Noun-verb dissociation in aphasia: type/token differences in the analysis of spontaneous speech

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Introduction

Many studies on aphasia have described disproportioned impairment of either verbs or nouns and have broached the issue of mental implementation of the grammatical class distinction. A clear picture has not yet been reached and, while evidence has has been found to indicate the lemma level as the possible locus of this distinction (Crepaldi et al., 2006), some alternative interpretations have been proposed (e.g., Rapp & Caramazza, 2002).

These studies have focused almost exclusively on picture naming tasks, and have practically ignored the assessment of the dissociation in spontaneous speech. A remarkable exception is the study by Bastiaanse and Jonkers (1998) in which, however, the authors considered only verb-impaired patients and focused exclusively on the production of verbs. The results of this study indicate that the naming performance resulting from picture naming tasks does not always correlate with lexical retrieval in spontaneous speech. The present study aims at verifying (i) whether the disproportionate verb or noun impairment that emerges from a picture naming task is also present in spontaneous speech, and (ii) whether this occurs irrespective of the type of aphasia.

Materials and Methods

Seven Italian aphasic patients participated in the study. Their lexical retrieval abilities on nouns and verbs were tested by means of a picture naming task of 40 actions and 30 objects. Nouns and verbs were matched for word frequency, length and age of acquisition (see Luzzatti et al., 2002). Patients were selected according to their performance on this task and their aphasia type in order to represent the major types of noun-verb dissociation observed so far, i.e., noun-impaired fluent (n=3), verb-impaired fluent (n=2) and verb-impaired non-fluent patients (n=2). Spontaneous speech was elicited by asking the patients to describe their job, their family, their

hobbies and how their speech disorder started. The spontaneous production was recorded and transcribed to obtain a three-hundred-word sample for each patient. For each sample, the number of closed class words, open class words, nouns, open class verbs and closed class verbs was counted. In order to increase the sensibility of the noun-verb ratio, three different counting procedures were used: (i) all noun or verb occurrences (token count), (ii) only the first occurrence for each word (type count) and (iii) only the first occurrence of each individual lexical entry irrespective of the inflection (stem count). Finally, all the data were transformed in *z*-scores in compliance with the norms reported in Semenza et al. (1989).

Results and Discussion

Figure 1 summarizes the patients' profiles (Type count) on the basis of noun/verb dissociation type and aphasia type. The results suggest that the verb- and noun-impaired patients (picture naming task) may produce (but not always do) less-than-normal items from the impaired grammatical category. This emerges manifestly for both verb-impaired agrammatic patients and noun-impaired fluent aphasic patients, but is not so clear-cut in verb-impaired fluent aphasic patients that are impaired on the action naming task but in their spontaneous speech produce proportionately even more verbs than normal controls (a phenomenon that emerges more clearly in the Type-count analysis). Moreover, unlike the data reported in Bastiaanse and Jonkers's study (1998), the result obtained with this study cannot be explained as the repeated retrieval of a small sample of verbs, since the patients produce a higher amount of verbs also in the Type count. They therefore appear to overcome their lexical disorders, possibly assisted by the sentence context in which verbs must be produced in spontaneous speech.

The profiles reveal some further information regarding the mechanisms underlying noun/verb dissociation. Verb-impaired agrammatic patients also produced a low rate of closed-class items; this asssociation is well-known and may be due to the emergence of right-hemisphere lexical knowledge that is said to be limited to high frequency concrete nouns (Zaidel et al., 1990). The spontaneous speech of fluent noun- and verb-impaired patients revealed a different phenomenon, with the noun-impaired fluent aphasic patients producing a lower rate of nouns and of open-class items (Type-count), a result that suggests a true lexical damage at the word form level. On the other hand, the verb-impaired fluent aphasic patients produce a normal

amount of verbs in their spontaneous speech although clearly below norms in the picture naming task; in other words, they appear to suffer from more central, sentence-context sensitive, lexical-syntactic damage predominantly affecting verbs.

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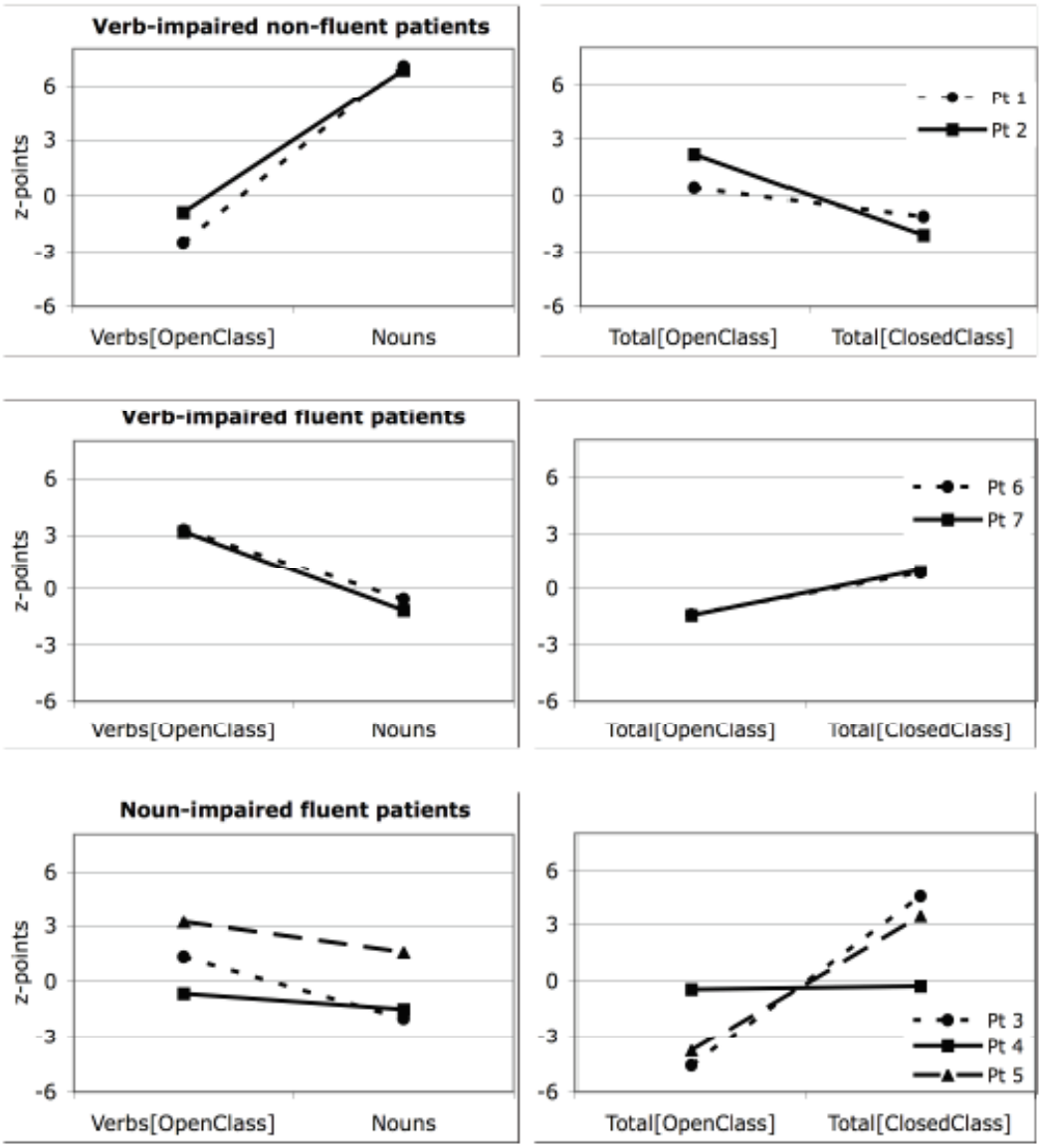
Verb-impaired non-fluent patients
z-points
6
3
0
-3
-6
Verbs[OpenClass]
Nouns
Total[OpenClass]
Total[ClosedClass]
Pt 1
Pt 2
Verb-impaired fluent patients
Pt 6
Pt 7
Noun-impaired fluent patients
Pt 3
Pt 4
Pt 5