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Action naming in anomic aphasic speakers: Effects of instrumentality and name relation

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Abstract

Many studies reveal effects of verb type on verb retrieval, mainly in agrammatic aphasic speakers. In the current study, two factors that might play a role in action naming in anomic aphasic speakers were considered: the conceptual factor *instrumentality* and the lexical factor *name relation to a noun*. Instrumental verbs were shown to be better preserved than non-instrumental verbs in a group of anomic aphasic speakers but not in a group of Broca's aphasic speakers. Name relation to a noun improved the performance of the anomic aphasic speakers as well. Again, no effect was found in the group of Broca's aphasic speakers. Verbs with a name relation to a noun were better retrieved in action naming than verbs without a name relation. These findings are discussed in terms of the spreading activation theory of Dell. (Dell, G. S. (1986). A spreading activation theory of retrieval in sentence production. *Psychological Review* 93, 283–321.)

Keywords: Anomic aphasia; Verb finding problems; Effect of verb type; Instrumentality; Verb–noun name relation

1. Introduction

Recent studies on comprehension, naming, and sentence construction revealed that different factors influence verb retrieval in aphasic speakers. Meaning (Barde, Schwartz, & Boronat, 2006; Breedin & Martin, 1996; Breedin, Saffran, & Schwartz, 1998; Jones, 1984), verb morphology (Kiss, 2000), the verb-argument structure (Kiss, 2000; Kim & Thompson, 2000; Thompson, Shapiro, Li, & Schendel, 1994; Thompson, Lange, Schneider, & Shapiro, 1997), transitivity and ergativity (Bastiaanse & van Zonneveld, 2004, 2005; De Bleser & Kauschke, 2003; Jonkers, 2000; Luzzatti et al., 2001, 2002; Thompson, 2003), and thematic information (Black, Nickels, & Byng, 1991; Breedin & Martin, 1996; Byng, 1988; Kiss, 2000; Luzzatti et al., 2002; Thompson et al., 1997) played a role in verb processing in aphasic speakers. Most of these effects were reported for aphasic speakers suffering from agrammatic or Broca's aphasia. The factors that influence verb retrieval relate in general to grammatical aspects of the verbs. The effect of these factors is therefore often explained by the underlying grammatical deficit Broca's aphasic speakers are assumed to have (cf. for example Thompson, 2003).

The present study describes effects of non-grammatical factors on verb retrieval, i.e., a conceptual factor (*instrumentality*) and a phonological/lexical factor (*name relation between a noun and a verb*). It will be investigated whether these factors also influence verb retrieval in Broca's aphasic subjects, although they do not concern grammatical factors. Next to the data of Broca's aphasic subjects also the data of anomic aphasic subjects will be presented in order to find out whether these factors play a role in verb retrieval in these subjects. The latter seems plausible, as anomic aphasic speakers are assumed to suffer from a lexical retrieval deficit, which is more specifically considered to be due to problems in retrieving the complete phonological information of words (e.g., Ellis & Young, 1988; Kay & Ellis, 1987). Specific problems in verb form retrieval have been described by Bastiaanse (1991), Jonkers (1998), and Jonkers and Bastiaanse (1998) in anomic aphasic speakers. These authors assume that anomic speakers are able to

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activate the correct verb lemma, but that they are unable to retrieve the corresponding phonological form from the lexicon.

In some studies, it has been shown that anomic or fluent aphasic speakers showed a better performance on noun retrieval than on verb retrieval (Berndt, Haendiges, Burton, & Mitchum, 2002; Jonkers, 1998; Kambanaros & van Steenbrugge, 2006; Kohn, Lorch, & Pearson, 1989; Shapiro & Caramazza, 2003; Williams & Canter, 1987). However, other studies revealed the opposite pattern (Miceli, Silveri, Nocenti, & Caramazza, 1988; Miceli, Silveri, Villa, & Caramazza, 1984; Zingeser & Berndt, 1990). Therefore, it is unclear whether a relation between a verb and a noun influences verb retrieval positively or negatively. Consequently, in the present study it is investigated whether a conceptual or phonological relation in name between a noun and a verb facilitates or inhibits verb retrieval in the anomic aphasic speakers and for comparison in Broca's aphasic speakers as well. Results on action naming will be compared with object naming scores in both aphasic groups.

The effect of a conceptual relation between verbs and nouns will be studied by focusing on so-called *instrumental verbs*. Instrumental verbs are verbs referring to actions for which an instrument (not being a body part) is required in order to perform the action. It is assumed that this instrument is part of the conceptual representation of the verb, as is illustrated by the following examples [example 1 is based on the representation of the verb *to clean* as given by Jackendoff (1990)]:[1]

(1) to clean:
[CAUSE([ ]$_i$,[INCH[NOT BE([SPOTS], [ON$_d$[ ]$_j$])]])]
(2) to polish:
[[CAUSE([ ]$_i$,[INCH[NOT BE([SPOTS], [ON$_d$[] $_j$])]])
([BY[$_{instrument}$RAG])]
(3) to mop:
[CAUSE([ ]$_i$,[INCH[NOT BE([SPOTS],[ON$_d$[ ]$_j$])]])
([BY[$_{instrument}$MOP])]

The difference between the more generic verb *to clean* and the more specific verbs *to polish* and *to mop* is the presence of an instrument in the conceptual representation. This part of the conceptual representation is necessary in order to activate the intended verb.

The verbs *to polish* and *to mop* differ with respect to the presence of the instrument in the phonological form of the verb. The verb *to mop* incorporates the instrument phonologically, whereas the verb *to polish* does not. Expressing the instrument in a prepositional phrase is therefore still possible when *to polish* is used as in (4), while it is odd with the verb *to mop* as in (5):

(4) The man polishes the mirror with a rag.
(5) The man mops the floor with a mop.

Bastiaanse (1991) studied the effect of *instrumentality* on verb retrieval in an experimental study in which two Broca's aphasic speakers and two subjects with anomic aphasia participated. She found no effect of instrumentality as such, but reported an effect of name relation to a noun within the group of instrumental verbs. Clear patterns per type could, however, not be found as the number of subjects was too small.

Kemmerer and Tranel (2000) reported a positive effect of *name relation* (homophony) between verbs and nouns on action naming for English in a large group of aphasic speakers. However, they performed no analysis for the effect of name relation in different types of aphasic subjects.

Recently, Kambanaros and van Steenbrugge (2006) reported a study to the effect of *instrumentality* and *name relation between a verb and a noun* in bilingual Greek-English anomic aphasic speakers. They found a positive effect of *instrumentality* on action naming in both languages. No effect of *name relation* was found on the Greek version of the action naming test, but *name relation* played a negative role on the English version. No effects were found for both factors on a verb comprehension task.

Jonkers and Bastiaanse (2006), however, showed that *instrumentality* and *name relation between a verb and a noun* may have an effect on verb comprehension scores as well, but they took the data of non-fluent and fluent aphasic speakers into account. *Instrumentality* did have an effect on the comprehension scores of the non-fluent aphasic speakers: instrumental verbs were significantly better understood than non-instrumental verbs. This was, however, only found when there was no name relation between the verb and the instrument. No influence of *instrumentality* was found for the fluent aphasic speakers. The latter group did show a significantly worse performance on instrumental verbs with a name relation between the instrument and the verb as compared to instrumental verbs without such a name relation.

In the first paragraph of this section it was mentioned that, in general, effects of verb type on verb retrieval relate to grammatical factors. One clear exception to this pattern is the study from Breedin et al. (1998; see also Barde et al., 2006). These authors presented data from eight aphasic subjects who showed a selective impairment to verb retrieval, but six of these patients were better in retrieving semantically complex verbs than semantically simpler verbs. Semantically complex verbs are verbs that have a higher number of semantic features than semantically simple verbs, e.g., *to run* has more semantic features than the semantically simpler verb *to go*. The authors point out that this shows that semantic features can facilitate verb retrieval, a finding that is not in line with the view that the dissociations that were found in aphasic subjects between verb and noun retrieval could be explained by assuming a lexical organization according to grammatical category, as for example has been suggested by Caramazza and Hillis (1991). Breedin et al. (1998) therefore

[1] In these examples i is the actor, j is the patient or theme; d denotes that a determiner is necessary.