Chapter 7

Rehabilitation of memory for people’s names

INTRODUCTION

The previous chapters clearly showed impaired learning and retrieval of people’s names in closed head injured patients. These impairments on experimental tasks confirmed the subjective reports frequently expressed by head injured patients about difficulties remembering people’s names (Brooks, 1984; Sunderland et al., 1983; Wilson, 1984; 1987). Given the objective and subjective problems in remembering people’s names in head injured patients, it is important to attempt to rehabilitate memory for people’s names in these patients.

Several attempts to improve memory for people’s names in brain damaged patients - not just closed head injured patients - have been reported. The large majority of these studies focused on learning new names and taught patients to apply imagery techniques to associate a name to a person’s face. Generally, the subject is encouraged to look for a distinctive feature in the face and to think of an image in which that feature is associated with the person’s name, or an appropriate transformation of that name. For example, to remember that a person’s name is Hammer when this person happens to have dimples in his or her cheeks, one can think of a carpenter’s hammer making dimples in the cheeks (Groninger, Groninger & Stiens, 1995). This technique, which is known as face-name association (Lorayne & Lucas, 1974), has been shown to improve name recall in normal subjects with an intact memory (Gieselman, McCloskey, Moeller & Zielan, 1984; McCarty, 1980; Morris, Jones & Hampson, 1978).

In rehabilitation studies applying face-name associations, the technique appeared to improve name recall in some brain damaged patients (Berg, 1993; Goldstein, McCue, Turner, Spanier, Malec & Shelly, 1988; Lewinsohn, Danaher & Kikel, 1977; Thoene & Glisky, 1995; Wilson, 1987) but not in others (Glasgow, Zeiss, Barrera & Lewinsohn, 1977; Wilson, 1981a). One explanation for the limited success of face-name associations is that it may require too much mental effort for brain damaged patients, whose information processing capacity is assumed to be overloaded relatively easily (Miller, 1992; Richardson, 1992). Consequently, the face-name association technique may be more suitable for mildly rather than for severely impaired patients (Moffat, 1984; Schacter & Glisky, 1986; Wilson & Moffat, 1984). Most of the studies that did find beneficial effects of face-name associations had tried to limit the effort required for making the associations. Lewinsohn et al. (1977) simplified the task by using names that referred to, or could easily be transformed to refer to, an object’s name and provided the patients with associations to link the name with the face. Thoene and
Glisky (1995) gave their patients verbal elaborations of the names that they could use to associate the name with the face. Although name learning in several brain injured patients improved following these procedures, in more natural circumstances the face-name association technique proved less effective. If the patients themselves had to come up with visual images associating the name with the face, there was no benefit of imagery (Glasgow et al., 1977).

Alternative approaches to improve name learning in brain damaged patients have been reported. Wilson (1982; 1987) and Wilson and Moffat (1984) provided patients with a visual elaboration of a person's name, e.g. a merry thorn with Mary Thorne, without requiring an explicit association between the name and the person's face. This strategy improved name learning in several of their patients. Glasgow et al. (1977) found a beneficial effect on name learning with, what they called, a simplified imagery rehearsal procedure. Names their patient found difficult to remember were written on a card. Three times a day the patient was asked to read the names and try to imagine the face of the person belonging to each name. Wilson (1981b) successfully applied the same technique in another patient with severe memory impairments. The imagery rehearsal technique employed by Glasgow et al. (1977) was more of a repetition procedure than of imagery and resembles the spaced retrieval procedure reported by Schacter, Rich & Stampp (1985). These authors prompted four amnesic patients to recall a person's name at increasingly longer intervals. This improved name recall in all four patients; for three of them the improvement was maintained over a 12-day delay. Wilson (1987) also found improved name recall in a patient who was taught repeated rehearsal of the names to be learned. An advantage of spaced retrieval may be that it does not put too much strain on the information processing capacity of brain damaged patients (Wood, 1987).

Jaffe & Katz (1975) employed the method of vanishing cues to teach a Korsakoff patient the names of hospital staff. The patient was cued with the initials of the two names to be learned; these cues were then gradually faded. Breuning, van Loon-Vervoorn & van Dieren (1989), using a similar approach, reported improved name learning in several other Korsakoff patients. Another method that appears to improve name recall is errorless learning. In errorless learning patients are taught new information in such a way that there is a minimal chance for them to make mistakes. Patients with a poor episodic memory may not be able to remember previous errors and fail to eliminate these errors as a result. Therefore, these patients would be better helped with errorless learning than with standard, but error-prone, learning (Baddeley & Wilson, 1994). Wilson, Baddeley, Evans & Shiel (1994) showed that several patients with severe memory problems learned people's names more quickly with the errorless learning technique than with standard learning.

As discussed in Chapter 1, one of the reasons why names are difficult to learn is thought to be their relative lack of meaning (Burke et al., 1991; Cohen, 1990). Most names no longer refer to known objects or occupations, thereby making them essentially non-
words. There are few semantic attributes connected to a name in contrast to, for example, a person’s occupation. Hearing that a person is a baker can evoke various images connected to a baker: bakes bread, gets up early, kneads dough. By contrast, hearing that a person’s name is Baker rarely evokes images connected to that name (Burke et al., 1991). Consequently, enhancing the meaningfulness of a name by increasing the number of semantic or phonological attributes connected to the name could improve name learning. This may be one of the reasons why the face-name association technique is helpful in learning people's names. If the name or a part of it refers to some feature in the face of its bearer, the name automatically becomes more meaningful. However, face-name associations are only one of many ways to enhance the meaningfulness of a name. One could just as well link the name to other physical characteristics of its bearer or to biographical facts, like the person’s occupation, hobbies, home situation or home town. Alternatively, one can think of other familiar persons or objects with a similar name.

Brooks, Friedman, Gibson & Yesavage (1993) asked normal young and elderly subjects for the strategies they had used in a name-face learning task. The strategies correlating highest with the number of names recalled were: “giving meaning to the name” and “looking for similarities with familiar names”. The strategy of “looking for a distinctive facial feature” bore no relation to the number of names recalled. Giving more meaning to a name by means of imagery or a verbal elaboration of the name, or by simply thinking of similar familiar names, may be easier and less effortful than the classical face-name association technique. It may, therefore, be more appropriate for training name learning in brain injured patients. Previous training studies have seldom applied this approach, with the exception of Wilson (1982; 1987) and Wilson and Moffat (1984). The current chapter reports an attempt to improve name learning in closed head injured patients by teaching them strategies to enhance the meaningfulness of people’s names, but without teaching the face-name association technique. The results of Experiment 3.4, in which subjects learned names or possessions to unfamiliar faces, showed that the performance of the head injured patients was clearly affected by the meaningfulness of the presented names. Both the patients and the controls recalled significantly more meaningful names than meaningless names. Therefore, it is expected that name recall can benefit from a training which encourages the patients to attach more meaning to people’s names.

In addition to name learning problems, impaired retrieval of familiar people’s names is also found following closed head injury. None of the training studies mentioned above reported attempts to improve the retrieval of the names of familiar persons. Improving name retrieval in memory impaired patients is at least as important as enhancing their name learning abilities. In everyday life, retrieving the names of familiar persons is probably required much more frequently than learning a new name. Cohen (1989) suggested several strategies that could be helpful for retrieving the name of a familiar person, or rather, for resolving tip-of-the-tongue states. Among these strategies were: “generating names to fit
partial information about the name”, “generating candidate names from the relevant context”, “trying to relive past encounters with the target person”. The results of the experiments discussed in Chapter 4 showed that recognition of familiar persons appeared unimpaired in the head injured patients and that the large majority of their naming problems could be considered as tip-of-the-tongue states. Furthermore, Experiment 4.3 showed that cueing could enhance the naming success in the patients. In the memory training described below, closed head injured patients were taught strategies, adapted from the strategies proposed by Cohen (1989), to improve their retrieval of familiar people’s names. Such strategies may increase the chance of successful name retrieval by stimulating the patients to generate potentially helpful cues.

Designing a training which is restricted to the rehabilitation of memory for people’s names seems a rather limited aim. However, an important problem with memory rehabilitation in brain damaged patients is generalization of the strategies to everyday life. Patients frequently fail to apply the strategies they have been taught during training outside the training context (Freeman et al., 1992; Fussey & Tyerman, 1985; Lawson & Rice, 1989; Miller, 1992). This lack of generalization is often attributed to the approach of many training studies which teach a particular strategy, e.g. imagery, and expect that the patients will spontaneously apply this strategy in the appropriate everyday life situations (Miller, 1992, Ryan & Ruff, 1988). Training skills and strategies aimed at one specific domain appear more successful in terms of long-term maintenance (Schacter & Glisky, 1986). Memory for names, and personal names in particular, can be considered as a specific domain. The circumstances in which to apply strategies for learning a new name or for retrieving a familiar name are well defined and easy to recognize. Therefore, a memory training directed only at people’s names may have a greater chance of improving everyday memory for names than an approach directed at improving patients’ memory for verbal information in general.

**METHOD**

**Subjects**

The subjects were 13 closed head injured patients and 13 healthy controls, matched for age and level of education (p>0.1). Eleven of the patients were contacted via a nearby rehabilitation centre. The patients had all been discharged from the centre at the time they were seen for this study. These eleven patients had also participated in Experiments 3.1, 3.2, 3.3, 4.1, 4.3 and 5.1. The remaining two patients were referred by the neuropsychologists of the university hospital. These patients had suffered a whiplash, rather than a concussion like the other eleven patients. Although whiplash can be regarded as closed head injury (Richardson, 1990), these two patients had not lost consciousness or gone through a period of post-traumatic amnesia following the moment of impact. These
features distinguished the whiplash patients from the other closed head injured patients, and for that reason the results of the whiplash patients were not included in the analyses of Experiments 3.1, 3.2, 3.3, 4.1, 4.3 and 5.1, even though they did participate in these experiments. In this training study, however, the main interest lay in evaluating the effect of training in memory impaired patients. Whether all the participating patients presented the classical symptoms of closed head injury was less important. In addition, the whiplash patients were memory impaired as demonstrated by their performance in the experiments mentioned earlier. Therefore, the two whiplash patients were allowed to participate in the training study and their results were included in the group means.

Table 7.1. Relevant demographical and neurological data of patient and control groups.

<table>
<thead>
<tr>
<th></th>
<th>patients (n=13)</th>
<th>controls (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>SD</td>
</tr>
<tr>
<td>age (yrs)</td>
<td>39.0</td>
<td>9.8</td>
</tr>
<tr>
<td>level of education¹</td>
<td>5.0</td>
<td>0.8</td>
</tr>
<tr>
<td>years since injury</td>
<td>4.5</td>
<td>2.4</td>
</tr>
<tr>
<td>length PTA (days)</td>
<td>42.5</td>
<td>25.0</td>
</tr>
</tbody>
</table>

¹ level can range between one (primary school only) and seven (university degree)

None of the 13 patients had language, psychiatric or intellectual disorders. Mean length of PTA of the patients who had suffered a concussion was 43 days, ranging between 3 and 90 days, which is indicative of severe to very severe head injury (Russell, 1971). All the patients reported having more memory problems, including more difficulties remembering people’s names, compared to the time before injury. No spontaneous recovery was expected during the period of the training, because the time since injury was at least two years (see Table 7.1). Most of the controls were friends or relatives of the patients. The control group served both as a reference for normal performance in the various tasks and to control for the effects of repeated testing. These 13 controls had participated in the same experiments as the patients; Experiments 3.1, 3.2, 3.3, 4.1, 4.3 and 5.1.

Training

The training of the patients consisted of eight sessions of one to one-and-a-half hours each during a period of four months. The first five sessions were held once a week, and the interval between the last three sessions increased by one week with each subsequent
session. The patients were seen individually and all received the same instructions and exercises.

The main strategy for improving learning of new names was directed at increasing the meaningfulness of people’s names. Several possible ways to achieve this were suggested and demonstrated to the patient. For example, “think of an occupation or an object with the same name”, “think of a familiar person with a similar name” or “think of a word that sounds similar to the name”. The patients were free to choose the strategies they preferred or to come up with a strategy themselves. Important criteria for choosing one strategy or another were whether the patient could easily apply the chosen strategy, and whether the patient thought this strategy would indeed improve his or her ability to recall a new name. The strategies chosen to improve the meaningfulness of people’s names were practised on a large number of names paired with unfamiliar faces. With the exception of the first two sessions, no special attempts were made to use names which fitted the faces or the additional information presented about the fictitious persons, and the trainer did not provide the patients with visual or verbal elaborations of the names.

Strategies for retrieving the names of familiar people were partly taken from Cohen (1989). The patients were recommended first to retrieve as much information as possible about the person whose name resisted access, then to try to reconstruct a situation where the person’s name had been encountered before, and finally to ask themselves what they knew about the name itself, including going through the alphabet to search for the first letter of the name. During training the retrieval strategies were practised after tip-of-the-tongue states had been induced by presenting the patients with photographs or descriptions of famous persons. When a name was finally retrieved, the patients were encouraged to give more meaning to that name, using the same strategies as taught for learning new names. The assumption was that, just as with new names, enhancing the meaningfulness of a familiar person’s name could provide additional cues for its retrieval on subsequent occasions.

The importance of applying the strategies taught during the training in everyday life was stressed repeatedly. Homework exercises encouraged the patients to practice the strategies at home, and to bring to the training examples of people’s names they found difficult to learn or to retrieve.

**Evaluation tasks**

Three target tests involving memory for people’s names were employed to assess the effectiveness of the memory training. The strategies practised during the training were expected to be beneficial for improving performance on these three tests. Items from the tests were not presented in the training. The three target memory tests were:
- **Name Learning Test.** The same task was used in Experiment 3.2. Ten photographs of unfamiliar faces were presented one by one for five seconds each and a surname was given verbally with each face. Following presentation of all ten names, the faces were shown again in a different order and the subject was asked to recall the name belonging to each face; no feedback was provided. Presentation and recall of the names was repeated on a further two occasions. The acquisition score was the number of names recalled correctly over the three trials (max. = 30). A delayed recall score was obtained after a 30 minutes interval (max. = 10). Acquisition and delayed recall scores were added to form a single total test score. Half of the names presented in the test had been rated as meaningful (mean rating: 3.88), the other half as meaningless (mean rating: 1.45). For further details on the names see the Methods section of Experiment 3.2. All subjects learned the same name with a given face, but the order in which the name-face pairs were presented was different for each subject.

- **Name-Occupation-Town Learning Test.** This was the same task as used in Experiment 3.3. Nine photographs of unfamiliar faces were presented one by one for five seconds each. With three faces a surname was given, three faces were presented with both a surname and an occupation and three faces were presented with a surname, an occupation and the name of a town. Subjects were told that recall of these three items was equally important. The procedure was similar to that of the previous test, except that in addition to verbal presentation of the names, occupations and towns, these items were also written on a card put in front of the subject. The names were different from those used in the Name Learning test. For the total test score, consisting of the acquisition score (max. = 54) and the delayed recall score (max. = 18), the number of names, occupations and towns recalled correctly was summed. The names used in this test had all been rated as moderately meaningful (range: 2.5 - 3.5). For details see Experiment 3.3. All occupations and towns were highly familiar. The combinations of names, occupations or towns presented with a particular face were different for every subject.

- **Famous Faces Test.** This task was also used in Experiment 4.1. Eighteen pictures of famous faces were presented one by one and subjects were asked to name each person provided this person was familiar to them. There was no time limit and no cues were given in case the subject was unable to retrieve the name. The percentage of faces named correctly was calculated for those faces that were familiar according to the subjects’ reports.

In addition to the target tests, two control memory tests were administered which served to distinguish a genuine improvement due to training from an improvement caused by the extensive attention received by the patients, also known as the Hawthorne-effect (Berg, Koning-Haasntra & Deelman, 1991; Ruff, Baser, Johnston, Marshall, Klauber, Klauber & Minter, 1989). Neither of these control tests was assumed to be sensitive to the strategies
taught in the training. Both control tests were standard neuropsychological memory tasks:

- **Digit Span forward**. Performance was expressed in the length of the longest series of digits that was reproduced correctly. A slightly revised version of the Digit Span task, proposed by Lindeboom and Matto (1994) was used, because of its better reliability compared to the traditional version from the Wechsler Memory Scale. In this task each series has three strings of digits and a subject proceeds to the next series as long as two out of three strings are reproduced correctly.

- **Auditory Verbal Learning Test**. Dutch version of Rey’s auditory verbal learning test, which consists of a list of 15 nouns. The words are presented auditorily on five occasions and subjects are requested to recall as many of the words as they can following each presentation. The total test score was the sum of the acquisition score (total number of words recalled correctly over five trials; max. = 75) and the delayed recall score (max. = 15), which was obtained about 15 minutes after the last acquisition trial.

**Procedure**

In order to establish reliable baseline levels, the subjects were tested with all five memory tests on three occasions with a one-week interval before training started. As mentioned earlier, all the subjects participating in this training study had also participated in Experiments 3.2, 3.3 and 4.1. The data of experiments 3.2 and 3.3 were collected at the first occasion of the baseline evaluation. The results of the first two baseline evaluations of the Famous Faces test was used for Experiment 4.1. Experiments 4.3 and 5.1 took place at the time of the baseline evaluations, before any training had occurred. Therefore, it is very unlikely that the experiments interfered with the training. Only the data for experiment 4.4, in which most of the concussion patients from this training served as subjects, were collected during or shortly after the training.

The first training session for the patients started approximately nine weeks after the third baseline evaluation. Training took four months and the patients were retested one week after the last training session and again six months following the end of training. The control group did not receive any memory training, but was tested with the same tasks and according to the same time schedule as the patient group, except that the controls were not retested for the six-month follow-up. At each evaluation, memory performance was assessed with the five tests described above. There were two comparable versions (A and B) of each test and the order of presentation of the two versions was the same for all subjects. Version A tests were administered at the first and third baseline evaluations, and at the evaluation six months following training. At the remaining evaluation moments, the second baseline evaluation and the evaluation immediately following training, subjects were tested with
version B tests. Because the subjects from both groups were presented with the same version of a test at equivalent evaluation moments, comparisons between the patient group and control group were always performed on identical test versions. Retest-reliability within the same test version and correlations between the different test versions were satisfactory; ranging between 0.76 and 0.93 for the target tests and between 0.65 and 0.89 for the control tests.

RESULTS

For each of the five memory tests the total test scores from the three baseline evaluations were pooled into a single baseline score. The mean baseline scores and the mean total test scores immediately following training (post-training) for both groups are displayed in Table 7.2, together with the patients' test scores six months following training (follow-up).

Immediate effect of training

To assess the immediate effect of training on name learning, the baseline and post-training scores of the two name learning tests were compared in a 2 (group) x 2 (evaluation moment) x 2 (type of test) ANOVA with repeated measures. This analysis revealed a main effect of group \( (F(2,23)=7.74, p<0.01) \), the patients performed significantly poorer than the controls, and a main effect of evaluation moment \( (F(2,23)=8.83, p<0.001) \), both groups performed better at the post-training evaluation than at baseline. The group x evaluation interaction just failed to reach significance at the 5% level \( (F(2,23)=3.13, p=0.063) \). Comparison of the baseline and post-training scores of the two groups for each individual name learning test in separate 2 (group) x 2 (evaluation) ANOVAs, showed significant group effects for both tests \( (F(1,24)>=13.53, p<0.01) \) and a main effect of evaluation moment for the Name-Occupation-Town test \( (F(1,24)=18.43, p<0.001) \). Most importantly, however, a significant group x evaluation moment interaction was found for the Name-Occupation-Town test \( (F(1,24)=6.36, p<0.05) \). In this test both groups did better at the post-training evaluation than at baseline, but this improvement was significantly larger in the patient group. It is unlikely that the relatively small increase in the controls' score was caused by a ceiling-effect. The maximum score obtainable in the Name-Occupation-Town test was 72 and the mean post-training score of the control group (60.1) was still more than two standard deviations below that maximum score (see Table 7.2).

The immediate effect of training on name retrieval was examined with non-parametric tests because the retrieval scores were expressed in percentages. First, the scores in the Famous Faces test of the two groups were compared at baseline and post-training with separate Mann-Whitney tests. These tests showed that at baseline as well as post-training
Table 7.2. Mean scores in the memory tests at baseline and immediately following training (post-training) for patients and controls, and six months following training (follow-up) for the patient group. (standard deviations are shown in parentheses)

<table>
<thead>
<tr>
<th>Test</th>
<th>Controls (baseline)</th>
<th>Controls (post-training)</th>
<th>Patients (baseline)</th>
<th>Patients (post-training)</th>
<th>Patients (follow-up)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name test</td>
<td>33.3 (4.2)</td>
<td>33.1 (6.2)</td>
<td>24.5 (7.7)</td>
<td>25.6 (6.0)</td>
<td>28.1 (8.8)</td>
</tr>
<tr>
<td>Name-Occupation-Town test</td>
<td>58 (5.7)</td>
<td>60.1 (5.9)</td>
<td>37.1 (16.7)</td>
<td>45.1 (14.5)</td>
<td>49.5 (17.2)</td>
</tr>
<tr>
<td>Famous Faces test (%)</td>
<td>73 (16)</td>
<td>68 (14)</td>
<td>45 (20)</td>
<td>50 (20)</td>
<td>45 (19)</td>
</tr>
<tr>
<td>Digit Span</td>
<td>6.0 (1.1)</td>
<td>6.1 (1.3)</td>
<td>5.2 (1.1)</td>
<td>5.4 (0.9)</td>
<td>5.0 (1.2)</td>
</tr>
<tr>
<td>Auditory Verbal learning test</td>
<td>68.6 (9.2)</td>
<td>75.7 (8.5)</td>
<td>51.3 (14.6)</td>
<td>59.9 (14.8)</td>
<td>53.5 (14.6)</td>
</tr>
</tbody>
</table>
the percentage of familiar faces named correctly was significantly larger in the control group than in the patient group (Z>=2.26, p<0.05). Second, the baseline and post-training scores within each group were compared with Wilcoxon signed ranks tests. In the patient group the baseline and post-training scores in the Famous Faces test were about equal (p=0.1), while the post-training score of the controls was significantly lower than their baseline score (Z=2.62, p<0.01).

The immediate effect of training on the two control tests was examined in a 2 (group) x 2 (evaluation moment) x 2 (type of control test) ANOVA with repeated measures. This analysis revealed a main effect of group (F(2,23)=6.99, p<0.01), the patients performed poorer than the controls, and a main effect of evaluation moment (F(2,23)=15.76, p<0.001), the subjects recalled more items in the post-training evaluation. However, the group x evaluation interaction was not significant (p>0.7). Although the performance of the head injured patients in the control tasks did improve following training, they improved to the same extent as the controls who had not received any training.

Performance in the Name Learning test did not change from baseline to post-training in either of the two groups. This finding was not expected. Especially the patient group was expected to recall more names following training than at baseline. As mentioned, half of the names used in the Name Learning test had been rated as meaningful and the other half as meaningless. The test scores displayed in Table 7.2 were collapsed over the meaningless and meaningful names. This may have obscured an improvement in name recall which was restricted to one of these categories. To examine this possibility, the total test scores at baseline and post-training were split into the number of meaningful and meaningless names recalled correctly at baseline and post-training (see Table 7.3).

<table>
<thead>
<tr>
<th></th>
<th>meaningless</th>
<th>meaningful</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>post-training</td>
</tr>
<tr>
<td>patients</td>
<td>11.6 (3.9)</td>
<td>11.7 (3.2)</td>
</tr>
<tr>
<td>controls</td>
<td>16.2 (2.5)</td>
<td>15.7 (4.2)</td>
</tr>
</tbody>
</table>

Recall of the meaningful and the meaningless names was analyzed in two separate 2 (group) x 2 (evaluation moment) ANOVAs. These analyses showed essentially the same results as obtained with the total test scores. For both the meaningful and the meaningless names only the main effect of group proved significant (F(1,24)>=10.36, p<0.01). Neither the main effect of evaluation nor the group x evaluation interaction approached significance
The number of names recalled from the Name Learning test did not increase following training, whether the names were meaningful or meaningless.

Performance in the Name-Occupation-Town Learning test did improve following training. However, the test scores which revealed this improvement contained the number of correctly recalled names as well as the number of correctly recalled occupations and towns. As the training was meant to improve name learning, name recall was expected to increase to a greater extent following training than recall of the other items. In Table 7.4 the mean number of names and non-name items (occupations + towns) recalled correctly at baseline and post-training are displayed for both groups. Comparison of the mean number of names recalled at baseline and post-training in a 2 (group) x 2 (evaluation moment) ANOVA revealed main effects of group (F(1,24)=20.3, p<0.001) and evaluation (F(1,24)=13.25, p<0.01). The patients recalled significantly fewer names than the controls and both groups performed better in the post-training evaluation. In addition, there was a group x evaluation interaction (F(1,24)=8.6, p<0.01). The increase in the number of names recalled at post-training was significantly larger in the patient group. By contrast, recall of occupations and towns had hardly changed from baseline to post-training. Analysis of the number of occupations plus towns recalled at baseline and post-training in a 2 (group) x 2 (evaluation) ANOVA showed a main effect of group (F(1,24)=11.83, p<0.01), reflecting the relatively poor performance of the patients. However, neither the main effect of evaluation moment nor the group x evaluation interaction were significant (p>0.2).

<table>
<thead>
<tr>
<th></th>
<th>names</th>
<th>occupations + towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>baseline</td>
<td>post-training</td>
</tr>
<tr>
<td>patients</td>
<td>16.8 (7.7)</td>
<td>21.6 (7.2)</td>
</tr>
<tr>
<td>controls</td>
<td>28.8 (3.6)</td>
<td>29.3 (3.6)</td>
</tr>
</tbody>
</table>

Table 7.4. Mean number of names and non-name items from the Name-Occupation-Town Learning test recalled at baseline and immediately after training (post-training); (max.=36). (Standard deviations are shown in parentheses)

Separate comparisons of the acquisition scores and the delayed recall scores from the Name-Occupation-Town Learning test at baseline and post-training revealed very similar results. Analysis of the acquisition scores and the delayed recall scores for name recall in separate 2 x 2 ANOVAs showed main effects of group (p<0.01) and evaluation moment (p<0.05), in addition to significant group x evaluation moment interactions (p<0.05). Analysis of the acquisition scores and the delayed recall scores for occupations plus towns again showed main effects of group (p<0.05), but no effects of evaluation moment (p>0.2) and no interactions (p>0.1). These results indicated that the patients’ improvement in the Name-
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Occupation-Town test was mainly caused by an increase in the number of names recalled following training.

Effect of training for individual patients

The patients’ mean scores indicated that learning new names had indeed improved following training. However, these group means reveal little about the fate of individual patients. To examine the effect of training for individual patients, the difference between the post-training and baseline scores in the target tests was calculated for each subject in the following way: 

\[ \frac{\text{post-training score} - \text{baseline score}}{\text{baseline score}} \]

The improvement of an individual subject from baseline to post-training was expressed as a proportion of the subject’s baseline level.

Following training performance in the Name-Occupation-Town test improved in 10 of the 13 patients. Their post-training score was at least 10% higher than their baseline score. By comparison, in only three of the 13 controls the post-training score in the Name-Occupation-Town test was more than 10% above the baseline score. In the Name Learning test the number of patients and controls obtaining a post-training score more than 10% higher than the baseline score was about equal; four patients and three controls. This is in line with the comparison of the groups’ mean scores in the Name Learning test, which failed to show an interaction between group and time of evaluation. In the Famous Faces test seven patients, but none of the control subjects, had post-training scores that were at least 10% above their baseline scores.

Subjective reports

At the end of the training, but before the post-training evaluation, 11 of the 13 patients reported that learning new names had improved compared to the time before training. For nine of these patients scores in the name learning tests had indeed increased compared to baseline. Six patients reported improvements in retrieving familiar names compared to the time before training. Post-training scores in the Famous faces test of all these six patients were considerably - 13% or more - higher than their baseline levels. Remembering other things than names, e.g. appointments or plans, had improved according to six patients. Ten of the patients claimed to use more memory strategies, including the strategies taught in the training, to remember people’s names since the beginning of the training. Performance of all these ten patients had improved in at least one of the target tests following training. The strategies reported most frequently for remembering people’s names were: thinking of some association to a name (61.5%), rehearsing the name (46%) and writing down the name in a note or diary (46%). Seven patients also reported using more strategies in general, that is, not just to remember people’s names.
Six-month follow-up

The patients’ scores in the memory tests obtained six months after the end of training are displayed in Table 7.2. To evaluate the long-term effects of the training, the scores at the six-month follow-up were compared with the scores from the post-training evaluation which took place immediately following training.

Six months following training the patient group had maintained its level of performance in the Name Learning test and Name-Occupation-Town test achieved immediately following training \((t(12)<1.73, p>0.1)\). Scores in the Famous Faces test and the two control tests had declined slightly relative to post-training, but only the decline in the patients’ scores in the Auditory Verbal learning test was significant \((t(12)=3.10, p<0.01)\).

The change in performance from post-training to follow-up of individual patients was expressed as a proportion of the subjects’ post-training level: \((\text{follow-up score} - \text{post-training score})/\text{post-training score}\). From post-training to follow-up performance in the Name-Occupation-Town test improved in six patients; their follow-up scores were more than 10% higher than their post-training scores. Follow-up performance in the Name-Occupation-Town test had deteriorated in three patients; follow-up scores were at least 10% below the post-training scores. Follow-up scores in the Name Learning test were more than 10% above the post-training scores in seven patients, while the follow-up scores of two patients were more than 10% below the post-training scores. The scores in the Famous Faces test of four patients had improved from post-training to follow-up, but the performance in this test of seven patients had deteriorated since the end of training. Their follow-up scores were at least 10% below their post-training scores.

Eight of the 13 patients said they still noticed some benefit from the training at six months following training. Six patients reported that their ability to learn new names had improved since the end of the training. Name learning scores at follow-up of three of these patients were indeed more than 10% higher than their post-training scores. Since the end of training, retrieval of familiar names had improved according to four patients. However, this was not confirmed by improved performance in the Famous Faces test. Only three patients reported using the strategies taught in the training to remember other things than people’s names. This is perhaps illustrative of the limited generalization of strategies to other domains than the one trained (Miller, 1992; Schacter & Glisky, 1986).

DISCUSSION

A group of closed head injured patients with impaired memory for people’s names were taught strategies for improving their ability to learn the names of newly met persons and to retrieve the names of familiar persons in a memory training. Immediately following training, the patients’ performance in a name learning test improved significantly compared to their
performance before training, and this improvement was maintained over a six-month interval. Before deciding on the effectiveness of the strategies taught, the effect of training on the patients’ memory for names has to be distinguished from potentially confounding effects such as repeated testing and the extensive attention received by the patient group.

To control for retest-effects, performance in the target tests before and immediately after training was compared between the patient group and the control group. Because the control group did not receive any treatment, an increase in test scores in this group could only be due to the effects of repeated testing. Therefore, one could only suspect the training to be beneficial if the improvement on the target tests was significantly larger in the patient group than in the control group. Such results were indeed found for the Name-Occupation-Town test. A problem might be the fact that the two groups had different baseline levels. Because the control group started off with higher baseline scores, performance in this group might benefit less from repeated testing. However, findings from the control tests argued against this possibility. In the control tests, which were expected to be affected by repeated testing but not by the training, both groups improved to the same extent from baseline to post-training. Furthermore, in the control group the post-training scores in the target tests were still well below ceiling levels.

A second effect that could have obscured a genuine effect of training was the Hawthorne-effect, arising from the extensive attention received by the trained group. Previous studies used a separate patient group who received a mock training to control for this effect (Berg et al., 1991; Ruff et al., 1989). In this study two control memory tests were employed for the same purpose. If it was merely the extensive attention that caused the patients’ test performance to improve, the pattern of results seen in the control tests should be similar to that in the target tests. However, in contrast to the target tests, the improvement in the control tests was equivalent in the two groups. This finding makes it unlikely that the improvements found in the target tests simply resulted from the extra attention received by the patient group. Separate analyses of the names and non-name items recalled in the Name-Occupation-Town test further indicated that name learning improved as a result of training in the patient group. Their improvement in this task occurred exclusively for the number of names recalled after training, the number of occupations and towns recalled following training being not significantly different from the baseline level. Six months following training the patients had maintained their level of performance in the Name-Occupation-Town test achieved immediately after training. Of the earlier studies aimed at improving name learning in brain damaged patients, only Schacter et al. (1985) and Wilson (1982; 1987) reported maintained improvement relative to baseline levels up to three months following training.

Strangely enough, performance in the other name learning test, the Name test, was hardly affected by the training. This was true for meaningful as well as meaningless names. It is not clear why the effect of training was so different for the Name Learning test and the
Name-Occupation-Town test. The procedure, the average rated meaningfulness and the frequency of the names used in the two tasks were very similar. Perhaps the visual presentation of the names, in addition to verbal presentation, as used in the Name-Occupation-Town test, was advantageous to name learning. Penney (1989) found that recall of word lists in normal subjects was higher if the lists had been presented visually than if they had been presented verbally. In elderly subjects, recall of verbal information was higher if that information had been presented both visually and verbally, rather than only verbally (Ressler, 1990). According to Ressler (1990), his findings can be explained in terms of Paivio's (1979) concept of coding redundancy. Information presented visually and verbally would stimulate both the verbal and the non-verbal memory codes. As a result, recall of bimodally presented information may be superior to information presented either visually or verbally. Similarly, the bimodal presentation of the names in the Name-Occupation-Town test may have given the patients more opportunities to apply the strategies trained than in the Name Learning test, where the names were presented only verbally. In previous rehabilitation studies which taught visual imagery of people's names, the names were presented either visually or both visually and verbally (Wilson, 1982; 1987; Wilson & Moffat, 1984). The majority of the names presented during the current training, for practice in strategies to enhance the meaningfulness of people's names, were also presented both verbally and in written form.

The approach taken in this study, training name learning by encouraging patients to concentrate on the name and try to give more meaning to that name, appears helpful. Name learning improved even though the patients were not provided with images or verbal elaborations to help them make the names more meaningful. This finding could corroborate the view that the lack of meaning of people's names is an important reason why names are difficult to learn (Burke et al., 1991; Cohen, 1990). Although the patients were not trained in the face-name association technique, they might have adopted this strategy after all. The design of this study makes it impossible to rule out this possibility, but the results do show that in order to improve the ability to learn a name to a face in memory impaired patients it is not necessary to train them in the face-name association technique.

The patients' mean scores in the Famous Faces test hardly changed following training. However, over the same time interval naming performance deteriorated in the control group who received no training. So, perhaps the training had prevented the patients' naming performance from deteriorating to a similar extent. Unfortunately, the limited number of famous faces used in the Famous Faces test (18) could have made it rather vulnerable to random changes in performance, thus making it difficult to conclude that the strategies taught in the training had any effect on the patients' ability to retrieve familiar names. Future training studies should employ more sensitive tasks to assess name retrieval. Additional strategies for improving personal name retrieval may be taken from techniques used in the rehabilitation of anomia (see Lesser, 1989). Phonemic cueing and introduction of a delay are
among the strategies applied in anomia rehabilitation which could also be used to enhance the ability to retrieve people’s names. Recently, Rastle and Burke (1996) found reduced probability of tip-of-the-tongue states in word retrieval in normal subjects, following prior phonological or semantic processing of the words. Similar results were reported by Smith, Balfour and Brown (1994), when the processing involved simply reading or writing the word. Likewise, phonological or semantic processing of the names of familiar persons may be a practical technique to reduce the probability of retrieval problems occurring with those names. In the training reported here, the patients were encouraged to give more meaning to a familiar person’s name following successful resolution of a tip-of-the-tongue state, but further training studies might apply more systematic processing of familiar names.