LEARNING ABILITY DURING A COURSE OF 20 ELECTROSHOCK TREATMENTS

By

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I. Introduction

Recent work at this hospital (Thorpe and Baker, 1958) has suggested that schizophrenic patients tested one week after completing a course of twenty E.C.T.s do not show significantly more impairment in some psychological functions than similar patients treated with insulin coma or chlorpromazine therapies. This finding may come as a surprise to many, particularly in view of the fact that disorientation, memory loss, and confusion are frequently seen during the course of electrical treatment.

The present report describes an evaluation of the course of electrical treatment in terms of a simple test of learning ability. Learning ability, which might, within the context of the present experiment be more accurately designated "the ability to perform on a learning test" has been chosen because of its relationship to most of the changes observable in schizophrenic patients receiving this treatment. These changes are usually as follows:

(*i*) The disappearance of schizophrenic symptoms.

(*ii*) An increase in co-operation.

(*iii*) The appearance of disorientation and confusion.

(*iv*) Memory impairment.

It is clear that a patient's ability to learn a series of nonsense syllables can be expected to be influenced by all these factors in one way or another. It is also clear that disappearance of symptoms, increase in co-operation, *absence* of disorientation and confusion, and *absence* of memory impairment will favour high scores on the learning test.

A simple test of the ability to learn can therefore be used as an objective and useful means of assessing the course of electrical treatment.

II. Method

As the experiment was carried out in two distinct parts it will be expedient to describe them separately.

A.—Part One

(i) *Subjects*

Ten newly-admitted female patients who had an overt schizophrenic psychosis on admission formed the experimental group. Five had previously received physical treatment for their schizophrenia while five had not. The mean age for the whole group was thirty years, ranging from twenty to thirty-eight years.

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(ii) *Treatment*

Full details of the treatment techniques are given elsewhere (Baker, Game, and Thorpe, 1958). Briefly, twenty electrical treatments were given at the rate of three a week up to the twelfth, two a week up to eighteen, and one a week up to twenty. Treatment was administered at 9.30 a.m. with a standard "Ectron" machine, employing "Ectonus" technique (Russell, Page and Jillett, 1953). Relaxants and/or pentothal were given to those patients in need of them, but these formed only the small proportion of one patient in ten.

(iii) *The Learning Test*

This comprised lists of ten three-letter nonsense syllables which were constructed specially for the experiment. The serial anticipation method using a memory drum was employed. That is, the list of ten syllables was presented one syllable at a time, which the patient read out. When all ten syllables had appeared the patient had to say what was the first one on the list, then the second and so on, the next syllable being revealed only when an attempt had been made to anticipate it. The list was presented six times after the first "introductory" presentation and the total number of correct anticipations was recorded.

(iv) *Procedure*

In this part of the experiment each patient was tested individually. The first list of syllables was always given following the first electroshock treatment, the second list of syllables following the second treatment and so on right through the course of treatment. Testing was carried out at 2.0 p.m. on treatment days and again one week following the last treatment.

B.—PART TWO

(i) *Subjects*

A second group of ten patients as described in Part One, with a mean age of thirty-two years and an age range of nineteen to thirty-seven years.

(ii) *Treatment*

Exactly the same as in Part One.

(iii) *The Learning Test*

This comprised the lists of syllables used in Part One. This list was written out on a blackboard and exposed for 20 seconds. The patients were then asked to write out as many syllables as they could remember on the sheet of paper provided. One minute was allowed for writing. The sheets were then collected, a second exposure made for 20 seconds and so on. The syllables were exposed six times in all, and the total number of correct responses was recorded. No penalty was awarded for incorrect order.

(iv) *Procedure*

Patients were group tested at 1.30 p.m. following their treatments. In this part of the experiment, as contrasted with the first, the patients did not receive the first syllable list after their first treatment, the second after their second treatment and so on. In fact the experiment was arranged in such a way that

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any list could follow any treatment. Patients were also tested one week following their last treatment.

III. Results

The results for the two parts of the experiment will be presented separately.

For Part One, Figure 1 shows graphically the average number of correct responses obtained by the patients following each treatment.

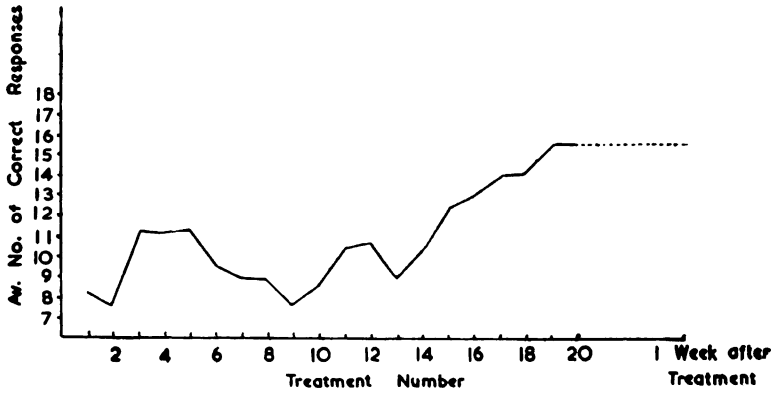


FIG. 1

It will be seen that, following a fluctuation in learning ability during the first thirteen treatments, a gradual improvement follows the fourteenth treatment which continues up to the twentieth.

Performance one week after treatment is similar to and not significantly different from that following the last treatment.

For Part Two, Figure 2 shows the results graphically.

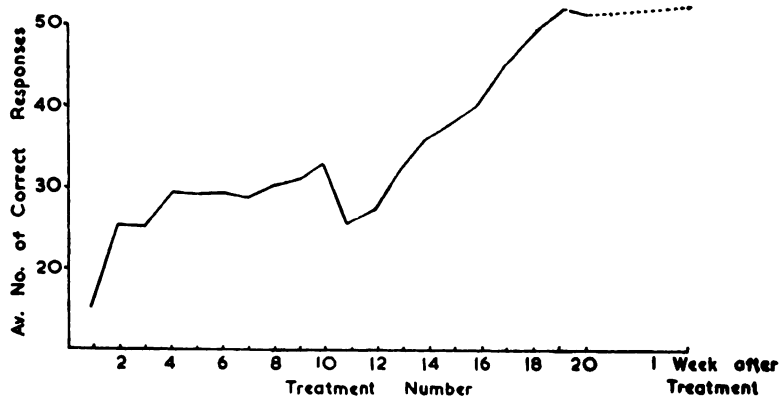


FIG. 2

Here we see a graph which is not unlike the first. Learning ability fluctuates during the first eleven treatments, but the twelfth is followed by improvement which is maintained up to the nineteenth, the twentieth being slightly though not significantly worse than the nineteenth. As before, learning scores one week after treatment are not significantly different from those following the last treatment.

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IV. Discussion

We may first consider the first part of the experiment. The graph presented in Figure 1 indicates that the relationship between the number of the treatment and the ability to learn is non-linear. We must however exercise caution in interpreting this finding for the following reason. When the patients received their first E.C.T. they were subsequently tested on syllable list number one and treatment number ten was followed by list number ten and so on. It is possible therefore that the curve in Figure 1 is an artefact due to the lists of syllables being of unequal difficulty. That this is not the explanation is suggested by the following graph (Fig. 3) which shows the association values of the different lists (Glaze, 1928).

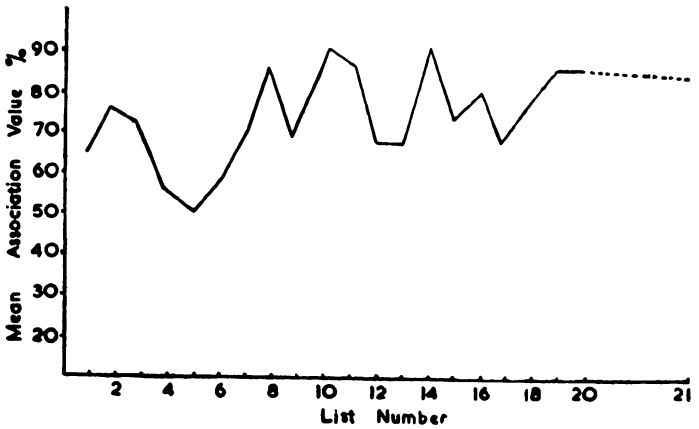


Fig. 3

The association values can be regarded as estimates of the difficulty values of the lists, a list having a high association value being more easily learned than one having a low association value. If the graph in Figure 1 could be accounted for in terms of the difficulty values of the lists we should see some resemblance between Figures 1 and 3. This is clearly not the case.

In Part Two of the experiment the difficulty values of the lists have been largely eliminated. In this part it does not follow that patients who have received their first or tenth treatments will be tested on lists numbered one and ten respectively. On the contrary, a knowledge of which treatment has been given tells us nothing about the number of the syllable list which has been used. Figure 2 shows that the progress of the curve of learning ability is not unlike the curve in Figure 1. In the case of both curves the last eight or so treatments are accompanied by improvements in learning efficiency, which build up to a peak after the nineteenth or twentieth treatment, which has been maintained one week later. It is interesting to note that the final curve of improvement comes at a time when the frequency of treatment has been decreased. Clinical experience suggests that the curve may not rise in this fashion if the frequency of three treatments per week continued.

The fact that the two graphs are not identical requires some comment. It should be remembered that the two groups of patients were extremely small, and also that the test of learning ability was not the same in the two parts of the experiment. It is not possible, from the present data, to explain the discrepancies between the two curves of learning, particularly those occurring

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earlier in the course of treatment. They may be due to chance factors, or they may be due to the change in the test. The more likely of the two possibilities would appear to be that of chance factors in view of the correspondence between the two curves after the twelfth treatment. The slight discrepancy following the nineteenth treatment is considered to be due entirely to chance factors.

V. Summary and Conclusions

The results of a learning test given throughout a course of twenty E.C.T.s do not suggest that the amount of psychological impairment increases with the number of treatments. If the treatments are spaced out as they are in the present experiment, a patient is able to learn more effectively as the course of treatment continues.

VI. Acknowledgments

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VII. References

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