The theory of good-enough processing (Ferreira et al., 2002) suggests that readers strategically adapt their parsing efforts to task demands and available resources, with the consequence of omitting processes that are less important either for the current goal (Swets et al., 2008) or for building a coherent structure (as postulated by Construal, Carreiras & Clifton, 1993). Indeed, von der Malsburg & Vasishth (2012) have shown that readers with low working memory capacity leave an ambiguous adjunct attachment underspecified more often than high-capacity readers. It is not clear, however, how this adaptation works. Is it necessary to assume that low-capacity readers use a different parsing strategy, or can the difference be explained by a common mechanism? So far there is no detailed model of the good-enough account that could clarify this issue.

We propose that underspecification results from a common strategy that aims for an uninterrupted reading process and therefore constrains attachment effort, when possible, by the timing of eye movement control processes. We implemented a model where the process of determining the attachment site of an ambiguous adjunct is subject to this interaction between parsing and eye movements. Specifically, the attachment process gets canceled if it has not reached its final stage by the time the next word has been identified and is ready for integration. A varying behavior due to working memory differences would be predicted by the assumption that low-capacity readers on average take longer to complete the attachment than high-capacity readers, resulting in more cancelations that leave the attachment underspecified. Eye movements were simulated in ACT-R using the eye movement module EMMA (Salvucci, 2001) interacting with a cue-based retrieval parser (Lewis & Vasishth, 2005). Individual differences in working memory capacity were modeled in accordance with previous studies (e.g., Daily et al., 2011) by randomly varying ACT-R goal buffer source activation $W$ (normally distributed with mean 1 and SD 0.25; higher values of $W$ improve speed and accuracy of retrieval processes). Low capacity was defined as $W \leq 1$ and high capacity as $W > 1$. Following Swets et al. (2008), an underspecification is not corrected later in the sentence. If an attachment was made, however, contradicting disambiguation information leads to a repair operation triggering a regression towards the beginning of the sentence.

We tested the model predictions against the results of von der Malsburg & Vasishth (2012). In their eye-tracking study of temporarily ambiguous (high vs. low) adjunct attachment in Spanish, they found (i) an ambiguity advantage in gaze durations in the pre-disambiguation region, driven mainly by low-capacity readers, and (ii) an increased probability for high-capacity readers to reread the sentence after disambiguation in the dispreferred high-attachment condition. They concluded that high-capacity readers attach more often and, hence, make more wrong attachments that require a reanalysis.

We simulated 50 participants reading the three experimental conditions (high, low, unambiguous) 15 times each. EMMA parameters were set to values estimated in Engelmann et al. (TopiCS, 2013) using the Potsdam Sentence Corpus (Kliegl et al., 2004). Other ACT-R parameters were set to values used previously by Lewis & Vasishth (2005).

The simulation results showed that the proposed interaction of parsing, eye movement control, and working memory correctly predicts (i) the observed ambiguity advantage in gaze durations and (ii) the difference in rereading proportions in the high-attachment condition. The presented simulations, thus, support the good-enough account in ambiguous adjunct attachment and demonstrate that a single mechanism can lead to different rates of underspecification modulated by working memory capacity.