

WHAT IS THE ROLE OF SEMANTICS IN SELECTIVE DAMAGE TO THE PHONOLOGICAL OUTPUT LEXICON?

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Anomia, the inability to provide the correct name of an object when presented with its corresponding picture, is one of the most frequent symptoms in aphasia (Goodglass and Kaplan, 1983) and can be in some cases the only language impairment in some patients with “pure anomia”. Failure to name a visually presented object or picture can be traced back at least to two different functional deficits: a semantic deficit, i.e. the inability to access the meaning of a given item; or a lexical/phonological deficit, i.e. the inability to access the phonological form of the word corresponding to a given item. In this latter case, a deficit of the phonological output lexicon, the semantic system is assumed to be unimpaired (Caramazza and Hillis, 1990). This assumption is schematized in the model proposed by Caramazza and Hillis (1990) which considers the phonological output lexicon and the semantic system as two distinct modules. Based on this model, Miceli et al. (1996) assumed that in anomia resulting from output lexical damage, a phonological treatment would result in improvement of anomia, whereas a semantic treatment would be ineffective. In addition they further predicted and found that a phonological treatment has no effect on naming abilities of untreated items.

An alternative hypothesis is to consider that the semantic system and the phonological output lexicon strictly interact and are not modular or “informationally encapsulated” (Fodor, 1983). One prediction of this hypothesis is that a semantic treatment may facilitate the access to the phonological form of the to-be-named item. The aim of this study is to test this prediction.

METHODS

Patient MK had a stroke in the territory of the left middle cerebral artery, resulting in a non-fluent aphasia with severe anomia. She showed a severe deficit in naming pictures.

The experimental material consisted of 120 pictures of objects (from Alario and Ferrand, 1999) that MK consistently failed to name over three sessions, but that she could correctly match in a word-picture matching task, a task traditionally considered as tapping semantic knowledge (Miceli et al., 1996).

During rehabilitation, were used the same items that MK could not name in the baseline condition; these were selected however, from a different set of pictures (*L’imagier du Père Castor, 1977*). The pictures were divided into three

sets of 40 items each (sets 1, 2, and 3) matched for lexical frequency, word length, semantic categories, and visual familiarity. Set 1 and Set 2 were treated either phonologically (Set1) or semantically (Set 2), whereas Set 3 served as control set.

The phonological treatment (Set 1) was administered in five sessions over five consecutive days. In each session, each item was presented ten times. For each item the experimenter read aloud the corresponding word that the patient was asked to repeat. At the end of each session, a naming task of the 40 pictures of the Set 1 was administered to MK. At the end of the last session, a naming task of the 120 pictures used in the baseline naming task (from Alario and Ferrand, 1999) was administered again to the patient.

The semantic treatment (Set 2) started two days after the end of the phonological treatment and was administered for five sessions over five consecutive days. In each session, each item was presented ten times together with the oral presentation of its semantic definition, but the corresponding word was not provided by the experimenter. At the end of each session, a naming task of the 40 pictures of the Set 2 was administered. At the end of the last session a naming task of the 120 pictures used in the baseline naming task (from Alario and Ferrand, 1999) was administered again to the patient.

Finally, the naming task of the 120 pictures used in the baseline naming task (from Alario and Ferrand, 1999) was administered to the patient 20 days and 66 days after the last treatment.

RESULTS

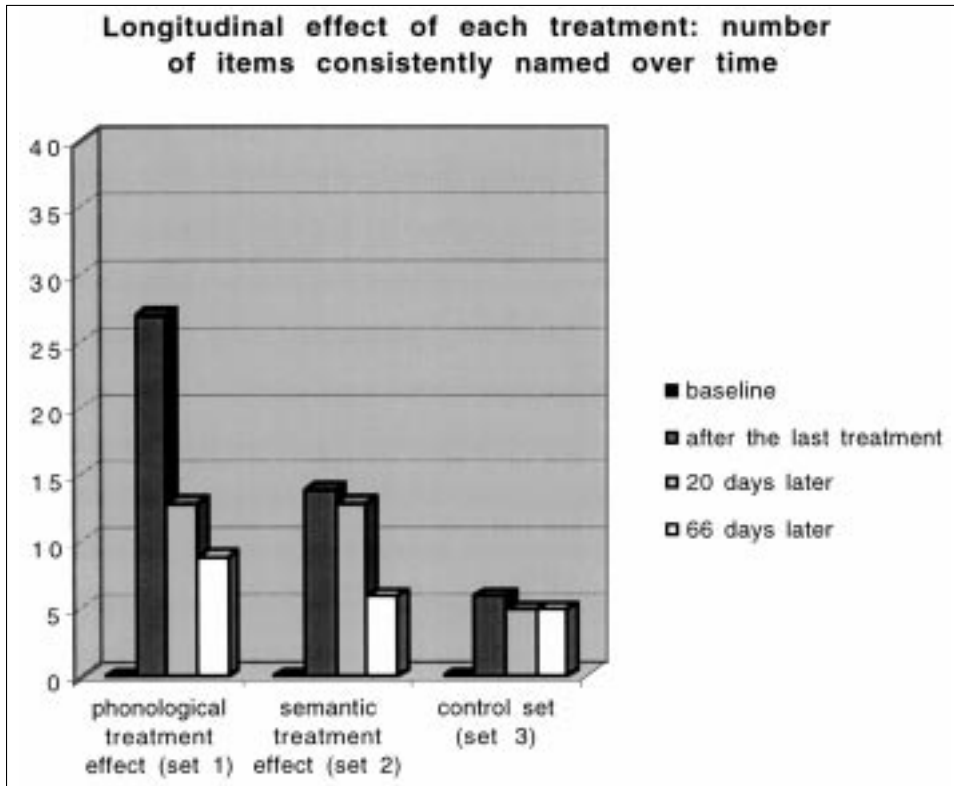
The results are reported in the figure.

Statistical analysis (χ^2 test) showed that both treatments, phonological and semantic, resulted in a significant improvement of MK's performances on the picture naming task.

The phonological treatment of Set 1 resulted in a clear and statistically significant improvement of the naming abilities of the items represented in this set. However, 20 days after the last treatment, the number of named items dropped to about 50%, and 66 days later, decreased further to 33% compared to the number of items named immediately following the last treatment.

The semantic treatment of Set 2 also resulted in a clear and statistically significant improvement of naming abilities, although this treatment was only half effective compared to the phonological treatment. However, the beneficial effect of the semantic treatment was more stable over time than the phonological treatment. In fact, 20 days after the last treatment the number of named items was almost the same as immediately after the last treatment, and 66 days later this number dropped to 50%.

Some generalization to untreated items (Set 3) was also observed immediately after the last treatment, 20 days and 66 days after treatment.



CONCLUSIONS

This study shows that a semantic treatment in a selective damage to the phonological output lexicon is effective and that its positive effect on anomia is much more stable over time than the effect of a phonological treatment. These results suggest that the phonological output lexicon and the semantic system closely interact and that the access to the meaning of a word can facilitate the access to its phonological form.

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