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Understanding the symptoms and sources of variability in second language sentence processing

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Cunnings (2016) proposes that differences between native (L1) and second language (L2) sentence processing can best be explained in terms of susceptibility to effects of interference and an overreliance on discourse level cues during memory retrieval. Cunnings' argument that difficulty in retrieval operations may provide a better explanation than a syntactic deficit account for explaining certain L1-L2 differences is convincing. However, the proposal for the 'overuse' of discourse is too broad and needs to be refined in terms of the specific contexts and conditions under which learners have difficulty. We also believe that difficulty with cue-based retrieval is still a characterization of the symptoms of differences between L1-L2 processing, and does not necessarily address the source of the variability.

Cunnings discusses several studies that address the use of discourse information online, some of which show that L2 learners are successful (Pan, Schimke & Felser, 2015) and others which do not (Roberts, Gullberg & Indefrey, 2008). In Roberts et al. (2008), both German and Turkish learners of Dutch showed increased reading times at the pronoun *hij* 'he' in examples such as (1), where the first sentence provides two gender-matching potential antecedents. Dutch natives, in contrast, showed the fastest reading times in this context, suggesting that they unambiguously resolved the pronoun in favor of the antecedent *Peter*, which is the matrix subject of the second sentence.

(1) Peter en Hans zitten in het kantoor. Terwijl Peter aan het werk is, eet hij een boterham.

'Peter and Hans are in the office. While Peter is working, he is eating a sandwich.'

Cunnings proposes that the L2 learners' increased reading times at the pronoun may be a result of an interference effect from having two competing antecedents, but this effect may also be due to learners facing difficulty with a particular aspect of discourse: updating the discourse model. The first sentence, which includes a conjoined Noun Phrase in subject position, establishes both *Peter* and *Hans* as the topic in the discourse model. The second sentence, which includes only *Peter* in subject position, should indicate a switch of topic, with *Peter* taking prominence. The natives are able to update the discourse model while the L2 learners do not, at least online. The German learners, but not the Turkish, do ultimately choose *Peter* as the referent in an offline task. What this suggests is that the L2 learners are good at the initial encoding of the gender information of the NPs in the first sentence and they are also good at maintaining this information, as the competition effect arises in the second sentence. But the L2 learners have difficulty in revising and updating the discourse topic online, potentially in line with the difficulty with revision that Cunnings discusses for garden-path sentences. Note that in the Pan et al. (2015) study, in which learners successfully use discourse information, no revision or updating is required.

These results suggest that we need to pay more attention to the precise contexts in which difficulties emerge, including, as Cunnings points out, careful consideration of the memory retrieval processes involved. It is also important to highlight that differences with respect to the resolution of pronominal ambiguity are not only attested between natives and non-natives but also among native speakers (Nieuwland & Van Berkum, 2006; Gabriele, Fiorentino & Covey, 2015), although the source of this individual variability remains a matter of investigation.

The study by Van Dyke, Johns & Kukona (2014), which Cunnings discusses, further strengthens the point that variability among native speakers is not trivial. Van Dyke et al. include a comprehensive battery of 24 measures that assess a range of linguistic and cognitive skills including print mapping, reading skills, oral language, memory, and intelligence in order to be able to understand the source

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of variability in comprehension among natives. They argue that linguistic abilities (quality of representations) are at least in part the source of language processing differences among natives. We would argue that this type of approach is needed in L2 studies as well. As Cunnings discusses, different abilities may be related to different stages of retrieval. For example, assessments of cognitive control may be particularly important to include as part of a comprehensive battery of measures if the language processing task involves updating or revision of an initial analysis. It is also necessary for research in L2 processing to begin to examine the relationship between processing in the L1 and L2 (Sparks, 2012), by examining the two languages 'within brain' in order to see if variability in the processing of the two languages is related, a project we have just begun in our lab. Cunnings (2016, 41) writes: "Further research is required to systematically examine how individual differences may influence different memory operations during L2 language comprehension, and the question of whether L2 processing can become fully nativelike if individual differences are taken into account." We wholeheartedly agree, as long as the individual differences in L1 processing are considered as well.

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