The Structure of Antecedent Influences Processing of Ellipsis

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[Introduction] One of the long-standing questions in the study of the processing of ellipsis constructions is whether processing of an ellipsis site is influenced by the structure of the antecedent of the ellipsis site. Some previous studies have shown that the structure of the antecedent does not influence the processing of the ellipsis site and suggested that structures may not be built in the ellipsis site [1,2,8,9]. On the other hand, other studies have suggested that the structure of the antecedent may influence the processing of the ellipsis site [7,10,11]. In the present study, we investigate whether structural properties of antecedent clauses influence the processing of the ellipsis site. The result of an eye-tracking while reading experiment shows that the structural complexity of the antecedent and the processing complexity of the ellipsis site correlate, i.e., when the antecedent involves more complex structures, the processing of the ellipsis site is slower. We argue this result suggests that the parser is accessing the structure of the antecedent when the ellipsis site is processed.

[Experiment] An eye-tracking while reading experiment (n=77) was conducted in which, the structure of the antecedent (*Antecedent*: NP vs. CP) x Structure of the second clause (*2nd Clause*: Ellipsis vs. Pronoun) were manipulated in a 2x2 factorial design (a sample set of stimuli is summarized in the table 1). Previous studies on the processing of wh-dependencies have shown that when the wh-phrase moves over a complex NP as in (1a), the processing of a wh-gap dependency is more difficult compared to when the wh-phrase moves out of a subordinate clause (CP) as in (1b) [3,6]. [3,6] argued that the different structure created different processing complexity effects.

(1) a. ... **who** [$_{NP}$ the consultant's denial about that the new proposal] had pleased GAP.
    b. ... **who** [$_{Clause}$ the consultant denied that the new proposal had pleased GAP].

Taking advantage of this paradigm, we can potentially test whether the structure of the antecedent of the ellipsis site influences the processing of the ellipsis site. If the parser accesses the structure of the antecedent during the processing of the ellipsis site, then when the antecedent involves more complex structure, the processing of the ellipsis site should be more difficult. On the other hand, if the parser does not access the structure of the antecedent, then the complexity of the antecedent should not create the difficulty of the processing of the ellipsis site. Pronoun conditions were included to serve as baseline since studies have shown that the parser does not access the structural information of the antecedent of the pronoun when the pronoun is processed [4,7]. A linear mixed effects model revealed that at the wh/pronoun region, a main effect of *Antecedent* in the Total Time Duration measure was found, such that the NP conditions were read significantly slower than the CP conditions ($\beta = 0.10$, SE=0.03, t=2.71, p<0.01) and an interaction between *Antecedent x 2nd Clause* ($\beta = -0.12$, SE=0.05, t=-2.26, p<0.05) was observed (see Figure 2). Further subset analysis found a significant difference within the *Antecedent* conditions whereby the NP conditions were read significantly slower than the CP conditions (p<0.05), but there was no difference within the Pronoun conditions.

[Conclusion] Taken together, this study shows that readers were sensitive to the syntactic structure of antecedents when processing ellipsis sites. One potential objection to this conclusion is that the sentences tested in this experiment are overly long and thus, readers would have given up processing these sentences. However, we observe the difference in processing between the Ellipsis conditions and the Pronoun conditions, in which the complexity and difficulty of the antecedent clause are tightly matched. If the readers have given up processing these sentences, we should not have observed such difference between the Ellipsis conditions and the Pronoun conditions. They should be equally too hard to process and similar effects should be predicted. We conclude that readers indeed had access to the structural information of the antecedent and recovered it when processing the ellipsis site.

	Factor1	Factor2	example
1	CP	sluicing	I wonder who the **consultant denied** that the new proposal had pleased, but no one knows <u>who</u>, in fact, nobody cares.
2	NP	sluicing	I wonder who the **consultant's denial** about the new proposal had pleased, but no one knows <u>who</u>, in fact, nobody cares.
3	CP	pronoun	I know who the **consultant claimed** that the new proposal had pleased, but no one knows <u>about it</u>, in fact, nobody cares.
4	NP	pronoun	I know who the **consultant's claim** about the new proposal had pleased, but no one knows <u>about it</u>, in fact, nobody cares.

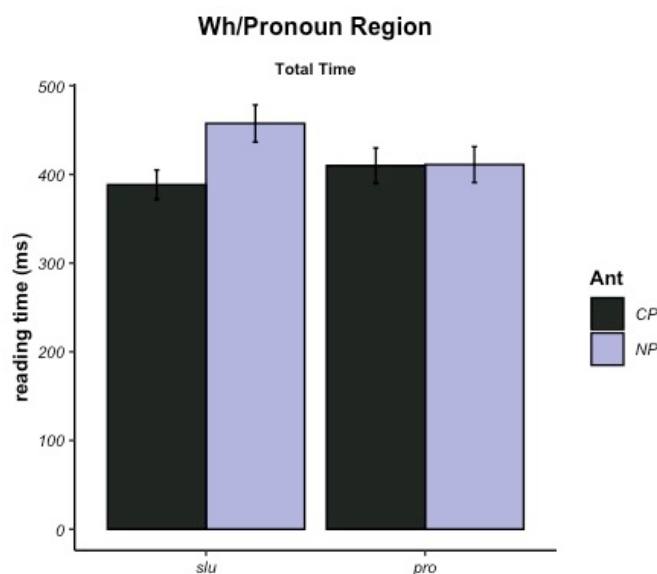Table1. A sample set of stimuli

Figure 1. The Total Time Duration (TTD) at the target (wh/pronoun) region

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