Online processing and interpretation of verb phrase ellipsis
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Introduction: In (1), the VP-Ellipsis site (VPE-site) can be interpreted as [$_{VP}$ punish him (=Bill)] (the Strict reading), or as [$_{VP}$ punish herself (=Susan)] (the Sloppy reading) ([1]).
(1) Bill punished himself and Susan **did [VP ø]** too.
(1)a./b. ...Susan did [$_{VP}$ ~~punish **him**_Bill~~]/[$_{VP}$ ~~punished **herself**_Susan~~] too.
During online sentence processing, it is unclear whether both of the readings are equally available, or if a preference exists for one of the readings. If there is any preference, what governs such a preference? Results from an eye tracking while reading experiment indicate that both readings appear to be equally accessible. Thus, the meaning of the VP is used as the retrieval cue in the resolution of the VPE-site.

VP-ellipsis: The resolution of VP-ellipsis (VPE) must involve the following steps. When the VPE-site is recognized, the parser needs to access and retrieve the content of the antecedent VP ([2]). In (1), the antecedent VP includes a reflexive, which refers to *Bill*. The retrieval of the antecedent VP may include this interpretation of reflexive, resulting in strict reading in (1a). On the other hand, in order to achieve the sloppy reading, either the parser neglects to retrieve the interpretation of the reflexive established in the first clause, or takes an additional step of changing the gender value of the reflexive and relinking the retrieved reflexive to 'Susan' as in (1b). Taken together, if the resolution of the VPE site involves the retrieval of the reflexive-interpretation, the sloppy reading could be costly, which involves additional operations, and the strict reading is easier and thus preferred [3]. However, no such difference is predicted if the value of the reflexive is not accessed when the VPE-site is resolved.

Experiment: An eye tracking while reading experiment (n=50) has been conducted in a 2x2 design where the interpretation of the VPE-site (Strict vs. Sloppy) x Reflexive Gender (Match vs. Mismatch) are manipulated as independent factors in a 2x2 factorial design. More concretely, the VPE-site in the third conjunct is forced to be a strict (4a/c) or sloppy (4b/d).
(4) a/c. Although <u>Mike</u> didn't punish himself/him, ...
    b/d. Although <u>Mary</u> didn't punish herself/him, ... Bill punished himself and ...
   ...**Mary did [$_{VPE}$ ø]** too since it was necessary.
In this design, the first clause (*Although ...*) rules out either the strict or sloppy reading in the third clause with the VPE-site by negating one of the potential readings. The gender manipulation should only affect the conditions where the sloppy interpretation is forced (4c/d) because in the strict reading the reflexive unambiguously refers to 'Bill'. Mixed effects models revealed no significant effects in the VPE region (*did too*). A main effect in the first spillover region (*since*) in total time approached significance, where strict conditions were faster overall ($X2 = 3.18$, $p=.07$). Furthermore, an interaction of VPE-site x Reflexive Gender was observed in first pass duration ($X2 = 6.7$, $p<.01$) and first fixation time ($X2 = 3.5$, $p = .06$) in the second spillover region (*it was*), such that Strict/Gender Match was slower than Strict/Gender Mismatch (4a,b), however Sloppy/Gender Mismatch was slower than Sloppy/Gender Match.

Discussion: These results minimally indicate that both interpretations are equally accessible during VPE resolution, and potentially point to processing advantage for the strict interpretation. Furthermore, the gender mismatch effect in the sloppy conditions supports the hypothesis that changing the gender value of the retrieved material is costly. Finally, we attribute the gender match effect in the strict cases to similarity based interference from the intervening referent 'Mike' between the reflexive and the antecedent 'Bill'.

[1] Ross, J. R. (1967). Constraints on variables in syntax; [2] Lewis, R. L., & Vasishth, S. (2005). An activation-based model of sentence processing as skilled memory retrieval. Cognitive science, 29(3), 375-419.; [3] Frazier, L., & Clifton, C. (2006). Ellipsis and discourse

coherence. *Linguistics and Philosophy, 29*(3), 315-346.

Total time at spillover 1

First fixation at spillover 2
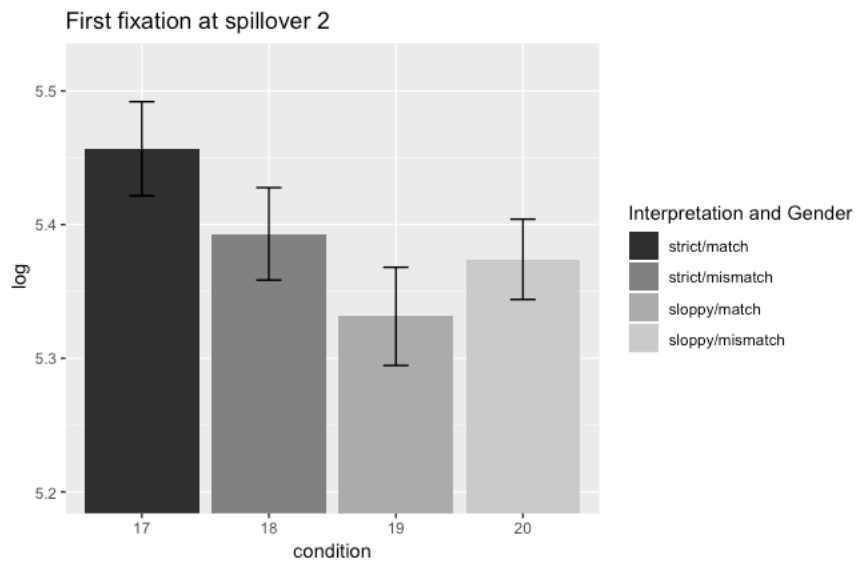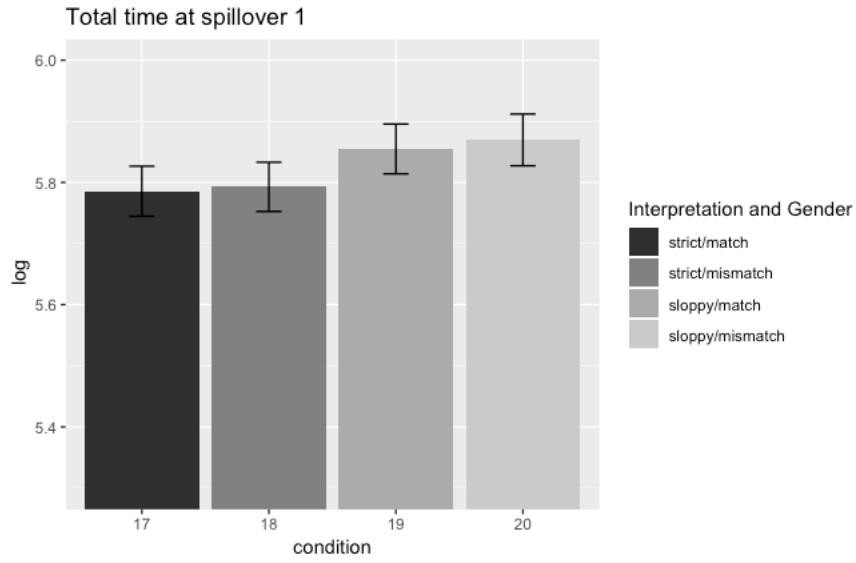
First pass duration at spillover 2