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Who do you refer to? How young students with mild intellectual disability confront anaphoric ambiguities in texts and sentences

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ABSTRACT

Along 2 experiments we tested the anaphoric pronoun resolution abilities of readers with intellectual disability in comparison with chronological and reading age-matched groups. In Experiment 1, the anaphor test of Elosúa, Carriedo, and García-Madruga (2009) confirmed that readers with intellectual disability (ID) are slower than control readers resolving clitic anaphoric pronouns, especially when the use of morphological cues (e.g. gender) is necessary. In order to test if the poor performance could be due to low levels of metacognitive skills during reading, an inconsistency detection task combined with eye tracking was designed in Experiment 2. Participants read short texts with an anaphoric pronoun in the fifth sentence, either morphologically (gender) consistent or not with the information provided in the second sentence. The scores in the anaphor comprehension questions presented after the text confirmed that readers with ID are affected by the gender inconsistency but they are unable to explicitly report it and recover from it, as the number of re-fixations after reading the critical sentence suggests. As their answers to the explicit detection questions showed, the adults control group did not show any preference for morphosyntax or semantics in spite of being aware of the inconsistency. In sum, both groups of readers with and without ID are affected by inconsistencies, but ID readers do not have appropriate metacognitive skills to explicitly identify the source of the inconsistency and fix it.

An anaphor is a linguistic reference to an antecedent piece of text (Rademaker & Haeusler, 2008). Though the form of an anaphor is varied: repetition (e.g. *the cake* and the coffee are in the table. *The cake* is delicious.), pronouns (*the cake – it*), lexical co-reference (*the cake – the dessert*) or even ellipsis (*the cake – Ø*), its function is always to maintain text cohesion by recalling previously mentioned entities (antecedents) without the need of merely repeating them. Struggling readers such as readers with Intellectual Disability (ID), who are the target of the present study may lack the adequate skills to identify and understand an anaphor, which is core for text comprehension.

How an anaphor is resolved depends on intralinguistic features that is, related to the text itself: word length (e.g. number of characters or syllables), word frequency of the anaphor antecedent (e.g. *domicile* vs. *house* as possible antecedents of the anaphoric pronoun *it*), distance between the antecedent and the anaphor (e.g. number of sentences or words between them)

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and kind of anaphor (e.g. pronoun, repeated name or ellipsis) (Arnold, Eisenband, Brown-Schmidt, & Trueswell, 2000; Arnold, Brown-Schmidt, & Trueswell, 2007; Cacciari, Carreiras, & Barbolini, 1997; Crawley, Stevenson, & Kleinman, 1990; Frederiksen, 1981; Garvey, Caramazza, & Yates, 1975; Gelormini-Lezama & Almor, 2011; Gordon, Grosz, & Gilliom, 1993; Järvikivi, van Gompel, Hyönä, & Bertram, 2005) as well as extra linguistic factors (related to the reader), mainly working memory (the memory system in charge of temporarily storing and managing the information, Baddeley, 1992) and metacognitive skills such as planning, checking and revising strategies during reading comprehension (Cain & Oakhill, 1999; Cain, Oakhill, Barnes, & Bryant, 2001; Ehrlich, Remond, & Tardieu, 1999; Long & De Ley, 2000; Yuill & Oakhill, 1988).

Apart from the semantics of the antecedent, in some languages such as Spanish pronominal anaphors bear a grammatical load for gender and number that helps to establish the link with the antecedent. Thus, finding a suitable antecedent for a pronoun can be accomplished through either (or both) of these grammatical features. Imagine a sentence like "Peter (m) gave one more coin to Thomas (m). He (m) had too many". Here, both *Peter* and *Thomas* could be the referred antecedent of the pronoun *he*. However, the context indicates that the most likely situation would be Peter giving out a coin as the result of having too many. In "Maria (f) gave one more coin to Thomas (m). He (m) had too many" *Maria* is the one awarding *Thomas* with a coin. A first probabilistic analysis will lead us to the same conclusion as in the former example. Nonetheless, the gender load of the pronoun indicates that the antecedent should be a masculine entity, becoming Thomas the only possible candidate. As one might expect, this duality is sometimes problematic resulting in the reader finding troubles to attach the pronoun to its proper antecedent.

There exist some antecedents on this psycholinguistic issue, as for instance the study of Oakhill and Yuill (1986) that explored the inferences drawn during a pronoun resolution task performed by skilled and low-skilled 7–8 year olds, who read two-clause subordinate sentences where the proper names were either of the same or different gender (e.g. Peter lent ten pence to Liz because she was very poor). In a first experiment, the subordinate clause was introduced by a pronoun referring to either the subject or the object of the main clause; in the second one, a gap was presented instead of the pronoun for participants to fill it in. Additionally, a comprehension question was presented right after the stimulus in the first experiment. Results showed that low-skilled readers encountered more difficulties drawing inferences about pronominal antecedents than their skilled peers, even when there was a gender clue to link the pronoun to the correct antecedent. These difficulties appeared especially when inferences were complex or included a higher memory load (i.e. the proper names were not given again in the question, so the reader should remember them). The authors found no interaction between level of reading comprehension and memory load, as both groups of readers performed better in the simpler conditions, always with lower accuracy rates in the low-skilled readers. An explanation in terms of metacognitive skills is suggested: low-skilled readers sometimes decide not to go back to the disambiguating information trusting thus in their representation of the text, even though sometimes this is not accurate. Skilled readers, on the contrary, go back in the text when they have doubts about their own representation. In addition, it was also argued that low-skilled readers did not pay enough attention to cues such as the gender of the antecedent.

Megherbi and Ehrlich (2005) also corroborated the conflict of ambiguous pronouns and inference making in spoken language. In this case they followed the hypothesis that 7–8 year children presenting problems in pronoun resolution by reading, should also struggle with them in spoken language. In an anaphoric resolution task children had to decide whether the final word of a sentence should be a masculine or feminine pronoun (e.g. according to the fairy tale, Cinderella put on a beautiful dress to meet the handsome prince. She danced with... him/her). Their findings showed a higher influence of the verb bias (tendency to link the pronoun to the subject or the object) on low-skilled readers, meaning that they trusted the semantics of the verb more than the gender of the pronoun itself in order to disambiguate it. On the other hand, in line with Oakhill and Yuill (1986)'s findings skilled comprehenders took advantage of the gender cues of the pronoun over verb bias, allowing them to get an extra benefit when there existed no conflict between both linguistic features.

The results of these two studies agree with the findings of Elosúa et al. (2009). Elosúa et al. (2009) investigated the resolution of clitic pronominal anaphora when morphosyntax (e.g. gender and number clues) and semantics come to conflict. Clitics are a kind of pronouns devoted to act as a direct or indirect object, in the case of Spanish from either a pre-verb or a post-verb position (e.g. pre-verb position: Lisa *lo* cogió mientras *lo* miraba; Lisa took it while staring at it; post-verb position: La madre gritó: "¡Lisa, cóge*lo*!"; the mother shouted: "Lisa, take it!"). In their Experiment 1b, Elosúa et al. (2009) compared the performance, in terms of speed and accuracy, of undergraduates in an anaphora resolution task in which the anaphor could be either morphosyntactically or semantically resolved. Results indicated that participants performed equally well in the two types of disambiguation, morphosyntactic and semantic, though it took significantly longer to resolve the semantic ambiguity than the morphosyntactic one. The authors also found a facilitative effect of morphosyntax over semantics, very likely due to the nature of the analysis required to benefit from them and the cognitive effort needed: using a semantic strategy implies the performance of a deeper and more resource-demanding analysis, while following the morphosyntactic clues only requires a surface analysis of the lexical units and the grammar rules.

These antecedents explored anaphora resolution by high- and low-skilled readers but not by youngsters with intellectual disabilities. Though the literature on this matter and population is scarce, a brief revision of the antecedents is made in the next paragraphs as we consider that assuming that readers with ID are low-skilled readers is a fair simply and inaccurate assumption.

Our own previous research confirmed that young readers with ID experience problems when they have to use and comprehend cohesive elements like connectives (e.g. but, besides, for that reason) in text. More specifically, Fajardo, Tavares, Ávila, and Ferrer (2013) found that readers with ID were less likely to select the target connective in a cloze task than