

Davide Crepaldi[§], Lisa Saskia Arduino[@], Valentina Tobia[§] and Claudio Luzzatti[§]

[§] Department of Psychology, University of Milano-Bicocca, Milano, Italy
[@] Institute of Psychology, University of Urbino, Italy and ISTC-CNR, Roma, Italy

INTRODUCTION

- ✓ Since the 80s, many studies on aphasic patients approached the issue of the noun/verb dichotomy representation in the human linguistic system (Miceli, Silveri, Villa & Caramazza, 1984).
- ✓ This dichotomy has been suggested to be represented in the lexicon either:
 - at a peripheral, modality-specific stage, that is, the phonological and orthographic lexicons (e.g., Rapp & Caramazza, 2002; see the *lexeme level* in Levelt's model, Levelt et al., 1999)
 - or
 - at a more central, modality-independent, lexical-syntactic level (e.g., Berndt et al., 1997 and Crepaldi et al., 2006; see the *lemma level* in Levelt's model).
- ✓ A clear picture has not been reached by considering only the studies on aphasic patients; some converging evidence from other sources of information is requested.
- ✓ For example, the orthographic priming effects can provide a quite clear understanding of what happens in the input orthographic lexicon with a *very high temporal resolution*.
- ✓ We can then use these effects to test whether nouns and verbs are differently represented at the very first levels of lexical processing (*lexeme level*).

General questions

1. Does the orthographic priming effect have the same characteristics irrespective of the grammatical class of the items used?

More specifically:

- Is there a cross-category priming effect?
- Does this possible effect present the well-known time course of the priming effects observed when the grammatical class is not taken into consideration? (see for example Feldman, 2000)
- Does the type of prime-probe relationship (morphological vs. semantic) interact with the cross-category priming effect?

2. Is the effect symmetrical when a noun primes a verb and when a verb primes a noun?

Prediction

If nouns and verbs are differently represented in the orthographic input lexicon as suggested by some studies on aphasic patients (see above), then we should expect that the grammatical class of the items do influence the observed priming effects, especially at short SOAs.

MATERIALS AND METHODS

Subjects

- ✓ 62 Italian undergraduate students (42 females and 20 males; mean age: 23,4).

Materials

- ✓ 2 experimental lists made up of 45 pairs of Ns and Vs:
 - A *morphological* set in which the pairs are morphologically and semantically related (e.g. *bacio-baciare*, *kiss_N-to kiss_V*; pairwise matching for imageability and length, while Vs are listwise slightly more frequent than Ns; Crepaldi et al., 2006).
 - A *semantic* set in which the pairs are only semantically related (e.g. *amore-baciare*, *love_N-to kiss_V*; pairwise matching for word frequency and length).
- ✓ 2 control lists made up of 45 Ns and 45 Vs:
 - A control list of unrelated words matched pairwise for word frequency and length with the *semantic* set.
 - A control list of unrelated words matched pairwise for word frequency and length with the *morphological* set.

Task

- ✓ Reading task

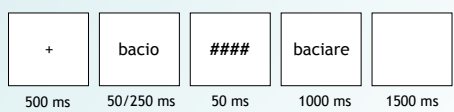
Experimental Design

- ✓ A 2x2 mixed design with the following variables:
 - *Prime Type (PT)*: morphologically vs semantically related; between factor.
 - *Stimulus Onset Asynchrony (SOA)*: 100 ms vs 300 ms; between factor.
 - *Relatedness (REL)*: related vs unrelated control prime; within factor.
 - *Grammatical Class (GC)*: Ns priming Vs vs Vs priming Ns, within factor.

	Morphological				Semantic			
	Related		Unrelated		Related		Unrelated	
	Prime	Target	Prime	Target	Prime	Target	Prime	Target
NV	bacio kiss(N)	baciare to kiss	svago amusement	baciare to kiss	amore love(N)	baciare to kiss	popolo folk	baciare to kiss
VN	baciare to kiss	bacio kiss(N)	girovare to promote	bacio kiss	amare to love	bacio kiss	curare to cure	bacio kiss

Table 1: An example is provided for each prime-probe pair used in this experiment. Please note that the same stimuli set is used in both the SOA=300ms and the SOA=100ms condition.

Timeline



RESULTS

Methodological advice

- ✓ The percentage of correct answers was at ceiling (the mean was 98% both in the items analysis and in the subjects analysis) and thus it was not analyzed further: then, the reported results refer only to the RTs.

RESULTS

- ✓ A main effect of RELATEDNESS (by subjects and by items): targets are responded faster when preceded by a related word.

GC is significant only in the subject analysis.

SOA significant only in the item analysis.

PT is highly significant in the item analysis, but only approaches significance in the subject analysis.

- ✓ RELATEDNESS interacts significantly only with PRIME TYPE: a bigger advantage as a consequence of the presentation of the primes in the Morphological than in the Semantic condition.

Morphological and Semantic Priming

The strong interaction between REL and PT lead us to analyze the data separately in the morphological and in the semantic conditions (see Figure 1 and Figure 2).

- ✓ Evident morphological priming with both SOAs (100 ms and 300 ms)

- ✓ No semantic priming with neither SOAs

- ✓ No interaction between REL and GC in neither condition.

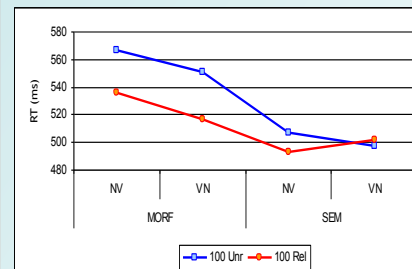


Figure 1: Mean RTs in the four experimental conditions when the SOA is 100 ms. NV, nouns prime verbs, VN, verbs prime nouns, MORF, morphological condition, SEM, semantic condition, Unr, unrelated prime, Rel, related prime.

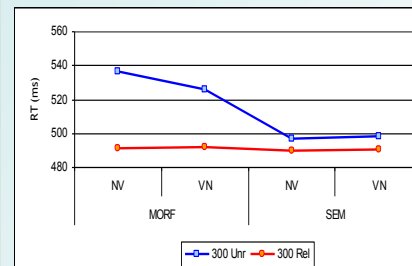


Figure 2: Mean RTs in the four experimental conditions when the SOA is 300 ms. NV, nouns prime verbs, VN, verbs prime nouns, MORF, morphological condition, SEM, semantic condition, Unr, unrelated prime, Rel, related prime.

DISCUSSION & CONCLUSION

- ✓ The characteristics of the cross-category orthographic priming are very different from those usually described by the studies which do not take into account the grammatical class (e.g., Feldman, 2000). In particular:

- The priming effect is present ONLY with morphologically related stimuli and NOT with semantically related stimuli.
- The SOA does not interact with the priming effect, at least when considering this small, though representative, sample of values (100 ms and 300 ms).
- ✓ The priming effect has the same characteristics irrespective of the fact that a N is priming a V or, vice versa, a V is priming a N.
- ✓ Summing up, the results seem to indicate that:
 - the grammatical class is represented in some way in the orthographic input lexicon: if it was not, semantic priming would be expected as it occurs when nouns are used as stimuli.
 - Ns and Vs entertain relationships ONLY if they are morphologically related and not when they are merely semantically related.
 - Nonetheless, since the grammatical class does not interact with the priming effect, Ns and Vs are probably symmetrically represented, without any relevant qualitative difference.

REFERENCES

- Berndt, R.S., Mitchum, C.C., Haendiges, A.N., Sandson, J. (1997). Verb retrieval in aphasia. 2. Relationship to sentence processing. *Brain and Language*, 56, 107-137.
- Crepaldi, D., Aguijaro, S., Arduino, L.S., Zonca, G., Ghirardi, G., Inzaghi M., Colombo, M., Chierchia, G., Luzzatti, C. (2006). Noun-verb dissociation in aphasia: The role of imageability and functional locus of the lesion. *Neuropsychologia*, 44, 73-89.
- Feldman, L. (2000). Are Morphological Effects Distinguishable From the Effects of Shared Meaning and Shared Form? *Journal of Experimental Psychology: Learning, Memory, & Cognition*, 26, 1431-1444.
- Levelt, W.J.M., Roelofs, A., Meyer, A.S. (1999). A theory of lexical access in speech production. *Behavioral and Brain Sciences*, 22, 1-75.
- Miceli, G., Silveri, M.C., Villa, G., Caramazza, A. (1984). On the basis for the agrammatic's difficulty in producing main verbs. *Cortex*, 20, 207-240.
- Rapp, B., Caramazza, A. (2002). Selective difficulties with spoken nouns and written verbs: a single case study. *Journal of Neurolinguistics*, 15, 373-402.

ADDRESS FOR CORRESPONDENCE

Davide Crepaldi

Macquarie Centre for Cognitive Science
MACQUARIE UNIVERSITY
Sydney, NSW 2109, Australia

Phone: +61 2 98506758
Fax: +61 2 98506059
E-mail: dcrepald@maccs.mq.edu.au