Orthographic Neighborhood Size Interacts with Morphological Processing

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In the domains of both phonology and morphology, traditional dual route accounts of word recognition posit two processing options, such that words can be recognized either in terms of their componential structure or as wholes. Curiously, while both dual route models assume analytic and whole word processing (where competitive or cooperative interaction are debated), these models fail to address the relationship between phonological and morphological analysis. More specifically, the influence on morphological processing of the orthographic and phonological properties of targets is neglected. This oversight may have implications for our understanding of cross-language differences in morphological processing.

In the present study conducted in English, we examine patterns of morphological facilitation in the naming task, in the context of a morphologically related or unrelated word (SOA 250 ms) and ask whether patterns are comparable for targets whose structure makes them orthographically similar to few (small orthographic neighborhood) or many (large orthographic neighborhood) other words.

Two sets of 48 targets were matched on measures that are known to influence the magnitude of morphological facilitation including surface frequency, morphological family size and number of semantic associates. Because the magnitude of morphological facilitation can vary with degree of semantic similarity between prime and target, and because inflected relatives (knotting-KNOT) tend to be semantically more similar to each other than are derived (knotty-KNOT) relatives,

all morphologically related prime-target pairs were related by inflection. Moreover, related pairs included no spelling change (glued-GLUE; knotting-KNOT), so that degree of form overlap based on preservation of the stem could not affect the magnitude of facilitation. In addition, target sets matched on letter length and number of phonemes. Crucially, however, targets differed on measures of similarity to other words (number of spelling neighbors, number of phonological neighbors).

ANOVAs based on naming latencies revealed a main effect of morphological relatedness, an interaction between orthographic neighborhood and morphological relatedness and a main effect of orthographic neighborhood size but only in the analysis by participants. Stated simply, morphological facilitation tended to be greater when a target's number of neighbors was small.

Effects of neighborhood density on magnitudes of morphological facilitation demonstrate the interdependence of form- and semantic-based processing. Because differences between related and unrelated target-naming latencies varied with number of neighbors, it appears that the degree of orthographic activation limits the potential for morphological analysis. Stated alternatively, facilitation tends to be greater when orthographic activation is attenuated due to fewer orthographic neighbors. Interactions of neighborhood density with magnitudes of facilitation likewise modulate gradations in morphological facilitation due to semantic transparency so that effects of transparency are more difficult to detect when neighborhoods are large.