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Self-Ratings of Memory Dysfunction: Different Findings in Depression and Amnesia*

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ABSTRACT

An 18-item self-rating test of memory functions was administered to two patient groups: seven patients with amnesia resulting from Korsakoff's syndrome and six other amnesic patients. These results were compared to results obtained previously for depressed psychiatric inpatients (n=19) and depressed inpatients prescribed electroconvulsive therapy (ECT) (n=35). The latter group was tested both before and 1 week after completion of the course of ECT. One pattern of memory self-ratings was reported by the two groups of depressed patients. These two groups reported an approximately equivalent level of impairment across all test items. A different pattern of memory self-ratings was reported by the two groups of amnesic patients and by the group tested after ECT. These patients reported considerably more impairment on some items than others, such that performance was not equivalent across test items. Finally, the patients with Korsakoff's syndrome underestimated their memory problems, reporting a less severe impairment than the other amnesic patients. The results show that the memory problems experienced in depression and in amnesia are distinguishable with self-assessment techniques. In addition, the similarity between memory self-ratings reported by patients after ECT and by amnesic patients supports the idea that memory complaints after ECT reflect primarily the experience of amnesia. Self-rating forms like the one described here may have useful application to many diagnostic groups where questions arise about the nature of reported memory problems.

Memory dysfunction is a common symptom of psychiatric and neurological illness, often occurring in the context of broader cognitive impairment. The symptoms of memory impairment can differ depending on the precipitating

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condition, e.g., whether memory impairment is caused by depression, dementia, or amnesia (Butters, 1984; Squire, 1986). Specialized neuropsychological tests have been successful to some extent in identifying different patterns of memory impairment and distinguishing among them (Cronholm & Ottosson, 1961; Sternberg & Jarvik, 1976; Weingartner, Grafman, Boutelle, Kaye, & Martin, 1983). For example, tests can distinguish the memory impairment exhibited prior to a course of bilateral electroconvulsive therapy (ECT), when patients are depressed, from the impairment exhibited shortly after ECT when patients are amnesic (Cronholm & Ottosson, 1961).

Assuming that patients themselves experience these two conditions differently, it should be possible to develop a self-rating instrument that discriminates between them, i.e., a test that separates the memory complaints of depression from the memory complaints associated with amnesia. Such a test might then be useful in evaluating other examples of memory complaints, such as those associated with head injury, pseudodementia, or normal aging.

Recently, we constructed an 18-item self-rating instrument that yielded a different response profile before and 1 week after a prescribed course of bilateral ECT (Squire, Wetzel, & Slater, 1979). Because the before-ECT response pattern was also found in a group of depressed psychiatric inpatients not prescribed ECT (Squire & Slater, 1983), this response pattern is probably typical of depressed patients and not limited to those particular patients who are about to receive ECT. Less is known about the after-ECT response profile. It could reflect some combination of the amnesia associated with ECT together with psychiatric illness. Alternatively, it could reflect primarily amnesia. To address this question, it would be useful to administer the self-rating form to neurological patients with amnesia.

Neuropsychological testing suggests that the amnesia following ECT resembles the amnesia associated with neurologic injury or disease (Squire & Shimamura, 1986). However, amnesic patients have seldom been studied with self-assessment techniques. In two studies, low correlations were reported for memory-impaired or elderly subjects between self-assessments of memory function and performance on memory tests (Sunderland, Harris, & Baddeley, 1983; Zelinski, Gilewski, & Thompson, 1980). Yet some amnesic patients have considerable insight into their condition (Kaushall, Zetin, & Squire, 1981; Shimamura & Squire, 1986).

The present study compared the memory self-ratings obtained previously from psychiatric patients (Squire et al., 1979; Squire & Slater, 1983) to the memory self-ratings reported by two new groups: six amnesic patients who had had either an anoxic or ischemic episode (n=5) or a penetrating brain injury (patient N.A.); and seven patients who were amnesic as the result of alcoholic Korsakoff's syndrome. Patients with anoxic-ischemic amnesia and patient N.A., but not patients with Korsakoff's syndrome, have good metamemory skills, e.g., they are accurate at predicting their own performance on memory [illegible] 1986). It was therefore expected that the first group

of amnesic patients should be able to make more accurate self-ratings than patients with Korsakoff's syndrome.

METHODS

Subjects

Patients prescribed bilateral ECT (n = 35). All were inpatients at one of five hospital San Diego County (Squire et al., 1979), where they were prescribed ECT for relie depressive illness. Patients with neurological disorder, schizophrenia, or depress secondary to alcoholism or drug-abuse were excluded from the study. Twenty-one of 35 patients had not received ECT before, and none had received ECT during the p year. Twelve of the 14 patients who had previously received ECT had received one cou of ECT from 1 to 16 years previously (mean = 8 years). The remaining two had recei either two or three courses of ECT during the same period. Treatment was administe three times each week on alternate days following medication with atropine, methohe tal sodium, and succinylcholine. Electrode placement was bitemporal. Thirty patie received their treatments with a Medcraft machine (sine wave, 130-170V for 0.6-1 sec The remaining five patients received their treatments with a Reiter - Cedak Model SOS machine which delivers a series of unidirectional brief pulses. The patients' psychiatri made all decisions concerning the number of treatments, which averaged 11.1 for t group (range = 5-21 treatments). Table 1 presents additional information.

Depressed patients (n = 19). All were inpatients at one of the hospitals where EC patients were tested (Squire & Slater, 1983).

Patients with Korsakoff's syndrome (n=7). Extensive neuropsychological data for six these seven patients and for alcoholic control subjects have been reported (Squire Shimamura, 1986). The full-scale WAIS IQ score for the seven patients averaged 103 (range 91-114), and their average Wechsler Memory Scale (WMS) score was 81.3 (rang 69-93). In normal subjects, the WMS score is roughly equal to WAIS IQ. For t patients, immediate and delayed recall (12 min) of a short prose passage averaged 4.3 ar 0 segments, respectively (21 segments total). Copy and delayed recall (12 min) scores f the Rey-Osterrieth figure averaged 26.3 and 2.7, respectively (36 segments total). Paire associate learning of 10 unrelated noun-noun pairs on three successive trials average 0.4, 0.2, and 1.3. Free recall of 15 words averaged 3.0, 3.9, 4.4, 4.1, and 4.6 on fi successive study/test trials (Rey Auditory Verbal Learning Test). For yes/no recognitio of 15 old words and 15 new words, the average score on five successive study/test tria was 20.2, 24.4, 24.1, 25.5, and 26.4. The Dementia Rating Scale Score averaged 129 points out of a possible 144 points (Mattis, 1976). Most of the points were lost on th memory subportion and the initiation-perseveration subportion of the test (7.0 points o memory and 4.4 points on initiation-perseveration). Independent neurological examina tion and neuropsychological screening indicated that memory impairment was the onl notable deficit of higher cortical functions. All patients could draw a cube and a house i perspective, and none had aphasia or apraxia.

Six additional amnesic patients. Extensive neuropsychological data have been reporte for four of these six patients and for control subjects (Squire & Shimamura, 1986) Patient A.B. became amnesic in 1983 following a cardiac arrest with unconsciousness patient G.D. became amnesic in 1983 [illegible]

during major surgery; patient LM became amnesic in 1984 following an anoxic epidsode that occurred during a seizure; patients W.H. and M.G. became amnesic in 1986 following an ischemic event. The sixth patient was N.A., who has been severely amnesic for verbal material since 1960 when he sustained a stab wound to the brain with a miniature fencing foil (Kaushall et al., 1981; Teuber, Milner, & Vaughan, 1968). As a group, these six patients obtained a full scale WAIS score of 120.5 (range 104-129) and a WMS score of 93.7 (range 81-105). Immediate and delayed recall (12 min) of a short passage averaged 6.0 and 0 segments, respectively. Five of the patients, excepting N.A., averaged 28.8 and 4.4 for copy and delayed recall (12 min) of the Rey-Osterrieth figure. N.A., whose memory impairment is primarily for verbal material, scored 33 for his copy and 17 after a 12-min delay. For all six patients, paired-associate learning of 10 unrelated noun-noun pairs on three successive trials averaged 5.5, 6.5, 6.7, 6.8, and 6.3 on five successive study/test trials. For yes-no recognition of 15 old words and 15 new words, the average score on five successive study/test trials was 24.0, 25.1, 26.2, 26.5, and 27.8. The Dementia Rating Scale Score averaged 136.2 points out of 144. Most of the points were lost on the memory subportion of the test (5.5 out of 7.8 points). Memory impairment was the only detectable deficit of higher functions. All six patients could draw a cube and a house in perspective, and none had aphasia or apraxia.

Test and Procedures

Subjects responded to 18 items that asked them to rate their memory ability in several ways (Table 2). Ratings were made on a 9-point scale from -4 through 0 to +4. Each item asked subjects to judge their memory now, compared to an earlier indicated time period. Depressed patients, patients tested prior to bilateral ECT, and patients tested 1 week after bilateral ECT were asked to rate each item by comparing their current ability level to "before I began to feel bad and went to the hospital". The 13 amnesic patients were asked to compare their current ability level to "before my memory problems began".

Table 1

Demographic Data for Patient Groups

Groups	ECT	Depressed	Korsakoff	Anoxic-Ischemic	Case NA
Sex					
Male	8	6	5	4	1
Female	27	13	2	1	-
Age (years					
Mean	41.3	44.4	55.4	53.8	48
SD	11.2	12.6	9.9	7.2	-
Range	25-64	23-62	43-70	46-64	-
Education (years)					
Mean	12.7	12.5	11.4	15.6	13
SD	2.1	1.6	1.62	3.3	-
Range	9-18	9-16	9-14	13-21	-

SD = Standard deviation

Because of the relatively small number of amnesic patients, each patient was given the self-rating scale on two different occasions separated by an average interval of 70 days. The score for each patient was the average score obtained on each item. One of the amnesic patients, W.H., was available for only one testing occasion.

RESULTS

Figure 1 (top) shows the results obtained with the self-rating scale before ECT and 1 week after ECT (n=35). To display the data, the test items (1 through 18) were ordered according to the self-ratings obtained after ECT. Thus item 1 (to the far left in Figure 1) yielded the lowest score and item 18 yielded the highest

Table 2.

Self-Rating Scale of Memory Functions[a]

1	My ability to search through my mind and recall names I know are there is	11
2	I think my relatives and acquaintances now judge my memory to be	1
3	My ability to hold in my memory things that I have learned is	8
4	My ability to recall things when I really try is	4
5	The tendency for a past memory to be 'on the tip of my tongue,' but not available to me is	13.5
6	My ability to remember the names and faces of people I meet is	5
7	My ability to know when the things I am paying attention to are going to stick in my memory is	2.5
8	My ability to remember things that have happened more than a year ago is	12
9	My ability now to remember what I read and what I watch on television is	6.5
10	My ability to make sense out of what people explain to me is	17.5
11	My ability to remember what I was doing after I have taken my mind off it for a few minutes is	2.5
12	My ability to pay attention to what goes on around me is	10
13	If I were asked about it a month from now, my ability to remember facts about this form I am filling out would be	6.5
14	My ability to recall things that happened a long time ago is	17.5
15	My ability to reach back in my memory and recall what happened a few minutes ago is	9
16	My ability to follow what people are saying is	13.5
17	My general alertness to things happening around me is	15
18	My ability to recall things that happened during my childhood is	16

[a] For each item subjects were asked to judge their ability as it seemed now compared to an earlier, specified time period. Subjects used a 9-point scale, ranging from -4 (worse than ever before), through 0 (same as before), to +4 (better than ever before). The items are ordered according to the score obtained 1 week after ECT. Item 1 produced the lowest score (mean = -2.5), and item 18 the highest score (mean = -0.6). Items 5 and 6, and items 17 and 18 were tied. The column of numbers to the right shows how the items would have appeared if the ordering had been done according to the responses of the 6 non-Korsakoff amnesia patients.

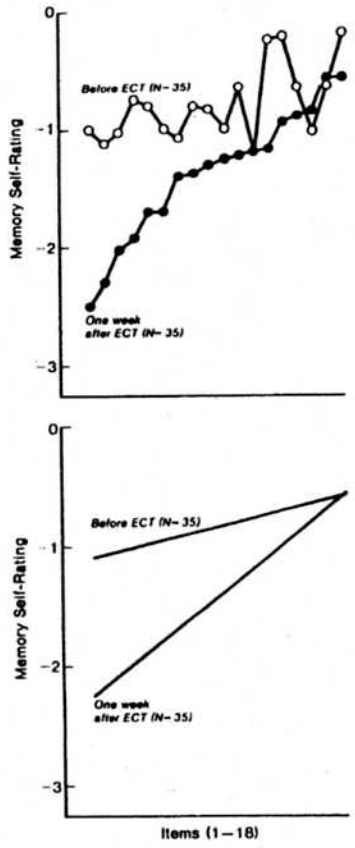

Figure 1 (top). Self-ratings of memory functions before and 1 week after bilateral ECT, as assessed by an 18-item test. (Bottom). The same data are represented as best-fitting lines across the scores for all 18 test items. The order of the items, from left to right, is shown in Table 2.

score. Next, best fitting lines were constructed through each set of self-ratings (Figure 1, bottom). The slopes and the 95% confidence limits for the slopes were as follows: before-ECT, slope = .033 ± .03; after-ECT, slope = .100 ± .01. An analysis of variance with tests for linear trends showed that memory complaints were greater overall after ECT than before ECT ($F[1,34] = 4.3, p < .05$) and that the linear trends were different ($F[1,578] = 22.5, p < .001$). Thus, after ECT memory impairment was experienced as both more severe and qualitatively different than before ECT.

Figure 2 shows the results for depressed patients, amnesic patients with Korsakoff's syndrome, and other amnesic (non-Korsakoff) patients. To permit comparison with the data for ECT patients, these data have been displayed just as in Figure 1, i.e., the order of the items is the same in the two figures. The top

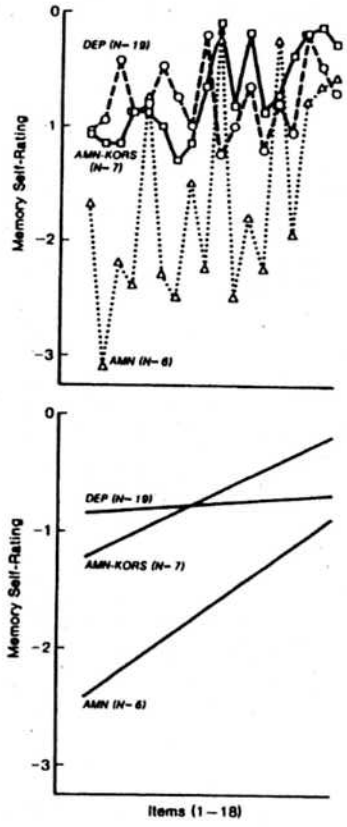

Figure 2 (top). Self-ratings of memory functions on an 18-item test, as reported by depressed patients (DEP), amnesic patients with Korsakoff's syndrome (AMN-KORS), and a group of non-Korsakoff amnesic patients (AMN). (Bottom). The same data are represented as best-fitting lines across the scores for all 18 test items. The order of the items, from left to right, is shown in Table 2.

portion of Figure 2 shows the average scores for each item, as reported by the three groups. The lower portion of Figure 2 shows best fitting lines through each set of self-ratings. The slopes and 95% confidence limits for the slopes were as follows: depressed patients, slope = .010 ± .03; Korsakoff patients, slope = .060 ± .02; amnesic (non-Korsakoff) patients, slope = .090 ± .08. These data can be summarized by stating that the pattern of memory problems reported by the depressed patients resembled those obtained before ECT and that the pattern of memory problems reported by the amnesic patients resembled those obtained after ECT. The patients with Korsakoff's syndrome, however, reported less severe memory impairment than did the other amnesic patients

Separate comparisons between groups revealed no difference between depressed patients and before-ECT patients (for the between-groups comparison, which assessed the overall severity of memory complaint, $F[1.52 < 1.0, p > 0.11$; for the comparison of linear trends, which assessed the pattern of memory complaint, $F[1, 884] = 1\ 2.2, p > .1$). Similarly, the scores of the two amnesic groups resembled the scores of the after-ECT group (for the between-groups comparison of Korsakoff patients and after-ECT patients, $F[1, 40] = 1.51, p > 0.1$; for the between-groups comparison of non-Korsakoff amnesic patients and after-ECT patients, $F[1,139] = .18, p > 0.1$; for comparison of linear trends, both $Fs < 2.4, ps > 0.1$).

In contrast, the two groups of amnesic patients differed from both the before-ECT patients from the depressed patients not prescribed ECT, especially with respect to the pattern, i.e., the slope, of the self-ratings. First, the depressed patients differed from the non-Korsakoff amnesic patients (for the between-groups comparison, $F[1, 23] = 5.7, p < .05$; for the comparison on linear trends, $F[1, 391] = 11.6, p < .001$). The depressed patients also differed from the Korsakoff patients in terms of the slope of the self-ratings (for comparison of linear trends, ($F[1, 408] = 5.1, p < .05$). Second, the scores of patients tested before ECT differed from those of the non-Korsakoff amnesic patients (for comparison of linear trends, $F[1, 663] = 5.5, p < .05$; the between-groups comparison was short of significance, $F[1, 39] = 2.5, p = .12$). Similar comparisons between the before-ECT patients and the Korsakoff patients were not significant ($Fs < 1.4, ps > 0.1$).

The patients with Korsakoff's syndrome tended to report less severe memory impairment than the other six amnesic patients ($F[1, 11] = 4.1, p < .07$). Nevertheless, the pattern of complaints reported by these two groups was similar ($F[1, 187] = 1.6, p > 0.1$).

We considered that the pattern of memory complaints observed, i.e., the slope of the best-fitting line through the ordered scores from the 18 test items, might vary considerably depending on the method used to order the test item scores. This possibility seems unlikely for several reasons. First, the pattern of memory complaints observed before and after ECT did not change noticeably when the items were ordered according to the score obtained after ECT (as in Figure 1, this study) instead of according to the magnitude of the before ECT-after ECT difference score, as was done in a previous study (see Figure 1, Squire et al., 1979).

Second, the 18 items were also ordered according to how the non-Korsakoff amnesic patients responded (see right-most column in Table 2). Although there were some differences, this item order was rather similar to the order that resulted when the items were ranked according to the after-ECT scores ($r = .51$, $p < .05$). Moreover, when the results for all groups were compared using this new item order as a basis for constructing response profiles and best-fitting lines, the findings were similar to those just described. That is, depressed patients and before-ECT patients reported similar memory self-ratings (for

linear trends, $ps > 0.1$). In addition, the self-ratings reported by these tv groups differed from those reported by the two amnesic groups (for fo comparisons of linear trends, all $ps < .05$, except Korsakoff patients vs. befor ECT patients).

To determine the reliability of the self-rating responses made by the amnes patients, we calculated the correlation between their responses on the tw separate test occasions. Specifically, average group scores for each item wer used to determine the correlation between the two sets of 18 items. For th amnesic (non-Korsakoff) patients, $r = .80, p < .001$; for the Korsakoff patient $r = .37, p > 0.1$. This finding shows that the non-Korsakoff amnesic patient rated their memory consistently on both test occasions; however, the Korsako patients were not able to rate their memory in a consistent fashion. Thes patients did rate the overall severity of their memory impairment similarly o the two occasions ($F[1, 6] = 0.3, p > 0.1$); but the pattern of memory impairmer was rated differently (for comparison of linear trends, $F[1, 16] = 12.8, p < .001$ In constrast, the non-Korsakoff amnesic patients were consistent across the tw testing occasions, both with respect to the magnitude of their rated impairmen ($F[1, 4] = 1.6, p > 0.1$) and with respect to the pattern of the impairment ($F[1, 68 = .09, p > 0.1$).

DISCUSSION

The amnesic patients reported an experience of memory dysfunction clearl different from that of depressed patients. It resembled instead the experienc reported by psychiatric patients one week after a course of bilateral ECT Amnesia is easily detectable one week after ECT (Cronholm & Bloomquist 1959, Squire, 1984; Weeks, Freeman, & Kendell, 1980). Accordingly, it seems reasonable to suppose that the memory self-ratings obtained after ECT are attributable primarily to amnesia rather than to some other factor or combination of factors.

Amnesic patients with Korsakoff's syndrome reported a less severe memory impairment than did the six other amnesic patients. Moreover, the self-ratings of the patients with Korsakoff's syndrome did not contrast as sharply as those of the other amnesic patients with the self-ratings reported by depressed patients. These findings occurred despite the fact that, as assessed by quantitative tests of memory function, the patients with Korsakoff's syndrome were as severely impaired as the other amnesic patients (see Subjects section; also see Squire and Shimamura, 1986). For example, the patients with Korsakoff's syndrome recalled an average of 4.0 words out of 15 on each of five successive learning trials, and they recognized an average of 24.1 out of 30 words across five learning trials. The corresponding scores for the six (non-Korsakoff) amnesic patients were 6.3 (recall) and 25.8 (recognition).

The patients with Korsakoff's syndrome did not reliably report their own

memory abilities. However, despite the inconsistency in their responses across two test sessions, these patients did underestimate the severity of their impairment on both occasions. In contrast, other amnesic patients appeared capable of accurate and consistent memory self-ratings. This difference between amnesic groups has also been observed with other metamemory tests, given recently to four of the six (non-Korsakoff) amnesic patients in the present study and to six of the seven patients with Korsakoff's syndrome (Shimamura & Squire, 1986). The patients with Korsakoff's syndrome were not able to predict their performance on a subsequent memory test, but the other amnesic patients made accurate predictions.

The difficulty that patients with Korsakoff's syndrome exhibit in reporting their memory abilities is probably not due to diencephalic damage alone, because patient N.A. had good metamemory in the previous study and also reported his memory problems accurately in the present study. The findings for patients with Korsakoff's syndrome may be due to the more widespread neuropathology associated with this patient group, which includes the diencephalic region as well as frontal neocortex (Shimamura, Jernigan, & Squire, in press).

It is interesting to compare the items that elicited reports of memory dysfunction in the memory-impaired groups with the items that did not elicit reports of memory dysfuntion. The six items that elicited the lowest average self-rating scores (and that reflected the most severe impairment) for the after-ECT group and the non-Korsakoff amnesic group were items 2, 3, 4, 6, 7 and 11 (Table 2); the six items that elicited the highest self-rating scores for these two patient groups were items 10, 12, 14, 16, 17, and 18. The former items asked about the ability to learn, retain, and recall, especially in the case of new material; and also about the judgment of others. The latter items asked about attention, concentration, immediate memory, and remote memory. Interestingly, these latter items, which were not endorsed by amnesic patients, were nevertheless endorsed by depressed patients about as readily as the other items on the test (see the before-ECT group in Figure 1 and the depressed group in Figure 2). It seems reasonable to suppose that the former items were asking about experiences likely to be associated with amnesia. Note that amnesia most severely affects new learning and memory for the recent past; whereas it typically spares immediate memory functions (including the ability to attend and concentrate), and it typically spares memory for the distant past. In contrast, the latter items ask about experiences likely to be associated with depression (e.g., impaired attention and concentration). Indeed, a sense of impaired attention and concentration might lead to an experience of impaired cognition, in general, and a tendency to endorse all items to a similar degree.

In summary, the findings show that self-rating instruments can distinguish between depression and amnesia, and they can identify those amnesic patients who underestimate their memory problems. This test might have useful application to other populations, where questions arise about the nature of

memory complaints or about the relationship between self-assessment an performance.

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