

# **The effect of instrumentality and verb-noun name relation on verb retrieval in bilingual Greek-English anomic aphasic individuals**

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## **Abstract**

The effect of instrumentality and verb-noun name relation has been studied in a group of late bilingual, Greek-English speaking individuals with anomic aphasia, who had previously shown a greater verb than noun impairment in a picture naming task. The results revealed a facilitatory effect of instrumentality in both languages. However, there was no effect of verb-noun name relation in Greek, and a negative effect of verb-noun name relation was observed in English. The findings showed that lemma retrieval was intact in this group of bilingual individuals whose main problem seemed to arise during the retrieval of the phonological representation of the target word.

**Keywords:** instrumentality, verb-noun name relation, bilingual anomic aphasia, lemma retrieval, phonological representation

## **1. Introduction**

There has been a huge interest in aphasic individuals' differential ability to retrieve nouns and verbs (see Druks 2002). To date, specific noun or verb impairments have been addressed in only a few studies of bilingual aphasia (Kremin & De Agostini 1995; Sasanuma & Park 1995; Kambanaros 2003; Kambanaros & Van Steenbrugge 2005). Recently, Kambanaros & Van Steenbrugge (2005) showed that bilingual Greek-English individuals with anomic aphasia experienced more difficulty retrieving verbs than nouns in both languages. Yet, the distinction between verbs and nouns might be too broad (Jonkers & Bastiaanse 1998). For instance, verbs can be further categorised into non-instrumental and instrumental verbs and the latter into those with or without a name-relation to the corresponding noun. Instrumentality is generally considered to be a conceptual feature and name-relation a phonological feature. The present study reports on the findings regarding the production of non-instrumental and instrumental verbs and the effect of verb-noun name relation in Greek-English speaking bilingual individuals diagnosed with anomic aphasia.

There has been considerable interest in verb and noun retrieval during confrontation naming. Findings of earlier studies suggested a double dissociation, with Broca's patients showing more difficulties in retrieving verbs than nouns and patients with anomic aphasia showing the reverse pattern. However, results of more recent studies show that both patient groups experience difficulties with verb rather than noun retrieval (Williams & Canter 1987; Kohn et al. 1989; Basso et al. 1990; Caramazza & Hillis 1991; Daniele et al. 1994; Kremin 1994; Hillis & Caramazza 1995; Jonkers & Bastiaanse 1996; Manning & Warrington 1996; Berndt et al. 1997; Bastiaanse & Jonkers 1998; Marshall et al. 1998).

Recently, Kambanaros & van Steenbrugge (2005) also found greater verb than noun retrieval difficulty in a group of bilingual Greek-English individuals with anomic

aphasia. As the greater verb impairment was observed in both English and Greek, it was most likely due to non-language specific differences in the relative complexity of verb and noun processing. Alternatively, the distinction in verb and noun production may be due to the differential complexity of the underlying linguistic representation of words belonging to the two grammatical word categories.

With the exception of a few 'atypical' cases (see Bastiaanse 1991; Jonkers & Bastiaanse 1998), Instrumentality has been shown to positively influence verb retrieval in monolingual, anomic individuals who seem to find it easier to produce instrumental verbs/actions, e.g. *to cut*, than non-instrumental verbs/actions, e.g. *to read*, in confrontation naming (Jonkers 1998; Jonkers & Bastiaanse 1996). As Instrumentality is a feature operating during lemma activation, it has been concluded that, unlike in Broca's patients, lemma activation is intact in individuals with anomic aphasia who are assumed to experience difficulty at a later stage when activating the phonological representation of verbs and nouns.

Jonkers (1998) argues that the facilitatory effect of Instrumentality is due to the co-activation of the instrumental noun lemma during verb retrieval, which in turn raises the activation threshold for the phonological representation of the target verb.

Instrumental verbs can be further differentiated into those that share a name relation or phonological representation with the instrumental noun (to hammer-hammer), and instrumental verbs that do not share the phonological form with the corresponding noun (to sweep-broom). There have been conflicting findings regarding the effect of verb-noun name relation in verb retrieval in individuals with fluent (anomic) aphasia: (i) no effect, in that (monolingual) individuals with anomic aphasia experienced equal difficulties in producing non-name related instrumental verbs compared to name related instrumental verbs (Jonkers 1998; Bastiaanse & Jonkers 1998), (ii) a positive effect of name relation with (fluent) aphasic individuals producing name related instrumental verbs significantly better than non-name related instrumental verbs (Jonkers & Bastiaanse 1996; Breedin et al. 1999; Kemmerer & Tranel 2000), (iii) a negative effect of name relation with name related verbs produced significantly worse than non-name related verbs (Bastiaanse 1991).

So far, the effect of verb-noun name relation has been examined in three languages: In English where the verb/noun share the same phonological word form (Caramazza & Hillis 1991; Breedin et al. 1999; Kemmerer & Tranel 2000); in Dutch (Bastiaanse 1991; Jonkers 1998; Bastiaanse & Jonkers 1998; Jonkers & Bastiaanse 1996, 1998) and in French (Kremin 1994) where the verb and the noun share the phonological form of the root stem (prior to inflection) but not the entire word form.

In the present study we investigate the effects of Instrumentality (a conceptual feature) and verb-noun name relation (a phonological feature) during L1 (Greek) and L2 (English) naming of action pictures in Greek-English speaking, bilingual individuals with anomic aphasia, who had previously shown more difficulty naming verbs than nouns in both languages (Kambanaros & Van Steenbrugge 2005).

## 2. Method

### 2.1 Subjects

Twelve Greek-English speaking, late bilingual individuals (aged 60-84) with fluent anomic aphasia, and a control group of twelve non-brain injured Greek-English late bilingual individuals, matched for gender, education and age, participated in the study. Each participant was administered the English and Greek version of the Boston

Diagnostic Aphasia Examination (Goodglass & Kaplan 1983; Tsolaki 1997). All participants were (pre-morbidly) fluent speakers of Greek and English having migrated from Greece in early adulthood and having lived in Australia for 46 years on average. All had conversational command of both languages according to self-report. For the aphasic individuals, this information was confirmed by family members or friends. Language proficiency was greater in Greek than English among all participants.

**Table 1.** Profile of the aphasic participants

<i>Subject</i>	<i>Gender</i>	<i>D.O.B</i>	<i>Lesion</i>	<i>Aphasia Type</i>	<i>Y.P.O</i>	<i>Years of education</i>	<i>Years of exposure to English</i>
BA 1	M	1928	L. CVA	Anomic	7	3	52
BA 2	M	1918	L cerebral infarct	Anomic	5	2	53
BA 3	F	1936	*L fronto-parietal CVA	Anomic	1	1	44
BA 4	M	1943	L parietal CVA	Anomic	2	8	46
BA 5	F	1933	L internal capsule infarct	Anomic	5	5	46
BA 6	M	1934	*L thalamus and posterior limb of the internal capsule	Anomic	2	11	41
BA 7	M	1939	L. basal ganglia involving thalamus and external capsule	Anomic	3	6	47
BA 8	M	1928	L. basal ganglia	Anomic	5	3	49
BA 9	M	1930	*L. thalamic-internal capsule infarct	Anomic	2	6	40
BA 10	F	1929	L. external capsule	Anomic	1	6	45
BA 11	F	1932	L. MCA CVA involving parietal lobe	Anomic	2	2	39
BA 12	M	1930	L. CVA	Anomic	5	5	47

**Table 2.** Profile of the control group

<i>Subject</i>	<i>Gender</i>	<i>Year of Birth</i>	<i>Education</i>	<i>Occupation</i>	<i>Age at migration</i>	<i>Years of exposure to English</i>
BC1	M	1929	5	Factory worker	25	48
BC2	M	1921	3	Factory worker	28	53
BC3	F	1940	2	Factory worker	23	39
BC4	M	1945	7	Electrician	12	45
BC5	F	1935	6	Dressmaker	20	48
BC6	M	1935	11	Builder	25	42
BC7	M	1934	6	Factory worker	31	37
BC8	M	1930	5	Factory worker	21	51
BC9	M	1934	6	Factory worker	26	42
BC10	F	1931	6	Florist	27	43
BC11	F	1930	2	Factory worker	26	37
BC12	M	1939	6	Factory worker	26	37
<i>Mean</i>			<i>5.4</i>		<i>24.3</i>	<i>44.1</i>

**Key:** BA = bilingual aphasia; BC = bilingual control (Note: all subjects were born in Greece and their schooling took place in Greece only.); M = male; F = female; D.O.B. = date of birth; Y.P.O = years post onset; CVA = cerebral vascular accident; L. = left; MCA = middle cerebral artery

All subjects' lesion sites were diagnosed using CT except those marked with an \*, who were diagnosed using MRI scans.

## 2.2 Materials

Each participant was administered the Greek Object and Action Test (GOAT) designed to assess verb and noun retrieval in bilingual aphasic speakers of Greek and English (Kambanaros 2003). The GOAT was piloted on a group of twenty non-brain injured, late bilingual Greek-English speakers aged between 55 to 75 years. All items of the GOAT had a high imageability and familiarity as evidenced by the response accuracy in the pilot group of subjects. None of the Greek words in the test were English cognate words. The instruments (nouns) were from the semantic category of tools/manipulated implements excluding body parts and consisted of 35 nouns in total. Similarly, the corresponding instrumental verbs were 35 in total. Non-instrumental items were all inanimate nouns drawn from common semantic categories such as household items, furniture etc., and consisted of 20 items in total. Similarly, the non-instrumental verbs corresponding to the nouns were 20 in total. Mean word frequencies of occurrence for the three verb categories were not significantly different: instrumental verbs without a noun-name relation (mean = 65.26 per million), instrumental verbs with a noun-name relation (mean = 68.29 per million), and non-instrumental verbs (mean = 75.04 per

million) (Kucera & Francis 1970). The same sets of action pictures and objects were administered in Greek and English on two separate occasions, with a one-week interval between the two sessions. The order of language (Greek or English) and task (comprehension or production) presentation was counterbalanced across the participants for each group separately. Only one language was examined and used by the examiner on each occasion.

*Comprehension:* Subjects were asked to point to the correct photograph from a set comprising the target action, and the two semantic distracters for each target action. Each subject was asked to point to the picture of the action matching the spoken word heard.

*Word production:* Subjects were asked to name (in one word) the action represented in the photograph in the target language.

### 2.3 Data analysis

All results were subjected to a repeated measures ANOVA, with two within subject variables each time, Language (Greek vs English) by Instrumentality (instrumental verbs (without a name relation) vs non-instrumental verbs) and Language by verb-noun name relation (instrumental verbs with vs without a name-related noun). The between subjects variable was Group (individuals with and without anomic aphasia). Given the *a priori* assumption of a significant difference in the performance of aphasic and normal individuals, the repeated measures ANOVA was also performed on the scores of the bilingual aphasic group only with Language and Instrumentality or Language and Name relation as within subject variables.

## 3. Results

The following tables show the mean percentages per each condition for the two participant groups:

**Table 3.** Mean percentages and SDs for Instrumental and Non-instrumental verb production in L1 and L2 in aphasic and control individuals

	<i>L1 instrumental verbs</i>	<i>L1 non instrumental verbs</i>	<i>L2 instrumental verbs</i>	<i>L2 non instrumental verbs</i>
<b>Aphasics</b>				
Mean	65.4%	60.0%	54.6%	47.5%
SD	28.8	23.5	21.8	19.7
<b>Controls</b>				
Mean	100%	100%	96.2%	99.2%
SD	0	0	4.8	1.9

**Table 4.** Mean percentages and SDs for the production of instrumental verbs with and without a noun-name relation in L1 and L2 in aphasic and control individuals

	<i>L1 name-related instrum. verbs</i>	<i>L1 non-name related instrum. verbs</i>	<i>L2 name-related instrum. verbs</i>	<i>L2 non-name related instrum. verbs</i>
<b>Aphasics</b>				
Mean	62.8%	65.4%	37.2%	54.6%
SD	27.9	28.8	11.5	21.8
<b>Controls</b>				
Mean	100%	100%	94.4%	96.2%
SD	0	0	6.2	4.8

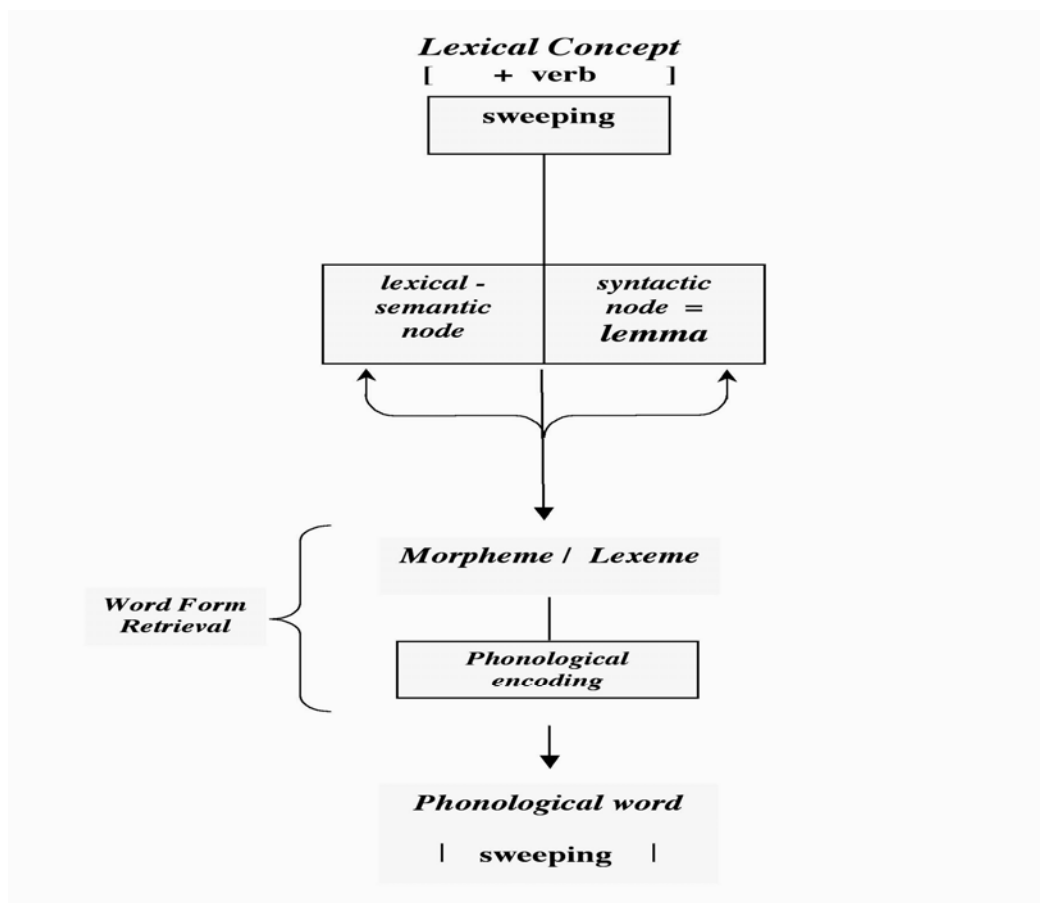
There were no significant differences between the two groups (aphasic *vs* controls) in the overall comprehension of instrumental and non-instrumental verbs ( $F(1, 22) = 1.64$ , ns), and of instrumental verbs with or without a noun-name relation ( $F(1, 22) = 3.81$ , ns). Furthermore, the naming ability of the non-brain injured bilingual individuals was not affected by Instrumentality (a conceptual feature) or Verb Noun name relation (a phonological feature), but these features did affect the naming ability of the bilingual individuals with anomic aphasia in the following way: Instrumental verbs were easier to retrieve than non-instrumental verbs ( $F(1, 11) = 5.06$ ,  $p < .05$ ) in L1 (mean = 62.7%) and L2 (mean = 51%) while the verb-name relation made it more difficult to retrieve name related instrumental verbs ( $F(1, 11) = 10.05$ ,  $p < .05$ ) in L1 (Mean = 64.1%) but not in L2 (mean = 45.9%).

#### 4. Conclusion

Instrumentality and verb-noun name relation influenced verb retrieval in late bilingual anomic aphasic individuals in different ways.

Bilingual individuals with anomic aphasia found instrumental verbs significantly easier to retrieve than non-instrumental verbs in both their native (Greek) and second language (English). This finding showed that lemma retrieval was relatively intact in both languages. On the other hand, instrumental verbs with a noun-name relation were more difficult to retrieve than non-name related instrumental verbs in L2, but not in L1. This might be due to weaker connections between lemmas and their phonological representations in the L2 compared to L1, combined with increased competition across co-activated phonological representations in L2 in the case of a name relation between the instrumental verb and noun.

Overall, the findings are compatible with the nature of the main processes underlying Levelt's (1989) two-stage model (see Figure 1),



**Figure 1.** An adaptation of Levelt's model

that is, competition during lemma retrieval may facilitate naming, whereas competition during the selection of the phonological word form will have a negative or detrimental effect on the selection of the target word.

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