

Experimental evidence for the status of the Right-Frontier Constraint

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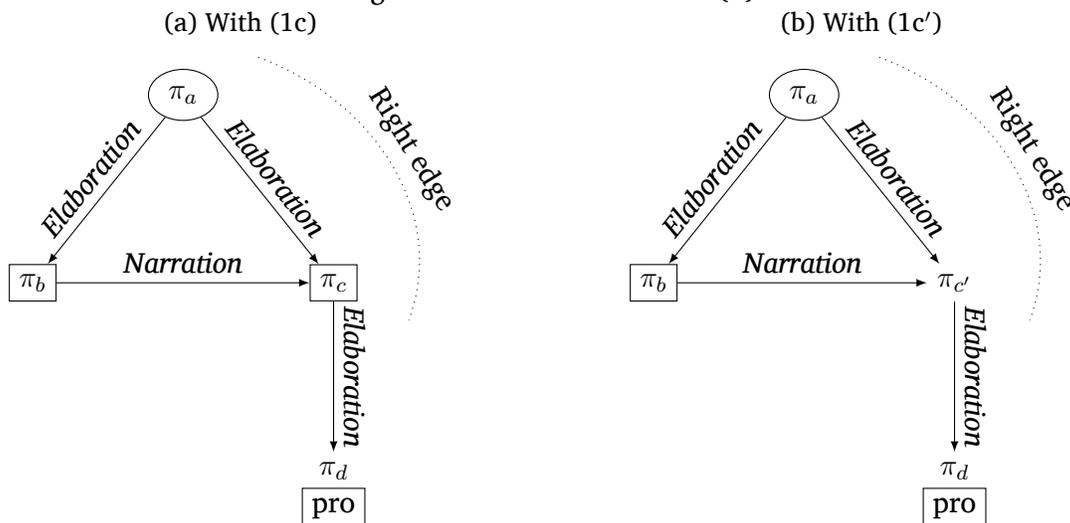
This study presents evidence that the Right-Frontier Constraint (RFC) is one of multiple factors that influence the production and coherence of pronouns. The RFC posits that the eligibility of antecedents for pronouns is determined by discourse structure (Polanyi 1985; cf. also Cristea, Ide & Romary 1998 on Veins Theory). Specifically, antecedents are eligible if their constituent sentences are on the right edge of the discourse tree, as determined by subordinating and coordinating discourse relations (in the sense of Asher & Vieu 2005). The RFC has been supported by some corpus evidence (Afantenos & Asher 2010), especially with propositional anaphora (Webber 1988; Asher 1993). Other corpus studies have argued against the existence of the RFC; instead, eligible antecedents are determined by linear closeness in the discourse (e.g. Tetreault & Allen 2003; Chiarcos & Krasavina 2008). More recently, Zeldes (2018) proposes that the RFC is violable, but one of multiple factors that influence pronoun production and coherence.

We tested Zeldes’s (2018) proposal by examining the RFC and linear closeness in an experimental setting. To test these factors, we constructed a series of discourses like (1). The discourses contain two human referents: *Jeannine* introduced in (1a), circled; and *student* introduced in (1b), boxed. In half of the contexts, *student* is mentioned in (1c); in the other half, it is not (1c’). The final sentence (1d) contains a referent coindexed with one of the antecedents.

- (1) a. Jeannine enjoys volunteering in her community.
 b. Last year, a high school student asked for help applying to college.
 c. Just yesterday, the student received acceptance letters in the mail.
 c’. Just yesterday, college acceptance letters came out.
 d. She got into Harvard!

We assume a discourse structure for (1) as in Figure 1. The two sentences (1b–c) are in a sequence of events, *Narration*, and they both elaborate upon (1a). Finally, (1d) elaborates upon (1c). In terms of linear closeness, student is always closer to (1d) than Jeannine. In terms of the RFC, Jeannine is always accessible to (1d), as (1a) is on the right edge. Student is only accessible if it is mentioned in (1c), which is also on the right edge.

Figure 1: Discourse trees for (1)



We conducted a forced choice task experiment with 50 participants on Amazon Mechanical Turk. Participants read discourses like (1) and were given a forced choice to complete (1d) by filling in a pronoun or full NP (i.e. *the student*). Each participant completed 8 tasks, including 2 fillers. The experiment had a 2x2 design with two binary factors. First, discourses contained either (1c) or (c'). Second, *Jeannine* and *student* either matched in grammatical gender or mismatched. This was specified by an intervening sentence after (1b) of the form *She needed help editing her essays* or *He needed...* The RFC predicts that pronouns referring to *student* should only be chosen when the antecedent is on the right edge (i.e. 1c). Linear closeness predicts no such difference.

We find that RFC effects arise when there is a grammatical gender match between the two antecedents, and linear closeness effects arise when there is a mismatch. Figure 2 presents the results for coreference of *student*. The shaded boxes indicate the outcome predicted by the RFC. When there is a match (Figure 2a), pronouns are more often chosen when *student* is on the right edge (1c), and NP's are more often chosen when it is not (1c'). However, when there is a mismatch (Figure 2b), RFC effects do not arise. The rate of pronoun choice does not vary between the two conditions. Simple t-tests conclude that there is a statistically significant difference between the two columns in Figure 2a, but no between those in Figure 2b.

Figure 2: Results for forced choice task (RFC prediction in bold)

| (a) With grammatical gender match | | | (b) With grammatical gender mismatch | | |
|-----------------------------------|--------------|-------------|--------------------------------------|--------------|-------------|
| | + Right edge | –Right edge | | + Right edge | –Right edge |
| Pro | 20% | 77% | Pro | 61% | 56% |
| Full NP | 80% | 23% | Full NP | 39% | 44% |

These results support Zeldes's (2018) proposal that the RFC is one of multiple violable factors in pronoun reference. Here, the RFC is active when there is competition between multiple possible antecedents. This suggests that the RFC has a disambiguating function. It also explains why RFC effects are prominent with propositional anaphora (Webber 1988; Asher 1993): each new sentence necessarily introduces competition for propositional anaphora, as they themselves constitute another proposition. By contrast, competition for anaphora like *she* only arises when multiple appropriate referents are introduced. We also present results on reference to *Jeannine* in these contexts and found that participants almost universally chose full NP's at a rate of 97%, in accord with a linear closeness account. Finally, we present corroborating evidence from a rating task using the same discourses as above. Again, grammatical gender match induces RFC effects, while linear closeness prevails in the case of mismatch. This implies that hearers also compute the RFC when they are anticipating pronominal antecedents when there is competition.

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