Chapter 14

DISCUSSION OF PSYCHOLOGIC INVESTIGATIONS

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In summarizing the psychologic changes following topectomy Landis ('49) commented as follows: "No patient in this group of 19 operartees which we have studied had a real or permanent impairment of mental function brought about by the operation, which could be demonstrated in any way by our exhaustive psychological test battery. In individual patients specific losses in the form of marked decreases in scores did occur but these losses were, so far as we could tell, more than compensated for by other marked gains and hence did not lead to impairment. There was no real loss in memory, learning, or intellectual functions brought about by any of the topectomy operations. There was a real valid gain in some recall and recognition memory scores in many of the patients, which gain was usually associated with the social recovery of the patient."

In the first Columbia-Greystone project a certain number of the topectomy patients made a "social" recovery from psychoses. The psychologists had difficulty in trying to decide how much of the change in psychologic test performance was due to recovery from psychosis and how much might be attributed to the operation itself. A second difficulty in the first project grew out of the fact that 23 of the patients were subjected to topectomy (an excision of tissue) and one to a venous ligation (no excision of tissue). The psychologic changes which occurred in the one venous ligation patient were just as clear and distinct as those which took place following any variety of topectomy operation. In the interpretation of the findings the facts of recovery from psychosis and an operation without removal of tissue complicated all attempts at explanation.

In the present study we have been able to clarify the psychologic findings on both of these points. (1) No patient made a recovery from psychosis following this series of brain operations prior to the completion of the psychologic tests. (2) In the present series different kinds of surgical techniques were employed, most of them non-specific in character. The venous ligation, thalamotomy, and transorbital operations were all of such a nature that it would have been unwarranted to believe that anything like the same specific areas of brain tissue were involved. Hence, any changes which were found running through the entire series of patients must be attributed to the generality of function of frontal lobe tissue, unless such changes could be
shown to be clearly differential in one or several patients without occurring in any other patients.

We should also point out that most of the psychologic procedures which were used in this set of investigations were new but were for the most part derived from ideas which had arisen from the experience gained from the first Columbia-Greystone project. Some of the methods used were precise and well standardized; others lacked precision, and still others had neither standardization nor precision. However, they were all of such a nature that they might conceivably have clarified certain of the questions which the first Greystone project brought into the foreground.

At the risk of being repetitious we feel that it is wise to bring together again in a summary fashion the outstanding conclusions which were found and which have been reported in chapters dealing with the psychologic portion of this investigation.

1. The Wechsler-Bellevue scale of Adult Intelligence showed no general permanent loss which could be attributed to any of these surgical procedures. The rate of improvement on the scores made on the performance portion of the test showed a greater deficit among the operated patients than it did among the control group. This deficit was most clearly shown by those individuals who received the more severe venous ligation operation (VL-I). There was a significant loss in scores on the subtests of Picture Arrangement, and Object Assembly which had not been fully regained 6 months after operation.

2. The Porteus Maze test showed an immediate drop after operation with a full recovery in all but the thalamotomy patients by 3 months after the operation. The gains which were attributed to practice or learning and which were made by the operated patients were not as great as those made by the control patients during the same period.

3. The Weigl test was not consistently changed in its performance following operation. There was more loss shown by the operated patients in their ability to verbalize their performance on this test after operation. This loss in ability was attributed to a decrease in "motivation."

4. The Revised Homograph test showed a clear loss in all patients 10 days after operation with a full resumption of function in most patients 3 months after operation. The postoperative loss seemed to be due to a lack of motivation to try to think of more than one or 2 definitions for the common words of the test. It was as if more effort was required to find the familiar words and the effort led on occasion to "compensation" by using unfamiliar words or phrases. Three months after operation these patients were able to use the same defining words which they had used before the operation, that is there was a "resumption of function" rather than a continuation of compensation.

5. There was no evidence of loss or change in either Incidental or Direct Memory which could be attributed to any of these brain operations.
6. There was no loss or change in ability to do the Delayed Reaction experiment which could be attributed to any one of these operations.

7. In the Verbal Directions experiment, the 4 control patients showed some learning effect on Form A pretest to posttest. Not so much learning effect was shown by the operatees. On Form B neither group showed any learning effect.

8. On the Learning test there was no evidence for an intraserial effect. There was evidence that the "forced" method of learning was more difficult for the operatees immediately after operation than the "free" method of learning. On the Interrupted Set experiment the operated did not do quite as well immediately after operation as did the controls. There was no consistent loss or change in the Sustained Task experiment.

9. The Attitude Evaluation indicated that the outlook on life and the problems of life of these particular patients were reported with a great deal of reliability and consistency and that little or no change was brought about by these brain operations.

10. There was some amnesia on the part of 8 of the operated patients for the last preoperative week and for the circumstances surrounding the operation itself.

11. There was little or no evidence of any interference with visual, auditory, or pain sensitivity so far as the primary sensory functions were concerned.

12. There was evidence of an interference 10 days postoperatively on the Spaced Attention test, on the Tapping test, on the Response Time test, and on the Finger Dexterity test.

13. The Time-Sampling observation study showed certain variations but there was no evidence that these variations with the A or S series could be attributed to the operations.

In the light of these findings certain conclusions seem clear and obvious. First, there can be no doubt that there is no general permanent loss of intellectual function, memory, ability to learn, intelligence, or the like which could be attributed to any of these surgical procedures which were carried out on the frontal lobes. Second, there is rather consistent evidence that there was a transient loss for the 2 or 3 weeks following operation, in the efficiency with which certain functions were performed.

In Chapters 9 to 13 inclusive, a variety of attempts at explanation of the basic nature of this transient loss have been made. Among these tentative explanations have been lowered interest or motivation, lowered ability to learn or to benefit from practice, and a lowering of basic capacity. Although any one of these tentative explanations might hold for the particular task or experiment involved it is difficult to explain all of the varieties of transient loss in any of these terms.

This transient loss usually exhibited itself in the following way. The patient seemed more lackadaisical, more easy going, and less
highly motivated toward the task at hand. If he was sufficiently stimulated it was often possible to get him to give as good a performance as he had given preoperatively, although as a usual thing it could not be done quite as rapidly as it was preoperatively. It was as if the individual was under an interfering influence, which interference resulted in a lack of drive or energy to complete the task as rapidly or as successfully as had been done at the preoperative test periods, or as would be done 3 months after the operation. Again it was as if the patient were sleepy, fatigued, or partially drunk so that there was disinclination to work at his usual level. It seemed at times as though there was a defect in the self-criticism necessary to produce the "normal" performance. It was usually possible by prompting, urging, or repetition to obtain as good a measure as had been obtained preoperatively, but it took an increase in stimulation to get such results. The transient deficit showed itself most clearly in motor or verbal tasks which require some "effort" or "attention," for example: free versus forced learning.

There is no certain evidence as to the basic cause of this interference or disinclination. Our evidence could be produced by either or both physiologic and psychologic factors. The Attitude Evaluation Interviews showed no basic psychologic changes in expressed motivation, while the evidence from the physiologic and laboratory tests is equally unrevealing.

In contrasting the psychologic finding of the present study with those of the first project, it is apparent that the changes due to recovery from psychosis are mainly, if not entirely in the realm of affective attitudes, loss of anxiety, decrease in complaints and the like. These affective attitudes probably interfere with the quality and quantity of performance in most of the psychologic tests that have been employed in both this and the previous study but that interference has affected the operated and control groups alike.

In conclusion, it is our present opinion that the psychologic changes which have been reported in both the clinical and experimental literature to be attendant on frontal lobe damage have been drawn from the study of too few cases and from the study of cases too soon after operation. If measurements are obtained in which preoperative levels were carefully established and sufficient time is given for recovery from the operation then no present evidence exists that "clean" and uncomplicated operative procedures done on the frontal lobes produce any permanent change in psychologic ability, capacity, or basic efficiency. It may be that more extensive damage that has resulted from any of the surgical techniques used in either Columbia-Greystone project or damage which is complicated by involving other than the frontal lobes will produce losses. We have no evidence on this last point. Finally we have no evidence that any function which we investigated is related in a specific fashion to any particular frontal lobe area, rather there was a generalized transient performance deficiency which is brought about by any sort of frontal lobe surgery.