Interference in ellipsis comprehension: New evidence for feature markedness effects

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It is well-established that memory retrieval for linguistic dependency formation relies on an associative, cue-based retrieval procedure [see 1 for a recent review]. However, it remains unclear what information ("cues") at the retrieval site are used to recover an antecedent in memory. In this study, we test dependencies involving verb phrase (VP) ellipsis to better understand what types of non-structural information are used in antecedent retrieval. Previous research has focused primarily on how noun phrase antecedents are recovered, but VP-ellipsis is an important test case to better understand what cues distinguish a VP in memory, and to contribute to a comprehensive theory of cues more generally. Here, we present the results of two self-paced reading experiments testing whether voice features (e.g., active vs. passive) are used to recover a VP antecedent. Results based on susceptibility to retrieval interference revealed that passive and active voice features are used differently in antecedent retrieval.

Motivation. VP-ellipsis involves a missing VP that requires retrieval of a previously-processed VP for interpretation, as shown in (1) [2]. A constraint on VP-ellipsis is that the antecedent and ellipsis must match in voice, as shown in (2) [3].

(1) Sally [$_{VP}$ betrayed Bill], and Tom did [$_{VP}$ ~~betray Bill~~] too.
(2) a. *Sally [$_{VP}$ betrayed Bill], and Tom was [$_{VP}$ ~~betrayed by Sally~~] too. (active-passive)
b. *Sally [$_{VP}$ was betrayed by Bill], and Tom did [$_{VP}$ ~~betray Sally~~] too. (passive-active)

A recent ERP study [4] showed that voice features can trigger interference from a grammatically-irrelevant but feature-matching antecedent at retrieval. However, previous behavioral research on ellipsis [5] has shown that active and passive ellipsis structures are differently acceptable and recent computational modeling work [6] suggests that they may rely on different retrieval cues, predicting a potential difference in reading time profiles. To address this issue, we tested active and passive sentences independently using self-paced reading.

Experiment 1: Passive voice (n = 120). Experiment 1 manipulated grammaticality (grammatical vs. ungrammatical for passive ellipsis) and interference (active vs. passive voice features on a relative clause VP that cannot serve as an antecedent) (see Table 1 for a sample item set). Reading times at the region immediately following the ellipsis marker (*did too*; Figure 1) showed a main effect of grammaticality (linear mixed-effects model: t = 2.76) and an interaction of grammaticality × interference (t = 2.23) carried by interference in the ungrammatical conditions (t = 2.78). Sensitivity to the passive voice feature on the relative clause VP suggests that passive voice serves as a cue to guide retrieval for ellipsis resolution.

Experiment 2: Active voice (n = 120). Experiment 2 used the same paradigm as in Experiment 1, but tested active ellipsis (Table 2). Reading times following the ellipsis marker (Figure 2) showed an effect of grammaticality (t = 5.46), but no evidence of interference (ts < 1.5). These results suggest that active voice is not used as a cue in retrieval for ellipsis or at least is not a strongly diagnostic cue to the antecedent. This proposal is supported by an interference × experiment interaction (t = 2.65) showing that active and passive voice behave differently with respect to interference effects in ellipsis processing (see Figure 3).

Discussion. These results are surprising because it seems that a cue for active voice would be just as useful in recovering an antecedent as a cue for passive voice. However, the results are consistent with the recent claim based on other dependencies that not all cues at the retrieval site are used in the same way [6-8]. The selective profile with respect to voice interference likely reflects a feature markedness effect, like that observed subject-verb agreement ("agreement attraction"), where only marked structures (e.g., plural verbs) show interference. For ellipsis, the marked passive ellipsis would deploy a (passive) voice cue, whereas the unmarked active counterpart would not deploy a (active) voice cue, leading to the observed profiles. These results point to a uniform account of feature markedness effects across dependencies with respect to retrieval interference.

Table 1: Sample items from Experiment 1: passive ellipsis (modified from [4])

+grammatical same voice	Jane was recruited for the event that was organized by the villagers, and John was too ...
+grammatical different voice	Jane was recruited for the event that the villagers organized, and John was too ...
-grammatical same voice	Jane recruited for the event that was organized by the villagers, and John was too ...
-grammatical different voice	Jane recruited for the event that the villagers organized, and John was too ...

Table 2: Sample items from Experiment 2: active ellipsis (modified from [4])

+grammatical same voice	Jane recruited for the event that the villagers organized, and John did too ...
+grammatical different voice	Jane recruited for the event that was organized by the villagers, and John did too ...
-grammatical same voice	Jane was recruited for the event that the villagers organized, and John did too ...
-grammatical different voice	Jane was recruited for the event that was organized by the villagers, and John did too ...

Figure 1.

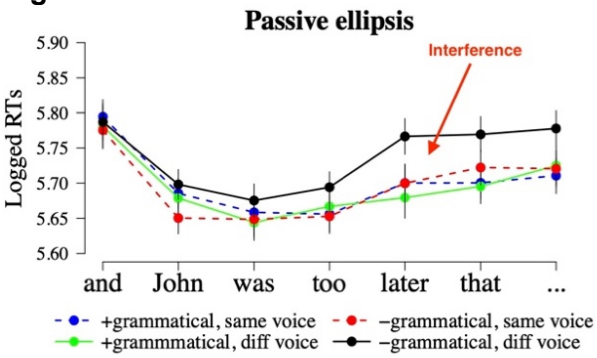


Figure 2.

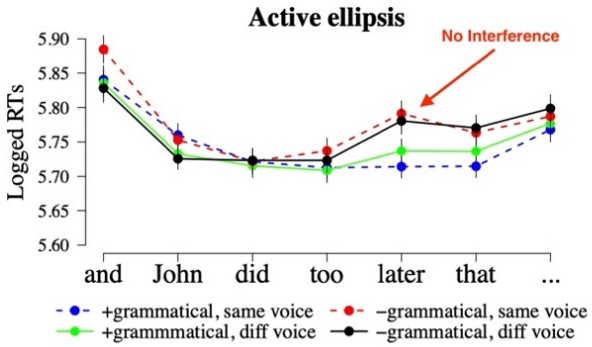
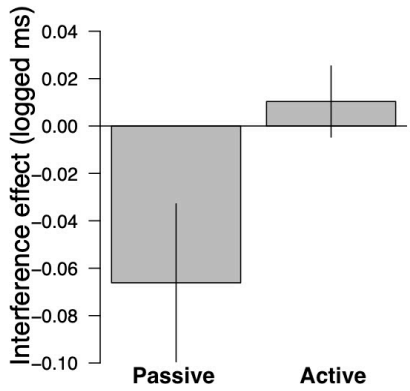


Figure 3.



[1] Jäger et al., 2017, *JML*; [2] Martin & McElree, 2008, *JML*; [3] Arregui et al. 2006, *JML*; [4] Martin, 2018, *PLOS ONE*; [5] Arregui et al., 2006, *JML*; [6] Parker, 2019, *Glossa*. [7] Van Dyke & McElree, 2011, *JML*; [8] Dillon et al., 2013, *JML*; [9] Vasishth et al., 2019, *TiCS*