Does Selective Reanalysis really play a role in sentence processing? Implications for computational models of eye-movement behaviour.
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Recent years have seen several attempts to extend the scope of quantitative models of eye-movement behaviour in reading to embrace the effects of syntactic processing (in addition to lower level lexical and sub-lexical effects). A particularly taxing aspect of this work is the challenge of providing numerically precise accounts of the temporal and spatial "shapes" of disambiguation-triggered regressive fixation sequences. Historically, the longest established model of such regressions is the Selective Reanalysis (SR) hypothesis (Frazier and Rayner, 1982). This states that, in the event of difficulty, the eyes are sent directly back to the point of original misanalysis to re-read from there. In this paper, we compare this proposal with an alternative we dub the Time Out (TO) hypothesis: basically that instead of being used to re-read the text, regressions are merely a way of "parking" the eyes until the parser signals it is ready to proceed. According to the TO view, the choice of regression landing sites is largely determined by the spatial layout of the text, and not by its linguistic properties. Two eye-tracking studies using 24 sets of sentences like 1(a,b) were run to test between these accounts.

(1a) After the cadet saluted(,) the major who was brusque and remote ordered (ordered) the sergeant to prepare the ammunition.
(1b) The new NCO recorded that after the cadet saluted(,) the major ordered
 the sergeant to prepare the ammunition.

To test whether, in line with the SR strategy, there is any tendency to return to areas of earlier misanalysis, Expt 1 (N=32) crossed Comma-inclusion with Misanalysis Position (words 4-6 as in 1a vs 9-11 in 1b). Contrary to the strict predictions of SR there was no sign of direct returns to the Misanalysis region. However for a minority of regressions there WERE delayed returns Also, in line with Time Out, most regressive fixations remained very close to the launch site.

Expt 2 (N=28) used 4 forms of 1a to probe for further signs of TO effects. Comma vs No-comma was crossed with Location of the disambiguating word (Word 12) (end of Line 1 vs start of Line 2). The point of initial misanalysis is clearly not altered by format changes, and so pure SR predicts no Location main effects or interactions. Against this, and in line with the TO hypothesis, the layout changes produced powerful changes in regression behaviour.

These results question existing models of eye-movement control in syntactic disambiguation. They also challenge the use of most standard eye-tracking measures for model-fitting purposes.