Speakers *do* prime themselves in syntactic production

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Syntactic priming is the tendency for a speaker to produce a structure that they have recently repeated, heard, or read (Bock, 1986). Computational accounts of this process include error-driven implicit learning models (Chang, Dell, & Bock, 2006); activation-based accounts (Reitter, Keller, & Moore, 2011), and more hybrid accounts (e.g., Jaeger & Snider, 2013). Each model predicts comprehension-to-production priming, but error-driven models do not predict that speakers will be sensitive to their own productions because there is no prediction error to drive learning. There is surprisingly little experimental evidence that speakers self-prime, though several corpus studies of the phenomenon exist, and the evidence that exists is confounded with overall speaker structural preferences. In three experiments using a three-part crowd-sourced behavioral task and novel statistical modeling to account for autocorrelation in multinomial data, we tested (1) whether a speaker's choices at time point (t) influence their choices at consecutive time points (t+1). As a control comparison, we also tested whether speakers showed priming from comprehension to production.

Procedure: We recruited participants from Amazon Mechanical Turk whose stated first language was English. The experiment was conducted on Qualtrics in three phases, which we illustrate in Table 1 (right). **Production phases.** Participants were tasked with describing 7 images depicting ditransitive events, which can either be produced with prepositional objects (**PO**, "The boy gave the frisbee to his friend"), double objects (**DO**, "The boy gave his friend the frisbee"), or simple events (**Other**, "The boy is playing with another boy"), along with 10 fillers. In the production phases, we assessed self-priming by asking whether speakers tended to use the same syntactic structure on a given trial that they produced on the previous trial. **Comprehension phase**: Participants rated the truthfulness of the descriptions associated with ditransitive *primes* and 10 filler images (3 catch trials that contained inappropriate descriptions). Experiment 1 contained six primes (all either DO, PO, or unrelated passive/active images). Experiment 2 contained single DO prime. Experiment 3 showed only one question at a time with no possibility of returning to earlier answers.

Production Phase 1
(7 ditransitive images)
Comprehension Phase
(1 or 6 ditransitive primes)
Production Phase 2
(7 ditransitive images)

Table 1. Procedure

Comprehension-to-production analyses. Logit mixed effects models showed that participants were more likely to produce the target structure (DO, PO) in Production Phase 2 than in Production Phase 1. For simplicity we plot the Experiment 1 comprehension-to-production priming effect in Figure 1 and report the analyses for all three experiments in Table 2. **Self-priming analyses.** To assess whether speakers prime themselves, we constructed a Markov mixed-effect multinomial logistic regression model that tested whether speakers produce more DOs immediately after DOs and more POs immediately after POs within the first production phase (trials 1-7). Speakers tended to reuse the previous structure, rather than produce the alternate form, suggesting that speakers self-prime. In Figure 2, we plot the tendency for speakers in Experiment 1 to reuse the previous trial's syntactic structure.

Conclusion. These results are less consistent with prediction error-based models of syntactic priming than with other models. The fact that we observe both self-priming between trials and comprehension-to-production priming simultaneously is consistent with models in which previously used structures maintain activation over time. In particular, Bayesian belief updating models that are sensitive to both comprehended and produced linguistic structures (e.g. Jaeger & Snider, 2013) or residual activation-based models (e.g. Reitter et al., 2011) provide a better fit to the results than purely error-driven learning models (e.g. Chang et al.).

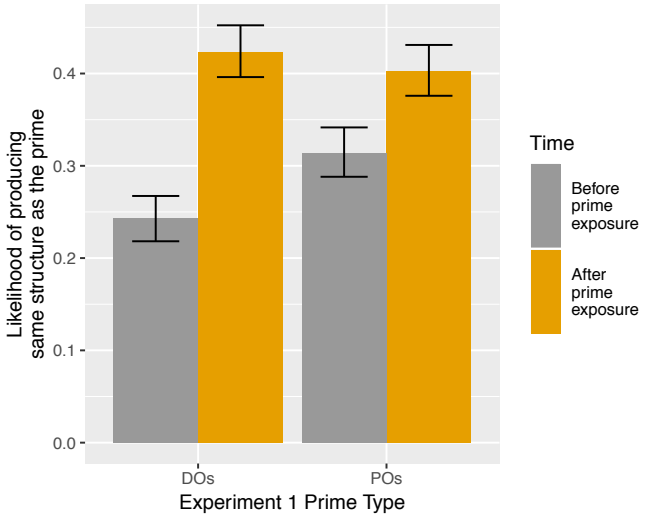

Figure 1. Comprehension-to-production priming, Experiment 1.

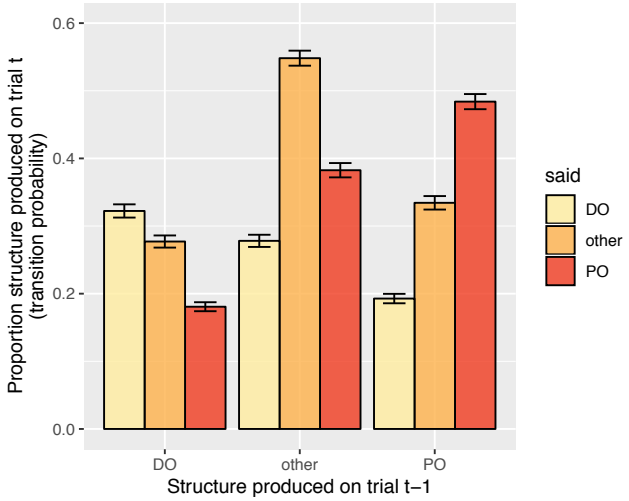

Figure 2. Self-priming, Experiment 1.

	Parameter	Beta	SE	z	p
Experiment 1	Intercept	-0.87	0.16	-5.39	< .001
	Priming	0.28	0.08	3.39	< .001
Experiment 2	Intercept	-1.20	0.21	-5.62	< .001
	Priming	0.26	0.06	4.38	< .001
Experiment 3	Intercept	-1.25	0.22	-5.68	< .001
	Priming	-0.13	0.06	2.17	< .05

Table 2. Assessment of comprehension-to-production priming

References

[1] Bock, J.K. (1986). *Cognitive Psychology*.
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