

Competing Effects of Syntax and Animacy in Priming of Relative Clause Attachment

Melodie Yen (UCLA), Idan A. Blank* (UCLA), Kyle Mahowald* (UCSB)

Background. Structural Priming [1,2]—the increased tendency to produce a certain syntactic structure following comprehension of a sentence with the same syntactic structure—has traditionally been interpreted as evidence for the activation of abstract syntactic representations. Whereas this phenomenon is robust, its effects are often small [3], and it has been argued that priming partially (and, sometimes, completely) depends on cues that are not purely syntactic (e.g., particular words, constructional features) [4].

Here, we test priming of prepositional-phrase attachment height in relative clauses [5,6]:

1. They increased the *salary* of the **landscapers** that... **did a wonderful job** (low attachment)
 2. They increased the *salary* of the **landscapers** that... *was originally too low* (high attachment)
- In (1) the relative clause “did a wonderful job” attaches locally to “landscapers,” whereas in (2) attachment occurs higher up in the syntactic tree, to “salary.” Past studies report a priming effect for these structures: sentence stems ending before the relative clause overall elicit low-attachment (LA) completions, but high-attachment (HA) completions increase after participants read a prime sentence with a HA structure.

However, past studies of PP-attachment priming did not control for the animacy of nouns (here, “salary” and “landscapers”), which has been shown to modulate priming of other structures [7-10]. If primes and targets match in noun animacy order (e.g., inanimate before animate), then structural priming conflates a syntactic effect (activation of HA vs. LA structures) with a semantic one (activating modification of animate vs. inanimate nouns). Moreover, it remains unclear how the animacy of the target nouns themselves affects priming: for instance, given the “privileged” status of animate nouns in production [11], they might also be the preferred targets for relative clause attachment. Thus, could low attachment to an animate noun (“landscapers”) be overridden by priming of high attachment to an inanimate noun (“salary”)?

Methods. We constructed 24 pairs of prime-target stems (**Table 1**). Each stem contained a prepositional phrase with a singular, inanimate (IN) noun and a plural, animate (AN) noun. In primes, IN occurred before AN (IN/AN, see example above). We used a 2x2 factorial design, crossing prime attachment with target animacy order. Specifically, half of the primes ended with “who were” (mandating LA completions), and the other half with “which was” (encouraging HA). Target stems ended in “that”; half were IN/AN (matching the prime), and half AN/IN. 60 participants completed 24 item pairs and 30 completed 12 critical items ($n=86$, after exclusions). There were two fillers between critical items. Target completions (HA vs. LA, with HA as the dependent variable) were modeled in a Bayesian mixed-effects logistic regression with a semi-informative prior. Fixed effects were coded for 3 contrasts: whether the animate noun in the target was in high or low position, the overall structural priming effect (whether the prime is HA), and the “animacy priming” effect (whether animacy priming would predict high attachment).

Results and discussion. As shown in Fig. 1., we found a baseline animacy preference (i.e., attaching to the animate noun in the target: $\beta=1.61$, 95% credible interval [.51, 2.68]) and a robust structural priming effect ($\beta=2.53$, 95% credible interval [1.60, 3.61]). When prime attachment and target animacy conflicted (see cyan data), animacy prevented priming: participants made descriptively *more* HA completions when the primes were LA but the AN target was high, and *fewer* HA completions when the primes were HA but the AN target was low. We did not find a significant effect of “animacy priming.” We conclude that structural priming in RC-attachment cannot be fully explained in terms of animacy effects. However, the structural priming effect is modulated by animacy attachment preference in a way not addressed by prior work on relative clause attachment priming. This work points towards the need for a broader effort to integrate syntactic accounts of structural priming with semantic and cue-based factors.

		Target Animacy Order	
		IN/AN (inanimate before animate)	AN/IN (animate before inanimate)
Prime Attachment	LA (low)	Prime: "We passed the property of the landowners who were..." Target: "They increased the salary of the landscapers that..."	Prime: "The assistant announced the score of the contestants who were..." Target: "The police arrested the inhabitants of the building that..."
	HA (high)	Prime: "The reporter visited the district of the voters which was..." Target: "The spy described the hideout of the rebels that..."	Prime: "The landlord reviewed the lease of the tenants which was..." Target: "The secretary contacted the signers of the petition that..."

Table 1. Experimental design and examples of stimuli

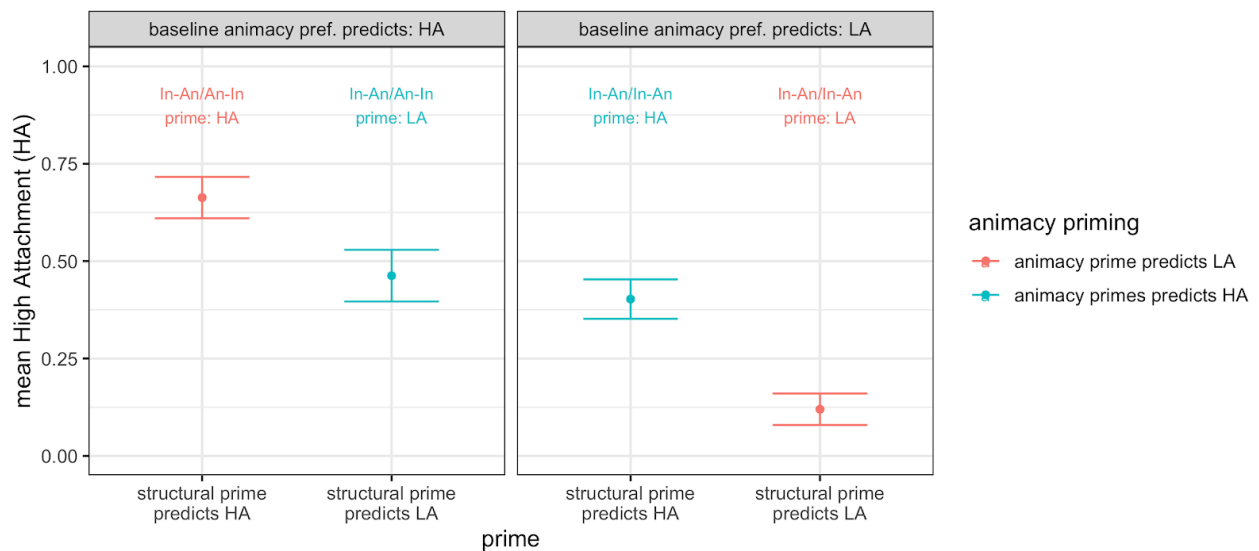


Figure 1. Mean high attachment (HA) completions of the target stem, as a function of whether (1) the animate item in the target is high or low (left vs. right panel); (2) the structural prime predicts high or low attachment (x-axis: structure primes HA vs. structure primes LA); and (3) whether “animacy priming” predicts high or low attachment (red vs. cyan). Error bars are 95% confidence intervals over participant means.

References

- [1] Bock (1986) *Cog. Psych.*; [2] Pickering & Ferreira (2008), *Psych. Bull.*; [3] Mahowald et al. (2016), *J. Mem. Lang.*; [4] Ziegler et al. (2019), *Cognition*; [5] Scheepers (2003), *Cognition*; [6] Desmet & Declerq (2006), *J. Mem. Lang.*; [7] Carminati, et al. (2008), *J. Exp. Psych: LMC*. [8] Bucklet et al. (2017), *Front. Psych.* [9] Bock et al. (1992), *Psych Rev.* [10] Huang, et al. (2016), *J. Mem. Lang.*; [11] Desmet, Brysbaert, & De Baecke (2002), *Quart. J. Exp. Psych. A*.