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PSYCHOLOGIC EFFECTS OF ELECTRIC CONVULSIVE TREATMENTS

(III. Changes in Affective Disturbances)

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THE PROBLEM

Often in the course of the investigation of personal memories reported in the first article of this series (7), the patients asserted after electric convulsive treatments (ECT) that they no longer felt disturbed about things that had bothered them previously. In addition to the patient's own description of the change an impressionistic comparison of the affective attitudes spontaneously expressed in the pre-treatment interview with those occurring during the post-treatment interview strongly suggests that there is a marked decrease in emotional tension following ECT.

Similar observations have been frequently reported in the clinical literature (10). Consequently it appeared to be worth while to obtain systematic, objective data on affective attitudes expressed before and after ECT and to compare the changes with those which occur in an equated control group.

The purpose of carrying out a systematic investigation of affective changes was not merely to test the isolated hypothesis, already fairly widely accepted by those who have had clinical experience with ECT cases, that a series of electroshock treatments tends to produce a decrease in affective disturbances. Rather, a primary purpose was to obtain some information relevant to another qualitative observation, made in the course of the personal memory interviews, namely, that the retroactive amnesias described in the earlier article (7) seem to be intimately tied up with specific changes in affective disturbances. For example, one of the patients was no longer worried about his physical health after ECT nor could he remember having had the queer and sometimes painful somatic sensations about which he had complained so bitterly in the pre-treatment interview. Time and again the ECT patients made such statements as, "I don't exactly remember what it was that used to bother me." Consequently our interest is not limited to the question of whether or not there are affective changes per se, but extends to the broader problem of whether or not such changes are related to the post-treatment amnesias.

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METHODS

The term "affect" is commonly used to refer to the conscious or subjective awareness of emotional reactions. In this sense, "affect" is "a personal experience which can be known by others only if described or communicated by the person who had the experience" (11). The more sustained type of affective reactions—which will be referred to as "affective-attitudes"—may be defined, operationally, in terms of certain types of verbal statements produced either spontaneously or in answer to an investigator's questions.

One of the most reliable methods available today for determining affective attitudes is that of the objective type of questionnaire, in which the instructions as well as the wording of the questions and the answers are standardized. This method has been applied in the present study, in the form of self-rating scales. Special efforts were made, however, to avoid the pitfalls which too often obviate the precision of objective questionnaire findings, sometimes rendering them far less "valid" than unsystematic results obtained by a free style of clinical interviewing.

For purposes of this investigation, four different kinds of self-rating scales, developed by the author, were used. They were designed to cover the following aspects of affective attitudes:

- (1) Feelings of "anxiety"
- (2) Disturbing memories
- (3) Feelings of personal "inadequacy"
- (4) Current psychologic "symptoms" related to emotional disorders.

A full description of these scales, including the specific instructions used and other details about their reliability and validity is to be found in a separate article (9). The essential features of the scales may be summarized as follows:

(1) Each questionnaire had a special set of instructions and was administered independently of the other three. All of them were administered orally in a private interview.

(2) For each questionnaire there was a standard set of answer categories from which the patient selected his answer to each question. In the preliminary instructions an effort was made to "anchor" the extreme choices for each scale by including standard examples to illustrate their meaning.

(3) The results obtained from each questionnaire have been analyzed in terms of sets of items which were judged to be relatively homogeneous with respect to manifest content. This type of analysis facilitates the identification of specific areas of affective disturbances which are affected by ECT.

SUBJECTS

The questionnaires were administered to the ECT patients shortly before they began the treatments and were repeated at approximately four weeks after completion of the electroshock series. Identical procedures were applied to the control patients, who received no form of shock treatment during the period when the investigations were being carried out. As has already been indicated in the earlier reports in this series (7, 8), none of the control patients were specifically excluded from ECT on the basis of any psychiatric considerations.

Each questionnaire was given to a different group of ECT patients. The corresponding control groups were closely equated with respect to five major characteristics:

(1) Age: The average age of each group was approximately 29 years; for each questionnaire the mean age of the control group differed by less than one year from the mean age of the ECT group.

(2) Education: For each group, the mean number of years of formal schooling was approximately 10.5 years; differences between the means were negligible.

(3) Duration of hospitalization: An equal number of cases (approximately four-fifths of each group) had been hospitalized for less than 60 days at the time of the initial administration of each questionnaire.

(4) Diagnosis: Approximately two-thirds of the patients in each group had been diagnosed as one or another form of schizophrenia; there were roughly equal numbers of paranoid, catatonic, and mixed cases. The remaining third of each group was composed mainly of cases classified as psychoneurosis or as borderline psychosis.

(5) Time interval: The mean time interval between the initial and final administration of each questionnaire was approximately 11 weeks for the ECT group and for the control group.

On the following characteristics also, there was little difference between the group of ECT patients and the control patients: prior hospitalization, duration of the mental disorder, sex and occupation.

RESULTS

Changes in Feelings of Anxiety.—The specific purpose of the "anxiety" questionnaire was to determine the degree to which each patient felt apprehensive, worried, anxious or fearful about various topics, in order to observe the changes in "feelings of anxiety" which are produced by ECT. An effort was made to cover most of the major sources of anxiety commonly encountered in clinical psychopathology. It should be kept in mind, however, that the feelings of anxiety with

which we shall be dealing may be related to, but are by no means identical with, the special syndromes of intense emotional excitement referred to in psychiatric practise as "anxiety attacks," "phobic anxiety" and the like.

All of the questions began with the phrase: "How afraid or anxious do you usually feel when. . . ?" The answer sheet from which the patient was required to select his answer to each question contained seven choices ranging from "Extremely afraid or anxious" down to "Not at all afraid or anxious."

On the basis of manifest content, the 45 items included in the anxiety questionnaire were broken down into ten scales or areas, representing various sources of anxiety feelings. A score was given to each patient on a given scale by adding together the numerical values corresponding to each answer, which range from 6 for "Extremely . . ." to 0 for "Not at all . . .". When divided by the number of items in the scale, the score for each patient is equivalent to his mean rating per item (9). These scores were used to obtain the average scores of the ECT group and the control group shown in Table I.

Approaching the results in Table I from a purely descriptive point

TABLE I.—CHANGES ON ANXIETY RATING SCALES

Scale Dealing with Anxiety about	No. of Items in the Scale	Mean Scores					
		ECT PATIENTS (N = 15)			CONTROL PATIENTS (N = 15)		
		Before	After	Change	Before	After	Change
(1) Personal problems and inadequacies	6	18.46	11.53	-6.93	17.47	15.40	-2.07
(2) Aggressive tendencies	4	10.13	7.00	-3.13	10.80	10.47	-0.33
(3) Economic adjustment	4	9.93	7.53	-2.40	9.80	9.93	+0.13
(4) Physical health	4	8.80	7.20	-1.60	11.40	11.53	+0.13
(5) Sex adjustment	7	11.93	7.26	-4.67	17.07	14.67	-2.40
(6) The future	5	14.20	11.87	-2.33	15.27	15.20	-0.07
(7) Parental disapproval	2	3.93	2.86	-1.07	5.53	5.46	-0.07
(8) Social relationships	4	8.60	6.47	-2.13	11.80	10.20	-1.60
(9) Fantasies, dreams, sleep	4	7.73	7.20	-0.53	9.60	9.67	+0.07
(10) Specific situations	5	9.27	6.07	-3.20	13.93	14.40	+0.47

of view, it may be said that the ECT group expressed less anxiety in all ten areas, the greatest decrease being on the scale dealing with anxiety about personal problems and inadequacies, (which included questions such as the following: "... when you think about the personal problems you have"; "... when you remember the failures you have had in your life"; "... when you remember the things you have done which you regard as wrong or bad"; etc.). In contrast, the control group showed a slight increase or no change in most areas and a slight decrease in the others, but the decrease was always less than that shown by the ECT group for any given scale. These observations suggest that ECT may tend to reduce anxiety feelings in general, but the reduction is more pronounced for some areas than others.*

On the whole, the objective data in Table I tend to bear out the reports of clinical observers that following ECT mental patients express less apprehensiveness, worry and anxiety about their personal problems and their life situation in general.

Changes in Disturbing Memories.—The "disturbing memories" questionnaire was designed to investigate what might be roughly described as "feelings of guilt or remorse" about past behavior. All of the questions are focused upon memories of a self-depreciatory character. Responses to the questions, if the instructions are followed, should indicate the degree to which the patient is "bothered" or "disturbed" by such memories. The seven answer categories ranged from "Extremely bothered" to "Not bothered at all." On the basis of the manifest content of the "memories" referred to in the questions, the 32 items have been grouped into seven scales.

The scale scores are again equivalent to the mean rating per item. The results shown in Table II are similar to those obtained for the "feelings of anxiety" scales. On all seven of the "disturbing memories" scales the ECT group shows a definite decrease in affective disturb-

*Statistical analyses of the changes shown in Table I (by use of the t-test) reveal that the ECT patients exhibit a reliably greater decrease in anxiety ratings than the control patients on the first scale (personal problems and inadequacies) and on the last scale (specific situations). The latter scale contains questions about typical sources of phobic anxiety, such as "... when you look down from a tall building"; "... when you think about someone you knew who died"; etc. The second scale in Table I, which deals with anxiety about aggressive tendencies (e.g., "... when you are very angry at someone in your family") also shows a much greater decrease among the ECT patients than among the controls, but the difference between the mean changes is not quite large enough to be statistically reliable, although it approaches the 5% probability level ($t=1.91$). For the remaining seven scales, although the ECT group consistently shows a greater decline in anxiety ratings than the control group, the differences between the mean changes are not statistically reliable. Hence, the general trend found for all 10 scales is definitely reliable only for the first and last scale and approaches the magnitude necessary for high reliability in the case of the second scale.

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0 -0.07
5 -0.07
1 -1.60
+0.07
+0.47

ances and this decrease is always greater in magnitude than that shown by the control group.

TABLE II.—CHANGES ON DISTURBING MEMORIES SCALES

Content of the Disturbing Memories Scale	No. of Items in the Scale	Mean Scores					
		ECT PATIENTS (N = 16)			CONTROL PATIENTS (N = 16)		
		Before	After	Change	Before	After	Change
(1) Immoral behavior	5	13.56	6.69	-6.87	13.44	11.19	-2.25
(2) Personal inadequacies	7	25.00	15.19	-9.81	22.56	19.56	-3.00
(3) Sexual experiences	3	6.56	2.94	-3.62	6.19	5.31	-0.88
(4) Inadequate citizenship	2	4.44	2.19	-2.25	3.69	2.69	-1.00
(5) Aggressive behavior	4	9.75	6.00	-3.75	11.81	10.25	-1.56
(6) Blameworthy social behavior	7	19.81	14.06	-5.75	21.19	16.44	-4.75
(7) Inadequate family [or] relationships	4	10.93	8.56	-2.37	11.19	9.44	-1.75

It will be noted that the greatest decline following ECT occurs on the first two scales (immoral behavior and personal inadequacies). The first scale contains items such as: "How much are you bothered or disturbed when you remember the things you have done which were morally wrong?"; "... the times when you had evil thoughts?"; etc. Typical items in the second scale are: "... the times you were a failure?"; "... the times when you did something that was stupid or foolish?". A statistical analysis of the changes indicates that on both of the scales the decrease shown by the ECT patients is reliably greater than that shown by the control patients. On the third scale (sexual experiences) the difference between the two groups approaches the magnitude necessary for statistical reliability ($t=1.96$). The remaining four scales show the same trend but the differences are not statistically reliable.

Changes in Feelings of Inadequacy.—The third questionnaire deals with the same type of affective attitudes as the "disturbing memories" questionnaire. The instructions, the answer categories and the scoring were identical for both. However, the questionnaire we are now considering concentrates upon current attitudes and evaluations of the self rather than upon memories of past behavior. It contains 26 items of the following sort: "How much are you bothered or disturbed at the present time by the feeling that you are to blame for your own

troubles?"; "... by the feeling that you are a useless person?"; "... by the feeling that your future is hopeless?"; "... by the feeling that you have lost your self-confidence?"

Before treatment, the average score for the 16 patients in the ECT group was 67.56; after treatment, the average score dropped to 29.94, a mean decrease of 37.62. In contrast, the 16 patients in the control group showed a mean decrease of only 5.75 points (from 55.13 to 49.38). The difference between the two groups was found to be statistically reliable.* Hence it may be concluded that following ECT there was a marked tendency for affective disturbances of the type covered by the "feelings of inadequacy" questionnaire to decrease.

Changes in Current Psychologic Symptoms.—The fourth questionnaire contains a variety of items of the sort usually employed in "psychoneurotic inventories" and in psychiatric "screening" tests. Some of the questions require the patients to give a rough indication of the frequency with which they have experienced various affective states (e.g., "During the past two weeks, how often have you felt sad or blue?"). Other questions require them to report on how often during the past two weeks they have engaged in certain types of behavior which may be indicative of the presence or absence of pathologic emotional disturbances (e.g., "... how often have you had dizzy spells?").

The results for the nine scales presented in Table III are based upon scale scores which are equivalent to the mean rating per item ("Every day during the past two weeks" counting as 5 points, "Not at all during the past two weeks," as 1). On the first scale (depressive reactions) there was a reliable decrease and on the second scale ("euphoric reactions") a reliable increase for the ECT group, as compared with the control group.† These two findings are complementary; they indicate that a series of electroshock treatments tends to produce a decrease in feelings of sadness, dejection, or melancholy and an increase in the opposite mood, feelings of happiness, cheerfulness or elation.

The third scale ("sociability") also shows a statistically reliable change, indicating that following ECT the patients are more likely to feel that they obtain enjoyment and satisfaction out of everyday social

*Analysis of covariance was carried out in order to take account of the initial difference in means. The F-value was 13.93 which has a corresponding probability value of below 1%, indicating that the large decrease exhibited by the ECT patients is reliably greater than the slight decrease exhibited by the control patients.

†A change is referred to as "statistically reliable" only if, on the basis of a t-test applied to the differences between mean changes, the probability value is below 5%. In the present section, as well as in earlier sections of this article, whenever reliable changes are reported they are not attributable to statistical artifacts arising from initial differences between the mean scores of the two groups.

relationships. The next three scales, dealing with complaints about deficient mental health, somatic symptoms and difficulties in concentration and thinking, show a somewhat greater decrease for the ECT group than for the control group. The decrease in complaints about mental health approaches the magnitude necessary for statistical reliability ($t=1.88$) but the changes on the other two scales are definitely not reliable. The scales dealing with "aggressive tendencies" and "paranoid ideas" also fail to show a reliable change. On the last scale, dealing with complaints about memory difficulties, the ECT patients show a statistically reliable *increase*. This is the only scale, out of the 27 different scales investigated in this study, on which the ECT patients showed a change in the unfavorable direction. It indicates that at least some of the patients tend to complain about their memory difficulties after ECT.

TABLE III.—CHANGES ON SCALES OF CURRENT PSYCHOLOGIC SYMPTOMS

Content of the Scale	No. of Items in the Scale	Mean Scores					
		ECT PATIENTS (N = 15)			CONTROL PATIENTS (N = 12)		
		Before	After	Change	Before	After	Change
(1) Depressive reactions	5	15.07	11.47	-3.60	12.42	11.75	-0.67
(2) Euphoric reactions	6	14.60	21.33	+6.73	18.33	17.66	-0.67
(3) Sociability	4	11.87	15.27	+3.40	15.33	14.66	-0.67
(4) Awareness of deficient mental health	3	9.40	6.80	-2.60	8.25	7.50	-0.75
(5) Hypochondriacal complaints	12	24.87	21.87	-3.00	22.42	22.17	-0.25
(6) Difficulties in concentrating and thinking	4	12.73	9.93	-2.80	10.83	9.58	-1.25
(7) Aggressive reactions	5	9.60	10.00	+0.40	8.50	8.25	-0.25
(8) Paranoid ideas	5	8.20	8.00	-0.20	8.33	8.50	+0.17
(9) Memory difficulties	3	5.46	7.13	+1.67	4.33	4.58	+0.25

DISCUSSION

The "Depression" Syndrome.—The results from the various scales of affective attitudes show a high degree of consistency in indicating that ECT tends to reduce affective disturbances. From the last questionnaire, dealing with psychologic symptoms, it was observed that "de-

pressive reactions" showed a reliable decrease following ECT and that "euphoric reactions" showed a reliable increase. The items making up these two scales, however, deal with only some of the more superficial aspects of the affective syndrome referred to clinically as "depression." But the pattern of affective changes which emerges from the results of the other three objective questionnaires also appears to highlight the "depression" syndrome as the constellation of affective disturbances which is primarily reduced by ECT.

From the other questionnaires, it was found that the main affective changes appeared to be centered upon self-depreciatory attitudes:

- (1) feelings of anxiety about personal problems and inadequacies;
- (2) feelings of guilt or remorse about past immoral behavior;
- (3) feelings of guilt or remorse about personal failures and shortcomings in the past;
- (4) a variety of self-critical attitudes indicative of current feelings of inadequacy.

Such affective attitudes constitute one of the essential characteristics of the "depression" syndrome, as it is described in the psychiatric literature. Many psychiatrists, especially those of the psychoanalytic school, single out self-depreciation as an out-standing clinical feature of depression. Fenichel (2), for example, gives the following description:

The classical depressions . . . tend to feel that they are not hated as much as they should be, that their depravity is not sufficiently apparent to others. . .

Hostility toward the frustrating object has been turned into hostility toward one's own ego. This self-hatred appears in the form of a sense of guilt. . .

There have been numerous psychiatric reports on the success of ECT in the treatment of depressive reactions, not only among manic-depressive patients, but also among involuntions, schizophrenics and psychoneurotics (10). The objective results from the present study bear out the generally accepted hypothesis, already widely supported by clinical observations, that ECT is primarily effective in alleviating depressive symptoms.

From an inspection of the scale scores of individual ECT patients, it appears that depressive symptoms were alleviated in the schizophrenic cases as well as in those few cases diagnosed as manic-depressive psychosis or involutional melancholia. Yet some of these same schizophrenic patients did not improve, so far as their main psychotic symptoms were concerned. It would seem, therefore, that the reduction of disturbing affect following ECT may occur without necessarily im-

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plying an alleviation of primary schizophrenic symptoms. Consequently the decline in depressive reactions revealed by the various affective attitude scales may not be attributable solely to the fact that, at the time of the after-test, the ECT group contained a higher proportion of patients who had improved clinically than did the control group.

In order to check further on this point, use was made of clinical improvement ratings obtained from the psychiatrist in charge of each case. On the basis of these ratings it was possible to classify both the control and the ECT patients into two general categories: fair or marked improvement (i.e., most or all of the major psychopathologic symptoms have been alleviated) and slight or no improvement (i.e., most of the major symptoms have persisted). It was found that even when clinical improvement status is held relatively constant, the ECT patients show a greater decline in affective disturbance scores than the control group. For example, on the scale dealing with "disturbing memories of personal inadequacies", the improved ECT cases showed a mean decline of 13.0 scale points whereas the improved control cases showed a mean decline of only 3.6; there was a mean decline of 6.6 among the unimproved ECT cases as against a mean decline of 2.7 among the unimproved controls. A similar pattern emerged for every one of the scales on which reliable differences between the two groups have been reported in the preceding section. This observation provides some support for the hypothesis that electric convulsive treatments tend to produce a reduction of affective disturbances even in those patients who retain their dominant psychopathologic symptoms.

The Relationship between Circumscribed Amnesias and Affective Changes.—At the beginning of this article it was mentioned that certain qualitative observations point to a possible relationship between the occurrence of retroactive amnesias following ECT and the reduction of affective disturbances. The plausibility of this relationship may now be evaluated in the light of the findings from the objective affective-attitude scales.

In so far as the findings provided by the affective attitude scales (including several that dealt explicitly with disturbing memories) tend to confirm the hypothesis that ECT produces a reduction in affective disturbances, they contribute to the initial plausibility of the "relationship" hypothesis. Both the affective changes and the circumscribed amnesias were observed during the same post-treatment period, i.e., approximately four weeks following the last electric convulsive treatment.

The observation on clinical improvement status, described in the preceding section, also contributes to the plausibility of the hypothesis. If it had been found that the changes in affectivity following ECT were

limited to those ECT patients who showed clinical improvement, the relationship would appear to be improbable since the amnesias were found to occur in the unimproved as well as the improved ECT patients (7).

The most cogent evidence supporting the "relationship" hypothesis is based on qualitative observations. In the course of giving their responses to the objective questionnaires, the patients sometimes made spontaneous comments to explain their responses. Often, too, the examiner followed up on some of the unusually high affective disturbance ratings, after completion of the questionnaire, by asking the patient to give his reasons for those particular answers. In a number of cases this additional material affords an opportunity to observe a direct relationship between a change in affective disturbance rating and the occurrence of an amnesia. A few typical examples will be described:

One patient, a severely depressed 38 year old woman who displayed no psychotic symptoms other than vague feelings of depersonalization, made the following spontaneous comments along with her ratings on two items in the pre-treatment test on disturbing memories:

Q. 6 How much are you bothered or disturbed when you remember the times when you made other people unhappy?

A. Extremely bothered. I must have made my husband terribly unhappy to get him to the point where he would blurt out—(cries)

Q. 21 How much are you bothered or disturbed when you remember the times when you were a failure?

A. Very bothered. My husband showed me that I am a complete failure as a wife. That's why I tried to commit suicide.

The personal experiences referred to by these comments were amplified by the patient in the pre-treatment interview on personal memories: her suicide attempt was precipitated by a quarrel with her husband in which he "blurted out the fact that he couldn't stand me as I was," a fact confirmed by the husband's statements reported in the patient's case history record.

In the post-treatment test, three and one-half weeks following the termination of ECT, this patient's response to Question 6 on the disturbing memories questionnaire was as follows:

Somewhat bothered. I think it's possible that when I tried to commit suicide I may have given my husband—or maybe increased—his heart trouble. But the whole thing is vague in my mind.

To question 21, her answer was:

Not at all bothered. I can't think of any times when I was a failure.

The post-treatment memory interview revealed that this patient was completely amnesic for the behavior of her husband which had preceded her suicide attempt, to which she referred in giving high affective ratings on the two items in the before-test. She was unable to recall when it was that she had last seen her husband before the suicide attempt and she claimed that her husband had never, at any time, displayed a negative reaction toward her. In the follow-up interview, two and one-half months after the last electroshock treatment, it was found this patient was still amnesic for the incident which had precipitated her suicide attempt. At this time, according to her psychiatrist, she continued to show an absence of the intense depressive reactions and suicidal tendencies which had been markedly alleviated by ECT. In this case it is possible to perceive, at the manifest level, the close relationship between the amnesia for a traumatic experience and the diminution in at least one major component of her depressive reactions.

Another case serves to illustrate a similar relationship involving amnesia for memories of subjective (delusional) experiences rather than for an actual traumatic event. Before ECT, on three widely separated questions in the disturbing memories questionnaire, the patient (an 18 year old male schizophrenic) gave the response "Very bothered" accompanied by a comment to the effect that he had sinned and caused harm by practicing telepathy. For example, to one question he responded:

Very bothered. I say that because I believe that I unintentionally killed a person through telepathy. I should try to forget about that but I can't. I was walking to high school one day and the idea flashed in my mind, like a daydream. I saw a bus coming and two red balloons blew under the bus and I sort of transmitted the urge to the little girl, who they belonged to, to chase them. The back wheel of the bus went over her body and killed her. At first I thought it was a daydream but then later my folks told me a girl was killed by a bus and I felt guilty. I felt it actually happened.

In the post-treatment session, this patient gave "Not at all bothered" as his response to the three questions which formerly had evoked comments about telepathy together with the high disturbance ratings. Detailed questions in the memory interview revealed that this patient had become amnesic for the various subjective experiences involving telepathy which he had described before ECT. According to his psychiatrist, this patient showed little clinical improvement since almost all of his psychotic symptoms, other than the telepathy delusions, persisted after ECT. With the psychiatrist's permission, a detailed investigation was made of the patient's amnesia for his former preoccupations with

telepathy. For example, the patient's statements about causing the death of a little girl, quoted above, were read to him. But even this failed to elicit any recognition or recall of the forgotten delusional experiences, about which the patient had expressed so much guilt in the pre-treatment session.

The next example illustrates the same type of close relationship between a change in affective disturbance rating and failure to recall personal memories, but in this case the amnesia extends to manifestly nontraumatic and even pleasant experiences. In the pre-treatment session the patient (a 22 year old female schizophrenic) described numerous dates she had had the preceding summer with a boy named Joe. For example, when asked, "What was the best experience you ever had in your whole life?" she answered, "The night Joe took me to S— Park. . ." But she also described being disappointed when, at the end of the summer, Joe no longer came to see her. On the disturbing memories questionnaire the following responses occurred:

Q. How much are you bothered or disturbed when you remember the sexual experiences you have had?

A. Extremely bothered. I'm thinking of a time once when I wanted to find out whether it was really sex that was bothering me. It was foolish for me to think of anything like that. That happened last August, when I let Joe go pretty far.

In the post-treatment session (four weeks after ECT), the patient gave as her response to this question, "Not at all bothered." After completing the questionnaire, the following inquiry was carried out:

Q. I want to return to one of the questions we just had. The one about being bothered by the sexual experiences you have had. Did you ever used to be bothered by that?

A. No.

Q. Did you ever have the idea that it was sex that was bothering you?

A. No, I never wondered if it was sex.

Q. Was there ever a time when you wanted to find out whether it was sex that was bothering you and you let a boy go pretty far with you?"

A. No, I don't recall that. I do think about sex a lot—I guess everyone does. And I did let a boy go pretty far.

Q. Who was that? What was his first name?

A. Sam.

Q. Any other boy?

A. No.

Q. Could it have been Joe?

A. I suppose it could have been Joe.

Q. When?

A. If it happened—which I'm not at all sure it did—that was at least two years ago or more.

Q. Did you go out with Joe last summer?

A. I can't remember anything about going out with him then. I think it was a different fellow named Joe that I may have gone out with last summer. I knew two Joes.

After many detailed questions about dates with Joe during the preceding summer, she was still unable to recall anything definite:

I can only vaguely recall him. He was good looking I remember. But I can't remember anywhere we went together or any of the dates we had. . . . Yes, we may have gone to S—— Park, but I can't recall anything about it.

What these examples indicate clearly is that at least some of the decreases in affective disturbance ratings, observed in the responses to an objective questionnaire on affective attitudes, are tied up with amnesia for the specific ideational content of the previously disturbing affective attitude. Similar examples could be cited from the material available on numerous other patients examined in the present series of investigations. Such observations supplement the indirect implications of the quantitative findings by providing some direct evidence for the hypothesis that there is a close relationship between the two types of psychologic changes produced by ECT.

The evidence derived from this study is not sufficient, however, to establish the "relationship" hypothesis. Nor does it provide any definite information about the causal sequence, since there is no indication as to whether the circumscribed amnesias are the cause or effect of the affective changes. Yet the findings and observations arising from this study do serve the purpose of focusing attention upon the possible relationship between the two types of changes and they indicate that the relationship is sufficiently probable to warrant concentrated research efforts on this aspect of the psychologic effects of ECT.

Hypotheses on the Role of Post-treatment Amnesias in Producing Affective Changes.—From the observations described in the last section, it would appear to be unlikely that the post-ECT amnesias and the reduction of disturbing affect are two completely independent effects of ECT. For the purpose of suggesting new and useful leads for subsequent research on the therapeutic action of ECT, it may be worth while to consider various hypotheses which might provide an explanation of how the two factors are related.

There are several different ways in which a direct psychologic relationship between the retroactive amnesias and the affective changes

could arise. The most obvious possibility is that only one of the changes is the primary effect of the electrically induced convulsions and that it, in turn, plays the causal role in producing the other. In other words, the affective changes might be the causal factor which underlies the occurrence of the amnesias or, conversely, the reduction of disturbing affect might be produced by the amnesias. From the available clinical evidence, however, it appears that neither of these two alternative hypotheses provides a satisfactory explanation of the psychologic effects of ECT.

If it is true that changes in affectivity play the causal role in producing post-ECT amnesias (e.g., by altering certain inner emotional cues necessary for eliciting the memory responses) then we should find exactly the same type of amnesias following any comparable change in affectivity. For example, patients who recover spontaneously from a depression should also be found to exhibit retroactive amnesias. But this would appear to be improbable inasmuch as there is a general absence of any clinical reports claiming that spontaneous mood changes are accompanied by circumscribed amnesias. Moreover, in the present series of investigations, a few of the control patients who received no shock treatments had markedly improved during the period of several months between the initial and final interviews and yet, despite the reduction in their affective disturbances, these patients displayed no evidence of retroactive amnesias (7).

With respect to the second alternative, it may be noted that some clinical observers have already suggested that the temporary amnesias manifested during the treatment period are an effective therapeutic factor (3, 4, 5). Lewis (12), for example, characterizes the temporary diffuse amnesias as "aiding the patients to forget their emotional problems temporarily and thus eventually breaking up the psychopathic pattern." In view of the findings presented in the first article of this series (7), the hypothesis could be extended to include the retroactive amnesias which persist beyond the usual recovery period, after the diffuse amnesias have cleared up.

There is some clinical evidence, however, which definitely tends to minimize the possibility that the amnesias produced by ECT play the primary role in bringing about an improvement in affective symptoms. In the present study, the ECT patients were given ten or more convulsive treatments, which is fairly typical for hospitalized patients treated by ECT. But patients in whom depression is the prominent feature are sometimes given only four or five electroshock convulsions, and it has been observed clinically that these few treatments are sufficient to produce the characteristic affective changes without giving rise to memory

disturbances (10). If this claim is verified, the primary therapeutic role of the amnesias would be excluded, on the assumption that the essential therapeutic factor is the same for a short series of treatments as for a longer one. A similar claim has been made for the use of unidirectional, as opposed to alternating, current for the induction of a full series of convulsions. Verification of this claim would not only provide evidence against the primary role of the amnesias but would also indicate that the retroactive amnesias are not a necessary consequence of a full series of convulsive treatments.

Studies of subconvulsive electroshock treatments might serve to illuminate another aspect of the problem. It has been reported that electrically induced petit mal reactions produce the diffuse amnesias of the type observed during ECT, but do not have the effect of improving affective disorders (10). If it proves to be the case that such treatments give rise to typical post-ECT amnesias without producing therapeutic changes in affective symptoms, there will be strong evidence against the hypothesis that the amnesias play a major role in bringing about clinical improvement.

From the above considerations it appears that there is little basis for assuming that the amnesias produced by ECT constitute the *primary* factor which will account for the therapeutic results achieved by the treatments. Nevertheless, such considerations do not exclude the hypothesis that the amnesias may play some secondary role in contributing to the reduction of affective disturbances. Before describing the qualitative observations which lend some weight to this hypothesis, it is relevant to call attention to the fact that alternative explanations of the apparently close tie-up between specific amnesias and specific affective changes appear to be inadequate.

We have seen that from the available evidence there is little basis for assuming either: (1) that the development of post-ECT amnesias is primarily due to the affective changes produced by ECT, or (2) that the improvement in affective symptoms is primarily due to the amnesias induced by electroshock treatments. A third causal sequence to consider is that both the amnesias and the affective changes may be symptomatic of some more general psychologic change arising from the organic changes produced by ECT. For example, Zubin (15) has suggested on the basis of certain experimental findings (1, 6) that ECT may produce a general "loss of familiarity" which might account for both the difficulties in recalling past experiences during treatments and the alteration in the patient's responses to perceptual cues which formerly evoked unpleasant affective reactions. But so little is known about the "loss of familiarity" factor and other psychologic variables

which may underlie changes in both memory functions and affectivity, that it is extremely difficult to deduce any consequences from the hypothesis which can be tested empirically, when one attempts to apply it to the type of behavioral changes observed in the present series of investigations.

We turn now to the hypothesis that the post-ECT amnesias provide a supplementary psychologic mechanism which contributes to the improvement of affective symptoms following ECT. This hypothesis assumes that the amnesias serve only to bolster or maintain the original improvement achieved by ECT and consequently it is consistent with the view that the basic change in affectivity is primarily and directly due to organic or physiologic changes produced by the electroshock treatments.

Qualitative observations made in the course of the present investigations strongly suggest that at least some of the affective changes produced by ECT are reinforced or maintained by the occurrence of the post-ECT amnesias. In several patients it was noted that some of the improvement in affective disturbances was apparently dependent upon the persistence of certain related amnesias, i.e., when the amnesias cleared up there was a reversion to the pre-treatment affective disturbance.

One patient, for example, had recounted a series of past difficulties with his mother and expressed intense hatred toward her in the pre-treatment interview. According to the psychiatrist's case notes, this attitude constituted a central feature of the patient's emotional disorder (psychoneurosis, anxiety type or, possibly, borderline schizophrenia). Four weeks after the termination of ECT, the patient expressed no hostility toward his mother and, in contrast to his former avowed plans, he stated that he was definitely intending to live at her home. But at this time he was amnesic for the difficulties he had had with her in the past. When interviewed two months later, the patient indicated that he had regained the forgotten memories and he asserted, "Now I hate her worse than ever." The first series of post-treatment interviews had provided some cues which elicited a partial recovery of some of the forgotten material* and this may have instigated the recovery of additional material during the subsequent period. The psychiatrist who was in frequent contact with the patient during the period in question provided additional confirmation of the fact that the recrudescence of hatred toward the mother *followed* the recovery of the forgotten memories.

*Cf. the material on this case in the section on "Characteristics of Post-treatment Amnesias" in the first article of the series (7).

Another patient displayed considerable effort in a post-treatment interview, in bringing forth a number of disturbing memories she had not been able to recall at first. Toward the end of that particular session, she asserted:

When I talk to you about all these things, I feel that remembering these things is bad for me. I feel worse now than I have ever felt in recent days. Now I feel that I might have the illness return, though when not talking to you I don't feel that way at all.

During the two or three days immediately following this interview, the patient's psychiatrist noted that she had become depressed for the first time since ECT, although her symptoms were by no means as severe as they had been before treatment and the relapse was only a temporary one. (It should be mentioned that it was only a few disturbing memories which had been recovered by the patient during the post-treatment interview; when re-examined almost two months later she was still unable to recall many critical events connected with her suicide attempt and other important features of her life history.)

Such case material implies that when the amnesias clear up there is a tendency for affective disturbances to reappear. If this dynamic relationship is borne out by subsequent investigations, there will be a sound basis for concluding that the post-ECT amnesias play some role in maintaining the reduction of affective disturbances.

In considering the post-ECT amnesias as a supplementary factor which facilitates the maintenance of clinical improvement after ECT, it should be recognized that the actual mechanism involved may be far more complex than the simple "sedative effect" suggested by Glueck (4) in his discussion of the possible therapeutic role of the temporary diffuse amnesias of the treatment period.

Since one of the basic sources of stress in many mental disorders is the awareness of personal inadequacies, there is the possibility that the retroactive amnesias have the effect of an artificially induced repression, enabling the patient to avoid some of the painful ideas about himself which give rise to the more pathologic modes of defense represented by certain of his symptoms. To make the hypothesis a bit more explicit, let us assume that a patient frequently encounters cues in his everyday life which elicit memories of an intensely disturbing character (e.g., certain features of the hospital environment may continually "re-mind" the patient of his temporary psychotic behavior prior to hospitalization). These memories would tend to produce an intensification of disagreeable affective states (e.g., guilt or remorse about having "lost

control" of oneself several times in the past). Also they may give rise to conflict-laden affects or impulses (e.g., hostility against one's family for having "caused this mess"). Such affective reactions in turn, would tend to mobilize avoidance reactions ("defenses") directed against environmental cues which tend to elicit the subjective disturbances (e.g., "depressive blocking," which MacCurdy (13) and others have described as a defensive device for avoiding intense emotional reactions).

If now the patient is given ECT and develops a series of amnesias which eliminate awareness of some of the painful memories which were previously evoked easily, he may experience less frequent and less intense affective disturbances.

It was pointed out earlier (7) that the amnesias following ECT often involve personal memories of pathologic behavior in the past, quarrels with persons who are loved and admired, and the like. With a substantial block of such emotionally disturbing memories no longer available to recall, the patient would be less likely to be overwhelmed by feelings of inadequacy and guilt; he might, therefore, be better able to abandon some of his pathologic symptoms which functioned as a defense against the affective disturbances.

Obviously only certain types of mental disorders could be expected to derive some benefit from the artificially induced "repression" of painful experiences provided by the retroactive amnesias. Taking account of their content, it is not implausible that the amnesias would aid in ameliorating affective symptoms in the depressive states and those defensive symptoms in schizophrenics which are motivated by the person's awareness of his own psychopathologic tendencies (the secondary "restitution attempts"). More detailed elaboration of this aspect of the hypothesis awaits further psychiatric research on the specific types of symptoms which benefit from ECT and their dynamic relationships to affective disturbances.

SUMMARY AND CONCLUSIONS

(1) On a variety of self-rating scales of affective attitudes, the ECT group, when examined approximately four weeks after the last treatment, showed a marked decline in affective disturbance scores, as compared with the equated control group. The results support the general conclusion that a series of electroshock treatments tends to produce a reduction in affective disturbances.

(2) The scales on which the ECT patients exhibited the most reliable decline in affective disturbance scores were mainly those which are relevant to the "depression" syndrome, as described in the psychiatric

literature. Consequently, the results tend to support the widely accepted hypothesis that electroshock treatments are primarily effective in alleviating affective disturbances tied up with depressive symptoms.

(3) It was found that even when clinical improvement status was held relatively constant, the ECT patients still tended to show a greater decline in affective disturbance scores than the control group. This finding supports the hypothesis that ECT tends to produce a reduction of affective disturbances even when the treatments fail to alleviate the patient's dominant psychopathologic symptoms.

(4) Various qualitative observations provide some direct evidence for a hypothesis which appears to be plausible in the light of the quantitative findings, namely, that the occurrence of post-treatment amnesias (7) may be closely related to the decline in affective disturbances.

(5) The possible role of post-treatment amnesias in producing the affective changes was discussed in the context of alternative causal sequences. From the available evidence, it appeared to be improbable that the amnesias are the primary causal factor producing the therapeutic changes in affective symptoms. But some qualitative evidence was presented which implies that the amnesias do contribute to the reduction of affective disturbances, probably as a secondary factor which aids in reinforcing and maintaining the therapeutic results of the treatments. The following hypotheses, which appear to be consistent with the findings and observations derived from the present series of investigations, were suggested as warranting further research:

(a) By partially eliminating from the patient's consciousness a substantial block of memories which tend to arouse intense affect, the post-treatment amnesias may have the effect of reducing certain areas of affective disturbance. In other words, the post-treatment amnesias may be equivalent to a new mode of defense which has an effect similar to "repression" in facilitating the avoidance of disturbing affect.

(b) By providing a new defense mechanism for warding off intolerable subjective states and thereby reducing the frequency and intensity of disturbing affective reactions, the post-treatment amnesias may contribute to the abandonment of some of the pathologic symptoms which had previously functioned as a defense against intense affective reactions.

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