiment. By manipulating structural parallelism sentence-internally to bias our stimuli toward specific readings (as shown in (3)), we find that phrasal comparatives are resolved to the oblique complement role more often under oblique bias than under neutral bias ($p = 0.06$), and least often under subject bias ($p < 0.001$). At the same time we observe a slight preference for oblique complement interpretations under neutral bias (3b), which resembles the object interpretation preference reported in Carlson (2002, 2020) (see Fig.1).

Word surprisal. Our next step is to test our hypothesis that speakers might exploit structural parallelism sentence-externally. That is, when the context sets up a contrast between two phrases, the grammatical role of these phrases will preferentially be kept constant across the clause preceding *than* and the material following it, as indicated by one of the overt strategies (VPE or preposition). To illustrate, the preceding context in (4) sets up a contrast between two oblique complements *about Adam* and *about Pete*, which we expect to lead to an oblique complement continuation for the post-*than* material. If it's expressed by ellipsis, remnants realized as PPs (*about Pete*) will maintain structural parallelism better than remnants realized as NPs (*Pete*). The preceding context can also set up a contrast between two subjects, as in (5), in which case we predict that VPE continuations (*Pete does*) maintain structural parallelism across clauses better than remnants realized as NPs (*Pete*). To test our predictions, we extracted word surprisal measures for NP/VPE continuations in the subject contrast conditions and for NP/PP continuations in the oblique complement contrast conditions from GPT2. The results of mixed-effects regression models are as expected: VPE continuations are more probable than NP continuations in the subject contrast conditions ($p < 0.001$), while PP continuations are more probable than NPs in the oblique complement contrast conditions ($p < 0.001$). We compare these results with human-produced continuations in online experiments, which are currently being conducted.

We interpret the current results as support for a combination of the cue-based model of memory retrieval, which Martin and McElree (2008, 2011) defend for ellipsis, and the principle of Maximize Parallelism, which Hawkins (2004) sees as facilitating the recoverability of ellipsis. During cue-based retrieval of an antecedent for an ellipsis, the cues provided at the ellipsis site point to the antecedent, but the diagnosticity of the cues is defined relative to distractors i.e. competing material previously processed and stored in memory that can lead to a slowdown or even retrieval failure. The additional role that Maximize Parallelism plays is to ensure that the cues present at the ellipsis site are

maximally parallel to appropriate elements of the structure of the antecedent – such maximal parallelism is not required or predicted by cue-based retrieval alone**.**

Examples

(1) He counts on Sandra more frequently than Ana.

(2) Theo respected her more than Wally.

(3) a. The colleague/he counts on Sandra more frequently than Ana. (oblique bias)

b. Julie counts on Sandra more frequently than Ana. (neutral bias)

c. Julie counts on the colleague/him more frequently than Ana. (subject bias)

(4) Abbie thinks about Adam a lot, and she thinks about Pete too. But she probably thinks about Adam more often than

(5) Adam and Pete both think about Abbie a lot. But Adam probably thinks about her more often than

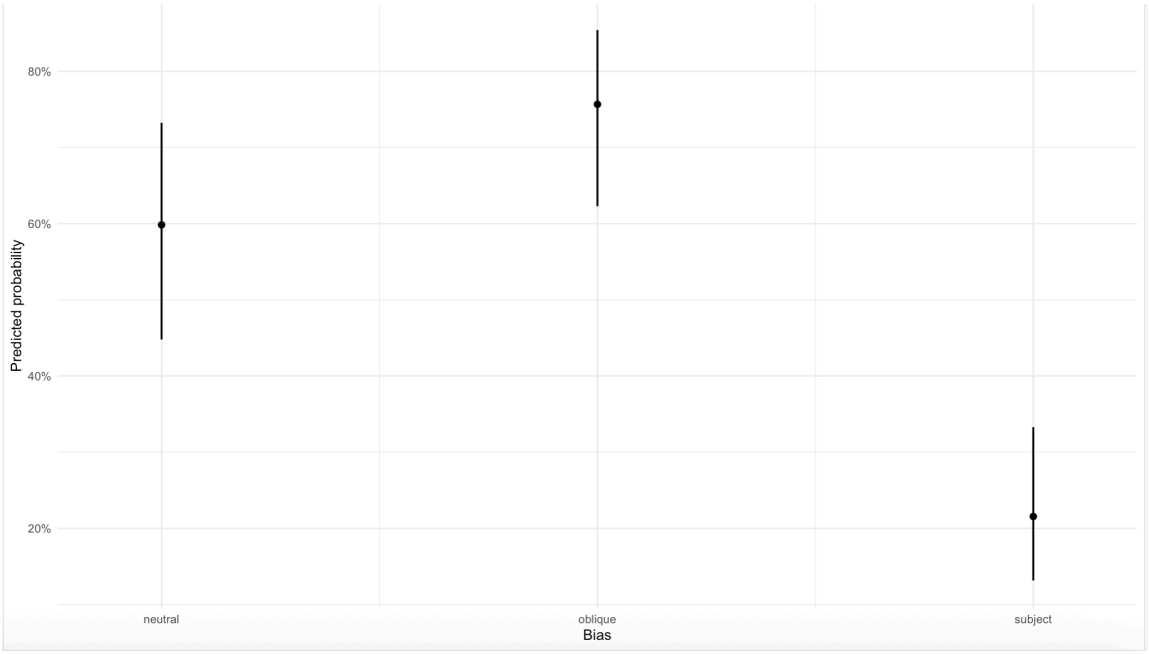

Fig. 1: Model predictions for oblique complement interpretations with Bias (neutral, subject, oblique) as an independent variable.

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