Introduction

Contextual priming (CP) was developed as a procedure to manipulate aphasic naming by contextual relationships (semantic, phonological, unrelated) and by intensive repetition priming (Laine & Martin, 1996; Martin & Laine, 2000). Since then, one facilitation study (Martin et al., 2004b) and three treatment studies (Renvall et al., 2003; Martin et al., 2004a; Renvall et al., 2005) have been published. These studies suggest that the contextual priming procedure is most effective when semantic processing is relatively spared. Renvall et al. (2005) hypothesized that if the patient's main problem is in activating the correct semantic representation in naming, the increased activation provided by context in the CP treatment is not channeled to the specific item but instead spreads more diffusely in the neighbourhood, maintaining abnormal competition between lexical items. The present study explores further the short- and long-term effects of the CP treatment and whether it is possible to obtain more item-specific semantic support for hard-to-name items by augmenting the CP procedure with additional picture-to-word matching tasks. As a reference, phonological tasks are also included. The effect of the CP treatment coupled with these two additional tasks is studied in two aphasic participants whose primary functional deficits are different.

Participants

LV is a 56-year-old right-handed female who suffered a frontotemporal infarction and subsequent right-sided hemiparesis over 4 years prior to this study. Spontaneous speech consists of mostly one-word utterances, and conversation relies heavily on conversation partners' questions and guessing. A comprehension deficit is evident in informal discussions, and formal testing indicates problems in lexical-semantic processing. In picture naming tasks, LV exhibits a relatively severe naming difficulty (BNT 20/60) with mainly semantic errors and no responses with occasional problems arising from a mild verbal apraxia. Repetition of single words is mostly successful although occasional problems occur. JP is a 52-year-old right-handed male who suffered a left temporoparietal infarction over 7 years prior to this study. Spontaneous speech is relatively fluent despite frequent word-finding difficulties which JP skillfully compensates for circumlocutions, semantically related words and posing questions to conversation partners. In picture naming, JP shows moderate problems (BNT 32/60) with erroneous words mainly being phonologically related nonwords and semantically related category members which he produces to compensate for the word-finding difficulty. In the repetition, problems occur especially with long words and phrases. Occasional problems also occur in lexical-semantic tasks. Taken together, neither one of our patients has a sharply circumscribed functional deficit in naming. However, one can conclude that LV's naming difficulty exhibits a clear lexical-semantic component, whereas JP's predominant deficit is in phoneme sequencing.

Method

The multiple-baseline treatment design for both participants included naming measurements before the treatment (6 for LV, 7 for JP), during the treatment (22 for LV, 29 for JP), and 1.5 months after the treatment had been finished. Stimuli used in these measurements were selected separately for each subject and included 120 hard-to-name items (60 to-be-trained and 60 untrained control pictures), and 20 easy-to-name items. Items-to-be-

trained were grouped into 12 sets (5 pictures in each). Items in 6 picture sets were semantically related and in the other 6 sets, they were unrelated. Of these, 3 semantic and 3 unrelated picture sets were trained with an additional semantic task (different for each set) including the 5 pictures from a set that were treated with the CP technique plus 2 easy-to-name pictures. The task was to match pictures to their written names. Similarly, 3 semantic and 3 unrelated picture sets were trained with an additional phonological task. The task was to find the written word among 5 alternatives that shared the last syllable with the word that was spoken to them. All the 5 items from one of the 6 sets at a time served as spoken stimuli in the phonological tasks. Thus, there were 5 separate phonological tasks for each set of items. The training protocol included repeated cycles of the additional semantic/phonological tasks followed by spontaneous naming attempts of the same items and repetition of the target names after the examiner. Each picture set was trained 10 times.

Results and Discussion

First, we analysed short-term naming success of treated and control items separately for each condition (semantic and unrelated) and additional task type (semantic and phonological) using the Shewart chart procedure (cutoff line 3 SD above baseline variation in both relatedness condition). The results indicate that both participants naming of all treated items was improved. In addition, LV showed slight improvement in naming the untreated items in the unrelated condition augmented with additional semantic tasks and JP in the unrelated condition augmented with phonological tasks while the naming success in these cases remained low (13% correct for LV and 18% correct for JP). Second, we compared participants' post-treatment performances to their last baseline measurements using the McNemar test. For LV the strongest effects 1.5 months after treatment were observed in the semantic condition treated with the additional semantic tasks (χ^2=7.11, df=1, p<.008), while endurance was also obtained in the same condition with additional phonological tasks (χ^2=5.14, df=1, p<.03). For JP endurance was observed in the semantic condition treated with additional semantic tasks (χ^2=5.14, df=1, p<.03) and in the unrelated condition with both semantic (χ^2=4.17, df=1, p<.05) and phonological tasks (χ^2=6.12, df=1, p<.02).

In summary, the findings from this study suggest that with the modified CP procedure it is possible to achieve not only significant short-term but also longer-term facilitation on naming in a patient with semantic problems. Simple picture-to-word matching tasks do not, however, facilitate naming significantly more than phonological tasks at least for a patient like LV who in addition to semantic problems did show phonological problems especially in repeating and reading aloud nonwords. In addition, the present study brings further evidence that patients with late phonological problems (like JP in this study and YK in Renvall et al., 2003) benefit from the CP treatment because of the repetition priming component while different contexts or additional semantic and phonological tasks all have similar facilitative effect on naming. The results are in line with Howard's (2000) conclusion that the item-specific facilitation of naming may be due to strengthened mappings between the lexical-semantic and lexical-phonological levels via massive practise.

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