

Memory and Priming in production of pronominal clitics in Spanish

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Structural priming in production has been shown to hold in sentence recall tasks. The logic of using recall to study priming is that the verbatim memory of an utterance is often poorly remembered, and must be *regenerated* anew from conceptual memory [1]. We use recall priming data to examine a morpho-syntactic alternation in Spanish known as clitic climbing, presenting results suggestive of a classic structural priming effect and others where it seems memory for clitic placement is robust against priming. We take these results to be suggestive of the formation of *different memory traces* for clitics and their verbs as a function of the formal aspects of the recall cue used.

Clitic climbing (CC) is a phenomenon where a pronominal object clitic can be associated with its selecting verb at a distance (Ex. 1), akin to a traditional filler-gap dependency. In the vast majority of configurations CC is not obligatory, but optional. Both positions are grammatical and natural, and the choice of one structure over the other has no semantic or pragmatic reflex [2]. Thus, the Spanish CC alternation presents an opportunity to use grammatical optionality much like the study of optional *that*-complementizers in English [3], where the two alternants are practically indistinguishable by meaning, allowing us to control broadly for the influence of meaning differences and focus on the structural memory and manipulation.

We present results from two sentence recall experiments where participants were asked to read aloud and later recall sentences containing clitics. Participants saw 3 screens per trial: Sentence 1 (targets), Sentence 2 (primes), and a recall prompt. Each sentence was of one of three types: Enclitic (no CC, Ex 1a), Proclitic (CC, Ex 1b), or Unrelated. Critical sentences had a small clausal preamble to supply the pronominal clitic with a referent, then a CC clause (Fig. 1). In critical trials, participants were given an unambiguous recall prompt, the assumption being that the production of the intervening prime would lead to priming during recall [3,4,5]. The primary motivation for running Exp 2 was to test the effect of the form of the recall prompt, the details of which are discussed below and demonstrated in Fig. 1.

In **Exp 1** ($N_{ptcp} = 15$, $N_{items} = 20$) the recall prompt consisted of the subject and predicate of the higher clause and the subject and lower verb of the CC clause. Here we found evidence of priming for clitic placement, though participants showed a clear bias for climbing, seen in the near ceiling performance for proclitic recall in Fig 2: ~80% with an enclitic prime, and ~95% with a proclitic prime. Our hierarchical Bayesian logistic models fit to the rate of climbing when recalling targets revealed moderate evidence for an effect of Prime Type, strong evidence for an effect of Target Type, and no interaction (Fig 3). **We take this as evidence for structural priming of CC, and note the strong effect of Target Type is a sign that participants had robust memory for S1s.** We note the difference in magnitude between the two parameters.

In **Exp 2** ($N_{ptcp} = 17$, $N_{items} = 20$) the recall prompt was simply the preamble. A model fit to this data revealed no evidence of an effect of Prime Type, strong evidence for an effect of Target Type, and no interaction (Fig 5). Here we saw a bias for enclitic use, ~95% enclitic responses with an enclitic target regardless of prime type, and a small slope hinting at priming across the proclitic target conditions. Again **participants had robust memory of their targets, but here our model showed no evidence of priming.**

The difference in results may have been due to the difference in recall cues, the bias of Exp 1 likely driven by the orthography of the prompt verb. In Spanish orthography enclitics are not spaced from their associated verb (Ex 1a). A prompt involving a clitic-less lower verb may have constrained responses to avoid enclisis, as it wouldn't match the orthographic form of the cue. In Exp 2 the fact that the recall prompt was always the clausal preamble could have led to a strategic memorization strategy, participants only memorizing the lower clause, forming a more lossless memory of clitics and their verbs. We take these results to indicate that priming holds for CC, though verbatim recall can be robust and assume that the memory encoding for

CC is more likely to preserve the morphological relation between a clitic and its verb, and that memory formation can be affected by formal aspects of the recall prompt used.

Example sentences and glosses

- (1) **a.** Marta quiere comerlo **b.** Marta lo quiere comer
 M. WANTS EAT=CLITIC M. CLITIC WANTS EAT
 "Marta wants to eat it"

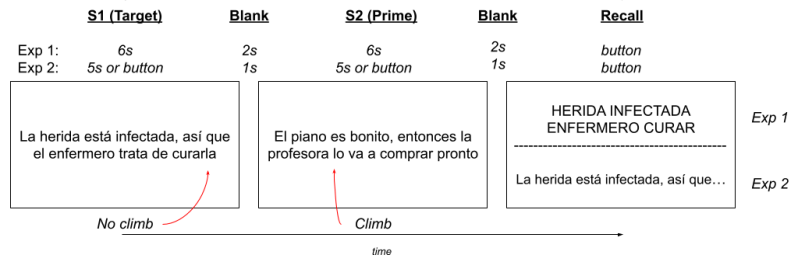


Figure 1: Schematic of a critical trial with an enclitic target and a proclitic prime

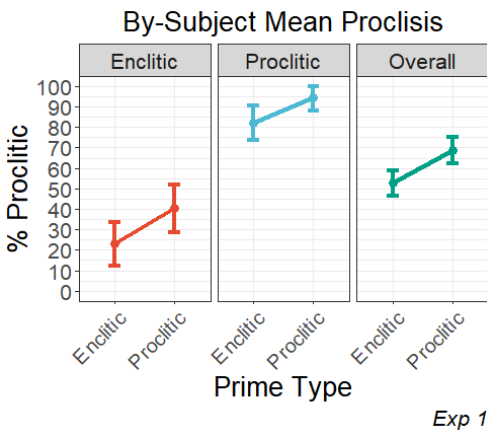


Figure 2: By-Subject means and 95% CI for Experiment 1, Target Type in headers

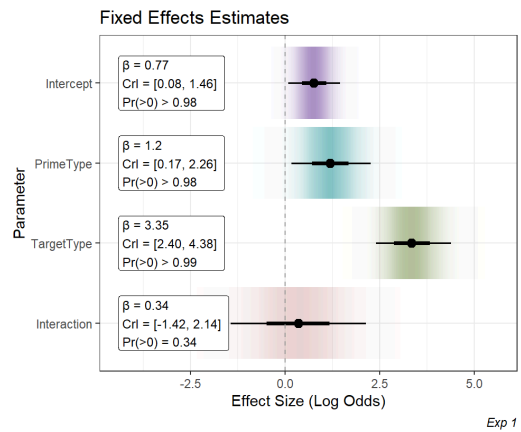


Figure 3: Parameter estimates for Experiment 1

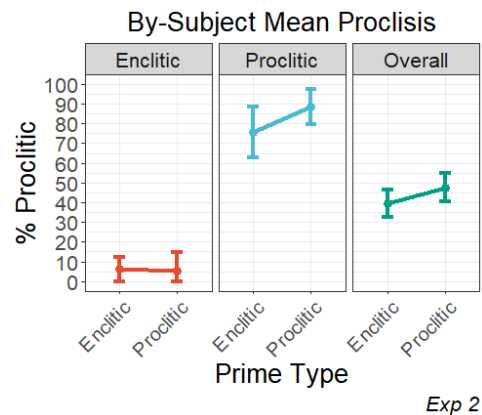


Figure 4: By-Subject means and 95% CI for Experiment 2, Target Type in headers

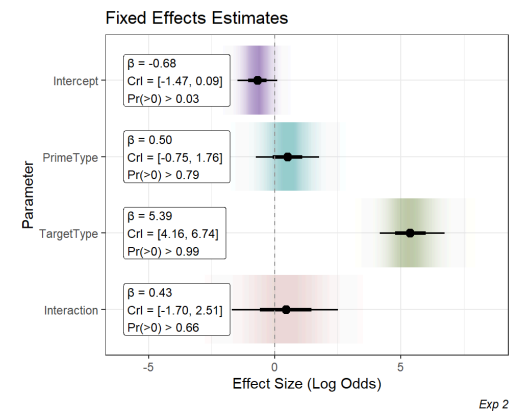


Figure 5: Parameter estimates for Experiment 2

[1] Potter, M. C., & Lombardi, L. (1998). JML. [2] Krivochen, D. G., & Fernández, L. G. (2022). Studies in Hispanic and Lusophone Linguistics. [3] Ferreira, V. S. (2003). JML. [4] Momma, S. (2022). JML. [5] Momma, S. (2023). Cognition.