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CHANGES IN IMPERSONAL AND PERSONAL MEMORY FOLLOWING ELECTRO-CONVULSIVE THERAPY[1]

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INTRODUCTION

Since the introduction of electroshock therapy, a great deal of work has been done on the occurrence of memory changes following such treatment. However, results in this area have been controversial and frequently contradictory. Many writers [1, 2, 11, 13, 14, 15, 18] have obtained findings indicating the presence of memory deficiencies following EST. On the other hand, some investigators [12, 17] have been unable to demonstrate that such defects occur. In those cases where memory losses were observed, the types of losses suffered were not well identified. This may be in part due to the nature of the materials used in these investigations. For instance, Sherman, Mergener, and Levitin [12] were unable to demonstrate any effect upon immediate and recent impersonal memories, while Zubin and Barrera [18], in a series of experiments utilizing orthodox learning materials, pointed out that learning and retention were affected adversely by EST.

In other aspects of the same problem (personal vs. impersonal, remote vs. recent, intellective vs. emotional memory losses), results have been equally inconclusive. In general, this may be because investigators have been satisfied to deal with findings rather than with methods. With this broad thesis in mind, confusion in this area may be traced to at least six major sources:

1. Different personalities may react differentially to electro-convulsive therapy. The majority of studies published to date have used experimental groups containing numerous nosological categories and, frequently, several types of convulsive treatments.

2. Time of testing subjects has varied from study to study. Pre-shock tests have been administered from one month to several minutes prior to initial treatment. At least a few investigators have tested during the course of shock treatment. Post-shock testings have varied from several minutes after final treatment to several weeks following the terminal shock.

3. Often the material utilized in the study is not meaningful to the subject as a person. Nonsense syllables and paired associates fall into this category.

4. The use of an external control group in this area of investigation has been a rarity. Possible practice effects and changes due to elapsed time thus are frequently not ruled out.

5. Most investigators have emphasized the quantitative aspects of post-shock memory changes rather than the possibly more significant qualitative aspects.

6. Perhaps most important, the majority of studies have not utilized materials which are psychologically important to the subject. In short, the personal memories, as opposed to the impersonal memories, have been largely neglected. In personal interviews, post-shock patients most frequently express concern over their personal memory defects, rather than impersonal defects.

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It was the purpose of this study to determine the nature of memory changes in post-electroshock paranoid schizophrenic patients, with a view to controlling much of the variation due to the sources listed above. Specifically, an attempt was made to determine the incidence and character of personal and impersonal, remote and recent memory changes.

Procedure

The general design of this study was as follows: An experimental group of 12 subjects (*S*'s) was tested before and after a series of shock treatments with the same battery of tests. An attempt was made to administer the initial test at such a time that the *S*'s were still unaware of their impending treatments. Mean time before initial shock treatment was 17 days. However, with individual *S*'s, time prior to initial treatment varied as much as 10 days on both sides of the mean. Post-shock test administration occurred at three weeks following terminal treatment, with as much as 10 days variation on both sides of the mean. Average total time between tests was 13 weeks. A matched control group of 12 *S*'s, paired individual for individual with members of the experimental group, was tested with the same battery of tests and retested again after a period of six and a half weeks.

The experimental group was made up of 12 paranoid schizophrenic patients, 8 women and 4 men, at the Veterans Administration Hospital, Downey, Illinois. All were white patients, ranging in age from 27 to 40 years of age. All received electroconvulsive therapy, with the number of treatments ranging from five to 25. Mean number of treatments was 15. Eight of the 12 experimental *S*'s had never received previous EST. Of the remaining four, three had received treatments two years prior, and one patient had received treatments one year previous to the EST series with which this paper is concerned.

The control group was also drawn from a white population of nursing trainees in residence, ranging in age from 20 to 25. No member of the control group had ever received EST or, as far as could be determined, any type of psychiatric treatment. The members of the control group were matched, individual for individual, with members of the experimental group. The matching criteria were (1) sex and (2) intelligence quotient, as measured by the CVS Abbreviated Intelligence Scale.

The standardized test battery consisted of three individual tests administered in the following order: (1) The CVS Abbreviated Intelligence Scale[6, 7, 8], (2) the Wechsler Memory Scale, Form I[16], and (3) a newly-devised personal memory inventory, consisting of 40 items—20 remote and 20 recent personal memories. Remote items consisted of such questions as "What is the name of the school where you attended first grade?", "Who gave you your first spanking?", "What is the first childhood dream you remember?" and "Where did you go on your first trip away from home?" Characteristic recent personal memory questions were: "What was the name of your last employer?", "What was your favorite hobby before coming to this hospital?" and "Who was the last person with whom you had an argument before coming to the hospital?"

The tests were administered on the wards, where environmental conditions were held relatively constant. Actual administration procedure consisted of a brief introductory period, followed by the battery as listed.

Results

It is possible to analyze the results of this study in each of three areas: mental efficiency, as measured by the changes on the CVS scale; retention of impersonal memories, as measured by the changes on the Wechsler Memory Scale, Form I; and retention of personal memories, as measured by the changes on the personal memory inventory.

On the CVS Abbreviated Intelligence Scale, the experimental group had a mean pre-shock IQ of 106.42 and a mean post-shock IQ of 111.25. The increase, in terms of the difference between the means, can be expressed as a t of 3.84, significant at the

one percent level of confidence. The mean first test IQ for the control group was 110.92, and the mean second test IQ was 112.75, yielding an insignificant t of 1.13. Thus, the general mental efficiency of the experimental group, after shock treatment, improved significently. Variation in individual IQ's occurred in the control group, but no definite trend was indicated. Changes in IQ scores for the experimental group, however, were almost consistently in the direction of improvement following shock.

TABLE 1. TEST-RETEST COMPARISONS OF EXPERIMENTAL AND CONTROL GROUPS ON EACH OF THE SUBTESTS OF THE WECHSLER MEMORY SCALE AND ON THE WECHSLER MEMORY QUOTIENT

Subtest	Test M	Retest M	t	P
Experimental Group				
Pers. & Cur. Info.	4.92	4.08	2.80	<.02
Orientation	4.33	4.67	2.35	<.05
Mental Control	5.33	6.33	1.24	>.20
Logical Memory	5.88	8.08	2.21	<.05
Digit Span	10.42	11.08	1.54	>.10
Visual Reproduction	6.67	8.17	2.11	>.05
Associate Learning	12.67	14.13	0.98	<.40
Memory Quotient	84.33	93.42	1.86	>.05
Control Group				
Pers. & Cur. Info.	5.67	5.83	1.48	<.20
Orientation	5.00	4.92	1.00	<.40
Mental Control	7.42	7.58	0.31	>.80
Logical Memory	9.83	10.17	0.56	<.60
Digit Span	12.33	12.75	1.61	>.10
Visual Reproduction	10.00	10.75	1.83	<.10
Associate Learning	19.17	19.83	1.09	>.20
Memory Quotient	108.25	112.92	1.89	<.10

Test-retest comparisons of the experimental and control groups on the Wechsler Memory Scale subtests and on the Memory Quotient are presented in Table 1. Here we find that both groups gained appreciably over the periods of testing in ability to retain impersonal materials. While the control group gained consistently on all subtests of the Wechsler Memory Scale, the experimental group showed much more variation. Compared with their own pre-shock scores, the experimental group improved significantly in Orientation and Logical Memory after shock and did significantly less well on Personal and Current Information.

In dealing with the personal memory data, concerning the time elements involved, two approaches were utilized. In any case, where the frequencies of personal memory changes over the period of therapy were dealt with, the experimental group acted as its own control. However, in compensating for the frequency of personal memory changes due to the passage of time alone in the experimental group, comparison of experimental with control data was necessary. In this experiment, comparison with the control data was made directly, without compensation for the five-week disparity in time, since, as Dietze and Jones [4] and Jones [10] point out, by far the greatest amount of forgetting of meaningful verbal material occurs within the first month after learning. "Learning" in this case would mean the initial exposure to the personal memory questions, although it may be argued that simple exposure to material does not constitute a learning situation.

The personal memory inventory was broken down into two main categories: remote and recent memories. Changes in reproduced memories over the periods of testing were classified as one of three types:

1. Major changes, denoting a complete change in the context of an answer.
2. Minor changes, indicating a partial change in the context of an answer.
3. Elaborative changes, indicating a more complete or elaborate answer at one or the other of the testing sessions.

Each personal memory inventory was given a code number and the inventories were selected randomly from the control and experimental groups for categorizing personal memory changes. Each inventory was categorized three times by the experimenter, and each of the 960 items which showed change was finally assigned to that category in which it had been placed two out of three times.

TABLE 2. CHANGES ON THE PERSONAL MEMORY INVENTORY OVER THE PERIOD OF TESTING FOR BOTH EXPERIMENTAL AND CONTROL GROUPS FOR TOTAL AND FOUR TYPES OF PERSONAL MEMORY CHANGES. THE DATA ARE FREQUENCIES

Type of Change	*Item*	*Exper.*	*Control*	X*	*P*
All Changes	Remote	117	63	24.97	<.01
	Recent	103	53	22.79	<.01
	Total	220	116	48.56	<.01
Major	Remote	87	34	29.88	<.01
	Recent	53	26	10.24	<.01
	Total	140	60	39.42	<.01
Minor	Remote	12	20	1.64	>.20
	Recent	19	10	2.34	>.10
	Total	31	30	0.00	>.99
Elaborative	Remote	18	9	2.52	>.10
	Recent	18	11	1.32	>.20
	Total	36	20	4.26	<.05

*Chi squares adjusted with Yates's correction for continuity.

Table 2 shows the frequencies of changes for both the experimental and control groups over the periods of testing for each of the three types of changes. As can be seen, the experimental group showed significantly greater-over-all changes in personal memory data. A more complete breakdown of the types of changes indicates that the experimental group exhibited significantly more Major personal memory changes than did the control group. The frequency of change appeared to be greater in the remote memory area than in recent memories. The experimental group also showed some differences from the control group in the frequency of their elaborations. In other areas of personal memories, the frequencies of changes were insignificant.

One other type of occurrence on the personal memory inventory will be considered here. This is the frequency with which *S*'s expressed inability to answer a personal memory item. These items were generally responded to in the form of negative statements, such as, "I don't know." The experimental group answered, "I don't know" to personal memory items significantly more often than did the control group. A comparison of the occurrence of such items between the experimental and control groups yielded a significant chi square of 24.68. In general, the experimental group appeared less able to answer remote personal memory items than recent. The chi square for remote material was 15.14; for recent material was 8.68. Both chi squares are highly significant.

On the remote items, the experimental group generally answered "I don't know" when asked prior to shock (significant chi square of 15.84), responding more adequately after shock (insignificant chi square of 0.08). On the recent items, the experimental group appeared less able to answer following shock (significant chi square of 6.98) than they had been prior to shock (insignificant chi square of 0.80).

Conclusions

The results of this study suggest the following:

1. In post-shock patients, after a period of two or three weeks following EST, general mental efficiency appeared to be improved somewhat beyond pre-shock level. This concurs with the general conclusions of Wittman and Russell [17]. Characteristically, the post-shock patients improved in their ability to verbalize, to abstract concepts and ideas, and to deal more adequately with symbolic materials.

2. Personal memories appeared to be more affected by EST than did impersonal memories. In the present study, the experimental group members, prior to shock, were able to retain impersonal materials less well than were the intellectually equivalent control *S*'s. After shock treatment, although they showed a tendency to improve beyond their pre-shock performances and also an increased ability to manipulate impersonal materials more easily, the experimental group did not approximate, to any degree, the control group in the retention of impersonal memories. However, marked gains were observed in the areas of general personal orientation, in space and time, and in logical memory. Further support for this finding comes from a study by Dawson [3], who found a significant decline in memory functions 24 hours after shock, but, two weeks later, retests with the Wechsler Memory Scale (alternate form) indicated that most patients had attained or improved beyond their pre-shock performance level.

The general finding that personal memories are affected by EST is corroborated by the findings of Janis [9] and other investigators. However, Janis states that amnesia for certain personal data was found in all 19 of his experimental *S*'s while such defects in his control group were negligible. This finding does not parallel strictly that of the present study. The suggestion here would be that amnesia for personal memories is more apparent in those patients who have been less therapeutically benefited by EST. Comparison with psychiatric notations and hospital discharges seems to indicate roughly that those patients who make a better post-shock adjustment suffer less from amnesia for personal data. These findings are far from conclusive, and the suggestion is here made that further research in this area might be profitable.

3. Pre-shock patients exhibited more personal memory disturbances in the area of remote memories; post-shock patients in the area of recent memories. Following shock, the experimental group appeared more able to handle remote personal memory material. While the experimental *S*'s seemed to verbalize more adequately about early childhood memories following shock, observable blocking appeared when they attempted to respond to questions involving more recent personal occurrences. This would seem partially to contradict the statement made by Holland [5], who suggested that EST may be therapeutically effective because it facilitates the repression of more remote traumatic memories.

Some of the memory changes which were observed may be dealt with more descriptively in terms of specific items on the personal memory inventory. Both normal and psychotic groups, particularly on retesting, found it difficult to recall their first childhood memory, the name of their first-grade teacher, and their favorite childhood food. In particular, the experimental group had difficulty in recalling their first childhood playmate, their first childhood dream, the food they disliked most as a child, the teacher they disliked most, and the circumstances of their first adolescent date. Over half of the shock group could not decide where they went on their first trip away from home.

On recent personal memory items, the normal group performed consistently well. The shock group, however, showed more changes in this area and a slight trend toward less adequacy of response following treatment. Items which appeared to be most affected were those involving their pre-hospitalization personal adjustments: jobs held previous to entering the hospital and recent physical illnesses.

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