

## High-cost referential support of relative clause ambiguities

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Although context effects on syntactic ambiguity resolution have been examined in a number of studies since Altmann & Steedman's original work (Cognition, 1988), we still know little about the inferential mechanisms that support contextual integration in sentence processing. Previous work suggests that more difficult ambiguities, such as relative clauses, may result in a reduced effect of context (see, e.g. Binder et al., JML, 2001; and Traxler and Tooley, 2007). It remains unclear to what degree these contextual results are due to superficial strategies, as context and target have tended to be repeated word-for-word in prior studies. Here, we present a series of experiments designed to explore this question.

We manipulated both the difficulty of contextual inference and the strength of the garden path across four experiments, adapting materials from McRae et al. (JML 1998). Each experiment crossed ambiguity [Reduced relative clause (RRC) vs. unreduced RC (URC)] with context [relative-supporting (Example (5)), vs. non-relative-supporting (e.g. with only one individual compatible with modification in NP1)]. Experiments 1(a) and 1(b) used a plausible agent of the target verb as NP1, as in Example (1) (harder garden path), whereas Experiments 1(c) and 1(d) used a plausible patient in NP1, as in Example (2) (easier garden path). In Experiments 1(a) and 1(c), NP1 was a synonym or hyponym of the contextually mentioned noun(s), (harder contextual inference) whereas Experiments 1(b) and 1(d) had a word-for-word repetition of NP1 with the context (easier inference). Example (3) shows a supportive context and Example (4) an unsupportive context from Experiment 1(a), which did not have repetition; Example (5) gives an example of a supportive context from Experiment 1(d), which did have repetition. The other five options follow a similar pattern.

Analyses of regressions out of NP2 show context effects even without lexical repetition: when analyzed individually or together (with experiment and NP2 length as fixed factors), a mixed effects model showed a consistent interaction between context and syntax, including in Experiments 1(a) and (c), which have a hard contextual inference. The ambiguity penalty (although present in both contextual conditions) was significantly reduced in a supportive context.

Thus, even in a difficult garden path, the inference supporting contextual integration went beyond a superficial strategy involving word repetition. This is notable because context effects are hard to elicit in ambiguous relative clause constructions (cf. Traxler and Tooley, 2007). Although there is a presumably a cost involved in making an inference, it appears as if the Principle of Referential Support (Altmann & Steedman, 1988) is robust against such penalties.

(1) Target 1(a,b) [ NP1 The postman] (who was)/ [ V carried] by/ [ NP2 the paramedics]/ was having trouble breathing.

(2) Target 1(c,d) The newborn (who was)/ carried by/ the nurse/ was having trouble breathing.

(3) Supportive Context 1(a) Two workers were at the mail sorting office when an accident happened The paramedics put one of the workers on a stretcher and took him to the hospital, but the other walked away unharmed.

(4) Neutral Context 1(a) A worker and a customer were at the mail sorting office when an accident happened. The paramedics put the worker on a stretcher and took him to the hospital, but the customer walked away unharmed.

(5) Supportive Context 1(d) Yesterday at the nursery, two newborns suffered asthma attacks. The paramedics arrived and carried one newborn to the intensive care section, but the other had recovered by the time they arrived.