Bilinguals' sensitivity to structure and event prototypicality: a structural priming study

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This study investigates bilinguals' sensitivity to input manipulations under structural priming conditions. On some accounts, structural priming is a form of implicit learning (Chang et al., 2006). Consistent with an implicit learning account of priming, stronger priming may arise in less proficient speakers when a prime's structure is infrequent considering specific verb biases (Bernolet & Hartsuiker, 2010; Jaeger & Snider, 2008; Jaeger & Snider, 2013). These are known as surprisal effects. In this study we examined whether bilinguals exhibit surprisal effects for different aspects of event structure by priming them with prototypical and non-prototypical, i.e., "surprising", passives.

Method

217 bilinguals from different language backgrounds enrolled in a university in New York participated in the study. We manipulated prime structure (active, passive) and animacy prototypicality (prototypical inanimate agent – animate patient, non-prototypical inanimate agent – inanimate patient) in a computerized cross-modal priming experiment (Bock et al., 2007). Table 1 shows examples of each item. Proficiency was measured with the grammar portion of the Michigan Test of English Language Proficiency (MTELP: range=30-45; mean=41.76; SD=3).

Results

We analyzed participants' responses with logistic mixed-effects models in R (Bates, 2010), predicting the logit-transformed likelihood of passive descriptions. Table 2 shows the best fit model. Table 3 shows the proportional data for each priming condition. We found predicted main effects of structure and animacy prototypicality: on average, bilinguals produced more passives when primed with passives than with actives (.65 vs. .21) and more passives in the prototypical animacy condition than in the non-prototypical condition (.82 vs. .49). At lower proficiency levels, bilinguals produced more passives overall, both prototypical and non-prototypical (Figure 1).

Discussion

Our results are consistent with error-driven learning accounts of structural priming. Exposure to less frequent structures (passives compared to actives) and non-prototypical passives compared to prototypical passives increased the production of these structures in bilingual speakers with lower English language proficiency levels. We conclude that bilinguals are sensitive to input manipulations that go beyond exposure to infrequent combinations of structure and verb bias and extend to infrequent mappings from conceptual features (non/prototypical animacy) to grammatical encoding.

[341 words]

Table 1. Sample Items

Example Sentence	Structure and Animacy Prototypicality
a. The boy is hit by the ball.	passive with prototypical participants, inanimate agents, animate patients
b. The ball is hitting the boy.	active
a. The milk is stirred by the spoon.	passive with non-prototypical participants, inanimate agents and patients
b. The spoon is stirring the milk	active

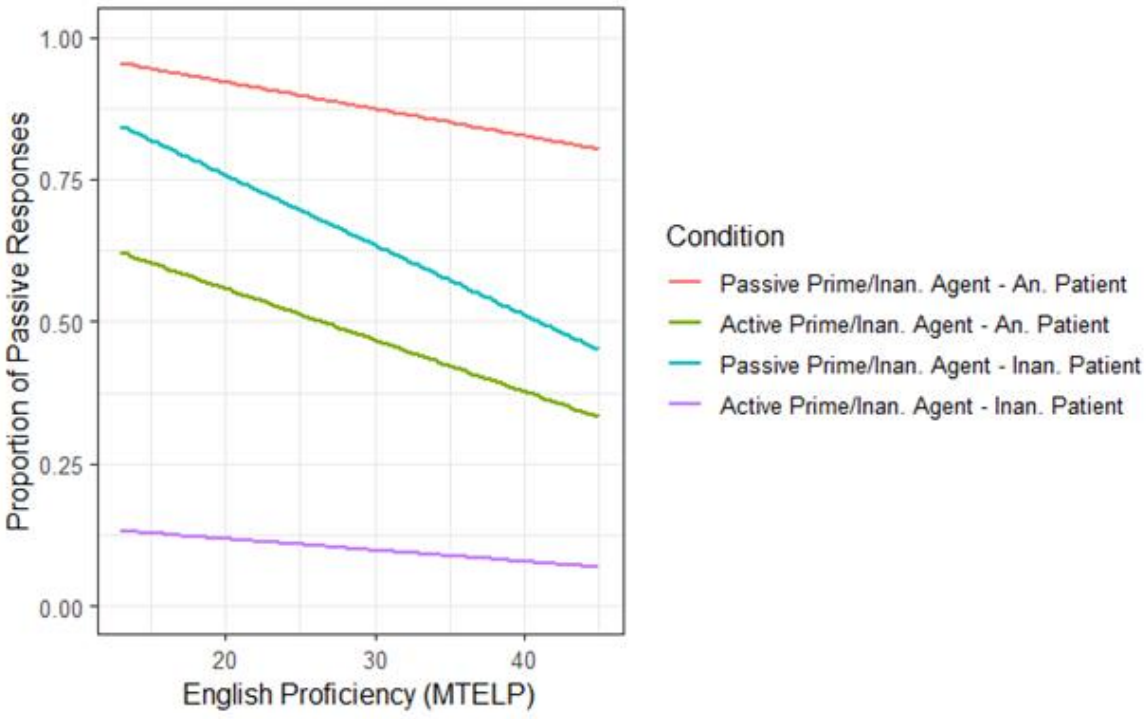
Table 2. Summary of fixed effects in the best fit mixed logit model.

Fixed effects	Estimate	SE	*z* value	95% CI	*p*-value
Intercept	1.80	0.95	1.91	-0.05 to 3.66	n.s.
Prime Structure	1.52	0.10	15.41	1.32 to 1.71	< .0001
Animacy	1.24	0.21	5.87	.82 to 1.65	< .0001
Proficiency	-0.05	0.02	-2.37	-0.10 to -0.009	<.01
Prime Structure x Animacy	-0.07	0.10	-0.72	-0.26 to 0.11	n.s.

Table 3. Mean proportion (and standard deviations) of passive responses after active and passive primes, by animacy prototypicality.

		Response Type by Animacy	
	Priming Condition	Prototypical Animacy	Non-Prototypical Animacy
Passive Responses	Active	0.36 (0.32)	0.07 (0.16)
	Passive	0.82 (0.28)	0.49 (0.33)

Figure 1. Proportion passives produced in the four cells of the design as a function of proficiency



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