

Planned Production and Self-Paced Reading of Relative Clause Attachment

Andrea Santi, Nino Grillo, Yosef Grodzinsky and Michael Wagner

Self-Paced reading (SPR) is one of the standard paradigms in studying sentence processing. Time spent on particular words/zones correlate with processing difficulty, and thus reveal properties of the human language parser. However, other factors influence reading time, and SPR is not entirely natural as a proxy for sentence processing, so other methods should complement the interpretation of SPR results. This paper investigates relative clause attachment comparing SPR with **Planned Production (PR)**, and provides evidence that they show comparable duration effects. The PR data suggests a new perspective on some previous SPR results.

In PR, the participants read a sentence silently until they are ready to produce it. We segmented the sentences into zones parallel to SPR-data and extracted duration and other acoustic measures. This method leads to richer data (various acoustic measures, distinction between lengthening and pause), and reduces some extraneous factors (i.e. plausibility effects). Using this method, we ran stimuli from (1) that had used the SPR technique to look at subject- and object modifying relative clauses (SRC and ORC), crossed with subject- vs. object extraction inside the RC. Acceptability judgments (1-5) were provided following the first reading of the sentence.

A mixed model regression showed a difference across extraction site and RC location for relative clause duration ($p < .002$) that replicated the effects of (1). Additionally, there was a significant effect at the matrix verb ($p < .01$): longer for the SRC than the ORC condition. We replicated these results in a second study without the PP modifier from the original stimuli. Furthermore, the matrix clause excluding the RC was significantly longer in the SRC than in the ORC condition ($p < .001$), but not significant difference was found over the entire sentence. This results challenges the conclusion reached in (1) that ORC are more difficult than SRC. We propose an alternative account for the shorter TC in SRC than ORC structures to the processing-cost-account (ie, Information Flow (IF)) proposed in (1). The 'speed-up' on the RC in the SRC structure may not be due to a lower complexity of SRC, but rather a reflection of the parser trying to minimize the temporal distance in the dependency relation between the subject and predicate. Thus, we claim that not all durational differences directly reflect complexity.

The replication of the relative clause results shows that PR is a suitable method to complement SPR. The results for both the relative clause and the matrix clause are consistent with either our speed-up account or the IF account combined with the Integration Cost of the Syntactic Prediction Locality Theory (2). An ongoing study designed to distinguish between these two accounts will be discussed. The results reported here are purely based on durational measures, to mirror SPR results. In the presentation we will discuss differential effects of duration due to lengthening and one due to pause duration, and effects of other acoustic variables exploring the richness of the data obtained with PR.

References:

1. Gibson, E., Desmet, T., Grodner, D., Watson, D., & Ko, K. (2005) Reading relative clauses in English. *Cogn Linguist* 16:313-354.
2. Gibson, E. (1998) Linguistic complexity: Locality of syntactic dependencies. *Cognition* 68:1-76.