

Can structural priming answer the important questions about language?

A commentary on Branigan and Pickering "An experimental approach to linguistic representation"

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Abstract: While structural priming makes a valuable contribution to psycholinguistics, it does not allow direct observation of representation, nor escape “source ambiguity.” Structural priming taps into implicit memory representations and processes that may differ from what is used online. We question whether implicit memory for language can and should be equated with linguistic representation or with language processing.

Branigan & Pickering (2017; henceforth BP) assert that structural priming reveals the nature of linguistic representation, and does so over and above other available psycholinguistic methods, and acceptability judgments in particular. We wholeheartedly agree with BP on the limitations of acceptability judgments, and on structural priming being an interesting phenomenon that is of use to language researchers. However, if the scientific aim is to study linguistic representation, we argue that the structural priming paradigm is also limited in many important ways, due to its reliance on domain-general implicit memory representations and processes, and because it only allows unidimensional inferences.

Priming is a form of implicit learning, stemming from implicit memory formed during recent processing (pages 19-21), measured through its effect on current processing. This begs the question whether structural priming can indeed “separate” representation from process. BP

assume that priming reflects changes in availability of the representations needed for processing, but that processing itself is somehow not affected (page 22). We think that this assumption is untenable. Very little is known about the implicit memory of recent language processing, the representations that underlie priming. How stable are these representations? How do they relate to the representations formed during online language processing? Are they implemented in language-specific and/or domain-general memory processes? It seems these questions are ignored at our peril if structural priming is to be a method for understanding linguistic representations. BP claim to work towards a theory of linguistic representation, but the domain-general nature of priming does not allow inferences about whether representations are linguistic or non-linguistic. In our view, structural priming is best seen as a more limited experimental approach to understanding implicit memory for language. Whether that suffices as an approach to linguistic representation we leave to the reader.

As an experimental approach, structural priming allows for rather limited inferences. One problem is that it suffers from the same source ambiguity and response bias (page 13) that confounds other behavioral measures (e.g., two-alternative forced choice or reaction time measures; see Macmillan & Creelman, 2004; Martin, 2016; McElree, 2006). The relationship between representation and process is necessarily blurred in measurements like these, because participants can trade speed for accuracy, and vice versa, using an internal criterion that can be related to either representational quality, bias, or the time it takes for a process to occur. Unlike techniques like speed-accuracy modelling (Reed, 1973), structural priming cannot tease apart effects stemming from representational quality and those from processing speed.

Another problem with structural priming is that it only allows unidimensional inferences (count in production, RT in comprehension), so we can only observe “greater than” and “less than” effects. This is problematic because observing similar priming effects (i.e., null results, pages 41-42) does not necessitate the conclusion that underlying representations are similar, and observing different priming effects do not necessitate the conclusion that underlying representations are inherently different. Furthermore, because structural priming is not time-resolved, nothing can be learned about *when* linguistic representations are used, or about how these representations change over time. Moreover, structural priming (in production at least) is limited to sentence structures that have an alternative structure describing the same event

approximately equally well, and therefore has very limited scope in terms of what can be tested.

Some of these issues can be overcome with neuroimaging techniques such as ERPs and fMRI. BP discount these techniques because of a lack of one-to-one mapping between the measure of brain activity (ERP component or localized brain activity) and levels of linguistic representation. We think that this is both unfair and misguided. Recent neuroimaging findings suggest that semantic and syntactic levels of representation are inextricably linked in processing (e.g., Nieuwland et al., 2013), and that linguistic representations are implemented in a dynamic network configuration (e.g., Hagoort, 2014, Skipper, 2015). However, this does not disqualify neuroimaging as a general method to study the processing of linguistic representations, especially with the advent of new 'decoding' techniques (King & Dehaene, 2014), it merely shows that the actual implementation of linguistic processes and representations in the human brain is very complex and not sufficiently understood.

In sum, we challenge the claim that "evidence from structural priming supports quite specific proposals about linguistic structure" and question the extent to which it "can be used to develop linguistic theory and discriminate among competing accounts" (p.5), mostly because we question the definition of a linguistic representation in the context of structural priming - as far as we can ascertain, it is an implicit memory representation with an indeterminate relationship to online representation and subsequent processing.

Our deeper concern is that priming doesn't explain how representations, either in production or in comprehension, are formed in the first place, nor how language processing unfolds and produces meaning. Furthermore, we think that the mechanism through which activation of comprehended structure influences produced structure is at stake for the theoretical advances that the authors are interested in, and we believe that progress towards a truly mechanistic theory of language cannot be made until processing mechanisms are formalized and computationally specified. Only then can the interaction between representations and processes during language use begin to be understood.

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