"Why verbs could be more demanding of executive resources than nouns: Insight from a case study of a fv-FTD patient"

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Introduction

Verb processing has been found to be more impaired than noun processing in patients suffering different forms of degenerative dementia, and especially in patients with frontal variant-frontotemporal dementia (fv-FTD) who presented the greatest discrepancy in performance between verb and noun comprehension and/or naming (Rhee, Antiquena, & Grossman, 2001; Silveri, Salvigni, Cappa, Della Vedova, & Puopolo, 2003). Rhee et al. (2001) and Silveri et al. (2003) suggested that the reduction of executive resources, which prevails in fv-FTD, might be the underlying cause for the disproportionate verb deficit in dementia patients. This suggestion was based on the finding of a significant correlation between measures of executive resources and the severity of the verb deficit.

Within this account, verb processing is thought to be more demanding of executive resources than noun processing because of the massive amounts of information represented in verbs (i.e., grammatical and thematic information further to semantic information). However, in these studies, the patients' performance with verbs and nouns was assessed only with a picture naming or/and a word-picture verification task, in which verbs had to be named or understood from actions depicted by static, black-and-white line drawings. Yet recognizing actions from such drawings might be a less familiar and more difficult task than recognizing objects. Therefore, it is unclear from these studies whether the disproportionate difficulties with verbs in fv-FTD patients are caused by the retrieval of verb linguistic representations or rather by the processing of static pictures of actions, being more demanding in executive resources.

In the present case study of a fv-FTD patient (JB), we addressed this issue by assessing the patient's abilities in noun and verb processing with (i) static pictures of objects and actions; (ii) written word stimuli; (iii) videos of actions.
Semantic association task with written nouns and verbs

A French version of the “Pyramid and Palm Trees Test” (PPT; Howard & Patterson, 1992) and of the “Kissing and Dancing Test” (KDT; Bak & Hodges, 2003) was prepared. The 52 noun triplets and the 52 verb triplets were matched in name frequency. Each triplet was composed of a written word (the target) and two semantically-related words written below it. JB was asked to point to the word that was more closely related to the target. Her performance was significantly impaired for both nouns \( t(5) = 26.19; p < .0001 \) and verbs \( t(5) = 9.63; p < .0001 \) but nonetheless significantly less impaired for verbs than nouns \( t(5) = 9.06; p < .001 \).

Discussion

JB was disproportionately impaired with verbs by comparison with nouns in both picture naming and word-to-picture verification. This finding replicates the results obtained by Silveri et al. and Rhee et al. with a group of FTD patients tested with very similar tasks. However, the same pattern was not found in JB when she had to name the same verbs from videotaped actions and to understand them from word stimuli. This suggests that she was not disproportionately impaired in retrieving the linguistic information associated with verbs but, rather, encountered particular difficulties with the processing of static pictures of actions.

We suggest that recognizing actions from static scenes is more demanding of executive resources than recognizing objects because not only the task is less familiar in everyday life, it also requires retrieving/computing information that is lacking in static scenes (the temporal and movement features) and yet crucial for the recognition of the action.

The results of this study thus point to the need of selecting appropriate stimuli for assessing verb and noun processing in brain-damaged patients (whatever the etiology) who are likely to have reduced executive resources.

References

