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Seeing what's missing: What (eye-tracking) data from native speakers and second language learners can tell us about the theoretical distinction between VP-ellipsis and VP-anaphora

VP-ellipsis is an interface phenomenon *par excellence*: the constraints on the grammatical acceptability of ellipsis clauses are at once purely syntactic—grammaticality is determined by the *structural* properties of the antecedent clause—and at the same time discourse-dependent—in contrast to some other core syntactic phenomena, the grammatical acceptability of an ellipsis clause cannot be determined without reference to the preceding linguistic discourse. At least since Sag's seminal work on the topic Sag (1976), VP-ellipsis facts have been central to the development of grammatical theory, especially in the context of Minimalist concerns with interface conditions, and this theoretical work continues to progress our understanding of the limits of core grammar; see, for example, Hankamer & Sag (1976), Sag & Hankamer (1984), Lobeck (1995), Johnson (1997), Merchant (2001), *inter alia*.

In tandem with purely theoretical work, experimentalists in adult language processing and first and second language acquisition have attempted to flesh out our understanding of the effects of constraints on VP-ellipsis in language processing, and to determine how and when these constraints are acquired by different groups of learners. One particular property that has received psycholinguistic attention is the so-called Parallelism Constraint (Hankamer & Sag 1984), the requirement that the ellipsis clause be syntactically parallel to its antecedent, as in (1a) vs. (??1b); a constraint, which—at least according to the theoretical literature—does not apply to (semantically-equivalent) VP-Anaphora constructions (2ab):

1. a. Someone had to put out the garbage, but John didn't want to.
b. ??The garbage had to be put out, but John didn't want to.
2. a. Someone had to put out the garbage, but John didn't want to do it.
b. The garbage had to be put out, but John didn't want to do it.

Tanenhaus & Carlson (1990) report a set of studies using the Sentence Completion Judgment Paradigm—a timed reading task in which subjects are asked to decide whether the second sentence (ellipsis clause) follows naturally and meaningfully from the first (Antecedent clause). These results show that adult native speakers are indeed sensitive to the effects of syntactic parallelism in language processing, both in the case of active vs. passive antecedents, as in (1)/(2), *as well* in the case of verbal vs. nominal antecedents (in 3 and 4 below).

3. a. John wanted someone to kiss him, but Jo didn't want to.
b. ??*John wanted a kiss, but Jo didn't want to.
4. a. John wanted someone to kiss him, but Jo didn't want to do it.
b. John wanted a kiss, but Jo didn't want to do it.

In a series of papers, Duffield & Matsuo further develop this paradigm, extending it to investigate Second Language learners' knowledge of ellipsis constraints—see Duffield & Matsuo (2000, 2001, 2002, Duffield & Matsuo (2003). The results of these latter experiments reveal two new findings: first, that lay native-speakers' acceptability judgments differ systematically from those given in most theoretical work—for example, there *is* a parallelism effect for VP-anaphora constructions also (albeit a smaller one); second, that advanced Dutch L2 learners, whose L1 does not license VP-ellipsis, *can* acquire the relevant constraints, but that their judgments nevertheless differ systematically from those of native-speakers when more specific factors (finiteness, construction type, semantic recoverability) are analyzed in detail.

A potential criticism of these results, however, is that Sentence Completion Judgment is not a true 'online' task: since it only measures responses at the offset of the stimulus sentence, it does not directly tap the use of grammatical knowledge in online processing. To address this, we employed the same materials used in Duffield & Matsuo's SCJ experiments in a reading task using a head-mounted eye-tracker (cf. Tanenhaus et al. 2000). Eye-tracking technology affords a number of different dependent measures that together provide a millisecond-by-millisecond chart of a subject's reading of a given stimulus sentence: *first fixations and first-pass reading times*, which are thought to reflect the earliest stages of processing, and which measure the amount of time each subject initially fixates on critical positions in the sentence; *regressions*, which show subjects' returns to earlier leftward positions—for example, to a potential antecedent phrase; *second pass fixations and total reading times*, which together reflect later stages of processing and integration.

Using this technology, we tested 15 English native-speakers and 20 advanced Dutch L2 learners of English on Duffield & Matsuo's materials, manipulating (in the test sentences) the syntactic parallelism of the antecedent clause (active/*passive/*nominal) and the anaphor type of the second sentence (VPE/VPA). Given the previous results from SCJ tasks, we predicted that English native-speakers should show reliable effects of parallelism in the VPE condition for both the active/passive and the verbal/nominal antecedent types, but expected the effect to be stronger for nominal vs. passive antecedents. For the Dutch L2 learners, since VPE is ungrammatical in their L1, and if they have yet to acquire the required competence in English, then we expected no such asymmetry in the parallelism effect, that is, both ellipsis types should be equally difficult to process. For both early measures, the analysis found a main effect of Ellipsis Type and no interaction with the between-subjects factor Language Group (First fixation durations: $F_1(1, 33) = 5.52$; $p < 0.03$; $\eta^2 = .14$; $F_2(1, 11) = 6.85$; $p < 0.03$; $\eta^2 = .38$; First pass times: $F_1(1, 33) = 4.88$; $p < 0.04$; $\eta^2 = .13$; $F_2(1, 11) = 17.02$; $p < 0.003$; $\eta^2 = .61$): irrespective of the type of antecedent, both the native English speakers and the L2 learners spent more time fixating the critical region in the VPE constructions (First Fixations: 236 ms; First Pass Times: 262) than in the VPA constructions (First Fixations: 223 ms; First Pass Times: 238). The expected interaction between Anaphor Type and Ellipsis type showed up in the later measures (Second Pass Fixations: $F_1(3, 99) = 3.71$; $p < 0.03$; $\eta^2 = .26$; $F_2(3, 33) = 4.11$; $p < .02$; $\eta^2 = .27$; Total Fixation Durations: $F_1(3, 99) = 7.37$; $p < 0.001$; $\eta^2 = .42$; $F_2(3, 33) = 3.64$; $p < .03$; $\eta^2 = .25$); here, again there was no difference between the two subject groups.

In summary, these new results provide confirmation of the claim that the parser has early and continuous access to grammatical information about constraints on VP-ellipsis constructions, and that such knowledge is both acquirable—and *used*—by advanced L2 learners online in L2 processing (subtle differences in the use of this knowledge notwithstanding).

Selected References

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