Is the concept “car” accessed when recognizing “carpet”? Evidence from a word-picture congruency task

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Abstract. The early moments of compound and pseudocompound processing were investigated by probing their “constituent” concepts (e.g., *DOOR* in *doorbell* and *CAR* in *carpet*). This was done by concomitantly presenting target words in one visual field (left or right, projected to the right or left hemisphere, respectively) with the picture target in the opposing visual field. The stimuli were presented for 100 ms followed by a backward mask and participants’ task was to judge whether the word and picture were related to each other. The experimental manipulations consisted of target word type (compound or pseudocompound), the constituent probed by the picture (first or second constituent), and the target word’s hemispheric projection (left or right hemisphere). Preliminary findings suggest that compounds and pseudocompounds are not processed differentially. Responses to pictures probing the first constituent were more accurate and faster when projected to the left hemisphere as compared to right hemisphere word projections. Taken together, the lexical conceptual representation of the initial word-like segments of compounds and pseudocompounds seem to be accessed during visual word recognition.

Keywords: Visual word recognition, Conceptual access, Word-picture congruency task, Compounds, Pseudocompounds

1 Introduction

How do morphemes map onto concepts? While it is clear that a compound word such as *doorbell* refers to a particular object, it also makes reference to two other objects related to its constituents—namely, *door* and *bell*. Some object names, however, superficially embed word-like graphemic sequences that do not correspond to true morphemes. For instance, a pseudocompound such as *carpet* can be erroneously parsed as containing *car* and *pet*. The comparison between true compounds and pseudocompound words serves as a crucial case study in understanding the cognitive architecture of visual word recognition and how the initial parsing of morpho-orthographic sequences access their conceptual representations. In the present study, we investigated whether the lexical concepts associated to compound and pseudocompound “constituents” (i.e., morphemes and pseudomorphemes, respectively) are accessed during the early moments of lexical processing employing a word-picture congruency task.

Many visual word recognition studies have provided support for a temporally distinct segmentation process that is hard-wired to detect morpheme-like letter strings before whole word identification [1]. On this account of a prelexical morpho-orthographic parser, both *doorbell* and *carpet* are decomposed into their "constituents"—producing a morpho-orthographic parse that is insensitive to the true morphological and semantic status of word segments.

Picture-word interference (PWI) studies have investigated whether the presentation of a distractor stimulus (either a word or a picture) facilitates the naming of a target stimulus. It has been shown that morphologically complex distractor words facilitate the naming of a picture target representing an embedded word of the distractor [2]. That is, naming *ROSE* (capital letters represent pictures of objects) is faster when accompanied by the distractor word *rosebud* as compared to an unrelated word, such as *dragon*. Facilitation effects in picture naming have also been observed when the picture target (e.g., *BONE*) represents a word in a form-related distractor word (e.g., *trombone*) [3]. However, the magnitude of the facilitation effect was smaller in the form-related condition (e.g., *trombone*) than the morphologically related condition (e.g., *hipbone*). These findings corroborate the evidence in support of a prelexical morpho-orthographic segmentation process and suggest that word "constituents" are accessed at the conceptual level.

2 Method

Participants (N=8) performed a word-picture congruency task which consisted of concomitantly presenting word and picture targets for 100 milliseconds, followed by a backward mask for 500 milliseconds. The participants' task was to judge whether the word and the picture were related to each other. The word targets were 20 compound and 20 pseudocompound words (Figure 1a). In critical trials, the pictures always represented one of the whole word's "constituents" but varied with regards to the constituent position. Specifically, half of the picture targets probed the first "constituent" of a compound or pseudocompound (e.g., *DOOR* in *doorbell* and *CAR* in *carpet*, respectively) and the remaining half of picture targets probed the second "constituent" (e.g., *BELT* in *seatbelt* and *ROCK* in *shamrock*). The final experimental manipulation consisted of projecting the word target either to right hemisphere (left visual field) or left hemisphere (right visual field), with the picture target presented in the opposing visual field. As per the findings from a previous PWI study, we expected an advantage in congruency judgements for compounds compared to pseudocompounds [2].

3 Results and Discussion

Accuracy and response times (RTs) were analyzed through linear mixed-effects models. The analyses of pilot data (note: we expect to run 24 participants by the time of the conference) did not find main effects of word type (i.e., compounds and pseudocompounds) and picture-word relation (i.e., picture represents the first or second

constituent) for both accuracy and RTs. However, there was a significant interaction between the hemispheric projection of the word target and picture-word relation. The decrement in performance seemed to be most pronounced between the hemispheric projections of word targets when the pictures probed the "first constituent" (Figure 1b). Specifically, word targets projected to the left hemisphere (e.g., *DOOR* + *doorbell*; as in Figure 1a) engendered more accurate and faster responses than words projected to the right hemisphere (e.g., *doorbell* + DOOR).

Taken together, this experiment allowed us to probe the early moments of conceptual access of compound and pseudocompound "constituents". While the constituents of compounds truly relate to their whole word, participants' performance did not seem to differ between both target word types (i.e., compounds and pseudocompounds). Moreover, the preliminary findings suggest that initial "constituents" seem to be accessed at the conceptual level regardless of their true morphological status in the whole word. The advantage for the initial constituent can be accounted for by a prelexical parsing system operating in a left-to-right fashion, yielding an initial morpheme-like letter string that quickly accesses its lexical-conceptual representation.

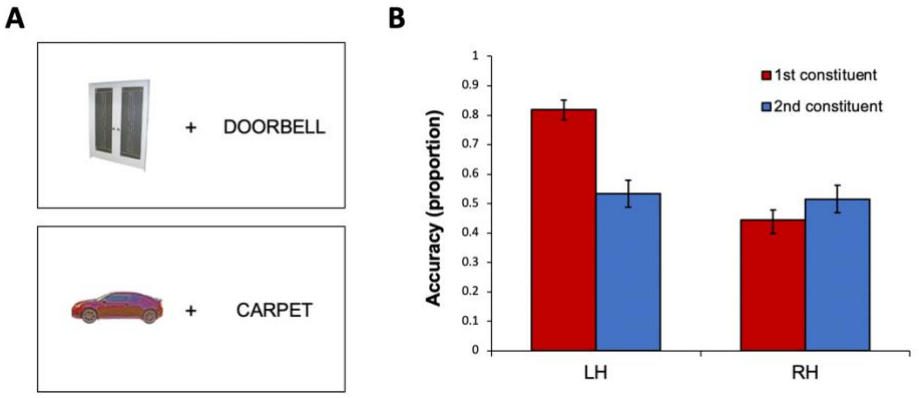

Fig. 1. (A) An illustration of experimental trials showing the presentation of compound (top) and pseudocompound (bottom) target words as well as picture targets probing the target words' first constituents. **(B)** Accuracy of congruency judgments as a function of word hemispheric projection and the constituent probed by the picture.

References

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