Comparing pronouns in Dutch and German: Can adults' object pronoun processing help explain cross-linguistic language acquisition differences?

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The way in which pronouns behave differently in Dutch (and English) compared to German points to a possible explanation for differences in language acquisition. For instance, a Dutch or English pronoun in a locative PP can refer back to the sentential subject, whereas a German pronoun cannot:

(1) De man$_i$ legt het boek naast *hem*$_i$ neer
The man$_i$ puts the book next to *him*$_i$
*Der Mann$_i$ legt das Buch neben *ihn*$_i$

This suggests that object pronouns in Dutch and English are functionally more ambiguous than in German, in the sense that the reference assignment of Dutch and English pronouns is not only based on a structural rule (i.e. 'pronouns cannot bind locally', cf. Principle B [1]), but also on discourse rules (e.g., Rule I [2]). In contrast, reference assignment of German object pronouns is more reliably based on this structural rule. Can this cross-linguistic difference explain why German children interpret object pronouns correctly [3], whereas Dutch (and English) children frequently incorrectly allow object pronouns like *him* in '*The hedgehog tickles him*' to refer to the sentential subject (Delay of Principle-B Effect (DPBE); e.g., [4])? We hypothesize that the difficulty for Dutch (and English) children in pronoun processing may be learning when an object pronoun can have a local referent and when not.

To examine this hypothesis, we investigate whether Dutch and German adults process object pronouns in different ways. In Dutch, Vogelzang et al. [5] found that more effort is needed to resolve pronominal compared to reflexive objects as measured by pupil size. They reason that this is due to reflexives being less ambiguous than object pronouns. Following this reasoning, we hypothesize that in German, where establishing object pronoun reference is argued to be more straightforward and therefore less ambiguous, there is no or less increased processing effort when resolving a pronominal compared to a reflexive object compared to Dutch.

We replicated the study of Vogelzang et al. in German, presenting German adults with auditory mini-stories (see the example in 2a-2c), of which the last clause contained either an **object pronoun** or a **reflexive**. Pupil size was recorded continuously during the sentence, and analyzed from the critical word in the last sentence (bold printed in 2c) onwards.

(2a) Der Igel hat ein Baumhaus gebaut.
The hedgehog has built a tree house.
(2b) Letzte Woche Freitag lief der Igel mit dem Panda durch den Wald nach Hause,
Last Friday the hedgehog walked home with the panda through the forest,
(2c) während der Igel **sich** / **ihn** über den dunklen Pfad beeilt / verfolgt hat.
*while the hedgehog hurried **himself** / followed **him** along a dark trail.*

Data collection and analysis is currently ongoing. Preliminary results show no differences between adults' processing of pronominal objects compared to reflexives in German. This suggests that in Dutch, traces of the DPBE, which only occurs in children, can still be seen in adults when sensitive, online measurements like pupil size are applied. In German, on the other hand, no DPBE occurs and thus no processing difficulties for object pronouns exist. We argue that these findings are a first step towards explaining why Dutch children have more problems interpreting object pronouns than German children.

[1] Chomsky, N., 1981. *Lectures on Government and Binding*. Dordrecht, The Netherlands: Foris Publications. [2] Grodzinsky, J., Wexler, K., Chien, Y.-C., Marakovitz, S., & Solomon, J. (1993). The Breakdown of Binding Relations. *Brain and Language*, *45*, 396–422. [3] Ruigendijk, E., Friedmann, N., Novogrodsky, R., & Balaban, N. (2010). Symmetry in comprehension and production of pronouns: A comparison of German and Hebrew. *Lingua*, *120*(8), 1991–2005. [4] Koster, C. (1993). *Errors in anaphora acquisition* (Doctoral dissertation). Groningen, The Netherlands: University of Groningen. [5] Vogelzang, M., Hendriks, P., & Van Rijn, H. (2017). Pupillary responses reflect ambiguity resolution in pronoun processing. *Language, Cognition and Neuroscience, 31*(7), 876-885.