Effects of processing depth on the use of gender cues and semantic inferences in pronoun resolution

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Language processing -- including pronoun interpretation -- is argued to be susceptible to shallow processing (Ferreira et al., 2000; Sanford & Sturt, 2002; Steward et al., 2007, and others). Although pronouns can be interpreted rapidly (e.g. Arnold et al., 2000), other findings suggest that demands of the task at hand determine whether comprehenders fully resolve pronouns. We conducted a self-paced reading study to investigate how processing depth influences pronoun interpretation. In particular, we investigated how participants’ use of (i) gender cues compares to their use of (ii) more probabilistic, higher-level semantic cues, and how the use of these cues is influenced by variation in processing depth. In ex. (a), the pronoun ‘her’ is unambiguous because there is only one female antecedent. In ex. (b), ‘her’ is gender-ambiguous because there are two possible female referents, but the semantics signals that the intended referent is probably Elaine.

(a) Elaine protected Joel. Stephen awarded her a special prize for bravery and everyone cheered happily.
(b) Elaine protected Jen. Stephen awarded her a special prize for bravery and everyone cheered happily.

To test how comprehenders use gender cues and higher-level semantic cues in different situations, we manipulated processing depth by asking readers to answer different kinds of comprehension questions: Shallow questions could be answered without interpreting the pronoun whereas deep questions probed the referent of the pronoun. (i.e., participants in the shallow question group ‘learned’ that a superficial reading of the sentence is enough, whereas participants in the deep group ‘learned’ that they needed to process the sentences – and the pronouns – more completely.) Participants’ reading time patterns suggest that under shallow processing, pronoun interpretation is not automatic, even with unambiguous pronouns. Under deep processing, reading time patterns suggest that comprehenders used both gender-marking and probabilistic higher-level inferences to infer pronoun antecedents, but with slightly different timing. As a whole, our findings suggest that processing-depth modulations impact both categorical cues and probabilistic, non-local cues. Time permitting, new data from second-language learners’ sensitivity to gender cues and more probabilistic cues will also be discussed.