Processing grammar-based and knowledge-based gender cues in pronoun resolution: Further evidence from eye-movements

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The present eye-tracking study addresses the processing of grammatical and stereotypical gender cues in pronoun resolution in German. Previous studies in German examined the resolution of noun phrase anaphors and showed early influences of grammatical and conceptual features (i.e., grammatical gender and gender typicality) of role nouns on anaphor resolution (e.g., Irmen, 2007). In the present study we investigated the resolution of pronouns referring to gender typical role nouns. We expected that the task of pronoun resolution, in contrast to resolving semantically richer NPs, would mainly depend on morphosyntactic features and that conceptual information such as antecedent gender typicality would only influence processing during later stages.

Experimental sentences consisted of two clauses and contained typically male, female, and neutral role nouns as antecedents in the first clause and personal pronouns (er\textsubscript{MasculineSg}/he or sie\textsubscript{FeminineSg}/she) as anaphors in the second. Role nouns and pronouns always served as subjects in their respective clause (e.g., Oft hatte der Elektriker gute Einfälle, regelmässig plante er neue Projekte/Often had the electrician good ideas, regularly planned he new projects; word by word translation to preserve the structure). Role nouns were presented in masculine or feminine form. Their gender typicality and grammatical gender could be congruent or incongruent (e.g., Elektrikerin\textsubscript{FeminineMale} [female] electrician, Kosmetiker\textsubscript{MasculineFemale} [male] beautician). The pronoun in turn could be congruent to the grammatical gender and/or the typical gender of the antecedent. Analyses were conducted for the role noun and for the pronoun plus the following adjective as pronoun region.

First pass reading times of the pronoun region showed an interaction between the grammatical gender of the role noun and the pronoun gender (Figure 1). Both masculine and feminine pronouns were fixated shorter when they followed a grammatically congruent antecedent. Furthermore, regressions out of the pronoun region were less likely to occur in the case of congruent than incongruent grammatical gender of antecedent and pronoun. Gender typicality of the antecedent did not affect any measure of the pronoun region.

Total fixation times of the role noun showed that it was fixated longer when its grammatical gender was incongruent with the pronoun. In this case of incongruity regressions into the role noun were also more likely. However, conditionalizing on the launching region showed that regressions coming from the pronoun region were only affected by incongruity in terms of grammatical gender, whereas regressions coming from the spillover region following the pronoun region were also affected by incongruity in terms of gender typicality. Finally, there was an interaction between the grammatical gender and typicality of the role noun. Both masculine and feminine role nouns were fixated longer in case of incongruent as compared to congruent typicality.

Results show that early stages of pronoun resolution are guided by grammatical features such as grammatical gender and that background knowledge about typical gender roles influences later stages as reflected in total fixation times of the antecedent or regressions into the antecedent from the spillover region of the pronoun. Our finding is well in line with two-stage models of anaphor resolution (e.g., Garrod & Terras, 2000), which claim that the first stage of resolution is influenced by lexical features only, whereas the second stage can
also be affected by semantic information (context, discourse, background knowledge). The present results will be compared with recent data from a study that tested NP anaphors as opposed to pronouns.

References:
