

Is children's reading "good-enough"?

Linking real-time processing and comprehension in children's reading

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Much research has focused on the resolution of misleading temporary ambiguities ("garden paths") in sentence processing. For example, it is well-documented that adult readers show increased reading times and regressive eye-movements when they encounter the disambiguating word in a garden-path sentence (Rayner et al, 1983). Temporary ambiguities can also affect offline measures of sentence comprehension. Christianson et al. (2001,2006) asked adults to read sentences such as "*While Anna dressed the baby played in its crib*", followed by a comprehension question probing the "temporary" misinterpretation e.g. "*Did Anna dress the baby?*". Participants incorrectly answered "YES" the majority of the time, suggesting that temporary ambiguities are not necessarily fully resolved during processing and that alternative interpretations may linger. However little is currently known about how comprehension is related to the earlier processing of the sentence. These questions are of particular interest for children since their reading comprehension is characterized by significant individual differences (Nation, 2005) and to date research with children has used non-reading paradigms Trueswell et al (1999). In the current study, children read garden-path sentences while we monitored their eye-movements, and then answered questions, allowing us to investigate the relationship between online processing and offline comprehension.

86 children (mean: 9yr;6) read sentences and responded to YES/NO questions after each, see Table 1 for examples. Each *garden-path* sentence had two control sentences: a *comma* counterpart (the control for real-time processing) and a "reversed" counterpart (a strong control for offline comprehension: errors on the YES/NO question cannot be due to garden path syntax). The design was fully crossed; filler trials ensured a balance of structures and YES/NO responses.

Results

Offline Comprehension: Significantly more errors on questions following garden-path sentences than either type of control (garden-path 58% errors; comma 43%; reversed 40%).

Online processing: Effects were apparent not at the disambiguating word but instead on the subsequent region (e.g. at "*in its*" rather than "*played*" in "*While Anna was dressing the baby played in its cot*"), corroborating previous child reading studies (Joseph et al., 2008). Specifically: we observed more regressions out of this region, and longer *go-past* times (the sum of all temporally contiguous fixations, including regressive eye-movements to the left of the region, until the point of fixation progressed to the region to the right), for *garden-path* sentences compared to *comma* sentences.

Predicting comprehension performance: Overall go-past times were *not* associated with differences in comprehension. indicating that that long go-past times may not be a good signature of the reanalysis process in children's reading. On-going work is exploring the role of regressions to specific regions and relating comprehension scores to various measures of reading and verbal working memory, with a view to further elucidating the nature of individual differences in reading comprehension.

Sentence Types	Example sentences	Example questions. Correct answer is always "NO".
Garden_P ./ Comma	1. While Anna was dressing(,) the baby played in its cot. 2. While the boy was eating(,) the biscuits baked in the oven.	Did Anna dress the baby? Did the boy eat the biscuits?
Reversed	1. The baby played in its cot while Anna was dressing. 2. The biscuits baked in the oven while the boy was eating.	

Table 1. Examples of *garden-path* sentences and their *reversed* and *comma* counterparts. Half of the sentences are *optional transitive* (e.g. eat) and half *reflexive absolute transitive* (e.g. dress) verbs (following Christianson et al. 2001).