

Investigating the comprehension of implicit objects in Brazilian Portuguese

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Some expressions demand antecedents and normally result in referential failure and processing difficulty without an antecedent, e.g. *Anna shot at Linda as he jumped over the fence* [1]. Other expressions can occur with an explicit antecedent (e.g. *My cats love fish. They are very fond of tuna*) or without one (e.g., *On the train, they served really bad coffee*) [2,3]. Thus, the language processor needs to recognize elements as **antecedent-demanding** (e.g. ‘s/he’) or **antecedent-accepting** (‘they’).

However, what happens in a case such as implicit direct objects (IOs) in Brazilian Portuguese, which can seemingly be **either** antecedent-accepting (*A Ana estava lendo Ø.*) or antecedent-demanding (*#A Ana estava folheando Ø.*)? The referential behavior of IOs in BP depends on the verb: with **Obligatorily-Transitive (OT) verbs**, IOs are *antecedent-demanding* (‘null objects’/‘anaphoric IOs’). With **OPTionally Transitive (OPT) verbs**, IOs are *antecedent-accepting*: they can refer back to **an antecedent** (book in (1), ‘anaphoric IO’) or evoke the existence of a referent (‘existential IO’).

We report an experiment on how verbs guide the processing of IOs in BP. We use sentences like (1) to compare contexts with and without (overt) antecedents to test the strength and timing of verb effects on whether an IO is interpreted as antecedent-demanding or antecedent-accepting, as reflected by *potential processing difficulties with IOs in contexts lacking antecedents*. Further, we also set up our sentences so that they allow us to compare configurations with overt vs. implicit antecedents to see if antecedent-demanding IOs are easier to process with overt or implicit antecedents. **Design:** 45 native BP speakers did a self-paced reading task (20 targets/32 fillers). We manipulated antecedent availability (**present**/absent) and verb type (**OT/OPT**), see (1). Questions (*Did Clara read/flip-through a book?*) followed targets: ‘yes’ means the IO found an antecedent.

(1) Example item (The study had 20 OT verbs; 20 OPT verbs and a Latin-Square design)

A Clara {entrou / **escolheu um livro**}, {**leu**_{OPT} / **folheou**_{OT}} no sofá da sala,
Clara {entered / **picked a book**}, {**read**_{OPT} / **flipped-through**_{OT}} on couch of room,
depois **guardou** na estante...
then **put-away** on shelf...

Q1 Presence vs. absence of antecedents: If missing antecedents cause slowdowns and if the referential needs of IOs are modulated by verb semantics in real time, we predict that conditions with OT verbs (antecedent-demanding IOs) should elicit slower RTs after the **critical verb** (*read/flipped through*) in antecedent-absent than antecedent-present conditions (*entered/picked a book*). OPT conditions (antecedent-accepting IOs) should be equally easy to process in both conditions.

Q2 Overt vs. implicit antecedents: We also test whether processing ease of antecedent-demanding IOs depends on whether the antecedent is overt or implicit. Although implicit referents are less accessible for subsequent reference [9,10,11,12], they do not always cause comprehension difficulties [13]. We investigate if antecedent-demanding IOs with implicit antecedents will be more difficult than overt (more accessible) antecedents. We tested Q2 by having all targets end with another antecedent-demanding OT verb’s IO (e.g., *guardou* ‘put away’). If implicit antecedents are less accessible, conditions with OPT verbs and no antecedent (which yield an implicit antecedent, the something being read) should elicit slower reading times after the final OT verb (*guardou*).

Q1/Fig.1 shows reading times (RTs): Conditions with OT verbs and *no antecedent* are read slower at two words following the verb (lmer, p ’s<.05) relative to OT conditions *with antecedents*. No such effects appear with OPT verbs. This supports our prediction that comprehenders face difficulties when *the verb signals the IO is antecedent-demanding but no antecedent is available*. **Q2/**RTs at the second IO verb (*guardou*) show no differences between overt/implicit antecedent conditions or a control condition without OT/OPT verbs. Comprehension questions (Fig.2) show a strong bias to interpret *the IO as coreferential with the antecedent whenever there is one* (no effects of verb type).

In sum, we find that IOs that *require* an antecedent cause processing difficulty when no antecedent is available, but no difficulties arise when at least an implicit antecedent is available: implicit and overt antecedents are equally suitable for satisfying an antecedent-demanding IO.

Fig1. Word-by-word RTs/ms, error bars +/- 1 SE (Q1 critical region in red, Q2 in purple)

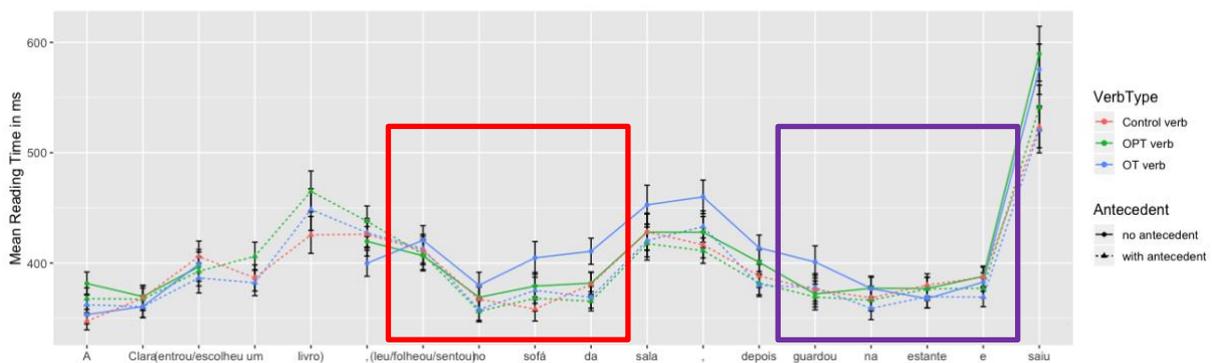
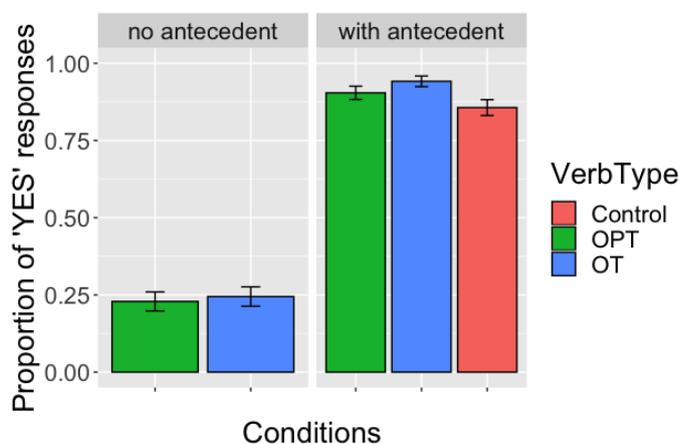


Fig.2 Comprehension Questions (a 'yes' answer indicates that the IO is interpreted as anaphoric)



References [1] Van Berkum, J. J., Koornneef, A. W., Otten, M., & Nieuwland, M. S. (2007). Establishing reference in language comprehension: An electrophysiological perspective. *Brain research*, 1146, 158-171. [2] Sanford, A. J., Filik, R., Emmott, C., & Morrow, L. (2008). Short Article: They're Digging up the Road Again: The Processing Cost of Institutional They. *Quarterly Journal of Experimental Psychology*, 61(3), 372-380. [3] Gerrig, R. J. (1986). Process models and pragmatics. *Advances in cognitive science*, 1, 23-42. [4] Condoravdi, C., and J. M. Gawron (1996) "The Context-Dependency of Implicit Arguments," in M. Kanazawa, C. J. Pin on, and H. de Swart, eds., *Quantifiers, Deduction, and Context*, CSLI, Stanford, CA, 1-32. [5] Fillmore, C. J. (1986). Pragmatically controlled zero anaphora. In *Proceedings of Berkeley Linguistics Society 12*, 95-107. Berkeley, Calif.: Berkeley Linguistics Society. [6] AnderBois, S. (2012). Indefiniteness and the typology of implicit arguments. In *Proceedings of the West Coast Conference on Formal Linguistics (WCCFL 30)* (pp. 232-240). [7] Kato, M., & Roberts, I. (1993). Portuguese Brasileiro. *Uma viagem diacrônica*. Campinas: Editora da Unicamp. [8] Cyrino, S., & Lopes, R. (2016). Null objects are ellipsis in Brazilian Portuguese. *The Linguistic Review*, 33(4), 483-502. [9] Williams, A. (2015). *Arguments in syntax and semantics*. Cambridge University Press. [10] Besserman, A., & Kaiser, E. (2019). The discourse status of implicit objects: Evidence from language production. In *Proceedings from the Annual Meeting of the Chicago Linguistic Society* (Vol. 55, No. 1, pp. 17-31). Chicago Linguistic Society. [11] Ariel, M. (2001). Accessibility theory: An overview. *Text representation: Linguistic and psycholinguistic aspects*, 8, 29-87. [12] Gundel, J. K., Hedberg, N., & Zacharski, R. (1993). Cognitive status and the form of referring expressions in discourse. *Language*, 274-307. [13] Cornish, F., Garnham, A., Cowles, H. W., Fossard, M., & André, V. (2005). Indirect anaphora in English and French: A cross-linguistic study of pronoun resolution. *Journal of Memory and Language*, 52(3), 363-376.