Accessing concepts from (pseudo)constituents of words

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Introduction

How are compound and pseudocompound words interpreted during visual word recognition? While it is clear that a compound word such as *bedroom* refers to a particular object, it also makes reference to two other objects related to its constituents—namely, *bed* and *room*. Some object names, however, superficially embed word-like graphemic sequences that do not correspond to true morphemes. For instance, a pseudocompound such as *fanfare* can be erroneously parsed as containing *fan* and *fare*. In fact, research seems to overwhelmingly support the view that there is some form of morphological parsing, whereby the visual word recognition system parses letter strings into morphemes and subsequently accesses their concepts [1]. It remains unclear, however, (1) the kind of knowledge available to the morphological parser during recognition, (2) the locus of semantic effects in morphological processing, and (3) whether the concepts of both constituents and full words are simultaneously accessed.

The present study aimed to investigate whether the "constituent concepts" of compound and pseudocompound words are tokened. The comparison between compounds and pseudocompounds is a crucial test case in understanding the nature of the visual word recognition system and how concepts are accessed by their linguistic labels.

We employed a picture-word congruency paradigm, whereby words and pictures were presented dichoptically, in opposing visual fields. Participants were instructed to judge the relatedness between word-picture pairs. The key manipulation involved presenting either compounds or pseudocompounds as target words and pictures depicting one of their "constituents" (e.g., *bedroom-BED* and *fanfare-FAN*, respectively). Additionally, we manipulated the position of the "constituent" probed by the picture (first and second "constituents"; see Figure 1a). These manipulations are motivated by the assumption that words and objects access the same amodal representations in the conceptual system [2, 3]. Thus, if compound and pseudocompound words are parsed and their "constituent concepts" are accessed, both word types are expected to yield relatedness judgements. However, if the morphological parser operates with knowledge of the semantic relation between constituent and full word, then only compounds are expected to yield relatedness judgements.

Method

Sixty-two participants performed a word-picture congruency task, which consisted of concomitantly presenting word and picture targets for 133 msec, followed by a backward mask for 200 msec. Target words were 24 compounds and 24 pseudocompounds. The set of target pictures probing the first (modifier) and second (head) "constituents" of compounds and pseudocompounds were evenly distributed. Additionally, we manipulated the complexity of the target word, which was either the full word or the probed "constituent" with hashmarks blocking the unprobed constituent (e.g., *bed####-BED*). We also controlled for the hemispheric projection of the target word, whereby words were presented either in the left or right visual

fields (right or left hemispheres, respectively), with pictures presented in the opposing visual field.

Results and Discussion

Analyses of accuracy and response times were conducted using linear mixed-effects models. Correct responses to pseudocompounds were "yes" relatedness judgements considering that responding "yes" reflects the degree to which pseudo-constituent concepts are tokened. The conceptual access to compound constituents was facilitated as compared to pseudocompound "constituents"—with greater accuracy and shorter response times. In addition, compounds and pseudocompounds produced a first "constituent" advantage for accuracy but not for response times. That is, probing the first (modifier) "constituent" elicited more accurate responses than probing the second (head) for both compounds and pseudocompounds (see Figure 1b).

Taken together, our findings partially support the view that the morphological parser is blind to semantics. Parsing is considered morpho-orthographic, whereby all potential constituent morphemes are identified from graphemic sequences. The inconsistent "modifier" advantage can be explained by either a parser that operates from left-to-right or by positing the composition of "constituent concepts" following a modifier-head structure. Specifically, probing the "head constituent" (e.g., *seatbelt-BELT*) can yield an incongruency between the word's compositional meaning (a type of *belt* that is modified by *seat*) and the picture referent (a generalized type of *belt*).

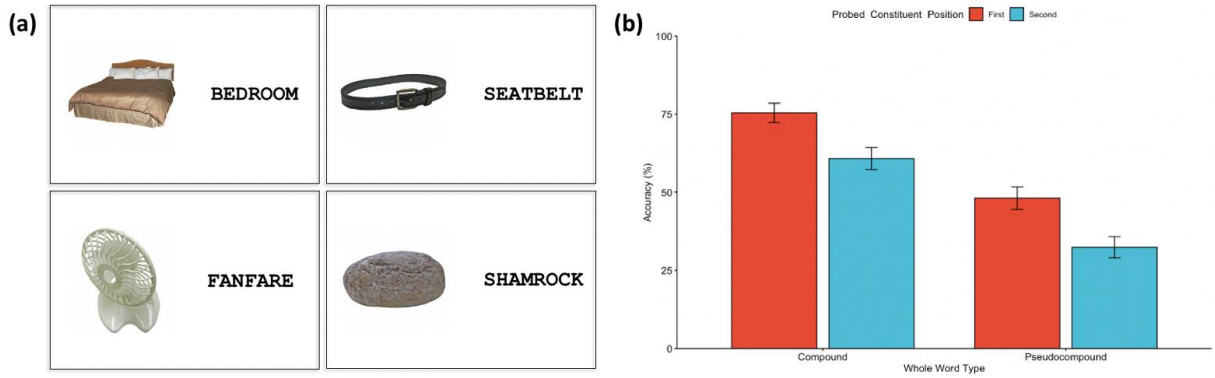

Fig. 1. (a) Illustration of experimental trials with compound (top row) and pseudocompound (bottom row) target words, as well as pictures probing the target words' first or second "constituents". **(b)** Mean accuracy in relatedness judgments to compounds and pseudocompounds as a function of the probed constituent position.

References

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