The Effects of Electric Convulsive Therapy on the Functioning of Mental Patients: A Symposium

VI. MEMORY FUNCTIONING IN PATIENTS TREATED WITH ELECTRIC SHOCK THERAPY

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The previous papers in this symposium have dealt primarily with the influence of electric shock on the behavior of animals. We shall now turn our attention to the influence of electric shock on human behavior. The amnestic phase following Electric Shock Therapy, like all other clinical phenomena, shows considerable variation from patient to patient and from shock to shock even in the same patient, but next to loss of consciousness it is the most prominent clinical feature observable. The amnesia for the treatment is one of the reasons for its popularity, and it has impressed some clinicians to such an extent that they have proposed amnesia as a cornerstone for theoretical explanations of the therapeutic efficacy of electroshock therapy. Before presenting the available data it would be well to give a rapid glance at the present status of amnesia in general with special reference to its clinical and experimental implications.

Although both psychologists and psychiatrists have been interested in memory perhaps more than in any other aspect of human behavior except emotion, the paths of psychology and psychiatry have previously rarely crossed in this area. There is little common ground for these two disciplines in the field of memory, and there are few if any common terms. Thus, while the psychiatrist speaks of registration, impression, repression, retrograde, anterograde, para- and hyper-amnesia, and engrams, the psychologist speaks of the same or nearly the same phenomena as learning, practice, retroactive inhibition, recent and remote memory, reminiscence, memory traces, etc. Learning, retention, and memory are three stages that every event, whether laboratory learning or life experience, undergoes; and the failure of memory may be attributed to one of these three aspects. There may be deficiencies in the original learning; or

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there may be a natural interference with the retention process; or the active remembering which we call reproduction, recall, or recognition may fail. It is important to know which one of these three aspects we are concerned with when we speak of the global concept of amnesia. If there were no opportunity to learn or to experience a given event to begin with, amnesia for the given fact or event would be out of question. Thus the events occurring during the unconscious state in E.C.T. are not properly speaking forgotten; they were never experienced. Similarly, some events occurring just before shock are not always retained, either because they were not fully observed or because insufficient time elapsed between the registration of the memory trace and the shock so that the condensation period required for crystallizing the memory was not sufficient. Third, retention may be unimpaired, but the patient may be unable to reproduce exactly the memory in question. This inability may be the result of alteration in the memory trace or may be due to certain intraorganic conditions such as fatigue, emotional attitude towards the memory, etc. As an example of the failure to reproduce exactly the given memory, we might turn to the work of Bartlett (1), who exposed symbols, stories, and other materials to his subjects and found that in subsequent reproduction the memories were altered in a very characteristic way. Examples of memory changes due to emotional attitude and affect are not difficult to observe in one's self and friends. The importance of memory alterations due to emotional or other interpolated psychological variables has been stressed by the Gestalt school as well as by general learning theory and has been proposed as one of the theories for explaining forgetting. Finally, the fault may be not with the learning or registration, nor with the reproduction, but with the actual memory trace itself. There may be actual destruction of memory in the organic sense. In such cases the memory is of course lost forever, and only learning anew will cause the material to be retained.

In all of these considerations one must remember that there are individual differences in learning, retention, and active remembering, just as there are individual differences in intelligence, height, and weight. Consequently, a certain amount of forgetting is to be expected in some patients and a greater or lesser amount in others,
regardless of the influence of shock. It must also be remembered that the registration process in mental patients is much slower than in normal individuals; hence at least some of the apparent amnesia observed clinically may be due to imperfect registration.

The clinician, especially the medical clinician, has not paid very much attention to the three aspects of the memory process described above, but he has instead paid closer attention to the type of material remembered or lost and has utilized as his chief tool the interview approach of direct questioning regarding memory. Psychologists, on the other hand, have developed more scientific methods that are keen-edged tools in determining not only the presence or absence of a given memory, but also its degree or extent. These methods are well known and go under the name of tests of recall, recognition, reproduction, and relearning. While the medical clinician depends primarily on testing memory by inquiring about the patient’s orientation in time and space and about recent and remote events, the psychologist prepares carefully selected materials which he implants in the patient by means of memory drum exposures or some similar devices and then after a suitable period tests the patient to determine the degree of retention present.

Despite the advantage of scientific precision which the psychologist enjoys, there are important aspects of memory which he has been unable to tackle adequately, especially in the field of personal memory. This is the field in which the clinician is most concerned. Personal memories, especially those involving the self or the sense of “menness,” are the ones that suffer most in the psychoses and the neuroses. By contrast, the impersonal memories sometimes suffer relatively little. The greater the ego involvement in a given memory, the greater are the chances of its being altered or distorted or completely repressed by the forces of the disease that threaten the self. If the self is completely isolated or thwarted, the patient may lose all personal memories, even his name and his own identity, and become one of the classic amnesia cases so prominent in newspaper accounts of loss of personal identity. Less severe cases of personal memory defect may involve loss of the time-ordering sense that serves as a chronological thread for ordering past events. Such cases have no adequate sense of recent and remote events, and past
and present are intermingled without adequate differentiation. The most spectacular failure of personal memory occurs in changes in the feeling of familiarity. Some patients and to a lesser degree normal individuals exhibit a phenomenon known as *déjà vu*, in which a false sense of familiarity is felt for events or scenes never previously experienced or observed. On the other hand, some patients and very few normals, if any, experience the phenomenon of *jamais vu*, in which everything, even that which should be most familiar, appears strange and foreign. These two aspects of memory, familiarity and unfamiliarity, are more subtle than the other memory factors; and defects in them may go undetected for a longer period.

Thus far very little if any correlation has been found between the loss of personal memory and loss of so-called impersonal or sensorimotor memory. An individual may be well oriented in the field of knowledge of impersonal events and yet be a case of loss of personal identity and vice versa. It would be incorrect to say that psychologists have not attempted to work in this field, or that they have not made any contributions, but their success here has been very meager compared to the abundant harvest they have reaped in the impersonal memory field. One interesting contribution in the area of familiarity is the finding that the judgment of feeling of *unfamiliarity* with reference to a given object which was never seen before is much faster and easier than the corresponding feeling of *familiarity* for a previously perceived object or event. That is, it is easier to report a thing as not having been seen before than it is to recognize something as having been experienced before (3).

As a result of the differences in approach, the theories explaining remembering and forgetting proposed by psychologists and clinicians are at loggerheads with each other. While the clinicians believe that people forget things because some psychic force pushes the memory out of consciousness, the experimentalists, although they permit the workings of the other types of memory losses also in their framework of explanations, believe that forgetting takes place primarily because of the interference of other memories.

Not one of the theories of the clinician or of the experimentalist has thus far been adequate to cover all the available data. It is reasonable, however, to conclude that Freud's psychoanalytic for-
mulations have provided considerable rationale for the repression theory of forgetting, and there has been somewhat more experimental evidence for the theories of retroactive inhibition and interference. Both the clinician as well as the experimentalist admit that some forgetting probably takes place because of the loss or deterioration of memory traces. But though the two fields are far apart in concepts, approach, and theory, careful examination of both may find many points in common. Since electroshock therapy provides a common meeting ground for both disciplines, the analysis of the phenomena observable in E.C.T. ought to provide a good starting place for integrating the two approaches.

A survey of the field of experimentation with human beings may be divided into two major divisions, clinical observations and experimental methods. The clinical observations vary from observer to observer but cover the entire gamut of phenomena which seem to occur in the period beginning with the closing of the circuit and the final discharge from treatment. There are at least four different phases of memory involved. The first deals with the immediate effects which are apparent at the moment the circuit is closed. The second deals with the memory losses which seem to become aggravated after about the fourth or fifth treatment session. The third deals with the general confusion and disorientation which occurs between treatment periods and which no doubt affects the entire mental life of the individual. Finally, the fourth deals with the long-range net effect of the treatment after cessation of electroconvulsive therapy. The type of memory loss in each of these four phases differs considerably, and it is well to bear in mind the particular phase of treatment when discussing experimental results.

The immediate effects really consist of two parts. The first is the insular memory loss which surrounds the electric shock itself, that is, the effects that transpire from the moment that the electric current is closed to the moment when the individual regains consciousness or regains orientation to events about him. These events are usually entirely lost to him since none of them could have registered or if registered could have had time enough to be consolidated. Following this period, which lasts from one to 10 minutes depending upon the individual, a period of gradual return of memory function.
ing sets in, during which the phenomenon of *jamais vu* characterizes the individual. This phenomenon is one in which the individual has complete loss of familiarity for some objects, events, and persons with which he is supposedly fully familiar. This sometimes proceeds to the point where he loses the sense of his own identity and does not know his own name or why he is where he is. Detailed surveys of the psychological characteristics as far as memory is concerned are given in reviews by Stainbrook (4) and by others, and these will not be repeated here. The more pervasive type of memory loss which begins to be felt about the third or fourth shock as a part of the general organic syndrome is not limited to the events of the shock period but juts back to earlier memory, sometimes affecting remote memories in a spotty manner. The patient complains of being unable to remember the names of long-standing friends or events formerly well known to him. More often than not this type of memory loss continues throughout the treatment period, but about three weeks after treatment it completely disappears and the patient's memory returns to its fulness or becomes even better than before treatment. There are a few instances in which it has been demonstrated that some of the memory losses continue for as long as a year after end of treatment, but in most instances there is a gradual return to pre-treatment functioning. It is likely that even in the few refractory cases full memory finally returns.

In order to determine the characteristics of each of these four aspects of memory loss, careful observational and experimental studies were made at the Psychiatric Institute (5). Regarding the immediate memory loss following shock, it has been noted that its outstanding characteristic is the patient's apparent attempt at regaining his hold on the environment from which he had momentarily slipped. He exhibits an amnesia for the treatment itself, which is insular in nature, since the events immediately preceding and immediately following the treatment are also lost, and experiences a temporary personal disorientation which is only gradually dissipated. In the case of one female patient, her maiden name returned first and then her married name. The most unusual event, however, is the fact that despite her protest that she had never previously seen the material memorized before shock, her recognition performance
was much better than chance. This seems to indicate that though the memory trace itself is retained, awareness of the memory is completely lost. But even this retention without awareness does not occur much before 20 minutes from the moment that the current is closed. After 40 minutes perfect recognition scores are usually achieved. Although none of the patients expressed a fear of the treatment and hardly any recollection of it, a few of them did indicate a fear of the awakening stage. One patient was terrified after shock because she had no idea who she was and where she was. This posttreatment disorientation period is of course not limited to E.C.T. since patients coming out of ether and other types of anesthetics report similar experiences.

As a result of these early observations a systematic effort was instituted to determine the different aspects of memory that suffer and those that go unscathed. By utilizing implanted memories it was found that recall and relearning show a complete loss after shock, whereas recognition memory is hardly touched by the shock treatment. Another result of this investigation was the fact that remote memory was less affected than recent memory. That is, implanted memories that were further removed in time from the shock showed less effect of the shock than those that were learned immediately before E.C.T.

One interesting paradox arises from the fact that "relearning" memory, which is usually a very sensitive measure since it taps memory traces which are below the threshold of immediate recognition, fails to reveal any retention; whereas recognition does reveal some retention. In order to investigate this apparent contradiction a second experiment was undertaken utilizing an interference effect. This was done by associating two nonsense syllables with the same commodity, one before E.C.T. and the second after E.C.T. Contrary to expectation, the interference effect was not only found to be present but was even enhanced by the shock. It was concluded from this that the shock does not destroy the memory trace but simply disorganizes it. The results of these preliminary experiments were followed up by more carefully planned experiments, and these results were generally confirmed. In addition some evidence was obtained for a lowering not only of retention but also of the learning ability dur-
ing the period of treatment. Both learning and retention, however, returned within three weeks after treatment to a level as good or better than the pretreatment status. The results were obtained not only on semimeaningful material (commodities paired with pseudo brand names) but also on completely meaningful paired associates.

This type of approach was also extended to personal memories as revealed in word association tests. It was found that E.C.T. affected personal memories in about the same way as implanted memories, causing a slight drop in recognition and producing some loss in the feeling of familiarity for the response words given before treatment. The persistence of the complex bound associations after treatment was found to be significantly lower than the corresponding persistence of complex free associations. That is, the shock treatments seem to disrupt the emotionally charged words much more often than the neutral words. E.C.T. seems to reduce quantitatively the emotional charge on the patient’s associations, leaving his memory otherwise relatively unaltered. The patient retains the memory which previously troubled him, but he no longer feels any anxiety about it.

Janis (2) reported a somewhat contradictory finding in this respect since the electric shock patients showed an increase in complex bound words as compared to his controls. However, he did not differentiate between the complex bound and complex free words, and a further analysis of his data may perhaps yield a differential between them. Janis also found that some of the memory losses persisted as long as a year after the treatment although even these losses did not appear to be permanent.

**Summary.** Whether or not memory losses constitute a basic feature of electroshock therapy is still debatable. The hypothesis that the patient recovers because his memory for adverse events or situations is wiped out is hardly tenable since no evidence for destruction of memory traces is now available. Even in instances where memory loss has persisted for a longer period, there is a suggestion of slower recovery rather than of complete annihilation. The evidence from loss of familiarity seems to be highly suggestive. Since the feeling of familiarity bridges both the field of memory and the field of emotion, it may be possible that a lowering of the threshold of familiarity is sufficient to free the patient from his anxieties about certain events
and situations which formerly proved to be disruptive of his organized mental life. It is this link between emotion and memory that may contain the essence of the change that occurs in electroshock therapy. But whether or not the present theory about loss of familiarity will prove to be a fruitful hypothesis can be determined only by further experimentation.

REFERENCES