

## Generalizing models of pronoun interpretation to ambiguous definite noun phrases

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Most research on reference processing focus on the interpretation of third person ambiguous pronouns. In this work, we tested whether Kehler and Rohde's (2013) expectation-based model [1] could also account for the resolution of ambiguous definite Noun Phrases (DefNP) as "the boy" in sentences like (1-2), a direct translation of our experimental items in Brazilian Portuguese (BP).

(1) César<sub>source</sub> kicked the ball to Ricardo<sub>goal</sub>. The boy...

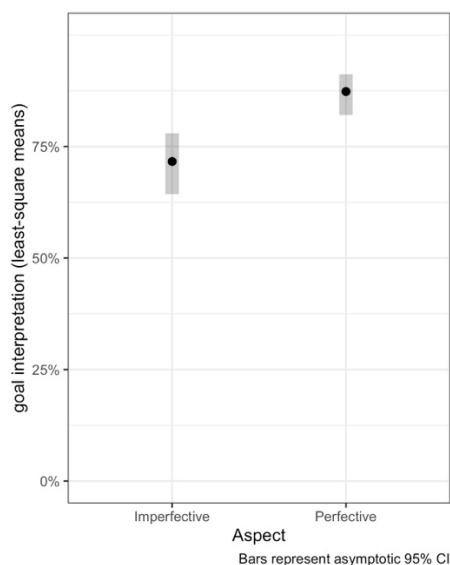
(2) César<sub>source</sub> was kicking the ball to Ricardo<sub>goal</sub>. The boy...

According to Kehler and Rohde's model (i) certain referential expressions are preferably produced based on the syntactic function of its antecedent (the production bias), (ii) coherence relations give rise to expectations about which referent is more likely to be mentioned next (the next-mention bias), (iii) pronoun interpretation result from the interplay between these two biases. Although these premises could apply to any referential form, their experimental evidence comes from studies on pronominal resolution [2,3,4].

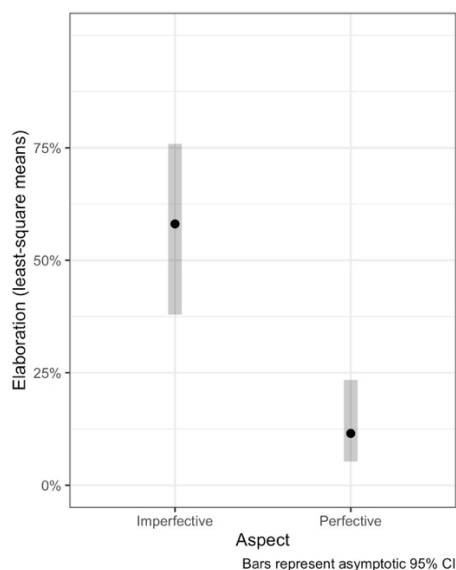
Regarding the production bias, previous studies on BP [3,4] and other languages [2] have shown that non-pronominal expressions are more likely to be produced when the speaker wants to signal the referent occupying the syntactic position of object in the previous sentence. Therefore, one could expect that ambiguous DefNP would preferably be interpreted as co-referring to the goal of the previous sentence in (1) and (2). However, this preference would be greater in (1). According to Kehler and Rohde's model, this would arise as a side-effect of the next-mention bias. Perfective sentences increase the likelihood of coherence relations such as Occasion, because it highlights the end state of an event, and as a result the goal becomes more prominent than the source. On the other hand, perfective sentences are more likely to be followed by Elaboration, a coherence relation that focuses on how the event unfolds. In this context, the source is more prominent than the goal. These patterns in coherence relations and their effect on referential ambiguity were attested by experiments on pronoun interpretation in BP [3,4] and other languages [2], but to the best of our knowledge it has never been reported for other types of referential expressions such as DefNP.

To test these hypotheses, we ran a sentence completion task. Sixty-six BP native speakers completed 18 sentences like (1-2), all of them used in previous experiments that focused on ambiguous pronoun comprehension [3,4, see Note 1]. Three independent judges annotated (i) the interpretation assigned to the ambiguous DefNP; (ii) the coherence relation that held across both sentences. We removed all data that remained ambiguous (7.5% data loss). A mixed-effect logistic regression with random intercepts for subjects and items showed a preference for goal interpretation in both contexts, and an increase in this preference for perfective sentences ( $\chi^2(1) = 26.36$ ;  $p < 0.0001$ ; cf. Figure 1). Occasion ( $n = 305$ , 39%) and Elaboration ( $n = 142$ , 18%) were the most common coherence relations. A second mixed-effect logistic regression, with coherence relation as the response variable and aspect as a predictor, showed that preference for Elaboration decreases in perfective contexts ( $b = -2.36$ ,  $SE = 0.33$ ,  $p < 0.0001$ ; cf. Figure 2). A final analysis checked whether Aspect, Coherence relation (both centered in [-.5, .5]) and their interaction affected the interpretation of DefNP. Results are depicted in Figure 3 and show no significant interaction ( $\chi^2(1) = 1.35$ ,  $p = 0.24$ ). A main effect of Coherence Relation showed that goal interpretations are more common in Occasion than in Elaboration ( $b = 4.81$ ;  $SE = 0.59$ ,  $p < 0.0001$ ). These results corroborate our initial expectations and show that the interpretation of ambiguous DefNP can be explained by Kehler and Rohde's (2013) expectation-driven model.

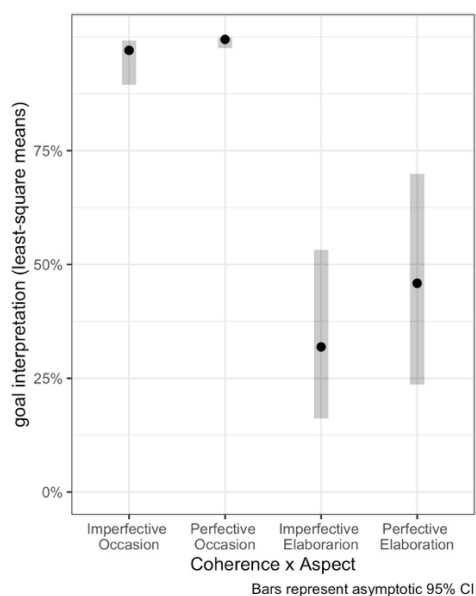
## Figures



**Figure 1:** Estimated frequency of goal interpretation following perfective and imperfective sentences.



**Figure 2:** Estimated frequency of Elaboration coherence relations following perfective and imperfective sentences.



**Figure 3:** Estimated frequency of goal interpretation for coherence relations and verbal aspect

### Note

[1] On previous experiments in BP with sentences such as “César kicked/was kicking the ball to Ricardo. He...”, there was a clear goal bias in pronoun interpretation for perfective verbs, but a source bias for imperfective verbs.

[2] The addition of random slopes in the linear models caused convergence issues.

### References

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