Discourse-based pronoun resolution in non-native sentence processing

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We report the results from an eye-tracking experiment and a questionnaire comparing native (L1) and non-native (L2) German speakers' resolution of personal pronouns. Building on and extending previous work, we investigated whether and when during processing a c-commanding potential binder and/or an extra-sentential coreference antecedent would be considered.

Background. A growing body of research suggests differences in the way L1 and L2 comprehenders resolve pronouns in real time, such that L2 speakers rely more strongly than L1 speakers on discourse/pragmatic cues (e.g. Felser & Cunnings, 2012; Kim et al., 2015). While pronouns can be linked to referential antecedents at the discourse-representational level via coreference assignment (CR), they must be linked to quantified antecedents in logical syntax via variable binding (VB). The latter, but not the former, normally requires c-command (Grodzinsky & Reinhart, 1993; Reuland, 2011). Trompelt and Felser (2014) showed that L2 learners of German tend to link ambiguous pronouns to a non-commanding CR antecedent (a proper name) rather than to a c-commanding variable binder (a quantified noun phrase, QP) both offline and during processing. However, it is not clear whether the L2 speakers' online preference for CR resulted from difficulty computing VB relationships during processing, or from the proper name being linearly closer to the pronoun than the competing variable binder (cf. Cunnings et al., 2014).

Method. We recorded the eye-movements of 48 L1 German speakers (12 male, mean age: 27) and 48 L1 Russian-speaking advanced (C1) learners of German (7 male, mean age: 27, German age of acquisition: ≥7) while they silently read two-sentence texts (n=24) such as (1a-c), whose second sentence contained an embedded 3rd person singular object pronoun. Two potential antecedents containing [+human] role nouns were available: a definite noun phrase (DP) as the subject of the first sentence and potential CR antecedent, and a QP introduced by the universal quantifier *jede/jeder* ('every$_{fem/masc}$') as the subject of the second sentence. The QP can only be linked to the pronoun via VB. Like German, Russian also allows personal pronouns to have a bound variable reading (Asarina, 2005; Bailyn, 2012). Three conditions were obtained in a gender-mismatch paradigm, with either one or both antecedents matching the pronoun in gender. Linear mixed-models containing fixed-effects of Condition were fit for various reading-time measures. After the main eye-tracking experiment, participants' ultimate interpretations were examined in an untimed antecedent decision task.

Results & discussion. Both groups preferred to link the pronoun to the CR antecedent offline, confirming earlier findings by Trompelt and Felser (2014). However, participants' real-time processing of the pronoun showed divergent patterns. Multiple Condition x Group interactions emerged in an initial between-groups analysis. Subsequent per-group analyses revealed significant QP gender-mismatch effects for the L1 group (e.g. rereading times: t=2.615, p=.009). Our L2 group, by contrast, was significantly slowed down by a DP gender mismatch (e.g. rereading times: t=2.052, p=.048). Furthermore, at the spillover region, the DP-mismatch condition elicited *shorter* reading times for our L1 group than the QP-mismatch condition (total reading times: t=-1.726, p=.092; Figure 1), but *longer* reading times for our L2 group (regression-path times: t=2.822, p=.01; Figure 2). These L1/L2 differences in terms of the nature and timing of the effects indicate that during real-time comprehension, our L1 participants tried to resolve the pronoun via VB and our L2 participants via discourse-based CR. This was despite the fact that the CR antecedent was located outside the current sentence, unlike in Trompelt and Felser's (2014) study. Note that a universally quantified noun phrase is non-referential and indicates a conceptual plurality despite being grammatically singular. This does not affect its suitability as a variable binder but renders it a poor match if pronoun resolution is attempted via the coreference route rather than via binding. The observed L1/L2 differences show that pronoun resolution can be attempted via different routes, or at different representational levels, and support the claim that during processing, information sources can be differently weighted across populations (Clahsen & Felser, 2018; Cunnings, 2017).

(1a) DOUBLE-MATCH
Der Sekretär *war neu im Büro.*
Jeder Kollege *glaubte, dass man* ***ihn*** *nächstes Jahr befördern würde.*

(1b) QP/VB MISMATCH
Der Sekretär *war neu im Büro.*
Jede Kollegin *glaubte, dass man* ***ihn*** *nächstes Jahr befördern würde.*

(1c) DP/CR MISMATCH
Die Sekretärin *war neu im Büro.*
Jeder Kollege *glaubte, dass man* ***ihn*** *nächstes Jahr befördern würde.*

'The secretary$_{\{masc/fem\}}$ was new in the office.
Every colleague$_{\{masc/fem\}}$ believed that he would be promoted next year.'

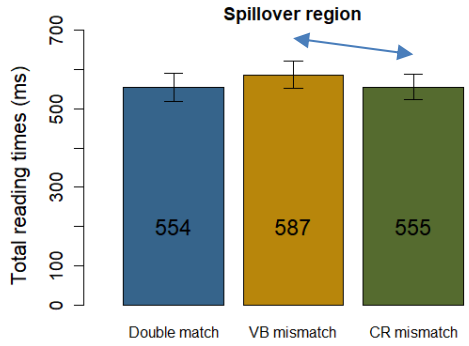

Figure 1. Total reading times at the spillover region (*nächstes Jahr*), L1 group.

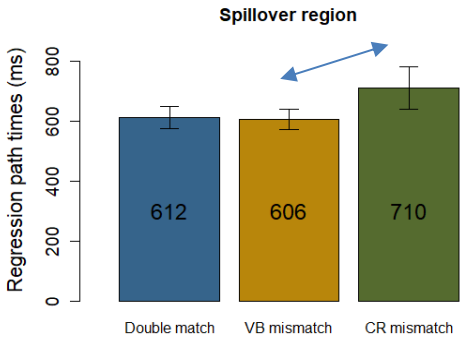

Figure 2. Regression-path times at the spillover region (*nächstes Jahr*), L2 group.

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