# TEACHING BASIC RELAXATION PROCEDURES TO PSYCHIATRIC PATIENTS RECEIVING ELECTROCONVULSIVE THERAPY

A thesis presented in partial fulfilment of the requirements for the degree of Master of Arts in Psychology at Massey University.

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ABSTRACT

There has been no research on psychiatric patients examining the ability to remember relaxation skills whilst receiving electroconvulsive therapy. This thesis addressed itself to the question of whether the patients could remember the relaxation procedures that were taught immediately before, during, or immediately after the ECT series.

Fourteen patients were assigned to three different groups. The first group received the relaxation training (RT) prior to beginning the ECT series, the second group received the RT during the ECT series and the third group received the RT immediately after the ECT series. Assessment was made of the verbal instructions taught to the patients using a checklist devised by the author. Comparisons were made between patients on their performance according to several different independent variables, diagnosis, frequency of ECT, response to treatment and order of presentation effects.

Eleven of the fourteen subjects learnt the RT procedures within three training sessions. The remaining subjects failed to learn the RT procedures in six sessions but this study did not confirm that ECT was a precipitant in their failure to learn. No significant effect was associated with diagnosis, frequency of ECT or response to treatment.

It was concluded that it is possible to teach RT procedures to the majority of psychiatric patients at the institution where this study was completed. This study produced no evidence to suggest that it is preferable to teach RT to

patients at any particular point in ECT treatment sequence and in addition there was no evidence of any anterograde or retrograde amnesic effects associated with ECT sufficient to interfere with the learning of verbal instructions associated with RT.

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CONTENTS

# CHAPTER 1

## INTRODUCTION

The broad question which is the concern of this thesis relates to the utility of short-term psychotherapy as part of the treatment regime for psychiatric patients who are concurrently receiving ECT.

The psychiatric hospital where the study was undertaken has a patient population which is characterised both by severity of illness warranting inpatient admission, but also rapid discharge with the patient returning to the community immediately gross symptoms are alleviated. In view of the geographical isolation of the hospital psychotherapy generally has to be completed prior to discharge.

As will be shown, there is a considerable body of research suggestive of learning dysfunctions and memory disorders associated with ECT and the question arises whether psychotherapy may be combined effectively with ECT.

The term "psychotherapy" is a broad term applied to many different strategies for influencing patient behaviour. The author chose to examine an aspect of learning in relation to one specific form of behaviour therapy, progressive relaxation training, (RT) which, as discussed later, has become a widely used technique for the treatment of anxiety related difficulties. As with other forms of behaviour therapy, the crucial aspect of relaxation training is that the patient or client is able to learn a set of procedures which may enable a new behaviour pattern to occur which will

form the basis of appropriate responses in the future, and be incorporated into his personal repertoire of living skills. Thus the author's primary goal was to establish whether the most severely ill patient group, that is those receiving ECT, were in fact able to learn and recall the relaxation training procedure. The effectiveness or otherwise of the training procedure to produce physiologically discernible muscle changes, or changes in the patient's anxiety related behaviour in the particular patient group, is beyond the scope of this thesis, as is the question of beneficial or counter-beneficial effects of teaching relaxation. However, a secondary goal is to look at any differences associated with the order in which the relaxation training and the ECT series occur.

i) ECT could affect the reproduction of relaxation training procedure when the prescribed ECT series is given to the patients after the learning of the relaxation procedure has been completed.

ii) ECT could affect the reproduction of the RT procedure when RT is given to the patients during the prescribed series of ECT.

iii) ECT could affect the learning and reproduction of the relaxation procedure if the RT is given on completion of the prescribed ECT.

Thirdly the author wished to establish whether difficulties in the recall of the relaxation training procedure is associated with the diagnostic groups.

Finally, in attempting to fulfil these goals it has

been necessary to examine the situation in the psychiatric hospital setting as it is currently functioning without in any way disrupting ongoing treatment plans and patient care. This study was designed with the aim of making maximum utilisation of the information available from the normal hospital procedures.

## 1.1 PROGRESSIVE RELAXATION TRAINING

Progressive relaxation training (RT), was developed by Edmund Jacobson (1938) who formulated a procedure for training people to relax their muscles. This he believed would assist his patients who were suffering from stress related diseases. Jacobson theorised that a reduction of muscle tension would lead to a reduction of autonomic nervous system activity. This theory received some support from a series of studies on the psychological and physiological effects of muscle relaxation (Jacobson 1938). He developed a complex and time consuming procedure requiring a total of fifty-six sessions of systematic training, which essentially consisted of having the patient lie in comfortable supine position and alternately tense and relax the major muscle groups.

"The aim is to train the patient to use his own initiative. He learns to localise tensions when they occur during nervous irritability and excitement and relax them away. It is a matter of nervous re-education." (Jacobson, 1938, p40.)

Since its development, RT has been adapted for a variety of clinical situations. Wolpe (1958) drew upon Jacobson's

work with progressive relaxation and theorized that a condition of deep muscle relaxation would be physiologically incompatible with tension and could be used for the inhibition of a fear response. He termed this "reciprocal inhibition".

"If a response antagonistic to anxiety can be made to occur in the presence of anxiety-provoking stimuli so that it is accompanied by a complete or partial suppression of the anxiety response, the bond between these stimuli and the anxiety responses will be weakened." (Wolpe, 1958, p71).

Wolpe (1958) drew upon 210 case studies as examples, claiming reciprocal inhibition had played an important role in curing or causing a much improved state in eighty-nine percent of the cases. His technique of counter conditioning which has come to be known as "systematic desensitisation" is now often used in the treatment of phobias (Mathers 1978). Progressive relaxation still remains an important part of the treatment technique for phobias.

Progressive relaxation has also been used for the treatment of generalised anxiety. This is a condition where the patients report anxiety over many situations not just in a specific phobic situation. Borkovec, Grayson and Cooper (1978) investigated the use of RT with seventy-nine subjects who reported moderate to severe levels of tension. According to the two self-report measures constructed by the authors the experimental subjects reported significantly reduced anxiety in comparison with the subjects in the control groups, after undergoing RT.

Another behavioural problem where treatment by RT has

been shown to be effective is insomnia. Steinmark and Borkovec (1974) used forty-eight sleep-disturbed college students who they randomly assigned to one of four groups. One group received RT, the second group RT and desensitisation, the third group received what the authors termed a quasi-desensitisation procedure which involved the presentation of chronologically ordered bedtime behaviours. This was designed as a placebo treatment. The fourth group was a waiting list control group. Despite instructions not to expect improvement in sleep patterns, both the RT, and RT plus desensitisation group reported a reduction in sleep disturbance as opposed to the placebo and no-treatment control groups.

Progressive relaxation has also been studied for its effects in reducing blood pressure. In their review of investigations in this area, Jacob, Krammer and Agras (1977) concluded:

"Historically, a number of uncontrolled, single group studies first pointed to the potential usefulness of the procedure. This was later confirmed by studies including no-treatment or attention-placebo control groups. On the basis of the latter, it seems safe to conclude that relaxation treatment offers more than a placebo in reducing blood pressure. This conclusion was upheld in an analysis comparing the results of relaxation studies with those of a sample of studies using placebo treatment." (Jacob et al., 1977, p1426.)

The present study utilised a method of RT from the model by Bernstein and Borkovec (1973), which in turn was derived from the techniques of Jacobson (1938) and Wolpe (1958).

The Bernstein and Borkovec (1973) model was chosen because it represents an efficient and well standardised procedure. In the introduction to their manual (1973) they comment that they wish to standardise a RT procedure that could be adopted by many experimenters so results from different studies are able to be compared:

"We hope that careful and widespread use of this manual will result in more valid and more comparable experimental investigations of these techniques." (Bernstein and Borkovec, 1973, p2).

Bernstein and Borkovec admit that their technique was developed on the basis of experience of what combination of variables such as timing and muscle groups appear effective, and efficient, in terms of therapist time, rather than experimental evidence as to the optimum combination of these factors, little such evidence being yet available. However, the ultimate effectiveness of their model of RT has been adequately demonstrated by research. Lehrer, (1978) used this model in a recent study to investigate the physiological effects of RT. Lehrer used forty subjects assigned to four groups. Twenty of the subjects were anxiety neurotic patients and they were randomly assigned to two groups, one group receiving RT according to the Bernstein and Borkovec model and the other was a no-treatment waiting list control group. The other two groups in the study were non-patient groups and were not anxious according to a self report questionnaire (The Speilberger State Anxiety Inventory). The first non-patient group was given RT and the other alpha-feedback training. The results of

this study were that when the four groups were compared on measures of skin conductance, heart rate, EEG from the dominant occipital lobe and a subjective self report anxiety scale, the Speilberger State Anxiety Inventory, the patient group that received RT developed physiological responses, according to the measures used, similar to the non-patient groups. The control group of anxiety neurotics remained significantly different from the experimental group receiving RT. Self reported anxiety in the treated patients also indicated a reduction in anxiety as compared to the waiting list control group. RT was associated with a significant increase in alpha waves, a significant reduction in skin conductance and no significant cardiac deceleration. Lehrer concludes:

"This supports the general notion that progressive relaxation of the muscles generalises relaxation in other physiological systems." (Lehrer, 1978, p401.)

Borkovec, Grayson and Cooper (1978) designed a study to compare the efficacy of tension-release instructions rather than a relaxation only procedure where the client concentrates on each muscle group in turn consciously attempting to relax it. Thirty-six patients were randomly assigned to one of three treatment conditions - RT with tension-release instructions, RT with no tension release instructions and a no-treatment condition. Dependent

variables were both physiological measures and subjective reports of anxiety levels, and also the number of training sessions before the subjects reported achieving a maximum state of relaxation according to their own perception. Both groups receiving RT showed significant differences on the measures used compared with the non-treatment group. Tension-release instructions were slightly the more effective form of training, but significance was not achieved on any of the measures except the number of sessions required. At a five month follow-up, however, the tension-release group reported significantly greater success and greater frequency of still practising the skill than those who did not receive tension-release instructions.

It could be postulated that the use of a taped or recorded presentation would be a more standardised procedure than live presentation by a therapist. Paul and Trimble (1970) investigated the efficacy of live presentation versus tape recorded presentation of RT. Using 30 subjects assigned to one of three groups, an RT group, a hypnotic induction group and a control group who were instructed to sit quietly and relax. All subjects were given their instructions via tape. Dependent measures were self reports on an anxiety scale, (The Anxiety Differential) and measures of muscle tension, heart rate, skin conductance and respiration rate. The results were compared with an identical study by Paul (1969) in which sixty subjects were trained in the same three experimental groups with live presentation of the skills by therapists. According to the data obtained, live presentation of the skills was superior to the taped present-

ation. Their findings were demonstrated in the measures of heart rate, muscle tension with the most significant differentation in the subjective report measure.

In the present study patients were taught progressive relaxation with a live presentation of the procedure and were taught the method with tension release instructions

## 1.2 HISTORY OF ECT.

Electroconvulsive therapy (ECT) has its origins in the 1930's when several types of convulsive therapy were being developed. Other "convulsive" therapies included insulin coma therapy, (Sakel, 1933) and camphor and phentylemetrazol therapies (Meduna, 1938). The use of chemical agents to induce seizures is not now retained as an efficient form of therapy. However, ECT is now widely used, for example Pitts (1972) estimated that electroconvulsive therapy is administered approximately 10,000 times a day in the U.S.A.

The use of electric currents to induce convulsions was developed by Celletti (1938). Originally ECT was used with schizophrenics but trials began with other diagnostic groups. ECT was successfully used for patients with depressive psychoses (Bennett,1938, 1939; Weigert, 1940), involutional depression (Bennett, 1940; Weigert, 1940; Hamilton and Ward, 1948; Huston and Locher, 1948 a,b; Fisbein, 1949) and mania (Bennett, 1939; Ziskind et al., 1943, 1945).

Fink, (1979), reports that interest in convulsive therapies increased during the second world war. A number

of studies examined different techniques of convulsion induction in an attempt to reduce undesirable side effects. Palmer (1939) and Bennett (1941) examined the use of curare to reduce the incidence of fractures, specifically spinal fractures.

A significant change to basic procedure occurred in 1952 with the introduction of barbiturate premedication and anaesthesia (Kalinowsky and Hoch, 1952).

One modification which had particular relevance to post-ECT memory changes was established by Holmberg (1953a, b). Holmberg reported that anoxia could be reduced if the patient inhaled oxygen prior to the administration of ECT. According to Holmberg (1954), hyperventilation increased the intensity and duration of the seizure, making it necessary to combine the use of muscle relaxants and oxygen. Although the clinical value of hyperoxygenation was established at this time, it was not until 1966 that its effects on the amnesic process were established. (Blachly and Gowing, 1966). These authors found a reduction in amnesia and confusion in patients receiving induced multiple seizures with hyper-oxygenation prior to ECT. In their experiments they provided forced ventilation with oxygen before, during, and after each seizure. Their subjects, who received two to six seizures, exhibited no memory deficits in self-reports, clinical assessments, or performance on psychological tests when compared to subjects receiving a single ECT without hyperoxygenation. This finding has been confirmed by others. (Bidder, Strain and Brunschwig,1970; Abrams, Fink, Dombush, Feldstein, Volavka and Roubicek, 1972).

It was some time before the new, modified technique, incorporating the use of barbiturate premedication, anaesthetic, muscle relaxant and oxygenation immediately prior to the convulsion being induced, became standardised and accepted. Specific descriptions of modified ECT, with technical details, may be found in many psychiatric handbooks, for example, Sargent and Slater, (1963); Kalinowski and Hoch, (1961); and Slater and Roth, (1977). All the above writers recommend the modified form of the treatment, which is now standard practice in New Zealand hospitals. (See Appendix B).

Several clinicians in the past have postulated that amnesia associated with ECT may be central to the therapeutic process because it was thought that ECT blocked emotionally disturbing material (Stainbrook, 1946; Stone, 1947; Zubin, 1948; Janis, 1948, 1950 a, b and c; Janis and Astrachan, 1951; and Brengelmann, 1959).

Janis, (1948, 1950a, b and c), an author involved with several articles on this theoretical approach claimed definite and consistent evidence that although the gross deficits in mental efficiency are temporary and reversible and are associated with a long series of unmodified ECT, there are also amnesias which persist long after the recovery period of two to three weeks after the completion of the series. He reported that "from the observed characteristics of the post-treatment amnesias, it appears they tend to blot out memories which are likely to evoke guilt, lowered self-esteem or other painful reactions." (Janis and Astrachan, 1950, p501.) These authors used a forty item personal

questionnaire which sought information from the subjects' personal life and history. The experimental group showed a greater decrement in performance on this questionnaire as in comparison to the matched control group who did not receive ECT. They concluded "This incidental observation is consistent with the hypothesis that the post-treatment amnesias are selective in character, affecting emotionally disturbing memories more often than emotionally neutral memories." (Janis et al., 1950, p510.)

However, interest and support for these arguments diminished in the 1960's with the advent of unilateral ECT and the research comparing it with bilateral ECT on the variables of memory effects and therapeutic efficacy. Generally research supports the notion that right unilateral ECT is associated with a significant reduction in verbal memory loss but with no corresponding decline in therapeutic efficacy. Thus the repression mechanism discussed earlier in this section has been shown not to be responsible for the clinical improvement in depressed patients. Zinkin and Birtchnell, (1968), in a study with 105 patients suffering from depression, of whom 50 received courses of right unilateral ECT and 52 patients receiving bilateral ECT, recognition memory tests were given to 71 patients (35 unilateral, 36 bilateral), either a few minutes before or one or two hours after the administration of single treatments. Results were compared with scores obtained by the same subjects in parallel control tests given in the absence of ECT. The unilateral patients showed significantly less impairments than the bilateral group. Assessment

of the therapeutic efficacy of the two types of treatment was made by a self administered depression inventory (Zung, 1965) and also by the number of treatments needed by each group to relieve depressive symptomatology. Overall both forms of treatment were found to be equivalent in their effectiveness. In a similar study Valentine, Keddie and Dunne, (1968), used 24 patients to compare unilateral and bilateral ECT on a measure of verbal recall, a paired associate learning task, and also on therapeutic efficacy. They concluded that no significant differences were noted between groups on the variable of therapeutic efficacy which was measured by a depressive scale assessed by an independent clinician, and also by comparison of the number of treatments needed by each group to relieve symptoms. However, there was a significant difference recorded on the recall task, the unilateral group which had the current applied to the right side showing less impairment on this task than the bilateral group. Other studies such as Costello, Belton, Abram and Dunne (1970), and Dornbush, Abrams and Fink (1971), supported the above results in that the recall of verbal material is independent of the therapeutic efficacy of ECT. Patients given non-dominant ECT (as determined by the Harris Test, 1958), had significantly better verbal recall than those given bilateral ECT, while neither form of ECT was more effective in reducing the depression. The argument that amnesia is central to the therapeutic process has been effectively negated by this recent research.

## 1.3 THE CURRENT CONTROVERSY

There is a current controversy surrounding ECT and memory loss. A body of public opinion, journalists, and particularly Scientologists have strongly criticised the use of ECT alleging that severe and permanent intellectual frequently results. (For example, "The Dominion", 12 December, 1981). Some professionals, such as Friedberg (1977), have also been strongly critical of its use, again citing memory deficits as being harmful effect. In his literature review Friedberg claimed "ECT is a common cause of severe retrograde amnesia" (Friedberg, 1977, p 1011). This statement was based on a selective literature review mainly citing case studies and patients' self reports, disregarding much of the current research on retrograde amnesia which will be examined in detail in the next chapter. Frankel (1977), examined 25 of the 58 articles Friedberg cited in support of his argument. Frankel concluded:

"In my view, Dr. Friedberg has weakned his position by the manner in which he has gathered the evidence to support it. The questions he raises are relevant; they have been asked by many others. However, he has attempted to answer them with data that have been carelessly culled from the literature and frequently reported inaccurately." (Frankel, 1977, p.1014).

For example, 11 of the 13 cases Friedberg cites in support of his argument that physical brain damage occurs, were dated prior to the introduction of oxygen and anaesthetic

into the ECT procedure. These modifications as discussed in Chapter 1, result in a reduction of side effects previously associated with ECT.

Contrary to the arguments Friedberg puts forward, there is extensive research which suggests that ECT does not cause enduring effects on memory. Wilcox (1956), studying 23 psychotic females who had been treated with a series of ten bilateral ECT's showed that they had returned to their pre-treatment level of memory functioning after two weeks. When followed up at twelve weeks they showed further slight improvement. Cronholm and Molander (1964), concluded that one month after a course of ECT there were no ECT related deficits on measures of verbal memory or personal remote memory. Turek and Block (1974), in a study when patients were given no concurrent medication, found that scores on the Wechler Memory Scale became progressively impaired during a course of treatment, but then rose to pre-treatment levels within one month of the course finishing. Squire and Chace (1975), in a retrospective study, could find no persisting effects six to nine months after treatment. Weeks, Freeman and Kendell (1980), in a study using 17 different memory tests, concluded that "ECT when used in every day clinical circumstances to treat depressed patients does not cause lasting cognitive impairment." (Fink, 1977), in his review of literature on brain damage and ECT concluded:

"It is difficult to negate the global judgment that ECT causes permanent brain damage. Except for persistent

subjective complaints of memory defect, however, the evidence for such injury or its persistence is lacking, despite extensive study. (Fink, 1977, p.993.).

The extent to which subjective reports of memory problems are made is not clear. Gomez (1975), in a study of 96 patients who received a mean number of 5.2 ECT treatments, found subjective complaints of memory impairment in only 11% of patients, twenty-four hours after treatment, and no complaints forty-eight hours after treatment. Squire and Chace (1975), however, examined subjective reports of memory problems in a study of 55 patients who had received a mean of 9.9 treatments, found that 67% indicated that their memory was not as good as it used to be when studied six to nine months later, and most felt that ECT was the cause of their memory problems. The differing result could be due to the longer ECT series, or more severely depressed subjects in the latter study, or the manner in which complaints were elicited.

Freeman, Weeks and Kendell (1980), located 26 subjects who complained of permanent, unwanted effects following ECT. Fourteen were located via newspaper requests, and twelve had made personal complaints to psychiatrists in the area. "The amount of distress this memory impairment caused varied considerably, but most found it irritating rather than incapacitating." (p18). These subjects were compared with two control groups. One matched group that had not received ECT and one matched group who had received ECT in the past. A battery of 19 cognitive tests was used and the authors concluded that significant differences were

mostly attributable to the level of depression or medication in the complainers. However, there still remained some differences indicating impaired cognitive functioning in the group with complaints. Their study is particularly good because it does acknowledge some of the complex problems associated with assessing subjective memory complaints, such as the effects of medication, a variable which is not controlled in most studies. Fink, (1979), points out that there has been little research that has investigated the relationship between medication, ECT and memory.

Another factor which was considered is Freeman, Weeks and Kendell (1980), their design was the effect of depression on cognitive function. Studies such as Valentine, Keddie and Dunne, (1968), Squire, Wetzel and Slater, (1979), Squire and Chase, (1975), Cannicott (1969) and Janis, (1950), did not control for this variable. Cronholm and Otterson, (1963), have shown that depression itself can affect the scores on some cognitive tests. Patients whose clinical state improved also tended to show improvement in their ability to learn new material. These authors concluded that successfully treated depressives rarely complain of memory deficits after ECT because they tend to judge more from their improved learning ability than their impaired retention.

In Cronholm and Otterson's (1963) study, 35 patients with endogenous depression were given three objective tests before ECT was started and again one week after completion.

The tests used were a 30 word pair test, a 20 item figure test, and a 30 item personal data test, all constructed by Cronholm and Molander (1957). Patients were also given a questionnaire one week after treatment that was aimed at making the patients compare their memory on the actual day of examination with before the ECT series. Patients were also rated on severity of depressive symptoms before and after ECT. The inter-relationships between subjective memory change and clinical improvement were examined using multiple regression analysis. They found that not only did patients with improved clinical states show an improvement in their ability to learn new material, but also the clinically improved patient tends to judge his memory as being improved independent of the objectively measured change.

Sternberg and Jarvik (1976), designed a similar study that produced similar results. They concluded:

"It is apparent that endogenous depression is associated with an impairment of short term memory but without any change in retention. It is also apparent that the greater the improvement of the depressive state the greater the improvement in short term memory, while long term memory is not influenced by such improvement." (Sternberg and Jarvik, 1976, p223). These authors based their conclusions on comparisons between a group of 26 hospitalised depressives, a group of 26 matched people free of psychiatric or physical illness, and a group of 20 patients on antidepressant medication.

Depression may be an important variable in the present study and this will be examined by comparing the patients who are depressed with patients who are not depressed.

Freeman et al. (1980), summed up their results, and in doing so stated the consensus of current professional opinion, saying:

"It may be that ECT does cause some degree of permanent memory impairment in a small proportion of the patients who receive it, but we consider that our own and other comparisons of carefully matched patients receiving ECT and drug treatment indicate fairly convincingly that ECT does not normally produce such enduring effects on memory, though they do not prove that it never does so." (p23).

These authors estimated that such impairment if it occurs may affect one person in a hundred who receives ECT treatment, and they point out the difficulties in isolating and studying this small minority.

## 1.4 MEMORY DEFICITS ASSOCIATED WITH ECT.

Memory deficits of three types are thought to be associated with ECT treatment.

(i) Memory deficits for events occurring immediately prior to the ECT.

(ii) Memory deficits for events in the remote past.

(iii) Memory deficits for events that occur following ECT.

The first two types are referred to as retrograde amnesia, while the third is known as anterograde amnesia.

It is well accepted by psychiatrists that these memory deficits may occur with ECT, but they are generally believed by clinicians to be both temporary and reversible side-effects of ECT treatment. The degree and the persistence of such memory deficits appear difficult to predict and this section considers the literature relating to retrograde and anterograde amnesia, in order that some conclusions may be drawn as to the likely effect of combining RT with ECT treatment.

It has been well established that after every shock, patients experience a period of amnesia for the few seconds preceding it, but the amnesia is not total. For example, Mayer-Gross (1944) showed that although most subjects denied any recollection of visual stimuli presented to them within a few seconds of the shock, they were frequently able to indicate the correct stimuli in a choice recognition test, although not remembering when and where the material had been previously seen.

Cronholm and Laegergren (1959), presenting visual stimuli, in a similar experiment, sixty seconds before the onset of shock, found significant retrograde amnesia. Similarly, Cannicot and Waggoner (1967) found amnesia by presenting verbal material an average of four minutes before treatment. This study was comparing the effects of unilateral and bilateral ECT on the verbal material and only the bilateral group showed impairment of memory for the stimuli. Zinkin and Birchnell (1968) presented visual stimuli three minutes prior to treatment and found amnesia for the stimuli.

Miller (1970), in a study using twenty patients who

were tested two and a half hours after ECT on their ability to recall word pairs, learned before ECT, produced strong evidence of disruption when ECT was administered half an hour after learning had taken place. This result was consistent with the findings of Cronholm and Molander (1961) but not with those of Worchel and Narcisso (1950), who used a similar test but only found deficits after the sixth ECT whereas Miller (1970) found deficits after the fourth ECT.

Two points emerge in reviewing the literature in this area. One is that there appears to be some confusion in the use of operational terms describing various aspects of memory and cognitive functions. For instance, the above studies in this chapter are confounding the two variables of learning and retention. Henry, Weingartner and Murphy make clear this distinction:

"The storage of information in memory may be viewed as a series of discrete steps that include storage in a sensory register (primarily an attentional stage), storage in short-term memory stores (measured by immediate recall of information), and recoding the information in short-term memory stores into a form that can be held in long-term storage." (Henry et al. p966, 1973).

In the above study the authors operationally defined learning as being measurable only immediately after the first trial of learning pairs. Subsequent trials were considered to be measuring retention or long-term memory.

Cronholm and Otterson (1963) were the first to accept this distinction between learning and retention and investigate

its relationship to depression and ECT. In a study with 35 patients with endogenous depression the above authors took ratings of the clinical states of the patients before, during, and after their ECT treatment series. Measures of objective memory changes were made on three operational variables, immediate reproduction, learning, delayed reproduction (the number of items reproduced three hours later), and forgetting (the difference between immediate and delayed reproduction). By deriving a forgetting score, a measure of retention is obtained.

Cronholm and Otterson (1963) were then able to determine the amount of material learned and compare it with the amount of material retained between their experimental groups.

The second issue that arises when reviewing the literature is the difficulty in establishing precise parameters of retroactive amnesia. For what length of time prior to an ECT treatment (or treatments) is retention of material disturbed? Some research has investigated the relationship between ECT and memories for events that occurred several years previously, or what are termed "remote events".

Brunschwig, Strain and Bidder (1971) used The Personal Data Sheet, a test constructed by Strain, Brunschwig, Duffy, Agle, Rosenbaum and Bidder (1968), to assess disruption of memory for events that have personal meaning for patients receiving ECT. The test consisted of 50 questions about recent and remote events. They concluded that "impaired retention persisted after treatment even among patients strongly motivated to regain normal functioning" (p74).

Unfortunately there were some difficulties with the design which make firm conclusions difficult to draw. There was no untreated control group with which to make comparisons because it has been shown that affective illness can affect learning and retention in patients who are not receiving ECT, Henry et al. (1973) and Cronholm and Otterson (1963), as discussed in the previous chapter.

Other findings from the remote memory area have come from Squire and his colleagues (Squire and Millar, 1974; Squire, 1974; Squire and Chace, 1975; Squire and Slater, 1975; Squire, Slater and Chace, 1976; Squire, 1974b).

Squire (1974b) developed a multiple choice test of remote memory for public events as opposed to the Personal Data Sheet discussed above which sought to assess subjects' memories for more personal events. Squire's test was composed of fifty questions pertaining to persons, places or events which were in the news during the 1940's, 1950's and 1960's. In the first study, (Squire 1974a) tested 10 patients after their fifth ECT. "Patients given the remote memory test after their fifth ECT were impaired in recalling events across nearly the entire time period sampled by the test." (p123). The design of the experiment was good because an untreated matched control group was used so that the effects of the depressive states on memory could be accounted for. The verbal portion of the Weschler Adult Intelligence Scale was also given before the ECT series and after the fifth treatment with no significant change noted. However, there is one criticism; no long term follow up was made which could have established how long the amnesic effects lasted. In this study, the patients, who were treated with

bilateral ECT showed a 45% retention following a course of five ECT treatments, compared with approximately 65% retention prior to ECT. The control group not receiving ECT did not show a decrement of performance.

Squire (1975), in a similar experiment included a follow up to assess how long the effects lasted and his conclusion was: "The memory loss associated with bilateral ECT was largely recovered one to two weeks after completion of treatment." (Squire, 1977, p998). Squire, Slater and Miller (1981) also tested six to nine months after completion of treatment and found no apparent deficit in remote memory.

Weeks, Freeman and Kendell (1980) made similar findings in a study that was investigating several cognitive functions. They used two tests to assess remote memories, Strain's et al. Personal Data Sheet (1968). Weeks et al. found no significant differences on the remote memory tests between the experimental group, (N=51), and the matched untreated control group. The follow up was carried out one week after each patient completed their prescribed course of ECT. It should be noted that they did not assess for any deficits immediately after ECT and it is possible the deficits did occur but did not last a week.

If patients are to be taught relaxation training and are assessed on their ability to remember a specific set of instructions related to this, it appears possible from the literature reviewed in this chapter that if ECT occurs after the training, then the patients may have deficits in remembering the skill and the related set of instructions.

ECT is also known to produce a certain degree of anterograde amnesia; that is, amnesia for events that occur following the ECT. Anterograde amnesia is traditionally studied by teaching a subject new material following an ECT series and testing to assess how much of the material is retained. Zinkin and Birtchnell (1968), Squire and Miller (1974), and Squire, Slater and Chace (1976), all used visual recognition tests to assess anterograde amnesia. Visual recognition tests involve the presentation of pictures on cards. The subjects are then asked to recognise the cards from a larger series of cards presented after a prescribed time lapse.

Zinkin and Birtchnell (1968), in a large study with 71 patients, used visual recognition tests, the items being pictures on cards. The patients, who had received bilateral ECT, showed significant impairment in their ability to recognise the newly learned material when tested at intervals of one and two hours after ECT, but at three hours their ability had returned to pre-treatment levels, suggesting that his type of interograde memory deficits lasts less than three hours following ECT.

Squire and Miller (1974), used two experimental groups and a control groups each consisting of nine subjects. Recognition tests were administered to subjects at varying intervals following each ECT treatment. The ability to retain material for thirty minutes recovered rapidly and was nearly normal by three hours after treatment which is in agreement with Zinkin and Birtchnell (1968). However, in this study the subjects were also assessed after a twenty-

four hour interval. They found that the ability to retain the material necessary for recognition for longer periods of time was significantly impaired. Patients did far worse on the twenty-four hour retention tests than on the thirty minute retention tests when compared with the control group whose performance did not deteriorate. "Moreover, after the fourth treatment patients were less able to retain material for twenty-four hours than after the first treatment indicating that the effects of ECT on twenty-four hour retention were somewhat cumulative." (Squire and Miller, 1974, p493).

Visual recognition tests have shown the presence of anterograde amnesia and difficulty in learning new material following ECT, but in the present study tests of verbal recall are more relevant.

Anterograde amnesia for verbal material has also been examined. Brunschwig, Strain and Bidder (1971), used paired associates tests to assess for post ECT amnesia with eighty-seven patients who were receiving ECT. Significant anterograde amnesia was recorded for the period of 36 hours after treatment, but the ability to learn and recall the material was recovered in the ten day period after the completion of the ECT series.

Squire and Slater (1978), investigated anterograde amnesia for verbal memory in 72 subjects who were assigned to three groups; a group receiving bilateral ECT, a group receiving unilateral ECT, and a control group. Two verbal tests, a story-recall test and a short-term memory test of consonant

trigrams were used. The first test was given to subjects before ECT treatment and 6-10 hours following the fifth treatment. The second test was administered 2-3 hours after the first and third ECT in the series. The authors concluded that bilateral ECT markedly impaired the ability to retain verbal material.

In a very recent study by Johnstone, Lawler, Stevens, Deakin Frith, McPherson and Crow (1980), 70 patients were randomly assigned to either a course of eight simulated ECT's or eight real ECT's. Six learning and memory tests were used to assess cognitive changes. Two verbal learning tasks were included in this battery and the authors concluded that memory deficits were measured by the tests during and immediately after the ECT series but no deficits were measured at the six month follow up. However, Johnstone et al. (1980) has not published details and the above article focused more on the comparative effects on the clinical state of the subjects between the simulated and real ECT groups. Despite a statement that an article concerned with the memory effects would be published, this has not occurred to date.

Weeks, Freeman and Kendell (1980), gave a battery of 19 tests covering a wide range of cognitive functions to 51 depressives before they received ECT and again one week, three months, and six months after the end of the course, as described in the previous section on retrograde amnesia. Three of these tests involved verbal learning, the Logical Memory test, (Weschler, 1945), an auditory verbal learning test, a paired associate learning test and a test titled

"Memory Sensitivity and Response Bias". The latter test involves the use of words printed on cards and the subject has to recognise these amongst other words fifty minutes after learning them. The same tests were given to 51 matched controls who did not receive ECT. There was no significant difference between the ECT group and the control group on any of the tests one week after the completion of the series. There was a significant difference at three months on two of the non-verbal tests and at six months there was a significant difference on the logical memory test with the ECT group performing significantly better. Overall, Weeks et al. found no significant impairment of verbal learning that could have suggested anterograde amnesic effects for verbal memory. The literature relating to verbal memory is similar to that relating to visual memory, suggesting that anterograde amnesia effects are short lived, and while they may still be apparent 36 hours after ECT they are not demonstrable a week to ten days after treatment. It must be noted, however, that Freeman, Weeks and Kendell (1980), published another study at the same time as the one discussed above that does indicate long-term effects of ECT on verbal memory may be possible. Twenty six subjects who complained of permanent memory problems following a history of ECT treatment were compared with two groups of control subjects on the same battery of tests used in the Weeks et al. (1980) study discussed above. Impairment in verbal memory was evidenced in two tests, Logical Memory, (Weschler, 1945) and Memory Sensitivity and Response Bias. Freeman et al. (1980) comments that although the complaining

group did differ on the above tests from the matched control groups, the results should be regarded with caution as only three of the tests gave any indication of impairment as against the other sixteen tests. As this finding is contrary to other current research Freeman et al. concludes tentatively that ECT may produce enduring effects on some cognitive abilities in a small proportion of the people who receive it.

To conclude, the literature reviewed in this section suggests that attempts to teach relaxation within a few hours after the administration of ECT would probably be complicated by anterograde amnesia related to the ECT. The shorter the interval between ECT and training, the greater the likelihood of impairment with most researchers detecting severe impairment if the interval is less than three hours, some impairment if the interval is as long as 36 hours is claimed by Brunschwig et al. (1971), and there is general agreement that anterograde amnesia is unlikely to cause difficulty a week to ten days after ECT. In the present study training given during or immediately after ECT could be influenced by anterograde effects. The ECT training interval would be shorter generally when training was given during the series, but the possibility of cumulative effects as suggested by Squire and Miller (1974), would have greater effect when RT was given at the completion of the series. It is therefore uncertain which order would be preferable from current knowledge.

## 1.5 BACKGROUND TO THE STUDY

The literature relating to retrograde and anterograde amnesic effects, reviewed in the last section, suggests memory deficits are prevalent within three hours of the administration of ECT. Fraser and Glass (1978) in a study of recovery from bilateral ECT in nine elderly depressed patients, reported a range of recovery times from shock until fully alert and orientated, of 8.3 minutes to 310.5 minutes. In order to avoid this critical period when disruption of the learning process would be highly likely, RT sessions were not scheduled to occur on the same day as ECT for any patient. This followed normal clinical practice on the ward which has arisen because of the considerable individual variation in the confusional period following ECT, the extra duties in which nursing staff are involved, and the fact that ECT patients frequently do not rejoin the normal ward programme until late in the day.

ECT sessions at the hospital are scheduled approximately twice weekly, so in many cases two or three days are available from the time of admission until the first ECT treatment. In other cases ECT may have commenced when RT is considered as appropriate additional therapy. The question thus arises whether it is preferable to commence RT as early as possible irrespective of the number of ECT's patients received, or whether it is preferable to delay RT until the ECT series is complete.

The literature cited in the previous section is much less clear on the extent of memory deficits to be expected during the period of administration of an ECT series,

excepting the few hours before and after each shock. It can only be concluded that learning and recall may be impaired during this period also.

A major goal of this study was therefore to assess the differential effects of RT taking place prior to the first ECT, during the series, or at the completion of the series. In order to do this, patients were assigned to three experimental groups for the purposes of comparison. The designation to a particular group depended on whether ECT had not yet commenced, had just commenced, or was almost completed at the time the referral for RT was received.

The first group, known as Group I, commenced with RT sessions. As described more fully in the method section, assessments of RT skills were made at the commencement of each training session after the first. Training sessions continued until the criterion score of 20 out of 20 was reached. A further assessment was made the day after each ECT, and a follow up assessment a month after the completion of the series.

For this group the learning task was therefore in the week prior to the first ECT, (see Results section below) and would not be affected by ECT whereas the recall task, once learning was established, was 24 hours after each shock and any deficits apparent in the results from this group would be due to retrograde effects of ECT.

Group II commenced RT part way through their ECT series. They received RT sessions and assessments on a daily basis, except on days when ECT was scheduled until the criterion level of performance was reached.

Group III did not start RT until the day following the final ECT session. RT sessions and assessments continued on a daily basis until the criterion level of 20 out of 20 was reached on assessment. There was a follow up assessment one month after the completion of the ECT series. The learning and recall tasks for this group were therefore in the week after completion of the ECT and could be affected by anterograde amnesia.

Both retrograde and anterograde effects could interfere with the learning and recall tasks for this group.

The subjects in Group I completed their learning prior to having any ECT. Their scores indicate how difficult it is to teach relaxation to severely ill psychiatric patients.

It would obviously be pointless to give this training prior to an ECT series, if retrograde amnesia resulted from the ECT and the scores were immediately forgotten. Each subject in Group I was therefore retested approximately 24 hours after each shock.

The subjects in Group II were taught relaxation during their ECT series. It is possible that either learning or recall could be affected by either positive or negative effects of the ECT. (Retrograde or anterograde amnesia, anxiety, clinical improvement, etc.). Similarly, the subjects in Group III who received RT after the completion of their ECT series could have greater difficulty learning because of cumulative anterograde effects, or could show improved learning because of a positive clinical response to ECT.

Comparison of the scores achieved by the subjects in the

three experimental groups will show whether it is more effective to teach relaxation before, during or after an ECT series.

A one month follow up was included to check whether the results of the initial comparison were maintained after a period of time.

The Assessment Procedure

Bernstein and Borkovec (1973) suggest that RT might continue over ten weekly sessions. Thus it may take two to three months of regular practice before the individual is adept at producing a state of relaxation. This study, however, focuses on the early sessions of the RT procedure when the patient is required to understand the principles of the RT procedure, so that he or she is able to rehearse the procedure without the therapist being present.

A 20 item check list was devised by the author in order that the extent to which the subject performed the rehearsal correctly could be measured. (See Appendix C). The use of a 20 item list was based on the information a patient would need to illicit for correct rehearsal to occur. This information was: muscle groups to focus on, how to tense them, the timing of tension-release cycles, and the basic requirements of self-practice, a quiet environment and two daily sessions.

A 20 item list has been used in other studies of verbal memory; for example, Miller (1970). Studies cited in the literature review have frequently employed recognition rather than recall tests as a more sensitive measure of

memory functioning when investigating ECT effects. However, recall is obviously more appropriate for the RT task where the goal of training is self monitored practice by the patient.

Similarly, studies cited in the review assessing the efficacy of RT, for example Paul and Trimble (1970), generally use procedures such as physiological measures or subjective experience of relaxation. Neither of these techniques were appropriate for the present study; firstly because measures such as those described above are open to other influence. For example, the training may be understood and remembered but it may still not produce muscle relaxation in this patient group because of either their illnesses or medication. Bernstein and Borkovec (1973) take a conservative view of drug usage and state their view as follows:

"Very little is known about the effectiveness of any relation skills learned under the influence of the various drugs which are currently routinely prescribed. Since relaxation is a learned skill, it is difficult to say whether the learning will occur effectively in the presence of drugs and whether the learned skill will generalise effectively to the non-drugged state if the client terminates drug usage after therapy." (p58).

Secondly, it would not be appropriate to expect deep muscle relaxation to occur during the introductory sessions of RT. Therefore, measurements of the amount of relaxation produced were not suitable for this study.

The dependent variables in this study were:

1) the number of training sessions required to reach the maximum score of 20 on the checklist.

2) the number of errors made according to the checklist during the first two assessments.

Case Studies

This investigation was carried out in one hospital and over a relatively short period of time. There are, on average, only nine patients receiving ECT per month, and only a proportion of these are referred for RT. Thus, the number of potential subjects available was small and they formed an extremely heterogeneous group.

In view of the fact that there is no research which examines the learning of RT by patients receiving ECT, case studies were included. If individual subjects achieved results that did not accord with those of other subjects in their experimental group, the author postulated that subject variables such as intelligence level could affect the learning of RT instructions. According to the clinical orientation of this study the author wished to establish some possible individual characteristics one would use in order to accept a referral for RT; for example, what subject variables may interfere with an acute patient's ability to learn.

In addition to the general demographic description, (age, sex, marital status, etc.) a clinical picture of each patient was given by outlining their previous psychiatric history and symptoms at the time of the current admission as well as their diagnosis. Since a basic learning situation is involved, I.Q., education level, and attitude to treatment in general

were felt to be important. This data was extracted from the ward file and nursing notes after the completion of the treatment programmes.

The RT trainer included a brief comment on each subject's attitude towards RT with their summary of scores, and these were abbreviated to either 'positive' or 'negative' by the author.

The Null Hypotheses.

The hypotheses all relate to the broad question of whether it is possible to teach RT skills to patients whilst they are receiving a series of ECT treatments. The first null hypothesis is therefore:

1) Patients prescribed a series of ECT will not be able to learn and recall the verbal instructions associated with RT. The ability to learn and recall the verbal instructions associated with RT was assessed as the number of errors made on the 20 item checklist over the first two trials. Success was operationally defined as a maximum score of 20.

2) ECT does not affect the ability of patients to learn and recall the verbal instructions associated with RT when the ECT is given in reasonably close temporal proximity to the RT. This general hypothesis can be broken down into three more specific null hypotheses so the differential effects of ECT can be assessed in relation to when in the series the RT occurred, either before, after, or during the ECT series.

2a) ECT does not affect the ability to recall the verbal instructions associated with RT, when the instructions are learned prior to the commencement of the ECT series.

2b) ECT does not affect the ability of patients to learn and recall the verbal instructions associated with RT when the instructions are learned during an ECT series.

2c) ECT does not affect the ability of patients to learn and recall the verbal instructions associated with RT when the instructions are learned after an ECT series.

The other null hypotheses relate to possible interference effects of other variables that have been discussed.

3) Depression will not affect the ability to learn and recall the verbal instructions associated with RT.

4) Receiving five or more ECT treatments will not affect the ability to learn and recall the verbal instructions associated with RT when compared with patients who receive less than five ECT's without.

5) Patients who show clinical improvement will not be significantly different from patients who show no improvement or deterioration when compared on their ability to learn and recall the verbal RT instructions whilst receiving ECT.