

## The processing of anaphoric encapsulation versus coreference in Spanish: An experimental approach with eye-tracking.

**Research question, hypotheses and state of art.** This pragmatic-experimental study seeks to draw the cognitive processing pattern of anaphoric encapsulation<sup>1</sup> in Spanish compared to that of traditional coreferential anaphora<sup>2</sup>. Anaphoric encapsulation is an activating, condensing and categorizing mechanism of predicative information previously mentioned in the discourse [1]. Three research questions are posed:

[i] Does encapsulation require greater processing efforts than coreference?

→ Hypothesis 1: Encapsulation requires greater processing efforts than coreference, because they condense more information than coreferential anaphora (predicative vs. nominal antecedent).

[ii] Does pronominal encapsulation require greater processing efforts than lexical encapsulation?

→ Hypothesis 2: Pronominal mechanisms, that are the minimum expression of categorization, require greater processing efforts than lexical ones.

[iii] In lexical encapsulation, does a higher degree of categorization require greater processing efforts than a lower degree of categorization?

→ Hypothesis 3: Encapsulators with a higher degree of categorization (degree of new given information) require greater processing efforts than those with a lower degree of categorization.

Unlike coreference, there are still few experimental studies on encapsulation [2] and so far none of these have been able to delimit its boundaries accurately so as to isolate it as a distinctive mechanism.

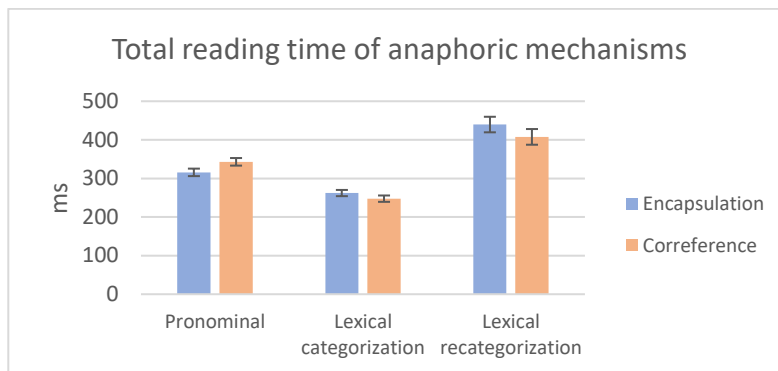
**Method.** To measure the processing efforts (ms) of the anaphoric mechanisms, an experimental online reading test in Spanish was carried out using eye-tracking methodology (N=340). The test is made up of six conditions<sup>3</sup>: Three coreferential levels and their encapsulating analogues, until now ill-defined in the existing literature [3]. These levels move on a continuum from less categorizing mechanisms to more (re)categorizing ones. The critical items were counterbalanced by condition with a Latin square and randomized by item. For the interpretation of the data, the variables were crossed with each other. Both the experimental design and the statistical method used (mixed models, which allows a more flexible qualitative interpretation and the normalization of hidden variables [4]) have been tested in numerous experimental pragmatics studies [5].

**Results.** The collected data were analyzed considering three parameters: Total reading time (TRT), first reading time (FRT) and re-reading time (RRT). The results obtained reveal (i) that the processing efforts of anaphoric mechanisms are minimized when it comes to encapsulation (*this, esto* – condition 2, Table 1) compared to coreference (*this, este/esta* – condition 1); (ii) that lexical expressions (*the review* – condition 4) never result in more processing efforts than pronominal ones (*this* – condition 2); and (iii) that the processing of lexical encapsulators depends on the level of (re)categorization, since the more categorical the encapsulator is, the greater and the more unstable the processing efforts it generates (*the boring text* – condition 6 vs. *the review* – condition 4).

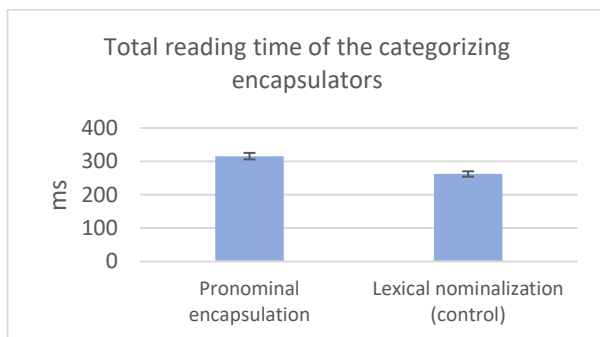
**Discussion.** Hypothesis 1 is partially met: Compared to coreference, encapsulation slows the FRT, but minimizes the processing efforts in the RRT, so that the TRT favors encapsulation (Graph 1). Hypothesis 2 is fulfilled: Contrary to what might be assumed, the processing of lexical expressions is never more difficult than that of pronouns. Lexical expressions, which are more informative than pronouns, did not incur any processing penalty, presumably because their antecedent was not prominent [6-7] (Graph 2). Hypothesis 3 is fulfilled: The data obtained demonstrate the extra efforts generated by the recategorizing expressions compared to the less categorizing ones, owing to the high amount of new information that the interlocutor must accommodate during reading (Graph 3).

This study reveals that the encapsulation processing pattern is unique and different from that of other referring expressions. It is a highly efficient mechanism that, despite its cognitive complexity, does not hinder processing compared to coreference at a global level. This project aims to contribute to the understanding of reference processing, from the perspective of relevance theory [8] and accessibility theory [9].

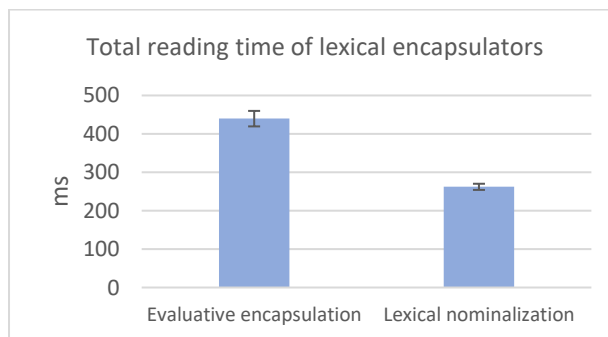
**References.** [1] Schmid (2000) *English abstract nouns as conceptual shells: From corpus to cognition*. Berlin/Boston: De Gruyter Mouton. [2] Parodi et al. (2019) Stepping back to look ahead: Neuter encapsulation and referent extension in counter-argumentative and causal relations in Spanish. *Language and Cognition*. [3] Borreguero Zuloaga (2018) Los encapsuladores anafóricos: una propuesta de clasificación. *Caplletra*. [4] Baayen et al. (2008) Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*. [5] Loureda et al. (2021) Comunicación, partículas discursivas y pragmática experimental. Madrid: Arco/Libros. [6] Gelormini-Lezama & Almor (2013) Singular and plural pronominal reference in Spanish. *Journal of Psycholinguistic Research*. [7] Çokal, et al. (2016) Processing of *it* and *this* in written narrative discourse. *Discourse Processes*. [8] Sperber & Wilson (1986) *Relevance: Communication and cognition* (2<sup>nd</sup> ed.). Oxford: Blackwell and Cambridge. [9] Ariel (1988) Referring and accessibility. *Journal of Linguistics*.



Graph 1. TRT of the studied anaphoric mechanisms with standard error.



Graph 2. TRT of the categorizing encapsulators.



Graph 3. TRT of the lexical encapsulators.

<sup>1</sup> [Ann and Mary reviewed the documentary about the Amazon]<sub>predicative antecedent</sub>. [The review]<sub>encapsulator</sub> went viral.

<sup>2</sup> Ann and Mary reviewed [the documentary]<sub>nominal antecedent</sub> about the Amazon. [The documentary]<sub>coreferential expression</sub> went viral.

<sup>3</sup>

Independent variables		Each participant reads only one critical item from each of the twelve sequence blocks.
Condition	Coreference	Encapsulation
Pronoun	Condition 1. Pronominal coreference Ann and Mary reviewed [the documentary] about the Amazon. [This (Este/Esta)] went viral.	Condition 2. Pronominal encapsulation [Ann and Mary reviewed the documentary about the Amazon]. [This (Esto)] went viral.
Lexical categorization	Condition 3. Lexical repetition Ann and Mary reviewed [the documentary] about the Amazon. [The documentary] went viral.	Condition 4. Lexical nominalization [Ann and Mary reviewed the documentary about the Amazon]. [The review] went viral.
Lexical recategorization	Condition 5. Evaluative coreference Ann and Mary reviewed [the documentary] about the Amazon. [The rubbish] went viral.	Condition 6. Evaluative encapsulation [Ann and Mary reviewed the documentary about the Amazon]. [The boring text (El sermón)] went viral.

Table 1. Example of the critical items of one of the six sequence blocks created in the experimental design.