

Late gender-congruency effects in Polish cataphoric pronouns: Evidence from eye-tracking during reading

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Cataphoric pronoun resolution has been argued to involve an active search for a potential antecedent, reflected in gender-mismatch effects: longer processing times when a cataphoric pronoun mismatches the gender of a subsequently encountered proper name [1], as in (A). This search is constrained by Condition C [2], which blocks coreference between a pronoun and a following noun in certain structural configurations. In self-paced reading, the absence of gender-mismatch effects in Condition C configurations has been taken as evidence for early structural filtering [3,4]. Eye-tracking studies on German, however, suggest that Condition C may operate later: early measures can show gender-mismatch effects even in Condition C configurations, whereas later measures reflect the constraint [5,6]. The present study extends this debate to Polish and builds on previous co-reference judgment findings from the same project.

The experiment used eye-tracking during natural reading with a gender-congruency manipulation. Materials consisted of 40 target sentence pairs distributed across four lists: 24 testing Condition C and Non-Condition C configurations, as in (C-D), and 16 *kiedy* 'when'-clause configurations, as in (B), where coreference between the pronoun and the following proper name is structurally possible. Each target sentence contained a cataphoric pronoun followed by a proper name, and the critical manipulation was gender congruency between them. Each list also included twice as many filler sentences as experimental items. Native speakers of Polish read the sentences silently while their eye movements were recorded. Following [6], the analyses employed linear mixed modelling and targeted the proper name and a spillover region consisting of the two following words. The measures were first fixation duration, gaze duration, go-past time, total reading time, and re-reading time. No effects were found in first fixation duration, gaze duration, or go-past time, indicating that gender congruency did not affect the earliest stages of processing.

For the Condition C vs. Non-Condition C sentences, the proper name region showed a significant gender congruency x sentence type interaction in total reading time. Estimated marginal means revealed a significant gender-congruency effect in Condition C sentences, but not in Non-Condition C sentences. Crucially, the effect in Condition C sentences went in the opposite direction to the standard gender-mismatch effect: names in gender-matching sentences were read longer than names in gender-mismatching sentences. Re-reading time also showed a significant interaction, but follow-up comparisons did not reveal a significant gender-congruency effect within either sentence type separately.

In the spillover region, the interaction between gender congruency and sentence type was marginal in total reading time, with marginal gender-congruency effects in both Condition C and Non-Condition C sentences. In the *kiedy*-clause sentences, the gender-congruency effect was only marginally significant in total reading time in the proper name region and did not emerge in the spillover region.

Taken together, the findings suggest that gender information affects Polish cataphoric pronoun resolution mainly during later re-reading or integrative processing. The absence of the expected effect in Non-Condition C sentences suggests that structurally possible cataphoric dependencies did not automatically trigger a robust gender-based active search in the present study. At the same time, the increased total reading times for gender-matching names in Condition C sentences may indicate sensitivity to gender-based compatibility between the pronoun and the following name, leading to additional evaluation of this relation

even when coreference is constrained by Condition C. Thus, the results provide the first eye-tracking evidence on Condition C effects in Polish, but support neither a straightforward early active-search account nor a simple late-filter account. Instead, they point to delayed and sentence-type-dependent sensitivity to gender congruency.

Examples:

(A) a. *When she₁ was fed up, the boy₂ visited the girl₁ very often.*

b. *When he₁ was fed up, the boy₁ visited the girl₂ very often.*

(B) *Kiedy przeniesiono go₁/ją₂ do innej klasy, Janek₁ znacznie poprawił się w matematyce i biologii. Małgosia₂ też przestała mieć problemy w nauce.*

'When he₁/she₂ was moved to another class, Janek₁ improved significantly in maths and biology. Małgosia₂ also stopped having learning problems.'

(C) *Jego₁/Jej₂ teściowie oświadczyli, że w ubiegłym miesiącu Adrian₁ wyprowadził się z rodzinnego domu do Warszawy. Oczywiście Anna₂ nie była tym zaskoczona.*

'His₁/Her₂ in-laws stated that last month Adrian₁ had moved out of the family home to Warsaw. Obviously, Anna₂ was not surprised by this.'

(D) *On₁/Ona₂ oświadczył/oświadczyła, że w ubiegłym miesiącu Adrian wyprowadził się z rodzinnego domu do Warszawy. Oczywiście Mirek₁/Anna₂ nie był/była tym zaskoczony/zaskoczona.*

'He₁/She₂ stated that last month Adrian had moved out of the family home to Warsaw. Obviously, Mirek₁/Anna₂ was not surprised by this.'

References:

- [1] van Gompel, R. P. G., & Liversedge, S. P. (2003). The influence of morphological information on cataphoric pronoun assignment. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 29(1), 128-139. <https://doi.org/10.1037/0278-7393.29.1.128>
- [2] Chomsky, N. (1981). *Lectures on government and binding*. Foris Publications.
- [3] Kazanina, N., Lau, E. F., Lieberman, M., Yoshida, M., & Phillips, C. (2007). The effect of syntactic constraints on the processing of backwards anaphora. *Journal of Memory and Language*, 56(3), 384-409. <https://doi.org/10.1016/j.jml.2006.09.003>
- [4] Kazanina, N., & Phillips, C. (2010). Differential effects of constraints in the processing of Russian cataphora. *Quarterly Journal of Experimental Psychology*, 63(2), 371-400. <https://doi.org/10.1080/17470210902974120>
- [5] Drummer, J.-D., & Felser, C. (2018). Cataphoric pronoun resolution in native and non-native sentence comprehension. *Journal of Memory and Language*, 101, 97-113. <https://doi.org/10.1016/j.jml.2018.04.001>
- [6] Patterson, C., & Felser, C. (2019). Delayed application of Binding Condition C during cataphoric pronoun resolution. *Journal of Psycholinguistic Research*, 48(2), 453-475. <https://doi.org/10.1007/s10936-018-9613-4>