

Current issues in morphological processing: An introduction

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That morphological considerations need to be introduced into any model of the mental lexicon is now the prevalent view in the field of word recognition. For several decades we have witnessed a virtual split between research on word recognition that focused on orthographic and/or phonological processing, and research that focused exclusively on the investigation of morphological structure. This split is well demonstrated by the classical models of the mental lexicon, which have not considered morphology as a necessary theoretical construct (e.g., Forster, 1976; McClelland & Rumelhart, 1981). From this perspective, however, it seems that the tide is turning. Whether the theoretical approach is distributed-connectionist or classical-localist, the role of morphologically defined variables is central in current attempts to explain linguistic behaviour. It remains to be seen, however, whether morphology needs to be explicitly represented in the system or whether morphological effects emerge from interactions within and between units representing form and meaning.

The present special issue is the third volume produced by a group of researchers who convene every two years to discuss the role of morphology in word recognition. It includes a series of experimental papers, all devoted to morphological processing. The experimental work outlined in the 13 papers of this volume is diverse. The volume explores a variety of

languages such as Arabic, Dutch, English, Finnish, French, German, Hebrew, Serbo-Croatian, and Spanish. The methods of investigations are diverse as well, and include single-word recognition, masked, cross-modal, and long-term priming, the monitoring of eye movements, or the use of computer simulations, with both the processing of speech and print being explored. However, most importantly, the present volume, being the third consecutive one on morphology, provides a longitudinal perspective on the theoretical issues currently under debate in this relatively young domain.

A brief overview of the papers appearing in the special issue suggests that the main theoretical controversies which were outlined a few decades ago by the pioneering experimental work on morphology, are still under debate. Current research is still focused on understanding how morphological information is stored in long-term memory and how it is used during the process of language comprehension and production. Central to this more general goal is the question of morphological decomposition, first raised in the seminal work of Taft and Forster (1975), and reflected in most of the volume's papers. How morphological structure interacts with the lexical system is indeed a central issue, since it bears on the representational architecture of the mental lexicon. However, the starting point for any reflection on this central issue is to provide evidence that morphologically defined variables do indeed influence language processing. Most articles in the volume provide clear behavioural evidence in this direction, emerging across different languages and methodologies.

The pervasiveness of morphological influences on word recognition is perhaps most plain in the article by Dijkstra and colleagues, who investigated effects of morphological family size (MFS) on the recognition of interlingual homographs in Dutch-English bilinguals. In a Dutch lexical decision task, they observed facilitatory effects of Dutch MFS accompanied by simultaneous inhibitory effects of English MFS—and the reverse was true when the language of the task was English. Dutch and English were also used by Kemps and her colleagues. Their paper explored the impact of prosodic information on the auditory recognition of morphologically complex words, showing that word-specific intonational information is lexically stored and assists morphological processing.

Given the cumulative evidence demonstrating morphological influences on lexical processing, a vast majority of articles in this volume seek to uncover the locus of these influences—evaluating key theories advanced over the past decade, be they single route (e.g., Taft, 1994) or dual-route (e.g., Schreuder & Baayen, 1995), sublexical (e.g., Frost, Forster, & Deutsch, 1997) or supralexical (e.g., Giraudo & Grainger, 2000), classical-localist (e.g., Marslen-Wilson, Tyler, Waksler, & Older, 1994) or distributed-connectionist (e.g., Rueckl, Mikolinski, Raveh, Miner, & Mars, 1997).

The sublexical and the supralelexical accounts were examined by Diependael and colleagues in both Dutch and French using masked cross-modal priming. Whereas the results from Dutch provided support for a supralelexical architecture, some of the results from French were not so obviously accommodated by such an approach. The paper by Rueckl and Galantucci explored the locus and time-course of long-term morphological priming using the fragment completion task (Weldon, 1993). Their results demonstrate that morphological priming has a modality-specific component early in the time course of processing.

A particularly topical issue, reflected in a number of the articles contained in this volume, concerns the extent to which morphological decomposition is influenced by semantic transparency. Though first raised in relation to classical-localist theories of lexical organization (Marslen-Wilson et al., 1994) this issue is central to more recent parallel-distributed processing (PDP) theories, proponents of which (e.g., Plaut & Gonnerman, 2000; Rueckl et al., 1997) postulate that morphological effects emerge as a consequence of learned statistical regularities that morphology brings to the form-meaning mapping. Mirković and her colleagues develop this account further in their examination of gender representation in Serbo-Croatian, which demonstrates that gender information results from systematic correlations between phonological structure and semantic features. Velan and her colleagues also evaluate this account in light of their observation that masked morphological priming in Hebrew is resistant to the orthographic changes seen in weak and defective roots.

In contrast to the data reported by Marslen-Wilson et al. (1994), a number of articles in this volume find morphological effects on word recognition that are uninfluenced by semantic transparency. Boudelaa and Marslen-Wilson demonstrate morphological priming effects in Arabic that do not appear to depend on the semantic similarity between prime and target; Diependaele and colleagues observe clear masked cross-modal morphological priming effects in spite of semantic opacity in French (although they find suggestive evidence for a semantic transparency effect at very short exposure durations); and Pollatsek and Hyönä fail to find any reliable difference in readers' eye fixation durations on Finnish compound words as a function of semantic transparency, while finding reliable constituent frequency effects for both transparent and opaque compounds.

These articles thus appear broadly consistent with recent arguments that favour a morphological decomposition process, blind to semantic transparency, which characterises early visual word processing. In the extreme case, it seems that pseudo-complex words such as 'corner' may well be initially processed as the combination of the (pseudo-) stem 'corn' and the (pseudo-) affix 'er' (Longtin, Segui, & Halle, 2003; Rastle, Davis, & New, in press). However, the characteristics of morphological

decomposition may depend crucially on time, with effects of semantic transparency dominating later stages of processing (Rastle, Davis, Marslen-Wilson, & Tyler, 2000). This account fits nicely with the eye movement data presented by Juhasz and colleagues. They found that spaces inserted in non-normally spaced compound words (e.g., 'softball' → 'soft ball') facilitated early visual word recognition (gauged by first fixation durations), but disrupted later recognition (gauged by total gaze durations that include refixations) to the extent that spacing hampered meaning specification. By contrast, evidence against prelexical morphological decomposition is presented by Carreiras and his colleagues. They demonstrate in a series of experiments that the stem-homograph effect which has been traditionally regarded as providing support for the decompositional view (e.g., Allen & Badecker, 1999) is not a reliable effect in Spanish. Therefore, further research is needed, both to explore the suggestive, and potentially critical evidence for early effects of semantic transparency observed by Diependaele et al. with French stimuli, and to understand better why the Semitic languages such as Arabic depart so clearly from this pattern, as described by Boudelaa & Marslen-Wilson.

Finally, this special issue not only provides an overview of current work on morphological processing, but also sets the scene for future work in this field. One promising future direction is likely to concern the link between morphology and syntax and semantics at the sentence level. This direction is well represented in the work of Deutsch et al., and De Almeida and Libben. Both these papers show contextual influences on the way morphologically complex words are processed in sentences. Also, Zwitserlood and her colleagues examined priming by sentence context of dominant and subordinate meanings of particle verbs in Dutch, that were either semantically transparent or opaque. They demonstrate a clear dissociation between the lexical and the conceptual/semantic systems. Thus, one critical issue for future cross-linguistic investigations of morphological processing is to determine how lexical processing of morphological information interacts with sentence-level processing, and how this might vary as a function of factors such as word length and agglutination. Just as for isolated word recognition, morphologically complex words are likely to play a key role in developing our understanding of the architecture of the processing system that maps form onto meaning at the sentence level.

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