of structural priming. What if there is more than one aspect that both input A and B share? In this case, the source of the priming effect remains ambiguous. Unfortunately, most evidence taken in support of structural priming has this source ambiguity issue – in particular, ambiguity between sequential and hierarchical relations. For example, although structural priming effects were reported in many studies of structural alternations without meaning change (e.g., alternating between prepositional/double-object sentences (henceforth, POs/DOs), passive/active sentences, different orderings of the auxiliary and main verb, and different positions of a particle in phrasal verbs (Bock 1986, 1989; Hartsuiker & Westenberg 2000; Konopka & Bock 2009; Messenger et al. (2012b); Pickering & Branigan 1998), the prime and target sentences in these studies shared both linear ordering and hierarchical argument structure (cf. Hare & Goldberg [1999] for discussion of potential semantic influences). Thus, in these cases, it is not clear whether structural priming effect arises due to linear or hierarchical relations.

B&P ambiguously state that syntactic representations that they assume are “shallow” and “monotragical” such that they “represent hierarchical and linear relations simultaneously” (sect. 2.1, para. 7, 8). Under this assumption, the priming effects found with PO/DO or passive/active alternations above would not have “source ambiguity” as distinction of linear vs. hierarchical relations becomes irrelevant, a notion with which we do not agree. An alternative account, however, is that priming is sensitive to cognitive computations of linear relations but may not be so sensitive to hierarchical relations of linguistic representation. Under this hypothesis, the priming evidence with the potential source ambiguity discussed above is accounted for straightforwardly in terms of priming of linear ordering, which is also consistent with the findings of Pickering et al. (2002), in which sentences that share hierarchical but not linear relations did not prime each other.

Word order is closely related to hierarchical argument structures; however, we believe that these two cannot be equated. Take sentences with a reflexive (e.g., “John, told Tom, to be kind to himself,” vs. “John, seemed to Tom, be to kind to himself”), cf. Sturt & Kwon 2015). Although local proximity is a factor, these examples clearly illustrate that the proximity is defined in terms of hierarchical relations and not linear ordering (Reinhart 1983; cf. Langacker 1969). Thus, syntax cannot be reduced to simple sequential structure, and hierarchical relationships are an integral aspect of human language syntax. As such, we believe that we need clear evidence in support of priming of hierarchical relations for the proposal of B&P to work (cf. Scheepers et al. 2011).

Thus, while structural priming seems convincing with many replications in various languages and participant populations, its nature remains unclear, and therefore, the use of priming experiments in lieu of (or alongside) acceptability judgments is a limited approach to understanding grammatical structure. The proposed approach would benefit greatly from experimental results using various syntactic constructions with which the priming of hierarchical structure can be clearly evaluated independently of linear ordering. In short, clearer evidence of priming of argument structure as well as word order is necessary before it can be argued that priming paradigms can be used to answer questions of structure, a core feature of human language syntax.
Abstract: Structural priming is poorly understood and cannot inform accounts of grammar for two reasons. First, those who view performance as grammar + processing will always be able to attribute psycholinguistic data to processing rather than grammar. Second, structural priming may be simply an example of hysteresis effects in general action planning. If so, then priming offers no special insight into grammar.

Branigan & Pickering (B&P) argue that structural priming methods have "reached maturity" (target article, para. 2) to the point that they can inform not only language production and comprehension processes, but also the nature of grammar, as typically studied by linguists using different analytical tools and methods. This view appears overly optimistic: structural priming remains widely used but poorly understood, with little consensus about why the effect is observed or exactly what production and comprehension processes are promoted from prior exposure to a sentence. Moreover, the larger class of priming methods, to which B&P link structural priming, has been the target of extensive criticism and reassessment of what can be gleaned from the tasks (Cesario 2014). Here, we consider two perspectives on the nature of structural priming and their consequences for B&P's claims for grammar.

One perspective is that structural persistence is a strongly syntactic phenomenon: Encountering/producing a sentence somehow biases the language processing system to expect or produce a similar syntactic structure. B&P's logic is that, because the processing system draws on the grammar, patterns of priming must reveal the nature of the grammar. This thinking raises the classic issues of the competence-performance distinction. If language use is grammar + processing, there is a credit assignment problem for psycholinguistic data: Any linguistic behavior might reflect the grammar, processing mechanisms, or some combination. B&P make exactly this criticism of other psycholinguistic methods—for example, that Frac et al.'s (2010) studies of subject-verb agreement production might illuminate the nature of the grammar, or alternatively they might reflect production or comprehension processes and be uninformative about grammar. Crucially, this assignment problem applies equally to priming. Haskell et al. (2010) used priming to study agreement production and found that subject-verb agreement is sensitive to the statistical patterns in prior usage (the primes). These results could support a graded grammar in which statistical patterns shape grammatical representations (Bybee 2006). Researchers rejecting this approach, however, could instead attribute these priming data to processing, leaving the grammar untouched by the statistics of usage. Thus, given B&P's assumption of usage=grammar + processing, structural priming is just as much subject to interpretive uncertainty as any other measure.

Even more interpretive uncertainty arises from an alternative view of structural priming—that it is not strictly syntactic but rather a language example of a more general tendency to repeat prior actions. Cognitive models of motor planning suggest these reuse effects (termed hysteresis effects) arise because it is easier to recall a previously executed motor sequence than to generate alternative plans de novo (Rosenbaum et al. 2006). Our own research investigates the link between structural priming and domain-general plan reuse, and we have developed parallel tasks that yield reliable structural priming for dative sentence structures and priming of nonlinguistic manual actions in the same participants (Koranda et al. 2016). We also observed a parallel effect of priming strength in both domains: Preferred sentences and movements are more easily primed than unpreferred ones, a phenomenon previously observed in structural priming (Brown 1966). These findings raise the possibility that plan reuse may be a domain-general property of action planning. MacDonald (2013) suggested that a general plan reuse bias would ground patterns of language use in basic planning mechanisms, and the existence of a general plan reuse bias may also explain why some nonlinguistic motor sequences such as stacking blocks appear to prime sentence structure choices in language.