Access to sublexical constituents without the influence of semantics

Introduction. How do we interpret words? What is the nature of representations mediating the mapping between orthographic input and meaning? These questions have been central to research in lexical processing with proposals varying in the role attributed to morphology and semantics. One view posits that words are parsed according to knowledge of sublexical regularities and without knowledge of semantics (e.g., Beyersmann et al., 2016; Rastle et al., 2004). Another view takes the mental lexicon to be informed of morphological and semantic properties of words (e.g., Feldman et al., 2009). It is unclear, however, whether the semantic representations of sublexical constituents are accessed during visual word recognition. In the present study, we employed a novel paradigm tapping the semantic access of "constituents" embedded in morphologically complex words and seemingly complex words.

Method. We employed a picture-word paradigm involving the presentation of a target picture (200 ms) followed by an English target word (56 ms and backward masked). Participants (*N*=57) were instructed to judge the relation between picture-word pairs. Experimental materials were 16 prefixed (*unmask*), 16 pseudo-prefixed (*sublime*), and 16 non-prefixed words (*template*) embedding a "constituent", which was depicted by the target picture (*MASK*, *LIME*, and *PLATE*, respectively). Pseudo-prefixed and non-prefixed words were monomorphemic words that superficially embed letter sequences resembling a potential root (e.g., *lime*, *plate*), and only pseudo-prefixed words contain a potential prefix (e.g., *pre-*). To establish baseline semantic access to "constituents", target words were manipulated to be the probed "constituent" as a stand-alone word (e.g., *mask*) or an unrelated control word (e.g., *unroll*).

Results. Data analyses were performed on relatedness judgements between target pictures and words (i.e., "yes" responses), as they indicate the degree to which "constituents" are semantically accessed. Mixed-effects logistic regressions showed that prefixed words yielded a higher proportion of relatedness judgements than pseudo-prefixed (*OR* = 2.79, 95% CI [1.53, 5.09], *p* < .01) and non-prefixed words (*OR* = 5.51, 95% CI [3.00, 10.14], *p* < .01). Relatedness judgements were also higher in proportion for pseudo-prefixed words as compared to non-prefixed words (*OR* = 2.71, 95% CI [1.10, 3.56], *p* = .02).

Notice that relatedness judgements to pseudo-prefixed and non-prefixed words were around or below chance (see Figure 1). In other words, participants judged the target picture of a lime to be related to the target word *sublime* about 50% of the time. Crucially, relatedness judgements to pseudo- and non-prefixed words should be closer to zero for there is no relation between these words to picture referents of their sublexical "constituents". In order to determine a baseline, we also compared relatedness judgements between full words and unrelated control words. All word types engendered a higher proportion of relatedness judgements to full words as compared to unrelated controls (prefixed: *OR* = 16.50, 95% CI [9.78, 27.85], *p* < .01; pseudo-prefixed: *OR* = 5.75, 95% CI [3.45, 9.56], *p* < .01; non-prefixed: *OR* = 5.44, 95% CI [3.19, 9.25], *p* < .01). Thus, letter sequences resembling potential morphemes seem to be semantically accessed despite being embedded in pseudo- and non-prefixed words.

Discussion. The identification of potential constituents seems to access their semantic representations. These results support the view that the visual word recognition system isolates potential morphemes without knowledge of semantics. The decrease in the semantic access of non-morphological constituents—as demonstrated in pseudo-prefixed and non-prefixed words— over true morphological constituents suggests that whole word representations quickly suppress unrelated constituents. However, pseudo-prefixed words also elicited a higher proportion of relatedness judgements than non-prefixed words. Thus, constituent access may be facilitated by the ability to compose the potential prefix (*sub-*) and the potential root (*lime*). Taken together, these results demonstrate temporally distinct stages in visual word recognition: (i) an initial semantically blind morphological parse followed by (ii) a morpho-semantically informed stage involving the detection and suppression of misparses.

Figure 1. Mean relatedness judgements as a function of word type for target constituents (*mask*), full words (*unmask*) and unrelated control words (*unroll*).
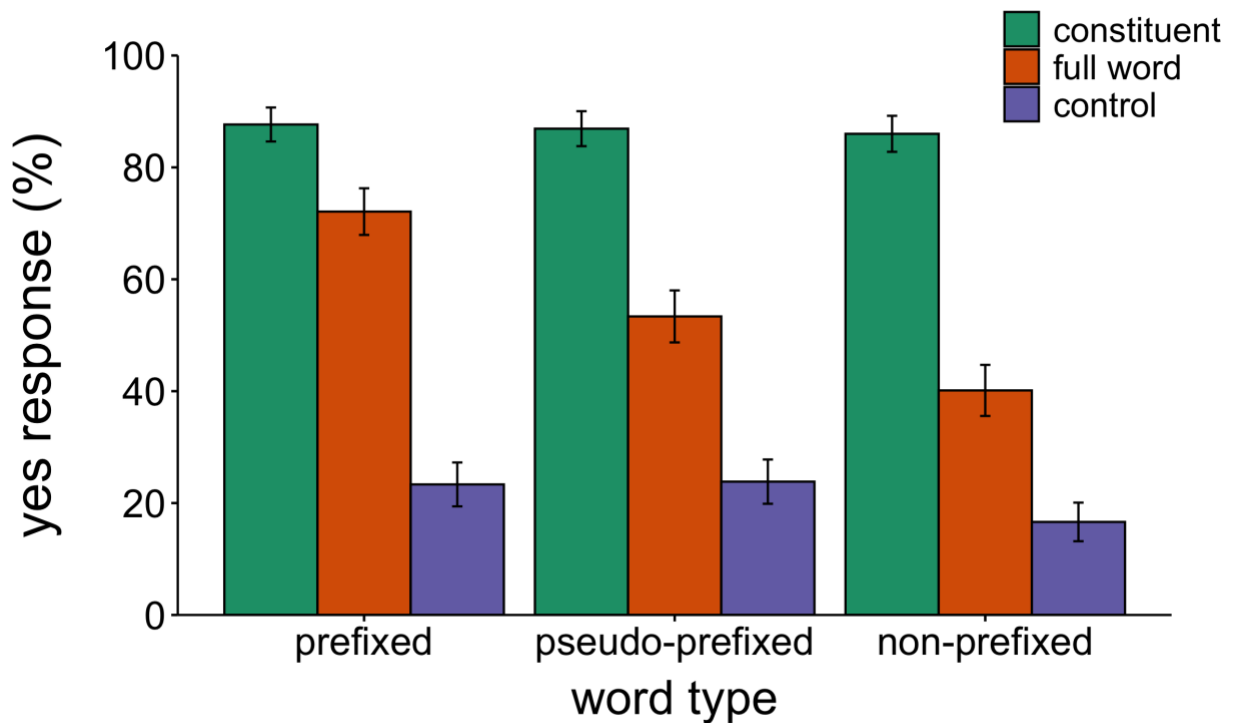
Note. Errors bars represent 95% confidence intervals of the mean.

References

Beyersmann, E., Ziegler, J. C., Castles, A., Coltheart, M., Kezilas, Y., & Grainger, J. (2016). Morpho-orthographic segmentation without semantics. *Psychonomic Bulletin & Review*, *23*, 533–539.

Feldman, L. B., O'Connor, P. A., & del Prado Martín, F. M. (2009). Early morphological processing is morphosemantic and not simply morpho-orthographic: A violation of form-then-meaning accounts of word recognition. *Psychonomic Bulletin & Review*, *16*, 684–691.

Rastle, K., Davis, M. H., & New, B. (2004). The broth in my brother's brothel: Morpho-orthographic segmentation in visual word recognition. *Psychonomic Bulletin & Review*, *11*(6), 1090–1098.