

What the speaker didn't think or what they didn't say? Pragmatic enrichment relies on conceptual, not sentential, alternatives.

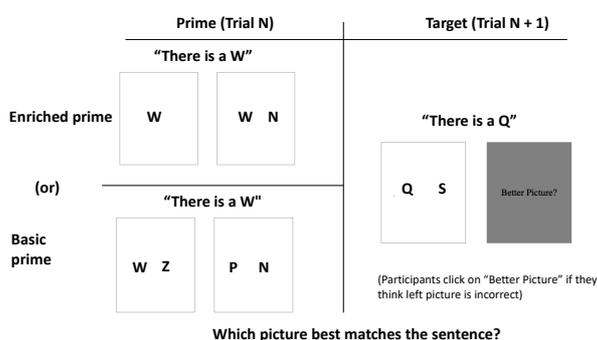
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People show an impressive ability to derive meaning beyond the lexical and compositional components of a sentence. Listeners can *enrich* the basic meaning of an expression by considering the intentions of the speaker. Grice (1989) famously argued that such enrichments require the listener to not only consider what the speaker says, but also what they could have said but didn't (the *alternatives*). But what representational form do alternatives take? Are they sentences that the speaker could have said, and thus formulated in a specific linguistic form, or are they merely alternative concepts that the speaker could have intended?

Previous literature overwhelmingly presents alternatives as words and syntax in the language of the speaker, i.e. formulated sentences, such as (2) (e.g., Bergen, Levy & Goodman, 2016; Grice, 1989; Levinson, 2000). However, theories of enrichment are usually presented as linguistic or computational models, unconcerned by psychological implementation, and there exists no direct evidence that alternatives are linguistically formulated. This leaves open the possibility that alternatives are instead non-verbal concepts, linguistically unrealized. Conceptual alternatives could be directly integrated with the basic meaning of the sentence, without the need for formulation.

We tested the formulation of alternatives using a cross-linguistic structural priming paradigm (e.g. Hartsuiker, et al., 2004) adapted for implicatures (see Bott & Chemla, 2016). If alternatives are formulated, a greater priming effect should be observed within the same language than across languages. Within the same language, priming of the alternative should occur because of active conceptual representations across trials and because of active lexical and syntactic retrieval mechanisms (e.g. Garrod & Anderson, 1987; Branigan et al., 2000). Across languages however, priming should only arise from active conceptual representations, since lexical and syntactic material is different across languages (there may be some priming from shared representations but this would be small in comparison to that within languages, e.g. Schoonbaert, et al., 2007).

Method and Results



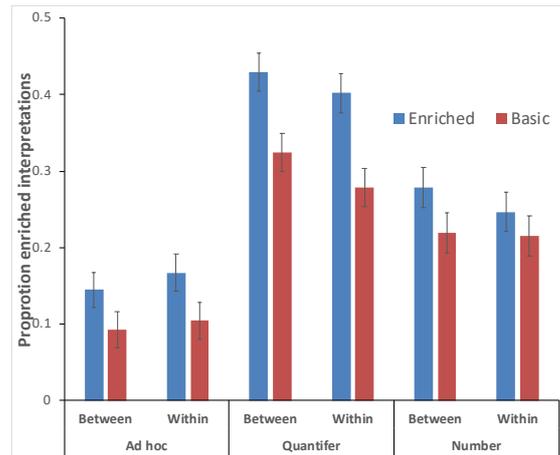
Participants saw pairs of pictures and clicked on the picture that best described the sentence (Fig 1.). Priming occurred if interpretations of the prime sentence influenced interpretations to the target sentence. We used three types of enrichment (1) quantifiers (2) number (3) *ad hoc* expressions. Figure 1 shows an example. Prime-target pairs could

either be within-language (English-English or German-German) or between-language (English-German or German-English).

Results with N=204 participants showed large within-language priming effects $t(203) = 6.0, p < .001$, (see Fig 2) and large between-language priming effects, $t(203) = 7.97, p < .001$, for all expression types, and with no difference in the size of the effect within/between languages, $F(1,203) < 1$. Participants were more likely to

derive pragmatic enrichment after they had done so in the prime trial than when they had not, and this effect was independent of whether the prime and target were in the same language.

We also analysed RTs to establish whether participants were translating from L2 to L1. We observed a significant switch cost, ($t = 2.81, p < .01$), as participants responded more quickly to targets that were in the same language as the prime than targets that were in a different language. However, there was no evidence that participants took longer processing L2 primes, nor that it was easier to switch back into L1 following an L2 primes.



Discussion We found that enriching a sentence in one language leads to enrichment in another. Importantly, priming across languages was no lower than priming within the same language. Thus, in at least some circumstances, alternatives are not formulated sentences in the language of the speaker, involving words and syntax, but pre-linguistic conceptual representations.

Our findings have two implications for theories of enrichment. The first concerns how alternatives are constrained. Many linguistic and computational theories use linguistic material to restrict the set of potential alternatives (e.g., Bergen et al., 2016; Katzir, 2007). However, if alternatives are not (formulated) sentences, there is no linguistic material on which to base the constraint. One promising solution, proposed by Buccola, Kric, and Chemla (submitted), is that alternatives could be restricted by the complexity of the conceptual representation (some concepts are more complex than others), and that this gives rise to the appearance of complexity factors in the linguistic distribution.

The second implication concerns the structure of the language processor more generally. We have shown that there is no automatic integration of the enrichment process and the formulation process. But if one takes the generation of alternatives to be a form of prediction (e.g. Huang & Snedeker, 2018), it follows that formulation must therefore be optional for certain categories of prediction. This conclusion, however, seems to conflict with evidence that when listeners predict upcoming material in comprehension, they can often formulate specific lexico-syntactic features of such upcoming material (e.g. Thornhill & Van Petten, 2012). Future research needs to address on what grounds the processor blocks the formulation of predicted semantic material.

Conclusion Alternatives are overwhelmingly presented in the literature as formulated sentences, complete with syntactic and lexical specification. In contrast, we have shown that there is no requirement for alternatives to be formulated. Alternatives are thus not “what the speaker could have said, but did not”, but what the speaker could have intended, but did not.

References Bergen, L. et al (2016). *Semantics and Pragmatics*, 9. Bott, L., & Chemla, E. (2016). *Journal of Memory and Language*, 91, 117-140. Branigan, H. P., et al. (2000). *Cognition*, 75(2), B13-B25. Buccola, B., Križ, M., & Chemla, E. (submitted). Conceptual alternatives: Competition in language and beyond. Grice, P. (1989). Cambridge, MA: Harvard University Press. Garrod, S., & Anderson, A. (1987). *Cognition*, 27(2), 181-218. Hartsuiker, R. J., et al. (2004). *Psychological Science*, 15(6), 409-414. Huang, Y. T., & Snedeker, J. (2018). *Cognitive psychology*, 102, 105-126. Levinson, S. C. (2000). MIT press. Schoonbaert, et al. (2007). *Journal of Memory and Language*, 56(2), 153-171. Thornhill, D. E., & Van Petten, C. (2012). *International Journal of Psychophysiology*, 83(3), 382-392.