



NOUN-VERB DISSOCIATION IN PRIMARY PROGRESSIVE APHASIA



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INTRODUCTION

Primary progressive aphasia (PPA) is a degenerative syndrome characterized by a relatively pure, slow and progressive deterioration of the linguistic abilities [1, 2]. The neurological frame is usually characterized by an initial hypoperfusion of the left perisylvian regions that is generally followed by atrophy [1]. PPA generally begins with word-finding problems, frequently associated with dysgraphia; then, it can evolve either in a non-fluent form, characterized by syntactic and articulatory problems that frequently make the speech dramatically reduced, or in a fluent form, in which the lexical and phonological difficulties become more and more severe, but remain relatively isolated [2].

The selectivity of this neuropsychological frame has permitted to study some important neuropsychological phenomena from a privileged point of view. In particular, studying patients with PPA can help in interpreting the noun-verb dissociation [3], a phenomenon which has been strongly debated in the recent neuropsychological literature [4, 5].

OBJECTIVES

This study aims at studying:

- (1) the phenomenon of noun-verb dissociation in a patient suffering from PPA.
- (2) the possible association between a predominant noun or verb impairment and the hypoperfusion of specific brain areas.

CASE HISTORY

FR is a 48 years old right-handed man, with no previous neurological impairment who has been presenting word finding problems and phonemic paraphasias since 2001. He came into our observation in April 2002 and after two years was diagnosed as suffering from fluent PPA.

MATERIALS AND METHODS

FR underwent:

- ✓ a broad neuropsychological assessment
- ✓ MRI and PET examinations
- ✓ a specific language assessment through the AAT [6]
- ✓ two specific tasks to investigate the lexical retrieval of nouns and verbs: a picture naming task (PNT) and a cued sentence completion task (Noun and Verb Retrieval in a Sentence Context Task, NVRSCT)

The two tasks devised to investigate the lexical retrieval are described in more detail below.

1. PICTURE NAMING TASK (PNT)

50 objects and 50 actions (some of the pictures were taken from other databases; 7, 8). In this task, the concomitant effect of the imageability was assessed by means of a Logistic Regression Analysis (LRA; 9).

2. NOUN AND VERB RETRIEVAL IN A SENTENCE CONTEXT TASK (NVRSCT)

45 pairs of sentences denoting the same event, either using a N or the corresponding V.

E.g. I heard the hunter **shooting**

Ho sentito **sparare** il cacciatore

I heard the **shot** of the hunter

Ho sentito lo **sparo** del cacciatore

The first sentence was presented in complete form, while a gap was left in the second sentence, to be completed with the target word.

For each pair of sentences two different conditions were employed: from N to V and from V to N (45 trials triggered a N, 45 trials triggered a V).



The NVRSCT has been devised in order to test the lexical retrieval of nouns and verbs with comparable imageability (V: 4,52±0,68; N: 4,30±0,92 in a 1-to-7 scale)

RESULTS

- ✓ The broad neuropsychological assessment confirms that FR's language impairment is quite isolated: actually, no other cognitive deficit was found.
- ✓ The AAT examination and the spontaneous speech are also compatible with the diagnosis of fluent PPA.

	T score	Severity
Token	58	Md
Repetition	52	Md
Writing	53	Md
Denomination	56	Md
Comprehension	52	Md

Table 1. AAT score.
Md = Mild disease

- ✓ The PNT reveals the presence of both a verb-specific impairment (N: 78%; V: 42%; $\chi^2=20.34$; $p<.001$) and a strong imageability effect (Logistic regression analysis: Wald=15.79; $p<.001$). On the contrary, FR does not show any verb-specific impairment in the NVRSCT (N: 42%; V: 40%).
- ✓ The MRI examination is negative while the PET shows moderate hypometabolism in left temporal and parietal lobes

DISCUSSION

FR manifests, in line with the literature [3, 10], a verb-specific impairment in the PNT as a consequence of PPA. However, both the Logistic Regression Analysis and the lack of dissociation in the imageability-matched NVRSCT suggest that FR's verb impairment mostly depends on the imageability effect; this indicates that, as it has been proposed for brain-injured patients [4], imageability may play a role in causing predominant verb impairments also in patients with PPA.

In addition, as opposed to what is reported in Hillis et al.'s studies [3, 10], a verb specific impairment is documented in a patient with *fluent* PPA. Finally, neuroimaging data indicates a hypoperfusion in the temporal and parietal regions; this is at odds with some previous studies [10, 11] suggesting that the frontal lobe is crucially involved in the processing of verbs.

Taken together, these results seem to indicate that also the posterior areas of the left hemisphere, and in particular the left temporo-parietal region, play a role in verb processing; this is in line with other recent findings obtained on brain-injured patients [12].

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