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PSYCHOLOGIC CHANGES FOLLOWING PREFRONTAL LOBOTOMY

A dissertation submitted to the
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1949

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CHAPTER I

PSYCHOLOGIC CHANGES FOLLOWING BILATERAL PREFRONTAL LOBOTOMY

Historical Introduction

Bilateral Prefrontal Lobotomy is the designation of a neurosurgical technique which purports to relieve symptoms of certain mental illnesses by surgical transection of the white matter in all four quadrants of the prefrontal area of both cerebral hemispheres in the human cortex. The immediate objective of this procedure is the severance of some sixty-five to eighty-five per cent of the main thalamo-cortical fibers connecting the thalamus and frontal lobes while leaving the cortical surfaces intact. Similar to lobotomy, but differing from it in that the white matter is severed in two quadrants of both prefrontal areas, is the British technique of leucotomy. In contrast to both is lobectomy, referring to any procedure which involves actual removal of cortical tissue either from organic necessity or for relief of mental symptoms.

Modern psychosurgery dates back only to November 12, 1935, the day on which Egas Moniz, a Portuguese neurosurgeon, first operated upon an intact brain with the intent of relieving mental abnormality. In the words of

Freeman and Watts (13, p. 12) this early technique involved:

... a trephine opening over the prefrontal region, 3 cm. anterior to a vertical plane through the external auditory meatus and 3 cm. lateral to the midline.... (and) the injection of minute quantities of alcohol (0.2 cc. absolute alcohol) into the subcortical prefrontal white matter.... An instrument called the leucotome was ... devised, consisting of a hollow needle carrying a stylet, toward the tip of which was a flexible wire loop or a cutting blade. ...When the instrument was introduced into the subcortical white matter and the stylet pressed upon to extrude the loop, it was possible, by rotating the instrument, to cut a core of white matter about 1 cm. in diameter. This core was not removed but was left free in the cavity thus formed to undergo autolysis. Upon release of pressure upon the shaft of the instrument the loop was again retracted and the leucotome could be withdrawn. With this instrument the surgeon, Almeida Lima, under the direction of Egas Moniz, cut from four to six "cores" in each prefrontal region, thus inactivating a fairly large number of connections within the frontal association areas. According to the directions, the leucotome was inserted downward and outward to a depth of 4.5 cm. and cores were cut at 4.5, 3.5, and 2.5 cm. The leucotome was then withdrawn and inserted in an anteromedial direction and cores cut at 4, 3, and 2 cm.

In later reporting upon the first twenty operations Moniz claimed seven recoveries and seven improvements with best results in agitated depressions and poorest in chronic schizophrenia. He noted various types and classes of postoperative symptoms, among which were mild temperature elevation, vomiting and somnolence, transient incontinence, occasional diarrhea, masking of the facies, akinesia and loss of initiative, stereotyped behavior, transient disorientation in time and place, and increase in appetite.

Walter Freeman and James W. Watts of George Washington University introduced the Moniz technique in the United States in 1936. After the first twenty cases, however, they noted frequent relapses and accordingly concluded that a larger proportion of white matter required trans-section. They proceeded therefore to develop their present technique of bilateral prefrontal lobotomy, which, with modifications, has become the method of choice. The main steps in the operation are described as follows by Freeman and Watts (9, pp. 285-6):

..The surgeon marks the midline and the approximate location of the coronal suture. After incising the scalp vertically, centering about a point on this line 6 cm. above the zygoma, he retracts the tissues and places a burr hole through the coronal suture on both sides. He reflects the dura, secures hemostasis, punctures the cortex in an avascular area, and then ... measures the diameter of the frontal lobes by passing a long cannula from one opening in the skull through the genu of the corpus callosum and out through the hole in the opposite side. He then locates the sphenoidal ridge by angulating the cannula downward toward the base of the skull.... The surgeon removes the cannula and inserts a blunt knife along the original tract of the cannula, and at a depth of 4 cm. or thereabouts, depending upon the width of the frontal lobes, makes a sweeping incision first upwards, then downwards, always maintaining the knife in the selected plane.... The surgeon deepens the incisions by making radial stab incisions that bring the broad tip of the knife substantially to the midline, severing the remaining fibers in the upper and lower quadrants of the frontal lobes.... He closes the incisions, bandages the head and marks upon the bandage the exact location of the burr holes so that the technician can accurately center the patient's head when making the roentgenograms.

Freeman and Watts have discovered that the postoperative

behavioral course of the patient is considerably influenced by moving the plane of section anteriorly or posteriorly to that described above. Sectioning farther back leads to an intensification of inertia, disorientation, vesical incontinence, masking of the face, plateau speech, and, in some cases, reflex grasping and a positive Babinski sign. Ordinarily they recommend the more posterior incisions only in refractory cases or those characterized by severe affective-intellectual deterioration.

Modifications, changes and improvements upon the Freeman and Watts method have been inaugurated by other neurosurgeons in the past decade for the threefold purpose of reducing surgical mortality, circumscribing the proper plane of section, and improving the post-operative psychologic status of the patient. Lyerly (48) in 1938 carried out twenty-one lobotomies at Florida State Hospital utilizing a technique of direct visualization of the operative field. By turning back a dural flap he was able to view the white matter directly, thus providing greater accuracy in the surgical approach. The absence of postoperative neurologic signs and operative mortality he attributes to this technique. Freeman (8) reports upon a variation of frontal leucotomy developed in 1937 by Fiamberti which is predicted to have widespread application in the future. This is termed

transorbital leucotomy, and it can be performed during the coma of electro-shock. Essentially it consists of insertion of a transorbital leucotome in the conjunctival sac above the eye maintaining moderate pressure on the eyeball itself. The instrument is moved against the roof of the orbit until the top of the vault is encountered. It is then driven through the orbital plate to a depth of 4 cm. and swept laterally, after which it is swept laterally and medially at a depth of 7 cm., the medial sweep being carefully held to a 15-20 degree arc. Surgical shock, postoperative complications, and discomfort to the patient are said to be minimal. Recovery is rapid, with headaches and some nausea usually present. Incontinence and undesirable personality changes are infrequent. The operation is a minor one effective in cases characterized by tension where the condition is threatening to become chronic. There are recent reports from Temple University of a technique known as thalamotomy (or thalamectomy), the purpose of which is to relieve anxiety by destroying or removing the medial thalamic nuclei, end stations of the fronto-thalamic radiations (Life, Aug., 16, 1948, pp. 57-60).

Throughout the brief and stormy history of psychosurgery much spirited opposition has been noted. Freeman

and Watts (14, p. 462) have collected sample criticisms by Winnicott, who insists "These treatments are pure shot-in-the-dark affairs. A new habeas corpus is needed now, a habeas cerebrum"; and by Bendit, who calls patients "decerebrated robots let loose"; and by Atkin, who is inclined to "suspect deeper and darker motives." Feeling that even though 5,000 persons have undergone psychosurgery since 1936 very few conclusive answers to any questions have been derived, the Research Committee of the Group for Advancement of Psychiatry has undertaken the task of designing and implementing an adequate research program. This group, consisting of approximately 150 American and Canadian members of the American Psychiatric Association, states in its June, 1948 Report (26, p. 2) that lobotomy:

Is an operation performed in the name of therapy, steadily advised with greater frequency....It is often done hastily, without adequate previous study, without the previous use of rational therapeutic measures and it is performed before an opportunity is afforded for possibility of spontaneous remissions. It represents a mechanistic attitude toward psychiatry which is a throwback to our pre-psychodynamic days, which in itself would not be of great concern if it were successful and did not harm the patient. It is a man-made self destructive procedure that specifically destroys several human functions which have been slowly evolved and that especially separate us from other animals. If the operation is of importance... it becomes all the more important for us to establish definite clinical indications and controls....

In common with the history of shock therapies in general prefrontal lobotomy and allied procedures have

been widely and experimentally applied before adequate theoretical constructs and therapeutic rationale have been forthcoming. Lobotomy has been recruited into the psychiatric armamentarium for treatment of almost all intractible conditions, running the entire range from painful organic conditions through the functional psychoses and into the neuroses, character disorders and psychopathies. Whether prefrontal lobotomy will eventually match the high promise it held in the hopes of its originators or whether it will finally find its place as a specific in certain types of tension cases remains to be seen. For the psychologist, however, it provides for almost the first time an opportunity to "stack up his tests against the easily observable and assessable results of an anatomically well-defined surgical operation of the brain." (59, p. 473).

Psychoneurological Theories Relating to Lobotomy

With the advent of radical therapies having as their common denominator the interruption of the fronto-thalamic radiations, new interest in the functional and cyto-architectonic relationships of the brain emerged. The chief focus of attention in lobotomy is the degree of control or reciprocal control exercised by the pre-frontal association areas upon the thalamus and also

upon the lower levels of autonomic and motoric integration. It has long been held that the generalized function of the prefrontal lobes in man is that of the intellect - synthesis, organization, planning, choosing, and the like. Comparative studies of the effects of prefrontal ablation in the primates and lower mammals by Jacobsen, Lashley, and others tend to reinforce this contention. After a review of the findings in this field with regard to the effect of such ablation on learning and memory, Morgan (52, p. 496) concludes:

Perhaps the best way of stating the effects of complete removal of the prefrontal areas is to say that seriatim functions are almost, if not entirely, destroyed. By seriatim functions is meant the organization or synthesis of skilled acts into an orderly series. The monkey, after extirpation of the premotor areas, gives clear evidence of being able to learn specific unskilled or skilled acts and, if these have been learned prior to operation, of remembering them. This is true even in seriatim problems, where a series of skilled acts is required. But although the animal executes the movements which the problem requires, he does not perform them in the correct sequence. If the problem requires pulling a rope, pushing a lever, and undoing a latch, in that order, the animal may show that he remembers what to do, because he makes each of the responses, but he has forgotten how to do them in order. Not only has he forgotten the order but he cannot relearn it.

The role of the thalamus with relation to the brain and the remainder of the nervous system has been shown clearly to be that of the main way station for all afferent pathways to the cerebral cortex. As such it must be an essential link in connecting a sensory stimulus

to the individual's awareness of it - his appreciation of its significance and its meaning to him. This interpretation places the thalamus in a position of dominance with regard to the affective-emotional components of behavior. Such beliefs were strongly held by Head in his thalamic theory of emotion and later by Cannon and Bard in the theory bearing their names. As Morgan (52, p. 373) has indicated, however, it is well to remember that experimental data show emotional response in general to be integrated at different levels of the nervous system. Nevertheless he summarizes the problem by observing: "The most complete expressions, involving first the restraint of emotion and later its maintenance, including localizing behavior with respect to the emotional stimulus, depend upon the intact cerebral cortex." This latter fact is of cardinal importance in explaining the effectiveness of transection of the fronto-thalamic fibers in dispersing the crippling affective components of obsessive-tension states and of the neuroses in general.

Theories of prefrontal functions and their modification by lobotomy are reflections of the basic neurodynamic postulates of their originators. If the observer has cast his lot with earlier "telephone-switchboard" connectionistic explanations or with rigid "functional localization"

constructs he may view with alarm the irreparable damage being wrought by lobotomy. If he is partial to the later "mass action" and pattern theories of Lashley he may look upon lobotomy as a saner technique akin to the shock therapies in their emotional rechannelization effects. Indeed he may even hope to cut the Gordian knot of neurosis with one clean sweep of the leucotome.

The American pioneers in lobotomy, Freeman and Watts, have been prolific in their theories of prefrontal function. After indicating that the post-Rolandic part of the cortex is preoccupied with the reception of impulses from diverse types of receptors throughout the body, these authors ascribe to it the ability to bring the individual into relation with what has gone before in his existence. Thus this area mediates experience. Say Freeman and Watts (13, p. 302):

(Most of the frontal cortex is) concerned with the projection of the whole individual into the future. With the intact brain the individual is able to foresee, to see before, to forecast the results of certain activities that he is able to initiate in the future, and he can visualize what effect these actions will have upon himself and his environment....(He can also) call upon his cortical mechanisms to assemble various parts of a problem and to select the proper course from among the many alternatives that present themselves to him at the completion of each separate step....

Various types of frontal lobe trauma can then reflect themselves in the behavioral changes so often noted -

inertia, lack of ambition, loss of self-consciousness, indifference to opinions, and satisfaction with inferior performance. It is to be presumed that in the psychodynamics of some neuroses and many psychoses, the opposites of these qualities were present in pathological degree, thus explaining the symptomatological relief afforded by lobotomy.

An intriguing theory is proposed by Porteus and Kepner of the University of Hawaii (58). They define behavior with reference to the relevant stimulus. This is the stimulus to which it is biologically advantageous to respond. Hence, the intensity of the reaction is proportionate to the organism's recognition of the degree of relevancy. Insofar as an individual's judgment may be faulty in judging the relevancy of the stimulus, to that degree may his response become inappropriate (psychotic or anti-social). The prefrontal lobes are the repository of the characteristic, unique, peculiar, and distinctive factors of the individual. His reaction to any given stimulus will be made in a characteristic way which can be termed his style of response. Since much behavior is intellectual-emotional, a continued emphasis upon anxiety about the future, fear of consequences, and self-consciousness leads to suffering

and ultimately to incapacitation.

Since cortico-thalamic connections are reciprocal, they bring about a blending of the cognitive and affective experiences. When these connections are transected they may radically alter the style of response of the individual. The transection, through reducing the emotional activation of the thalamus, likewise reduces the effect upon centers below the thalamus, thus eliminating autonomic symptoms. It may likewise induce somnolence by relative inactivation of the hypothalamic "wakefulness" center. Porteus and Kepner conclude (58, p. 14):

...we may say that the cortex is the organ of choice, the decision in each situation having to do with its relevancy....But since so much of human behavior is charged with, or governed by emotion, there must be some connection between the prefrontal cortex and the centers that mediate our emotional life. These appear to be the thalamus....The dorso-medial nucleus seems to be the chief way station between the emotional centers of the prefrontal cortex, for when the connection is cut, its cells suffer the most marked degenerative changes....

Egas Moniz held to the theory that lobotomy disrupts stereotyped synaptic patterns in the brain, anticipating perhaps that the future could reveal in lobotomy a deactivation of the reverberating circuits established by traumatic experiences. Porteus (58) states that he prefers to follow the lead of Cajal in believing the neural circuits "become established through the enmeshment of neuronic filaments into definite systems...(and

that) in situations with emotional affects, very widely separated areas of the brain may be involved in the circuit ...(with lobotomy thereby breaking up the pattern) of habitual intellectual-emotional response."

In an extended analysis of the various cortical-subcortical functions which may possibly be modified by lobotomy Kisker (45, p. 351 ff.) admits the interference with affective patternization, and states, "However, I am inclined to look beyond corticothalamic pattern interruption, and include concomitant restructurization of the motorium." After calling attention to and tracing probable pathways of the cerebropontine connections from the frontal lobes to the nuclei of the pons Kisker holds:

It now becomes possible to visualize an intellectual-affective-motor chain which includes the prefrontal association areas, the medial thalamic nuclei, the cerebellum, the pons and tracts returning once again to the frontal poles. This chain is further brought into functional integration with the total organism by way of thalamic connections with cranial and spinal centers.... It is not too difficult to understand how certain basic postural patterns may be changed by lobotomy, with a concomitant fluidity of psychological attitudes which become capable of being remolded in the period of organic transition. It might even be said that there is an alteration of motoric identification in that the rigid psychotic structure of object-reality is dissolved, and new lines of identification are established.

In a quantitative study of psychometric impairment indices on 207 brain injury cases and 30 control subjects at the University of Chicago Clinics, Halstead (30)

sought evidence for and against the main current theories of brain functioning. From a total battery of twenty-seven tests thirteen were finally selected on the basis of their ability to yield "primary mental abilities" or irreducible unit factors represented in human intelligence. Some of Halstead's conclusions of interest in the present discussion are (30, p. 148):

- (1) In comparison with other types of subjects, individuals with damage to the frontal lobes have high impairment-index scores...
- (2) This relation holds whether the lesion is unilateral or bilateral and whether it is on the right side or on the left side of the brain.
- (3) There is no quantitative evidence of hemispherical dominance yielded by this study.
- (4) There is no relation between the degree of impairment and the extent of the lesion...
- (5) This is true for the brain as a whole, for the cortical areas of the prefrontal lobes, and for cortical areas outside the frontal lobes.
- (6) No evidence for a general principle of mass action is yielded by this study. On the other hand, the available data do not bear upon mass action in restricted cytoarchitectural areas.
- (7) Bilateral subcortical lesions of the frontal lobes, as in lobotomies, do not disturb the functions reflected by the impairment index....
- (8) The impairment of functions reflected by the impairment index is independent of psychometric intelligence....
- (9) A review of the literature on cerebral function in mammals other than man indicates that, while some functions appear to be diffusely represented in the cortex, others are regionally localized in the brain....
- (10) (The inference is drawn that while biological intelligence) is represented throughout the cerebral cortex, its representation is not equal throughout. It is distributed in a gradient with its maximal representation occurring in the cortex of the frontal lobes....

Halstead's results for man reveal a considerable

discrepancy when compared to Lashley's cortical damage studies in rats. Lashley found that initial learning was "retarded by a lesion in any cortical field and that diverse lesions of equal magnitude produce, on the average, equal effects," and also that "within the single (cytoarchitectural) fields...retardation is solely dependent upon the extent of destruction, irrespective of its locus within the cerebral hemispheres (quoted in 30, p. 130)." Halstead (30, p. 130f) indicates that these discrepancies can probably be accounted for in terms of the greater structural differentiation in the human brain, the greater general encephalization of functions, and the lack of homologous behavioral functions in the two animals. Halstead concludes that his own "regional-specialization" view of intelligence is not incompatible with Lashley's mass action postulate if due allowance is made for the encephalization factor.

In concluding this discussion of psychoneurological theories of cerebral neurodynamics, it should be emphasized that many of them are concerned with far broader implications than the behavioral results of prefrontal lobotomy. Throughout the literature on lobotomy, however, the main theme is that of the restructurization of the intellectual-affective life of the individual by surgical section of

prefrontal-thalamic connections. In studies of the behavioral sequelae of prefrontal lobotomy there is general agreement that the patient reflects emotional flattening, lack of attention, diminished spontaneity, vasomotor changes, euphoria, loss of judgment, unresponsiveness, talkativeness, disorientation, perseveration, and transitory phenomena like incontinence, aphasia, hemiplegias, and occasional abnormal reflexes. The degree of recovery from this symptomatology is individually variable, depending upon the preoperative psychologic and physiologic state of the patient.

Lobotomy as a Therapeutic Device

Results. Most of the results reported by psychiatrists and neurosurgeons have been of the qualitative variety. Ordinarily the postoperative status of the patient is judged in terms of such criteria as: (1) Whether the patient can be discharged from the hospital to return home and/or to work; (2) whether he stays in the hospital on an open or closed ward; and (3) whether there is sufficient diminution of symptoms to facilitate his adjustment as a member of the hospital population. Of the more than 5,000 patients lobotomized in the English speaking countries the overall results indicate that

thirty per cent have left the hospital and support themselves, twenty per cent have left the hospital and live with their families, thirty per cent are considered improved but remain in the hospital, and twenty per cent show little or no improvement. In the latter twenty per cent, two to five per cent are considered worse. Estimates of surgical mortality vary from two to five per cent.

In 1947 the Board of Control of England and Wales released a report summarizing their results on 1,000 refractory and chronic leucotomized cases (3). Thirty five per cent of these patients were discharged, 242 being listed as "citizens"; thirty-two per cent are listed as improved in the hospital environment; one per cent are considered worse. Throughout the series surgical mortality reached three per cent.

In Freeman and Watts' report (15) on their original 20 lobotomies of 1936 some 10 years later they find 6 have died, 4 are employed, 4 are keeping house, 4 are living at home, and 2 are hospitalized. In a review of 100 female patients Parker (54) reports that about 50 per cent improved. Of 200 leucotomy cases Frank (20) claims social recovery in 42 per cent and improvement in 28.5 per cent. Porteus and Kepner (58) noted some improvement in 11 out of 20 (55 per cent). Lysterly says

74 per cent of his 55 cases improved enough to go home. McKenzie estimated 85 per cent of his 27 cases as benefited. Greenblatt (24) with 247 patients concludes the operation was "worth doing" in 65 per cent, "gratifying" in 41 per cent of those, and "stellar" in a remaining 14 per cent. Gayle (23) believes that only 50 per cent of all patients net good results even if well selected. Elder (7) secured disappointing results in 11 transorbital leukotomies in 11 chronic cases. Liebert (47), lobotomizing 38 cases, found 66 per cent improved and was able to discharge 12 patients.

Indications. Rather consistently throughout the literature on lobotomy certain constellations of symptoms appear greatly relieved. These are the ones commonly found in obsessive-tension states, hypochondriasis, intractible psychosomatic conditions, and agitated depressions. The operation is usually indicated for patients believed to be chronically ill, who have not responded to all other acceptable forms of treatment and who have shown no signs of spontaneous remission. This would include its use with reservations in schizophrenia, manic-depressive psychosis, and involutional states, with contraindication in chronic alcoholism, drug addiction, psychopathy, sexual deviation, and deteriorated

catatonia (see 27). The present trend, however, is strong toward selection on a strictly individual basis.

The British Board of Control (3), drawing conclusions on the basis of 1,000 cases, found results better in older patients with shorter duration of illness, and in the affective group rather than the schizophrenias. A striking feature was the excellent results attained when the operation was performed within two years after onset. If leucotomized within two years, 50 per cent of the schizophrenics and 65 per cent of the manic-depressives were discharged. If five years were permitted to elapse, these percentages dropped to 10 and 15 respectively.

In their experience with lobotomy (some 400 cases), Freeman and Watts (15) believe the following are favorable indications: (1) Older age, (2) better education, (3) lower occupational level, and (4) satisfactory home environment. They think affective disorders respond more favorably than schizophrenias, with tension and depression best of all. They warn that the operation in obsessive cases may release pent-up hostility, but state that the most important of all criteria is emotional tension, since when this is reduced completely there is no use operating.

Several investigators have achieved good results in painful conditions. Olivecrona (15) believes that of

1134 painful conditions treated by various means the seven relieved by lobotomy responded best. He states that if this should be further confirmed in more cases, a most important advance in the surgery of pain will be made. LeFever (46) finds severe pain relieved in assorted cases like cancer of the cervix and tabes dorsalis, and he notes that although the patient can still feel the pain there is an indifference to it.

Evidence that lobotomy is an excellent specific for depression has been cited by Parker (100 cases), Yahn (209 cases), Shorvon (5 cases), and Myerson (all reported in reference 15). Frank (20) found a far larger percentage of success in the melancholia states as compared to the schizophrenias. This is confirmed by Reitman (61) and by Hurt (36) who would also like to see in the preoperative picture an acute onset, a previously well-integrated personality, and an absence of senility. He mentions post-operative rehabilitation as being very important, recommending "glamorous nurses and absence from the refractory ward." Draper (5, p. 77 and p. 80) finds that the chief criterion for lobotomy is not any certain psychiatric diagnosis, but rather a certain syndrome or constellation of symptoms adding up to psychic tension. He asserts that lobotomy "strikes a vital blow at the

emotional component which tends to keep some schizophrenic psychoses alive." Very recently Kalinowsky and Scarff (38) have urged that if the patient has received adequate treatment by non-surgical methods lobotomy can never make him worse, but can be expected to relieve his mental suffering. They recommend two months postoperative institutionalization and social work follow-up with the family after the patient is at home. Immediately before lobotomy they use a planned course of shock treatment (20 to 30 consecutive treatments); if there is no response, immediate effort should be made to discover through sodium amytal the degree to which psychotic regression is reversible. They have found hebephrenias and catatonic stupors refractory to the operation, although paranoid types and psychoneurotics are good risks with the reservation that careful diagnosis and evaluation of the premorbid personality be undertaken. In conclusion, Kalinowsky and Scarff (38, p. 85) state: "Individual case reports rather than large statistics should be encouraged after the statistical approach has served its purpose as a rough means of general orientation."

Sequelae. The immediate postoperative course of lobotomy gives rise to two main types of behavior. These are inertia and disorientation. The former may often

appear as a type of perseveration in which the same acts may be repeated over and over again. It may also appear as a lack of initiative or responsiveness, a kind of phlegmatic resistance to activity. The latter, disorientation, may occur in the time, place, or person categories, with memory for recent events particularly confused. Various transitory symptoms occur, the nature of which may be determined by the premorbid personality, the nature of the disease, and the plane of incision. These latter include somatic symptoms like increased appetite, Babinski reflex, vesical incontinence, vesical retention, ataxia, stupor, rectal incontinence, aphasia, and hemiplegia; intellectual and emotional symptoms like emotional flattening, diminished spontaneity, lack of attention, indifference, loss of judgment, euphoria, unresponsiveness, talkativeness, and Witzelsucht; neurologic symptoms like trismus and fibrillary contractions affecting the masseter and platysma muscles, and the ocular disturbances of Argyll-Robertson pupils, myosis, unequal pupils, ptosis, and nystagmus. In some patients extreme somnolence, headaches, and occasional vomiting also occur. At the end of the first or second postoperative week, however, these signs are markedly reduced. The altered personality configuration is

outlined. This often is characterized by a freedom from former worries and a lack of preoccupation with delusional and hallucinatory material. There may emerge instead a kind of resigned indifference to formerly disturbing situations.

While the above changes are taking place there are certain physiological effects as yet uncharted. These include greater sympathetic and parasympathetic reactivity, electroencephalographic changes and increased seizures, but no provable alterations in blood pressure (Greenblatt, 24). Post mortem findings by Greenwood (25) and Freeman and Watts (9 and 17) show atrophy of the nucleus medialis of the thalamus as the important condition with some degeneration of the Marchi preparations anterior to the incisions.

Effects on Creativity. Hutton (34) has recently shown that personality changes after leucotomy take the form of reduction in shyness, in reserve, in religiosity, and in asociability. Whether a similar reduction in creative abilities like writing, painting, and composing occurs has also been investigated by Hutton (33) and by Reitman (60). Hutton, after noting relatively poor performance after leucotomy, wonders whether the patient is actually unable to imagine "another and better ideal world", or whether "he has merely become dissociated from

the emotional factors which motivate such activity." Hutton and Bassett (33) observe that "the present exists in perception, the past exists in memory, and the future exists in imagination." In view of this statement they apparently ascribe imagination to the frontal lobes and explain diminished creativeness on the basis of destruction in this area. Reitman (60) refers to a "creative spell" shortly after leucotomy in schizophrenics, but notes that this spell subsides greatly in the succeeding months. In the history of lobotomy, however, there are scattered instances of individuals who have continued on high levels of academic and professional achievement, although at reduced efficiency.

The literature above has been reviewed as being characteristic of that reported by psychiatrists and neurosurgeons during the past ten years. It can be noted that the degrees of improvement are usually reported in loosely constructed adjectival form with emphasis upon the more pragmatic factors in "social recovery." Since lobotomy is perhaps the most radical technique being practiced today, our resort to it in the absence of a more compact therapeutic rationale necessitates candidate selection on the bases of chronicity and intractibility, thus imposing a severe handicap upon the measure.

Psychological Studies of Prefrontal Lobotomy

Perhaps the most significant statement that could be made about the psychometric changes following lobotomy is that most of the standard personality tests, projective devices, and intelligence scales yield equivocal results. Up to the present time it cannot be determined whether these instruments are too rough to measure the subtle changes occurring or whether the types of abilities altered by lobotomy are not adequately represented in the instruments used. Halstead (30) has been especially critical of results so far, and has even complained that "at no point have other than superficial attempts been made to standardize the criteria for the preoperative and postoperative clinical status of patients. Not a single patient has been adequately studied...The pyramiding of unknowns is scarcely a pathway to knowledge." (p. 124). In his own work Halstead used no fewer than twenty-six tests, seventeen of which bear his name. Included in the battery also are some familiar tests like the Multiple-Choice Ink Blots (Borschach as modified by Harrower-Erickson), the Minnesota Multiphasic Personality Inventory, the Henmon-Nelson Test, the Seashore Measures of Musical Talent, and a Manual Steadiness Test. He mentions having found the Stanford-Binet test "insensitive" to these

changes and believes the many other tests highly correlated with it possess similar deficiencies. He states (30, p. 125): "It might be commented upon in this connection that a physicist who purported to measure microvolts with a voltmeter would scarcely be taken seriously." While Halstead's approach is to be commended from the point of view of pure experimental psychology, it could be noted that if such impaired abilities as "critical-fusion frequency" and "finger-oscillation" have escaped previous observers they may contribute but little toward the decision as to who should be lobotomized. In the long run, however, adequate mapping of the postlobotomy personality must take note of such unitary perceptual variations.

The findings of Halstead (30, p. 147), relating mainly to lobectomy, have led him to postulate a four-factor theory of biological intelligence. The four factors he found valid for differentiating the effects of brain injury are: (1) The central integrative field factor, C, "the ground function of the 'familiar' in terms of which the psychologically 'new' is tested and incorporated"; (2) the abstraction factor, A, "a basic capacity to group to a criterion...involving the comprehension of essential similarities and differences"; (3) the power factor, P, which "reflects the undistorted

power factor of the brain...operating to counterbalance or regulate the affective forces..."; and (4) the directional factor, D, "a vector constituting the medium through which the process factors, noted here, are exteriorized at any given moment." According to Halstead's table (30, p. 41), he finds the heaviest C-factor loading in the Henmon-Nelson IQ test, the heaviest A-factor in his own Tactual Incidental Recall test, the heaviest P-factor in his own Dynamic Visual Field test, and the heaviest D-factor in his own Tactual Performance Speed test. With reference to lobotomy Halstead (30, p. 126) finds the 17-test impairment index to give no evidence of a reliable or consistent shift. He indicates that this result, in contrast to that in lobectomy, may be due either to the nature of the impairment index or to the fact that prefrontal lobotomy is primarily a subcortical operation...(leaving) the cytoarchitectural areas of the cortex essentially undisturbed. In this connection one may conjecture as to why Freeman's often noted lack of ambition, indifference to opinion, and satisfaction with inferior performance do not reflect themselves in a lowered psychometric performance level on whatever test.

In a study of 10 lobotomized schizophrenic patients compared to 7 similar patients not lobotomized Robinson (64)

found insignificant results reflected by the Rorschach Ink Blot Test, the Stanford-Binet Intelligence Scale, and the Shipley-Hartford Scale. She discovered that lobotomized patients did less well in alternating attention and making a plan (Porteus Mazes), but better in learning (Hunt-Minnesota). From observation of the subjects, however, she believed them lacking in deliberativeness and prolonged attention. To test these functions she devised deliberation tests for the cognitive aspects of attention and adapted three of the Downey Will-Temperament tests for the motor aspects of attention. She found lobotomized subjects inferior in the Rhymes and Numbers tests of deliberation and on the Volitional Perseveration and Motor Inhibition Downey tests (measuring persistence in attaining a self-set goal and capacity for holding back motor impulses respectively). On the Speed of Decision test the lobotomized subjects were far hastier. She concluded, therefore, that the factor of deliberativeness or prolonged attention is damaged by lobotomy.

Hunt (13, Chaps. 14 and 15) made psychometric surveys of 16 male and 24 female subjects lobotomized by Freeman and Watts. She selected a battery of tests including the Kohs Block, Cube Construction, Arithmetical Calculation, Paper Form Board, Cancellation, Substitution,

Woodworth-Wells Color Naming, Match-Stick, Coin-Under-Cups, Binet Interpretation of Pictures, Rorschach, Kent-Rosanoff, and Bernreuter Personality Inventory. The battery was administered preoperatively and two weeks postoperatively. The results show generally small differences between the two administrations. All the reliable differences in accuracy are in favor of the postoperative state. General inertia and lack of interest were noted in the second series, but antagonism to the procedure decreased. The improved performances either in speed or accuracy were noted on Cube Construction, Arithmetic, Paper Form Board, Cancellation, Substitution, Match-Stick, and Coin-Under-Cups. Lack of testing time precluded the giving of lengthy complex tests, although in the few cases tested with proverb interpretation and arithmetical reasoning preoperative levels were maintained. In the early postoperative period Rorschach records show quantitative changes toward further personality constriction, greater extratensive tendency, loss in organizational and synthesizing ability, and a larger percentage of popular responses. Qualitatively the changes show less response perseveration, less self reference, less concern and self-criticism, greater apathy, and fewer neurotic trends. The Kent-Rosanoff Word Association Test reveals

postoperatively longer testing time, fewer delayed responses, fewer failures, fewer peculiar associations, less self-reference, less perseveration, and less resistance to the procedure. On the Bernreuter Personality Inventory a decided decrease in Neurotic Tendency and Introversion was revealed. Comparing her lobotomy results to those of organic brain disease and lobectomy by Piotrowski and Harrower-Erickson, Hunt finds that only one Piotrowski sign (F%) out of six is consistently present and that changes are in the direction of the constrictive picture of Harrower-Erickson, although much less severe. In a follow up retesting series of six patients several months later Hunt found that Rorschach improvement followed the pattern of clinical improvement, showing expansion, greater intellectual adequacy, and fewer indications of abnormality.

In a Rorschach analysis of 20 cases following pre-frontal lobotomy Kisker (48) points to "six signs which seem to dominate the postlobotomy picture....Low F-plus, low R, lengthened reaction time, lack of M, C, and Z responses, and a relatively high proportion of H and Hd responses"(p. 50). In comparing his signs with the organic signs of Oberholzer, Piotrowski, and Harrower-Erickson, Kisker finds only two which appear in every

list (low F-plus and low M). He further observes that Rorschach improvement may not necessarily parallel clinical improvement, and concludes that "neurosurgical transection of the frontal association areas plays a less important role in the reorganization of the Rorschach patterns than does the prepsychotic and preoperative personality structure." (p. 52)

In another series of tests designed to sample changes in abstract and categorical behavior Kisker (40) used a modification of the Kohs Block Design Test (reproducing card designs with colored blocks), the Weigl-Scheerer-Goldstein Color-form Sorting Test, a Grouping-Behavior test suggested by Vigotsky (grouping of sixty miscellaneous objects by any type of basic principle), and the Rorschach Test series described above. Kisker's results do not reveal a consistent postoperative defect in abstract and categorical behavior by any of these measures, since changes in performances on all the tests cannot any more be ascribed to lobotomy than to "residual(s) of the preoperative psychotic structure."

Observations on perceptual-motor changes after lobotomy were made by Kisker (44) chiefly through the use of the Luria tremographic technique and a series of visual-motor tests. He found in this area no postoperative

disturbances where there had been no preoperative ones, although in some instances the preoperative disturbances disappeared. These alterations in the direction of increased motor efficiency Kisker interprets as functions of the general destruction of psychotic attitudes rather than altered neurodynamic organization as a result of surgery. In a discussion of the total picture of the behavioral sequelae of lobotomy Kisker (39) states that his experimental design was geared to determine the presence or absence of postoperative changes in "emotional, intellectual, and attitudinal patterns, as well as alterations in the orientative and motor functions (p. 172)." Since his results suggest emotional re-patternization, lack of intellectual change, attitudinal modifications, dysfunction in orientative mechanisms, and re-organization of the organic (motoric) substrate, he believes these factors to "constitute the core around which the post-lobotomy picture arranges itself (39, p. 189)."

In his paper read before the 1948 meeting of the International Congress of Psychology, Goldstein (as reported in 37) asserted that ordinary psychometric procedures do not reach the intellectual changes wrought by lobotomy. He pointed out that failures and successes in various subtests tend to cancel each other out and

that the postoperative patient covers his defects by passing the tests through reliance upon memory of a concrete situation or by rote. Thus he believes that the all important defect, loss of ability for abstraction, can be overlooked by the psychologist. He suggests the utilization of the Goldstein tests of abstraction, since the losses referred to as "lack of synthesis" and "lack of insight" are but "aspects of an inability to abstract."

In a note about testing psychosurgery patients Porteus and Peters (59) have come to believe that mental diagnosis is the most important application of psychological tests. They think the most important questions asked of a test are what it measures, how well it measures it, and how this trait is related to social adjustment. In their study of 55 lobotomy cases they applied among others the Porteus Maze tests. In the immediate postoperative period there is a sharp drop in performance, then a gradual gain flattening out after two years at a level of one year's increase in test age above the preoperative level. They found the maze test quite sensitive, and make the two important observations that patients show a lack of practice effect and a marked tendency to make the same errors repeatedly.

Peters (55), studying the same patients as Porteus,

tried to establish a list of traits for predicting the outcome of lobotomy from the preoperative status. A 199-item trait list was the result, with nine traits found statistically reliable in the favorable traits category and fourteen in the unfavorable traits category. In the preoperative status he emphasizes the predictive value of the two general principles of heightened activity level and a state indicating integrity and dominance of the cortical centers.

The mounting criticism of equivocal results yielded in the postlobotomy states by the commonly employed testing instruments such as the Rorschach, Stanford-Binet, Kohs Blocks, and various personality inventories has been spearheaded by psychologists themselves and echoed throughout the literature by neuropsychiatrists. The usual reaction to this situation has too often been in the form of categorical pronouncements calculated to undermine the general confidence clinicians have had in these devices for the past decade. It appears that there are two probable explanations of the apparent failure of these tests to meet their present demands in the postlobotomy area: (1) They were standardized on normal subjects with intact brains; and (2) they were validated in terms of the more global and socially applicable types of

intelligence requisite to such endeavors as school achievement, occupational effectiveness, and socio-economic adjustment. At the present time there is surely no real cause to doubt the need of measuring the traits just mentioned. In fact, the latest listing of tests indicated for use with lobotomy included most of the subtests of the Wechsler-Bellevue Scale as well as personality tests like the Minnesota Multiphasic and projective techniques like the Rorschach and Thematic Apperception (See 26, p. 9).

CHAPTER II

THE PRESENT STUDY

Purpose: The purpose of this study is fourfold:

(1) To observe changes in test results of psychotic patients after prefrontal lobotomy; (2) to observe behavioral changes; (3) to note discrepancies between these two in individual cases; and (4) to determine which techniques best describe the personality changes involved.

It has been charged that commonly employed psychometric devices are insensitive to the cognitive and affective alterations induced by surgical damage to certain circumscribed areas of the cortex. Neuro-psychiatric studies, on the other hand, purport to reveal changes in interpersonal relations, reduction of morbid symptoms, and release from rumination, anxiety, depression and psychic tension. In the present study parallel clinical and psychometric descriptions are summarized for each of 21 patients during both preoperative and postoperative periods for purposes of comparison.

Method: Preoperative and postoperative serial testing of 21 psychotic lobotomy candidates at Longview State Hospital was carried out during the period February, 1948 to October, 1948. Operations were performed at a

rate of one per week on patients selected for radical therapy on the bases of intense symptomatology, long duration of illness, and extremely poor prognosis. Psychological examination was undertaken preoperatively and was repeated (in most cases) during the second and eighth postoperative weeks. At the same intervals a behavioral check list (see Appendix I) was filled out by the examiner in consultation with the head ward attendant and/or the attendant or nurse who had observed the patient's ward behavior for an extended and continuous period.

For purposes of this study it was decided that three conditions would be observed. These were: (A) the control or preoperative condition; (B) the experimental I or first postoperative condition; and (C) the experimental II or second postoperative condition. For convenience, these three will hereafter be designated as A, B, and C conditions respectively, with prime importance attached to A and C. Thus, each patient served as his own control, with condition B registering immediate psychometric changes and condition C the more crystallized states. Testing during each condition required parts of two days, with some departures from the planned schedule occasioned by illness or disorientation of the patient. At each

sitting tests were administered in a given order and by but one examiner throughout. All tests were given in the examining room of the patient's ward except those of condition B, which were often given in the patient's hospital room. The testing environment was considered optimum in all instances. Testing was attempted on 22 patients, with one surgical mortality reducing the total to 21.

Apparatus: The following psychological tests and procedures were utilized:

1. Clinical Interview:
 - (a) Appearance, attitude and behavior
 - (b) Emotional reactions, affect, and mood
 - (c) General description of patient (with supplemental observations derived from hospital records, psychiatrists, nurses, attendants, et al)
 - (d) Social history (abstracted from hospital records)
2. Rorschach Psychodiagnostic Test
3. Wechsler-Bellevue Intelligence Scale (Forms I and II)
4. Agnosia, Apraxia, Aphasia Series (from the Examiner's Handbook, Revised Edition, p. 49)
 - (a) Naming pictured objects, (b) repetition of the spoken word, (c) understanding the spoken word, (d) reading aloud, (e) understanding the written word, (f) writing names of objects seen, (g) writing from dictation, (h) copying the written word, (i) spelling the spoken word, and (j) use of pictured objects.
5. Color Naming (Examiner's Handbook, p. 153)
6. Color Substitution (adapted from Test 5 above)
7. Memory Span for Objects (Examiner's Handbook, pp. 156-9)

8. Picture Similarities (Examiner's Handbook, pp. 161-4)
9. Proverb Interpretation (Examiner's Handbook, pp. 119-21)
10. Writing (own name, "United States of America", etc.)
11. Orientation Series (consisting of five questions each for time, place, person, and memory for recent events)
12. Behavior Inventory (this investigator's 55-item trait list)

Description of Tests and Procedures

The Clinical Interview in each instance preceded formal testing of the patient. It consisted of the examiner's impressions regarding the patient's posture (stereotypy, ability to retain position, etc.), expression (masklike, sad, silly, distressful, etc.), attitude (hostile, passive, erratic, etc.), movements and speech (retarded, overactive, monosyllabic, mute, etc.), and general behavior (withdrawn, excited, irritable, pestering, etc.). It also took account of the patient's emotional reactions (flat, inappropriate, rigid, etc.), and mood (euphoric, depressed, apathetic, etc.). These phases of the behavior were supplemented with descriptions by physicians and nurses as well as the social worker's report.

The Rorschach Test was utilized to provide

information on the presence and quality of personality restructurization after operation. It is said to reveal insight into such phases of personality as present functioning intelligence, alogical and illogical thought processes, attention to detail, conventionality, orderliness in approaching a task, discrimination and judgment, accuracy of perception, personality stability, imaginal utility, emotional lability, regressive trends, inferiority feelings, dysphoria, euphoria, anxiety, type of personal needs, adaptivity, stereotypy, interests, degree of self will, fluctuations in efficiency, perseveration, introversive-extratsensive trends, coherence, etc. It was believed that lobotomy might be accompanied by demonstrable changes in any or all the above named facets of personality.

The Wechsler-Bellevue Scale was included not only because of its usefulness in establishing the adult IQ, but also because of its ability to yield patterns of selective impairment through the technique of scatter analysis. It consists of 11 subtests, of which six are verbal and five performance. It yields a verbal IQ, a performance IQ, a full scale IQ, and a psychograph for personality description and diagnosis.

Each subtest of the Wechsler Scale theoretically aims to measure a specific type of cluster of individual

abilities. Some of these abilities have been indicated by David Rapaport (78, p.28) as follows: (1) Verbal Ability, as measured by Vocabulary, Information, Comprehension, and Similarities subtests; (2) Attention and Concentration, as measured by Digit Span and Arithmetic subtests respectively; (3) Visual Organization, as measured by Picture Arrangement and Picture Completion subtests; and (4) Visual-Motor Coordination, as measured by Block Design, Object Assembly, and Digit Symbol subtests. In addition to these basic groupings, it is thought that more homogeneous abilities are involved in each subtest. These are "memory" in the information test, "judgment" or "reality testing" in the comprehension test, "verbal concept-formation" in the similarities test, "attention" in the digit span test, "concentration" in the arithmetic test, "planning ability" in the picture arrangement test, "concentration on visually-perceived material" in the picture completion test, "visual-motor coordination" in the object assembly, block design, and digit symbol tests, with the last named involving a considerable element of learning. The vocabulary test may involve a complex of verbal abilities such as verbal meaning, verbal learning, word fluency, and the like (Cf. 79 , p. 402)

Clinicians skilled in the interpretation of Wechsler scattergrams have long noted what appear to be definite laws of scatter operating in the scores of patients in various nosological groups. The hypothesis arises, therefore, that scatter (or unevenness of performance) is not random, but is patterned in such a way as to reflect diagnostic differentials among clinical and normal groups. There are three scatter measures in common use which appear clinically valuable. These are: (1) Vocabulary scatter, which deals with the configuration of the other ten subtest scores as they deviate from the vocabulary score; (2) Mean scatter, which is the deviation of a given subtest score from the mean score of all the subtests; and (3) Modified mean scatter, which is the deviation of a given subtest score from the mean of the other subtest scores in its own scale (i.e., Performance or Verbal Scale). In the present investigation the scatter principle was utilized as an aid in detecting configurational changes in individual test results under experimental conditions B and C.

The Color Naming test was introduced in this battery as an indicator of relative mental speed in a simple perceptual act. It requires the patient to name as quickly as possible 50 colors on a single page where blue, red,

green, black, and yellow are represented equiproportionally. Total time in seconds and total errors are recorded.

The Color Substitution test consists of the same page of colors as the Color Naming test, but requires the patient to deal with the colors symbolically by designating them as 1 through 5 respectively rather than by name. Total time in seconds and total errors are recorded.

The Memory Span for Objects test consists of 20 commonly used objects pictured on a double page. The patient names the objects and then with the book closed recalls as many as possible. The score is the number correct out of 20. Two series of object pictures are used, one for males and one for females. The test involves visual memory, attention, learning and recall abilities, and is claimed to be useful for patients recovering from various shock states and head injury conditions.

The Picture Similarities test includes five sets of pictured objects (kitchen objects, fruits and vegetables, desk objects, etc.). A subject who gives an abstract resemblance receives A or B; if he gives concrete resemblance he receives C, with D reserved as the score for failure. This test serves as an adjuvant to the Wechsler-Bellevue word similarities subtest, tapping the same functions on a lower level.

Proverb Interpretation consists of two lists of ten proverbs each, with the patient merely being required to read or listen to a reading of each one. He is then asked, "What is it supposed to mean?" The score is the number correct out of ten with liberal allowances made for phrasing. Literalistic interpretations are failures. This test was used as another approach to the abstracting function, although it is not well suited to marginal intellects.

The writing own name and USA requirement was introduced chiefly as a routine procedure for quick estimation of literacy, motor blocking, and simple motor coordination.

The Orientation Series included five questions each for place, time, person, and memory for the recent past. The list actually used was a modification of questions appearing on pages 35 and 36 of the Examiner's Handbook. It was introduced routinely to register possible changes in gross orientation during the postoperative state.

The Behavior Inventory (see Appendix I) consisted of a list of 55 traits which could be considered as symptoms of the individual patient. The examiner, in consultation with ward attendants and nurses who had known the patient for many months, filled out the first list preoperatively and seven weeks postoperatively.

The second list he filled out with the aid of the hospital ward nurse on the day the patient was discharged from her care. In the latter case observation of the patient had been over a two-weeks period. The inventory was considered indispensable to the present study, since the attendant is the person who literally lives with the patient and observes him under varying conditions when he is not likely to be "on his good behavior."

General Information Regarding Patients Studied. The patients tested were selected for lobotomy by the Neuropsychiatric Staff of Longview State Hospital. In addition to prognosis, several other considerations were involved in the selection. These included requests by parent or guardian, type of ward behavior, failure of all other therapeutics, type of symptomatology, and state of physical health. Lobotomy was regarded as a measure of last resort in otherwise hopeless cases. Its aim was not necessarily to cure the patient, but to render him more amenable to routine ward care. If the operation afforded him some relief from anguish and made him a safer associate for other patients, it was considered advisable. Of the 22 patients tested and lobotomized in this series, 21 survived, constituting a surgical mortality rate of 4.6%. This compares favorably with the

3 to 5% rate reported throughout the English speaking world. The candidates selected in the present series are typical of those cited by other investigators.

In Table 1 below essential information on all patients is summarized. For convenience, patients are grouped by diagnostic category with subtotal averages below each group. Each individual is coded by initial rather than by name. Age is listed as of last birthday prior to operation. Diagnosis is the current staff designation. Duration of illness in months is estimated from the social history abstract, and in most cases precedes the hospital admission date. Marital status is signified by single, married, or divorced. Siblings reported are those living. Per cent symptom loss is computed by dividing the number of symptoms reported by attendants postoperatively by those reported preoperatively. Psychiatrist's ratings are stated in terms of a six-point scale where A represents anticipated discharge from hospital and return to work, B discharge from hospital for care at home, C transfer to an open ward with occasional absence with leave, D better adjustment on closed ward, E, reduction in morbid symptoms, and F no improvement.

TABLE 1

SUMMARY OF ESSENTIAL DATA - ALL PATIENTS

Pt.	Sex	Age	Diagnosis	Duration Illness (Months)	Lobotomy Date (1948)	Highest School Grade Completed	Marital Status	No. of Siblings	% Symptom Loss	Rank Order of Symptom Loss	Present Status Rating by Psychiatrist	Psychologist
1. DA	F	33	Paranoia	54	13 Sept.	13	D	0	63	2	D	B
2. EH	M	29	Paranoia	102	12 July	8	S	2	36	9	E	F
3. ME	M	38	Paranoia	15	23 Aug.	13	S	0	22	15	C	C
Mean		33		57		11		1	40		D	D
4. GA	M	31	Manic-Dep. Psychosis	157	28 June	12	S	7	13	18	F	F
5. IT	M	40	Manic-Dep. Psychosis	120	17 May	10	D	3	28	14	C	D
Mean		36		139		11		5	21		D	E
6. JB	F	51	Psychosis with Mental Deficiency	202	5 April	6	M	3	18	16	F	E
7. OJ	F	22	Psychosis with Mental Deficiency	60	23 Feb.	7	S	2	33	11	D	D
8. ER	M	26	Psychosis with Mental Deficiency	100	12 July	7	S	3	0	19	F	F
Mean		33		121		7		3	17		E	E
9. EC	F	18	Catatonia	9	19 Apr.	10	S	1	36	10	D	C
10. MC	F	33	Catatonia	16	23 Feb.	8	M	2	46	7	C	D
11. ED	M	37	Catatonia	151	15 Mar.	13	S	1	53	5	D	C
12. BG	M	33	Catatonia	108	13 Sep.	9	S	0	32	12	F	E
13. ML	F	49	Catatonia	300	28 June	7	S	3	-23	21	F	F
14. CS	F	22	Catatonia	6	5 April	13	S	5	30	13	D	D
Mean		32		98		10		2	29		D	D
15. LB	F	37	Hebephrenia	175	3 May	7	S	6	54	4	D	D
16. WD	M	32	Hebephrenia	94	7 June	11	M	1	57	3	B	C
17. MK	F	39	Hebephrenia	182	17 May	12	S	1	16	17	D	E
18. AL	F	54	Hebephrenia	192	7 June	20	S	2	39	8	D	D
19. BS	M	18	Hebephrenia	25	15 Mar.	9	S	2	48	6	B	B
20. SS	F	22	Hebephrenia	56	23 Aug.	8	S	0	73	1	D	D
Mean		30		121		11		2	48		C	D
21. AR	F	38	Schizoaffective Psychosis	24	3 May	8	M	7	-12	20	D	C
Mean		38		24		8		7	-12		D	C
Mean of Total		31		102		10		2	32		D	D

1/ Attendants' Rating.

CHAPTER III

RESULTS: INDIVIDUAL SUMMARIES

Case 1 (DA). This is a 33 year-old paranoid woman who is an only child and who was divorced in 1942 after a trying five years of marriage. She had one child and sued for divorce on grounds of cruelty, but the action was contested by the husband. While suit was pending she attempted to drown herself in the surf in Florida, but "the cold water brought me to my senses and I swam out." After achieving the divorce the patient worked as a commercial artist in fashion advertising at a Cincinnati store. She was discharged allegedly because her drawings "lacked appeal," but her parents say she was extremely sarcastic and ridiculing. She is described as talented, intelligent, sociable, artistic, temperamental, and excessive in habits. There is a history of numerous affairs with men, and the patient's delusional system involves her conviction that friends continually spread stories of her immorality and prostitution. She even believes they have posted the FBI to trail her and keep track of her actions. Original admission to Longview was in February, 1944. After electroshock therapy and a short stay she was discharged and worked in Pittsburgh where she again lost her job. After a short readmission and a Long Visit she returned to Longview in August, 1947. Her condition at this time was one of confusion with active auditory hallucinations. Her verbalizations included frequent allusions to her mother, upon whom she blamed most of her troubles. After OT and shock therapy had wrought no change in her condition she was indicated for lobotomy during the summer of 1948.

Psychological Findings. Preoperative examination revealed an attractive, graying, asthenic woman of dignified bearing with a tense and depressed expression. She answered the examiner's questions precisely with exaggerated enunciation and diction. Orientation was intact except for memory of the recent past.

Conversational material elicited was of a vaguely philosophical variety, although delusional ideas were much in evidence. Rapport was unbroken throughout the testing period with considerable positive transference noted. There was neither obvious regression nor manneristic behavior. In the testing situation after lobotomy the patient was cooperative and pleasant. Answers to questions were more direct, with vague philosophical discussions being eliminated. A summary of the test results of DA for all three conditions appears in the following table.

TABLE 2
CASE 1 (DA) TEST SUMMARY

SHORT TESTS			
	A	B	C
Pic. Sim.	A	A	A
M. Span Obj.	14	10	11
Proverbs	9	1	10
AAA Series	10	10	10
Orientation			
Place			
Time	5	5	5
Person	5	1	4
Recent Events	4	4	5
Color Naming	3	3	5
Color Sub.	33	32	30
Own Name, USA	66	67	71
	OK	OK	OK

	A	B	C
Info.	13	13	13
Compr.	15	14	15
D. Span	9	10	11
Arith.	12	10	8
Simil.	14	14	12
Vocab.	14	13	14
V. IQ	121	117	120
P. Arr.	8	6	11
P. Comp.	14	14	12
B. Design	14	15	16
O. Assem.	14	13	15
D. Symbol	11	8	11
P. IQ	120	114	125
F.S. IQ	122	117	124
Det. %	13	16	12

[illegible]

Points of interest in DA's results are to be noted in Proverb Interpretation, where in the immediate post-operative situation, her literalistic explanations netted only one correct, and in Time Orientation, where post-operative temporal confusion reduced her score to one. The disappearance of verbal abstraction ability is a sign of organic involvement, but in this lobotomy case it was temporarily hidden, only to emerge later. The Wechsler results show no changes in IQ, but do reveal interest alterations. Information and vocabulary, as expected, are stable throughout, but lower picture completion and higher picture arrangement (reflecting attenuation of over-vigilance and better grasp of interpersonal relations) are signs of psychometric "improvement" in a paranoid. The smaller increase in digit span (attention) performance may corroborate this conclusion. In the postoperative Rorschach changes one notes emergence of Dd in a more nearly normal approach, shift of color to the healthier FC, emergence of FY, hastened reaction time, increase in H and reduction in Hd, and an anticipated increase in popular percepts. It is still apparent, however, that we have a coarctated and rigid personality, as evidenced by the F+% of 100, the suspiciously low R, and the frozen M:C ratio. The test results unequivocally support the judgment of attendants,

however, who noted a 63 per cent decrease in DA's symptoms, especially in rumination, complaining, tantrums, restlessness, homicidal trends, profanity, and indecency. On the basis of psychologic evidence the examiner would rate this patient B (probable discharge and satisfactory home adjustment).

Case 2 (EH). This is a 29 year old paranoid unmarried male who is the eldest of three siblings. He has shown steady psychotic regression since hospitalization in 1940. Prior to that time he is described as having been normal in most respects, athletic, sociable, but a repeated failure in school. The medical history is negative and the work history lists the only employment as electrician's helper. Onset of the disease was rapid, with the patient beginning to complain in 1940 that unknown individuals were after him intending blackmail. He stated that the people next door had planted a dictaphone in his room to gain information about him. The delusional pattern became quickly crystallized with symptoms of active hallucination and intense suspicion regarding ordinary events. Hospital records show that in spite of extended insulin and electroshock treatments the patient gradually became more withdrawn, vague, seclusive, delusional, and negativistic. On the ward he had to be urged to go to the cafeteria, to dress, and perform required details. At the insistence of his parents he was indicated for lobotomy in April, 1948.

Psychological Findings. At time of first examination this patient appeared flattened in affect, passive, monosyllabic, withdrawn, and apathetic. His answers were detached and depersonalized, perfunctorily given. He showed no curiosity regarding the purpose of the interview and stated that the examiner was his brother. Preoccupation with introversive ruminations seemed far

more important to him than did the test materials. He was anergic and passive throughout all subsequent testing sessions, being unmoved even during a scuffle and heated exchange of words between the attendant and a nearby patient.

The following table summarizes the performance of patient EH during the three testing conditions.

TABLE 3
CASE 2 (EH) TEST SUMMARY

SHORT TESTS				WECHSLER-BELLEVUE				RORSCHACH			
	A	B	C	A	B	C		A	B	C	
Pic. Sim.				4	4	5	Info.	17	14	10	C
M. Span Obj.	A	D	B	3	2	3	Compr.	3	1	1	C
Proverbs	10	6	3	0	0	4	D. Span	13	11	9	C
AAA Series	2	0	0	4	3	8	Arith.	1	2	0	C
Orientation	9	10	9	2	3	6	Simil.	0	0	0	C
Place	3	3	2	5	3	6	Vocab.	62	69	50	C
Time	3	1	1	62	60	75	V. IQ	82	93	90	CF
Person	3	1	1	3	1	1	P. Arr.	35	36	20	FC
Recent Events	4	2	3	9	3	7	P. Comp.	6	2	1	FY
Color Name	35	32	32	12	3	10	B. Des.	0:0	0:0	0:0	YF
Color Sub.	90	x	76	10	8	12	O. Assem.	0:0	0:0	0:0	FV
Own Name, USA	OK	OK	OK	6	5	2	D. Symb.	3:0	1:0	1:0	RT Bl
				89	62	76	P. IQ	1	0	0	RT C
				73	58	74	F. S. IQ	1	1	1	T/R
				20	38	19	Det. %	0	3	3	H
											Hd
											A
											Ad
											An

Postoperative changes in patient EH are not in the direction of bettered performance. Lower scores are found on abstract and concrete resemblance, verbal abstraction, and in orientation. Under C condition he stated he was on the fourth floor (actually first) of a building at "Clilli, Ohio" (actually Cincinnati), that the month was January (actually July), and that the other patients were "folks visiting through the seasons." Spelling of common objects was faulty ("clomul" for comb, "hammom" for hammer, "pensial" for pencil, etc.) when writing was done from pictures, but was correct when copying the written word. On the Wechsler, attention and concentration improve on a limited level, but this may be due to motivational fluctuations rather than improved sensori-cortical integration. Visual-motor coordination (digit symbol) is considerably reduced, suggesting the possibility of cortical disturbance in regions other than the frontal poles. Strict paranoid signs in the record are not eliminated, but if anything are augmented. The Full Scale IQ is unaffected, though the Verbal IQ is substantially increased. Turning to the Rorschach, we see further evidence that lobotomy has not arrested the retrograde nature of this psychosis. Productivity continues to wane, contact with reality

becomes even more precarious, perceptual content veers farther from normal, and interpersonal ties are disintegrating. Pathologic reactivity to emotional stimulation arises postoperatively along with slower thought processes. The 36 per cent symptom loss reported by attendants can, when examined in detail, be demonstrated to have occurred in a reduction of symptoms signifying emotional reactivity (e.g., in irritability, bitterness, aggressivity). In a patient of this type these alterations point to a psychotic settling process, a failure to continue fighting the disease. The psychologic rating would therefore be F (no improvement) on the psychiatrist's scale.

Case 3 (WH). This 38 year old man, diagnosed as paranoid, is an unmarried only child. His present attack dates from June, 1947, although there were previous admissions for treatment of "delusional behavior" as early as 1934. The history indicates he has always been irritable, demanding, and of volatile temperament. His father is a retired professional man, and both he and the patient's mother have tried to humor him in his idiosyncrasies. The work history has been erratic with no really successful adjustment. The patient has always had an obsessional desire to become a renowned musician. Though he is a pianist of some ability, he has always felt that his achievements have been frustrated by his not possessing the most expensive piano money can buy. He feels that a minimum figure for such an instrument would be in the neighborhood of \$5,000. His father, at considerable sacrifice, purchased an \$1,800 one, but this was denounced by the patient as a "cheap instrument." At this time he desired a house of his own, so the father agreed to purchase it. The patient, however, disagreed so violently over details of its construction that the project was

almost abandoned. Later an acceptable house was purchased in Cincinnati, but he was never satisfied with it since it was not adorned with a \$5,000 piano. At this time the patient claimed to have received a letter from an eminent concert pianist which allegedly stated his musical genius was being sacrificed on a poor piano. This letter was lost, according to the patient, by the hospital authorities. It was during the hearing of a suit against the hospital regarding the letter that the authorities decided to have the patient probated. At about the same time he had picketed the office of the president of a large company in Cincinnati because the latter refused him a hearing regarding the demanded purchase of an expensive piano. Upon admission to Longview the patient was described as delusional, talkative, and inappropriate in affect. After two escapes and no improvement from shock therapy, he was indicated for lobotomy in May, 1948.

Psychological Findings. Initial examination revealed a tall, asthenic, awkward, loquacious, and pedantic male, rigid in affect, but possessing an excellent vocabulary and considerable wit. There was a mild tremor of the extremities and a notable hesitation in speech, especially when quick conversational shift was required. After a sharp exchange of wit between the patient and the examiner, rapport was established and maintained. During the interview there was much obsessional, though not frankly delusional, material elicited concerning the question of the piano. After lobotomy the patient was cooperative during testing periods, but comparatively lethargic. He complained mildly about having a "hole in the head," but mentioned the piano only in connection with resenting the time lost from practice during enforced hospitalization.

Following is the psychometric summary of patient WH.

SHORT TESTS			
	A	B	C
Pic. Sim.	A	A	A
M. Span Obj.	10	14	11
Proverbs	9	2	9
AAA Series	10	10	10
Orientation			
Place	5	5	5
Time	4	5	5
Person	5	5	5
Recent Events	5	5	5
Color Naming	45	38	38
Color Sub.	120	80	91
Own Name, USA	OK	OK	OK

WECHSLER-BELLEVUE			
	A	B	C
Info.	17	17	15
Compr.	15	14	15
D. Span	11	10	9
Arith.	12	12	11
Simil.	16	15	15
Vocab.	15	14	16
V. IQ	130	126	128
P. Arr.	8	12	10
P. Comp.	15	14	12
B. Design	12	12	10
O. Assem.	12	11	11
D. Symb.	4	6	5
P. IQ	110	115	107
F.S. IQ	122	122	119
Det. %	29	24	30

TABLE 4
CASE 4 (WH) TEST SUMMARY

RORSCHACH			
	A	B	C
R	19	17	16
W	5	7	5
D	12	9	11
Dd	2	1	0
M	2	3	3
EC	0.5	0.5	0.5
F+%	86	90	91
F%	74	65	68
A%	68	65	56
P	7	7	7
M:C	2:5	3:5	2:5
W:M	5:2	7:3	5:2
FM	0	0	0
S	2	1	4
CF	0	0	0
FC	1	1	1
FY	1	2	1
YF	0	0	0
FV	0	0	0
RT BL	3"	5"	5"
RT C	9"	5"	6"
T/R	63"	35"	29"
H	2	3	3
Hd	2	0	2
A	11	10	5
Ad	2	1	4
An	0	0	0

Discrepancy between immediate postoperative proverb score and the other two conditions indicates that high-level abstraction functions even in a superior verbal intellect were temporarily eliminated. Preoperatively, in explanation of the proverb "No use crying over spilt milk," WH had said, "One should not dwell upon accidents or misfortunes of the past since they are irreparable." Shortly after operation in answer to the proverb, "Lie down with the dogs, get up with the fleas," he said, "If you sleep with them you contract fleas." The deterioration of this ability, however, was ephemeral, since it returned within a seven-weeks period. Orientation, mental speed, and low-level abstraction were apparently unaffected. The Wechsler IQ values did not shift perceptibly, although the lowered performance scores throughout bespeak the motor blocking noted clinically. The paranoid-like alertness on picture completion was reduced under condition C to a level more consistent with the performance on other tests in the same scale. There was also a slight improvement on picture arrangement indicating better anticipatory and planning ability. The Rorschach changes leave little to dwell upon from the quantitative standpoint. Stereotypy, productivity, emotional rigidity, and conventionality are at their approximate preoperative levels. Qualitatively,

the attitude toward the test was similar in all three administrations. Extraneous comments and witticisms were frequent. Attendants' ratings find WH less talkative, less suspicious, and less given to speech blocking. They rate his symptom reduction at 22 per cent, which is not high. Psychological rating would place WH at the C level (open ward status).

Case 4 (GA). This 31 year-old manic-depressive unmarried male was admitted to Longview in May, 1935, but strong symptoms of his condition were noted by family members a year previously. He comes from a family of seven siblings, and was described by them as having been outgoing, kindly, and intelligent. Educational history reveals he is a high school graduate, having skipped a grade in grammar school. He enjoyed outdoor sports, but also liked to read religious literature. He became excessively religious just before admission and read the Bible compulsively. He composed a special letter to his sister requesting forgiveness for once stealing a dime from her. Ideas of grandeur and religious excitement became so intense that he walked the floor and preached throughout the night. He had worked his way up to consideration for foremanship at a steel mill, but suddenly felt unworthy of this station. He began to attend Holy Roller meetings, insisting he had been to heaven and begging God to take him back from the earth to relieve his suffering. Upon admission he showed flight of ideas, impulsiveness, overactivity, hallucinations, and disorientation. He was suffering upper respiratory infection and toxemia which were successfully treated. After discharge from Longview in July, 1935, he was returned two months later in a "restless state bordering on schizophrenia." By 1939, after insulin and metrazol treatments numbering over a hundred, he had regressed to a mutistic, incontinent, disoriented, and autistic state. Further treatment and ward care brought no change, and by 1948 he was silly, masturbatory, and disheveled. Lobotomy was requested in January, 1948.

Psychological Findings. Preoperative examination revealed a mute, malodorous, autistic individual who

responded to simple commands. He accompanied the examiner to the testing room without hesitation. Extended questioning as to orientation failed to elicit any response. The patient held chin on chest and would not look up. He had an incessant compulsive movement of rubbing the right eye with the right thumb along with gross body tremor. Emotion-provoking questions left him unmoved, though he drew back reflexively from the flash of a cigarette lighter. He accepted test materials, but did not react to them. The patient knew his right from his left hand and would carry objects to designated places. He was said to eat regularly and well and to have become less violent during the past year. Repeated attempts to test him at later dates were unsuccessful.

Lobotomy was performed in July. There was no perceptable change in the patient's behavior except for reduction in mannerisms. Periodically, from July through October, attempts were made to secure postoperative test results, all unsuccessful. The patient is now as mute and autistic as before. Neurologic examination shows elementary reflexes and higher reflexes controlled by voluntary action intact. Higher intellectual functions, extent of awareness, and insight cannot be determined. Attendants' ratings show little (13 per cent) reduction in symptoms. They find the patient somewhat more able

to care for himself and believe he is better oriented.

The psychological rating is F (unimproved).

Case 5 (IT). This is a 40 year-old divorced male who has been diagnosed as a manic-depressive, but who also shows paranoid features. He was born in Jerusalem of Hungarian parentage, and was one of four siblings. After coming to the United States at age 14 he completed two years of high school. In his own business (furniture store) he was described as shrewd and hard working. At home, however, he was domineering, unreasonable, and high tempered, striking his wife on several occasions. He was against having children, but agreed to it after his wife threatened divorce; when she was pregnant he told her he hoped the child would be crazy and deformed. In 1936 he attempted suicide by slashing his wrists, and from that time until admission in 1938 his whereabouts was usually unknown to the family. At the hospital IT has been an extremely trying patient. In addition to his violence on the ward he has written letters to the rabbi, his lawyer, and the superintendent. On one occasion he escaped from the ward; at another time, from his brother's custody. He was returned by police both times. He attempted to incite other patients to rebellion, and asked them to sign sworn statements attesting what he termed "slave conditions" at the hospital. He was released once upon request of the rabbi and once by court order. Each time he came quickly to police attention and was returned in a disoriented and dangerous condition. By April, 1948, after a monotonous history of violence, destructiveness, and tantrums necessitating frequent physical restraint, IT was recommended for lobotomy.

Psychological Findings. Preoperative examination revealed a refractory, wild, hot tempered male of slight stature who alternately struggled and screamed while being restrained by an attendant. The examiner's questions were answered in an explosive manner and at a volume level which left one's ears ringing. Orientation to person was non-existent, although memory for recent events

was intact. When presented with test materials there was so much opposition that examination had to be discontinued. A manic attack was clearly in the making. Two further attempts at testing were made one week apart. On these occasions the patient was in a depressed mood, being either mute or speaking in an inaudible manner.

Immediately after lobotomy IT became severely disturbed. He screamed so loudly at night that it was necessary to put him in a closed room in complete restraint. For the entire two-weeks postoperative period he was on forced feeding, was incontinent, and dangerous. He struck a senile patient during the short period he was out of restraint. When testing was attempted he threatened to kill the examiner. Three weeks later, however, when he had been returned to the refractory ward, he had quieted down considerably. It appeared that lobotomy had at least made him an easier patient to care for on the ward. At the testing session he was quiet, apathetic, and mildly cooperative. He attempted the Rorschach, but could give no responses, stating apologetically that his eyesight was poor. It was difficult for him to retain stable posture, and there was a lower jaw tremor which imparted a vibrato effect to his voice. Speech was still uneven in volume and slurred in enunciation. On the Wechsler

Scale he invariably prefaced each answer with the remark "zay tole me eet vaz -." Both the Wechsler and the Rorschach were unscorable. The aphasia series was correct, though writing was a chore. Errors in spelling included "sysirs" for scissors, "haymier" for hammer, and "pencill" for pencil. One proverb was correctly interpreted. Orientation scores were: Place, 5; time, 1; person, 3; and recent events, 3. Memory Span for Objects was 6 and Picture Similarities was B. Color Naming required 65", while Color Substitution took 150".

In the three months following testing the patient was regularly visited. At times he would converse at length, but test results showed no improvement over those cited above. The behavior inventory shows a 28 per cent reduction of symptoms, important among which are restlessness, insomnia, overactivity, nakedness, and periodic mutism. Psychological rating would place this patient at the D level (better hospital adjustment).

Case 6 (JB). This is a 51 year-old widowed mentally deficient psychotic who is the mother of three children. Except for the period September, 1931 to January, 1933, she has been committed to Longview since June, 1931. Her husband died of pneumonia in 1939, but she could not comprehend the situation. She came from a family of four siblings, all of whom are reported as normal. Prior to her marriage she skipped from job to job as an unskilled worker. Shortly after marriage her husband reported she "talked peculiarly, branching off into irrelevant subjects, never keeping on the original topic." In 1929, at the time of a sister's death,

JB began taking pills to abort, although she was not pregnant. She believed she was being poisoned, that her husband was unfaithful, that her money was being stolen, and that her husband's mother was "a bad woman." Her language became offensive. She imagined a man walked behind her shining a light on her spine and felt safe as long as he followed her. When he "left" she experienced diffuse pains. During the year and a half when she was on trial visit (and AWOL) from Longview the neighbors complained that the house was dirty, the children were neglected, and marital bickering was continuous. The Humane Society was instrumental in having JB recommitted. A survey of the extended progress record from 1933 to 1948 reveals no change in her mental state. There are many notes and letters written by a sister in a semiliterate hand and addressed to the superintendent. These complain that the clothing the writer sent to JB disappeared. A long series of patient replies by the hospital that JB is destructive of her clothing appears to go unheeded. Up to 1948 the patient remained withdrawn and schizophrenic. Lobotomy was indicated in February, 1948.

Psychological Findings. Initial impressions revealed this patient as a short, well nourished, graying woman who wore a silly and childish expression. She was cooperative, but misidentified the examiner and her surroundings. She was ruminative, confabulatory, autistic, and profoundly lacking in insight into her illness. There was much preoccupation with bodily functions with somesthetic delusions and ideas of reference. She called the examiner "Freddie," and told him it was all right to operate (though nothing of this nature had been suggested). Frank de-personalization was noted with the patient speaking of herself in the third person. After lobotomy testing was facilitated, attention was better focused, directions were

more consistently followed, and rumination was not prominent. Insight and awareness, however, remained at their pre-operative levels.

Psychometric results are depicted in the following table.

TABLE 5
CASE 6 (JB) TEST SUMMARY

SHORT TESTS		
	A	B
Pic. Sim.	3	3
M. Span. Obj.	0	7
Proverbs	0	0
AAA Series	10	10
Orientation	2	3
Place	1	1
Time	3	2
Person	3	2
Recent Events	3	2
Color Name	70	60
Color Sub.	x	x
Own Name, USA		180

WECHSLER-BELLEVUE		
	A	B
Info.	3	3
Compr.	5	3
D. Span.	0	9
Arith.	0	3
Simil.	5	2
Vocab.	5	5
V. IQ	69	76
P. Arr.	3	3
P. Comp.	0	6
B. Design	5	4
O. Assem.	6	6
P. IQ	75	81
F.S. IQ	72	77
Det. %	43	85

RORSCHACH		
	A	B
R	37	30
W	5	2
D	30	24
Dd	2	4
M	0	0
ΣC	13	10
F+%	55	60
F%	62	73
A%	19	10
P	4	6
M:C	0:13	0:10
FM	0	0
S	1	0
CN	1	0
C	29	7
CF	21	1
FC	1	0
FY	1	0
Y	0	0
FV	15.5	67
RT Bl	52	52
RT C	17	17
T/R	5	5
H	0:15	0:15
Hd	1	0
Ad	0	1
An	0	0
Fd	0	0
C	13	6
B	6	1
A	7	2
C	8	3
B	1	0
A	0	0
C	1	1
B	0	0
A	0	0
C	12"	8"
B	3"	41"
A	36"	41"
C	2	2
B	5	0
A	2	0
C	3	6
B	4	9
A	9	13

In this case attention is directed to the concentration and attention factors. Failures on tests measuring these preoperatively seemed due to inability to attend to outside stimuli because of ruminative self-preoccupation. Improvement in this respect is noted in Picture Similarities, Memory Span for Objects, Digit Span, Arithmetic, Picture Completion, Color Substitution, and Object Assembly. Most of these were failed preoperatively. There is clearly a liberation of the factors involved in the Performance and Verbal IQ Scales, with the Full Scale IQ reflecting a sharp postoperative elevation. The preoperative Rorschach shows a massing of signs for deteriorated schizophrenia (pure C, low F+%, no M, deterioration C, incoherence, word hash, peculiar R, deviant verbalizations, etc.) In the second postoperative record there is a reduction in the qualitative signs of schizophrenia, although the totals show very little improvement. Childish verbalizations ("two little mice," "moo cow," etc.) are still in evidence, and anatomy responses increase. Ability to maintain contact with test materials and examiner's directions was facilitated. According to attendants, there is relatively little symptom loss (18 per cent). Irritability, stereotypy, tantrums, and need for physical restraint have disappeared. In view of this and the better functioning

in orientation and attention, the psychological rating is E (less troubled by morbid symptoms).

Case 7 (OJ). The history of this patient is obscure. Reports indicate she is a 22 year-old mentally deficient psychotic who comes from a family of three siblings. The father is dead and the mother is an acknowledged prostitute who encourages her daughters along the same lines. For several years the patient lived away from home with various men. She was an Aid to Dependent Children and Juvenile Court case. Upon admission in February, 1943, she was belligerent and noisy, screaming "I'll kill you!" at the attendant. She explained these outbursts by saying voices were "talking bad about me." After a series of 14 electroshock treatments OJ appeared sufficiently tractable to be tried in occupational therapy. She soon attempted to choke the nurse, however, and was transferred back to the refractory ward. After a five-year period of assaultive attacks on other patients and almost constant physical restraint OJ was recommended for radical therapy in January, 1948.

Psychological Findings. At examination OJ was an untidy, manneristic, vacuous looking young woman who spoke in a whisper. Affect was inappropriate and blocking in speech and movement were pronounced. Answers on most test items were limited to the repetition of a single word which sounded like "sayo."

This behavior was characteristic of all testing periods. Contact with the patient was sporadic, and mutism was frequent when questions proved too difficult. Except for the immediate postoperative examination, however, the patient was able to respond to the Rorschach. Following is a summary of test results.

SHORT TESTS

	A	B	C
Pic. Sim.			
M. Span Obj.			
Proverbs	3	0	10
AAA Series	0	0	0
Orientation	5	9	10
Place			
Time	1	1	1
Person	1	1	1
Recent Events	1	1	4
Color Name	300	72	55
Color Sub.	x	95	120
Own Name, USA	OK	OK	OK

TABLE 6
CASE 7 (OJ) TEST SUMMARY

	A	B	C
Info.	2	1	1
Compr.	0	0	0
D. Span	0	0	2
Arith.	0	0	1
Simil.	1	2	0
Vocab.	2	4	2
V. IQ	47	47	47
P. Arr.	1	1	1
P. Comp.	0	1	1
B. Design	1	4	2
O. Assem.	0	7	5
D. Sym	2	2	1
P. IQ	34	51	41
F.S. IQ	35	43	39
Det. %	52	25	33

	A	B	C
R	21	4	24
W	6	2	3
D	12	2	20
Dd	3	1	1
M	0	0	0
MC	8	7	7
F+	70	33	33
F%	57	67	67
A%	24	25	25
P	3	0	0
M:C	0:8	0:7	0:7
W:M	6:0	3:0	3:0
FM	0	0	0
S	2	1	1
CN	2	1	1

	A	B	C
C	3	2	2
CF	3	2	3
FC	1	2	2
FY	1	2	2
YF	1	2	2
FV	0	1	1
RT Bl	0	0	0
RT C	29"	4"	4"
T/R	45"	5"	5"
H	66"	75"	75"
Hd	0	1	1
A	5	0	0
Ad	0	6	0
An	0	0	0
Fd	5	2	5

Orientation in this patient was sharply deficient throughout the series. Abstraction ability was defective on all levels. Color naming preoperatively was extremely slow due to blocking. This performance was facilitated after lobotomy, as was color substitution. Wechsler scores for all three administrations were so low as to be meaningless from an analytical standpoint. Only Object Assembly shows appreciable rise after operation. This may be occasioned by a reduction in anxiety, since bland schizophrenics do well on this subtest. The preoperative Rorschach, especially when examined qualitatively, shows a massing of psychotic signs. Under condition B no percentages have been calculated since there were only four responses. Postoperatively the Rorschach indicates a somewhat more practical approach, less concern about the relevancy of observations, and a mild shift toward better controlled affectivity. Attendants report a 33 per cent loss of symptoms, chiefly in restlessness, quarrelsomeness, homicidal trends, rumination, and assaultiveness. She occasionally threatens to choke others, but never actually attempts it. Psychological rating places this patient at the D level (better hospital adjustment).

Case 8 (ER). This patient is one of four siblings whose father died in 1926. The mother is a domestic with a common school education. ER is a 26 year-old psychotic

with mental deficiency who was never married. He had epileptic-like attacks up to age four, but these ceased after treatment. During his first years at school he was seclusive, shy, and inept, being continually teased by other boys. The Child Guidance Home advised that he be placed in the Seguin School for backward children. After completing the sixth grade there he was sent to Washington Trade School, but refused to return after a few weeks because of being teased. At this time he imagined everyone was laughing at him, that people talked about him, and that he was God. He became confused, neglectful, careless, high tempered, moody, and depressed. He refused to eat, slept poorly, and would not leave the house. After being picked up by deputies, he was admitted to Longview in March, 1940. Prolonged insulin and electro-shock therapy brought temporary improvement, but psychotic regression was clearly evidenced. By 1948 the psychiatrist's report characterized him as an "autistic, acutely manneristic, deteriorated schizophrenic." Lobotomy was indicated in March, 1948.

Psychological Findings. Preoperative examination found this patient to be a ruminative, untidy, under-nourished white male of 26 years who walked with a shuffle gait and held his left arm statuesquely above his head. Food particles from a recent meal were smeared upon his face and shirt front. He identified the examiner as a brother and spoke of himself in the third person. He prefaced his answers to most questions by mumbling, "Go ahead, Ed; you can do it; it's easy." By constant urging and repetition of questions some testing was accomplished. It was not possible to administer the Wechsler or Rorschach, however, until after lobotomy, when there was notable improvement in ability for sustained attention. Test results for the three conditions are presented in the table below.

TABLE 7
CASE 8 (ER) TEST SUMMARY

SHORT TESTS			
	A	B	C
Pic. Sim.			
M. Span Obj.	D	B	B
Proverbs	2	6	6
AAA Series	0	1	0
Orientation	7	10	8
Place			
Time	4	4	4
Person	1	1	1
Recent Events	3	3	3
Color Name	3	2	3
Color Sub.	x	52	61
Own Name, USA	x	x	x

WECHSLER-BELLEVUE			
	A	B	C
Info.		4	2
Compr.		3	0
D. Span		4	3
Arith.		1	2
Simil.		5	3
Vocab.		4	5
V. IQ		66	59
P. Arr.		6	1
P. Comp.		6	1
B. Design		5	6
O. Assem.		5	3
D. Sym.		1	0
P. IQ		66	48
F.S. IQ		63	50
Det. %		41	0

RORSCHACH			
	A	B	C
R	x	20	16
W		6	6
D		14	10
Dd		0	0
M		0	0
zC		2.5	1
F+%		35	67
F%		85	81
A%		10	38
P		3	3
M:C		0:2.5	0:1
W:M		6:0	6:0
FM		0	0
S		2	0
CN		2	0

Ability to meet minimal demands of the testing situation was almost nonexistent preoperatively, but was facilitated after lobotomy. This is reflected by better scores on Memory Span for Objects, Color Naming, and Picture Similarities, as well as scorable records on the Wechsler and Rorschach. Orientation in all spheres remained disturbed. Self-preoccupation and autistic ruminational trends appear to have been temporarily dispersed by the operation, only to be reestablished in the succeeding two months' period. Under the B condition Wechsler scores, in the main, showed minimal scatter from the impoverished vocabulary level. When we reach the C condition, however, we note that Picture Arrangement, Picture Completion, Similarities, and Information have fallen away to nothing. The Rorschach comparisons indicate little in the way of improvement. Immediately after operation there is some emotional reactivity and self-will, but this disappears. Under condition C the only good signs are the rise of F+ and A above the critical minimum. ER is rated as unimproved (0 per cent symptom loss) by attendants and psychiatrists alike. While symptom intensity in stereotypy, catalepsy, and rumination was being reduced, new symptoms like incontinence and nakedness arose. Psychological rating would also place him in the F (unimproved) category.

Case 9 (EC). This patient is an 18 year-old catatonic who was hospitalized in July, 1947. Her father and mother are both living and there is a sister two years older who is described as being considerably brighter than EC. The patient was always jealous of the sister, and at age 16 became listless, indolent, and unable to continue in school. In spite of 58 insulin shock treatments at Good Samaritan Hospital she gradually began to hear strange voices and to experience hallucinations of many types. When she became incontinent, abusive, destructive, and grimacing she was admitted to Longview. After electric shock treatments her condition remained unchanged, with the psychiatrist noting irrelevant talk, defective memory, active hallucinations, and depressed mood. Lobotomy was suggested in March, 1948.

Psychological Findings. Examination found this patient to be an obese, untidy, sleepy, and phlegmatic young woman who spoke in a monotone. Indifference to testing was noted, with frequent yawning and requests for repetition of questions. Insight into her illness was nil; she stated she was at Longview to have her eyes checked. Sibling rivalry with the sister was readily elicited, the patient stating she disliked her sister but loved her father "an awful lot." Thinking was notably vague, with blocking and retardation in speech common. Little change was observed in the patient during the postoperative month. After that, behavior during testing was altered in the direction of greater responsiveness, alertness, and attention. Results for the three conditions are presented in the following table.

In the A series all test scores reflect the fact that EC met only the minimal requirements demanded. In a lackadaisical manner she proceeded through the series giving arbitrary responses. Verbal and pictorial abstraction were notably poor. These tests require effort, whereas the simpler Color Naming and AAA series can be accomplished mechanically. The very low scores on the Wechsler indicate an almost complete lack of motivation, especially when it is remembered that the patient completed ten years of schooling. The preoperative Rorschach was vague, arbitrary, perseverative, and unimaginative. There was no evidence of sincere application (O F+, O sum C, no P, no H). Responses were sometimes given when the patient was looking out the window. On one such occasion a bird began to sing outside the window, whereupon EC pointed vaguely to the center of a blot saying "Birds." After operation testing was delayed because the patient experienced psychomotor attacks requiring further treatment and hospitalization. During the B test series, however, there was a notable improvement in effort as well as quality of responses. This new attitude had the effect of elevating the IQ by 11 points as well as raising scores on the shorter tests. The Rorschach, however, did not yield a dependable protocol until the C series, some

eight weeks later. By this time there was notable psychometric improvement (emergence of Dd, M, C, FC, and H with F+%, F%, P, and M:C at or near normal levels.) The Verbal IQ of the Wechsler at the same time jumped 18 points with better attention and concentration especially evidenced. Clinically the patient was more alert, responsive, and concerned about her performance. The behavior inventory revealed a 36 per cent reduction in symptoms. Many of those overcome were critical, such as mannerisms (grimaces), destructiveness, incontinence, disorientation, and tantrums. Some new symptoms arose; these were mild ruminative trends, suggestibility, and erotism. In view of the psychometric findings and post-operative psychologic interviews the psychologist's rating is C (open ward possible).

Case 10 (MC). This patient, a 33 year-old catatonic, is married and the mother of three children. She completed eight grades of schooling, and was married at age 20. Her marital life was characterized by frigidity and irritability for the first ten years, but in 1945 her husband states she suddenly became over-religious, talking in terms of impending judgment and maintaining her bed was the cross of Christ. She began to punish her youngest child for slight misdemeanors and became extremely negativistic when deterred. At the same time she experienced vivid auditory and visual hallucinations. She slept with a butcher knife under her pillow, accused her husband of infidelity, tore at objects, choked her baby, became untidy, and, at length refused to leave her bed. She had a "vision" of her dead father's returning spirit, and became suicidal thereafter. Upon admission to General Hospital she was tentatively diagnosed as paranoid and transferred to Longview. At this time she was disconnected in speech, delusional, and abusive.

A month after admission the psychologist said in part, "this is a silent, resistive woman who shows little interest in her surroundings, requires tube feeding, and remains totally unresponsive and sullen under questioning." From 1946 to 1948 MC received three series of electroshock and one series of insulin treatments. She was retained on the refractory ward and had recurring spells of hallucinatory behavior accompanied by screaming. After it was determined that therapy was bringing about no change in her condition, she was recommended for lobotomy in January, 1948.

Psychological Findings. Preoperative examination was conducted on the hospital ward one day before lobotomy. The patient was active, libidinous, temporally disoriented, and exhibitionistic. The fact that her head had been shaved apparently gave her no concern. Her zestful attitude toward taking the tests was apparently assumed, since the results were not at all striking. In the two postoperative series her behavior was in sharp contrast to the above. She was drowsy, unconcerned, and inactive, showing no interest in the procedure. Test results under all conditions are presented in the following table.

TABLE 9

SHORT TESTS

WECHSLER-BELLEVUE

RORSCHACH

In the above table attention is best directed to conditions A and C, since under B condition the patient was acutely disoriented, anergic, somnolent, and unmotivated. Her Rorschach responses were nonsensical; deviant verbalizations and loss of distance were observed. For Card IX she said "Up or down or up; oh, what does it seem to be?"; and on Card X, "A bubble here, a bubble there; if you'd put this urine here it wouldn't go through there - oh, I'm piddlin', ain't I?" In the C series, however, visual memory and simple perceptual speed approach normal levels. High level abstraction (proverbs) is lost, though orientation is at its best level. The Wechsler Full Scale IQ returns to a level approximating condition A. The high positive scatter of Picture Completion, Block Design, and Object Assembly compared to low scores on Comprehension, Similarities, and Picture Arrangement points clearly to a deteriorated schizophrenic condition (with notable paranoid features). This conclusion is corroborated by the Rorschach scores, where we see the pattern of deteriorated paranoid schizophrenia expressed in a low F+% combined with high An and Sex content, coarctation, high Dd and Hd, emergence of S, and verbalizations like "pieces of skin," "hips and thighs," and "it could be either a man's or woman's." From a psychometric standpoint, therefore, MC's record reflects postoperative psychotic regression. Before

operation she made some effort to conceal the bizzarerie which were so frankly expressed in the later records. The behavior record shows a 46 per cent loss of symptoms, these being nakedness, incontinence, feeding problem, rumination, religiosity, complaints about health, and blocking in speech. It will be noted that though the patient is "more psychotic" in a psychological sense she is considerably less difficult to care for on the ward. Since the psychologist's rating takes cognizance of other factors in addition to test results, MC's final rating is D (better hospital adjustment - easier to care for).

Case 11 (ED). This 37 year-old catatonic unmarried male comes from a home described as unusually happy and secure. There is one brother and both parents were living at time of admission in 1935. As a child ED was so rapid a learner that the school principal advocated his skipping grades. He was active during high school, playing varsity basketball and football, appearing as soloist in operettas, playing saxophone in a dance orchestra, and editing the school paper. He had an excellent disposition and was a member of many mixed groups. After high school he attended a university, majoring in electrical engineering. At this time he was described as having been "deeply in love" with a girl he had met in Florida. When she demanded that he move to Florida to be near her, and he did not comply, she wrote that she had married another. The patient's parents felt that this episode was severely traumatizing. He continued work in his father's business, however, and it was not until some four to five years later that symptoms began to appear. These first took the form of withdrawal from social contacts and loss of interest in personal appearance. The patient began to read copiously in the fields of religion and medicine. He complained of being "terribly self-conscious", and thought his flesh was decaying from leprosy. He started to fast because "Christ did." He would eat only alone in his room,

refusing all meats, and expressed a fear of soap and water. During the next few months he stayed in his room writing stories, constructing numerous pattern drawings for inventions, and frequently mumbled answers to imaginary companions. Upon admission to Longview he was delusional, resistive to feeding, irrelevant, disoriented, and incoherent. He explained he was in a transmutative period, passing from one state of matter to another, being in the "dry matter" state at the time. From 1935 to 1941 intensive treatment in the forms of occupational therapy, protamine zinc insulin, metrazol convulsions, and extended electroshock failed to arrest the progress of the disease. At various intervals thereafter the record states he was "catatonic, stiff, mute, autistic, cataleptic, requires a sawdust bed, walks backward with a scissors gait," etc. Lobotomy was requested in September, 1947.

Psychological Findings. Original examination was conducted on the receiving ward where ED was placed to facilitate forced feeding. When the examiner entered the room the patient was standing on his head, a position he had assumed for the past 15 minutes. Upon being righted by two attendants, he assumed a fetal attitude, curling into a knot and remaining on the floor. He was forced into a chair, and after several attempts to slide off, finally managed to sit erect. He responded very slowly to simple commands which did not require standing, but was mute. Although he gazed for many moments at the proffered test materials, he would not hold them himself. The extensor muscles of the hands appeared to pull the fingers into a fan-like position, but the legs and feet were in flexed position. It was obvious that the patient was aware of his surroundings, but verbal communication

was impossible. The following day ED was lobotomized. Immediately after operation he spoke one word of greeting to the examiner, but again became mute. He was visited by the examiner four times in the succeeding 11 days; testing was still impossible.

On the eleventh postoperative day the patient indicated that he would write answers to questions. He did so in a slow and laborious manner, capitalizing each letter and writing perpendicularly from the bottom up (for example, the word KEY being written ^YE^K). In this manner he wrote correct answers to five Arithmetic items, ten AAA items, ten Color Substitution Items as well as 6 digits forward and 5 backward. Upon persistent questionings as to why he did not talk, he wrote "afraid to". It was obvious that even though the patient did not speak he carried on mental processes at normal speed.

During the succeeding two months there was gradual change in this patient. He began to talk, first monosyllabically, then in full sentences. His gait and posture approached normal, he played softball, and he was working on the grounds regularly. He gained weight rapidly and went alone to the cafeteria eating voluntarily. On the 73rd postoperative day he carried on a long conversation with the examiner, telling of his family,

his work at the hospital, his interest in ceramics, his knowledge that he was much better, etc. Delusional material was nevertheless elicited. He stated that his tongue had been cut off in 1933 by a dentist and that this necessitated his writing from the bottom of the page upward. He averred that he was 20 men and that his thumb ~~was~~ missing; when the examiner grasped his thumb by way of disproving the statement he explained he was speaking of one of his other bodies. He pointed out that spirits guided his actions, although acceding to their demands was entirely optional on his part. He volunteered that he would like to take some tests, especially "the one with the colored pictures." Post-operative testing was begun the following day. Results under conditions B and C are presented below, but it must be noted that the series was begun 60 days after operation instead of the usual 14.

TABLE 10
CASE 11 (ED) TEST SUMMARY

	SHORT TESTS		
	A	B	C
Pic. Sim.	x	x	10
M. Span Obj.			0
Proverbs			8
AAA Series			1
Orientation			5
Place			2
Time			3
Person			123
Recent Events			94
Color Name			OK
Color Sub.			
Own Name, USA			

	WECHSLER-BELLEVUE		
	A	B	C
Info.	x	9	13
Compr.		5	9
D. Span		10	10
Arith.		1	1
Simil.		11	10
Vocab.		9	10
V. IQ		89	97
P. Arr.		3	3
P. Comp.		8	8
B. Design		4	9
O. Assem.		12	11
D. Sym.		2	3
P. IQ		83	87
F.S. IQ		86	93
Det. %		50	40

	RORSCHACH		
	A	B	C
R	x	17	25
W		11	7
D		5	13
Dd		1	5
M		0	1
EC		0.5	3
F+%		58	63
F%		83	68
A%		65	60
P		0	6
M:C		0.5	1:3
W:M		11:0	7:1
FM		0	0
S		0	0
CN		0	1

C
CF
FC
FY
YF
RT Bl
RT C
T/R
H
Hd
A
Ad
An
Bt

A
B
C

Little can be said regarding the short tests, since only one series (C) is available. Pictorial and high-level verbal abstraction are defective as is simple perceptual speed. The latter impairment may probably be a reflection of motor blocking; that is, the patient perceived the colors on the Color Naming test, but was unable to vocalize quickly. In the B condition of the Wechsler we have the picture of deteriorated schizophrenia except for the unimpaired digit span. The great impairment in arithmetic is indicative of an absence of those factors involved in concentration and symbolic integrative processes. In C condition the Wechsler scores follow a configuration similar to that in B, although appreciable gains are noted in Information, Comprehension, and the IQ levels. Impairment on concentration, visual-motor speed, and anticipatory planning are consistent in both conditions. It is on the Rorschach under condition C that we find convincing supportive evidence of clinical change. The shift from vague and "lazy" percepts to a more nearly normal approach is seen along with a firmer grip on reality and ability to respond to the obvious. The ability for appropriate affective display (4 FC) has replaced the flat and emotionless state previously noted. The Rorschach shifts are vividly and precisely expressed

in this patient's behavioral changes. He is no longer a mute, stuporous, cataleptic, and vegetative catatonic; on the contrary, he is a neat, well groomed, approachable individual who responds to conversation, enjoys music and art, and resides on an open ward. He is at present successfully pursuing an occupational therapy course in ceramics. The attendant's rating shows a reported 53 per cent reduction in symptoms, notable in somnolence, mannerisms, stupor, catalepsy, muteness, feeding problem, and incontinence. Slowness, place disorientation, shyness, and mild speech blocking are still present, and some ideas of reference can be elicited. The psychologist's rating for ED is C (open ward status).

Case 12 (BG). This 33 year-old unmarried catatonic male was an only child whose grandmother reared him from age four. He completed the ninth grade, but left school to work. Job history consists of a series of low-paying positions, the last being stock man in a dress shop at \$13 per week. The patient's father lives on the west coast and has not seen his son for 21 years. About 11 months before admission in 1939 BG received a head injury while being robbed. Five months after this episode he began to experience excitable moods during which he was assaultive. At time of admission in August, 1939 he was irrelevant, incoherent, and lowered in psychomotor activity. Insight and judgment were nil, and he complained of head and ear pains as a result of his previous injury. Physical findings were negative except for acne vulgaris and some evidence of malnutrition. After 61 insulin shock treatments in 1940 the patient was noted to be silly in affect; prognosis was guarded, with the record stating he "will probably be a permanent custodial case." In 1944 BG escaped and was held in custody by Los Angeles police. Upon his return he was

placed on the refractory ward with almost constant restraint being necessary because of unpredictable behavior. In 1945 he nearly amputated his own thumb at the proximal joint. Electric shock treatments brought no change in his condition, and in 1946 there were three reported episodes of assaultive behavior against other patients. Further therapy was to no avail, and BG was recommended for lobotomy in May, 1948.

Psychological Findings. At time of preoperative examination the patient had to be held in an erect position by an attendant. He kept his head down and would not look at the examiner. He was mute, extremely untidy, and wore a rigid, agonized expression lacking in mimic modulation. When the name of a boyhood friend of the patient was mentioned by the examiner he struggled to free himself from the attendant's grip. All efforts urging him to respond to test materials failed. When the examiner said, "I see you won't talk today," BG again struggled to free himself. Subsequent efforts at testing were made at periodic intervals before and after lobotomy. On the 61st postoperative day the patient's appearance was substantially the same as on first contact. Behavior on the ward appears to have been somewhat altered, since attendants report 32 per cent reduction in preoperative traits. The chief symptoms relieved are need for physical restraint, silly laughter, feeding problem, homosexuality, masturbation, tantrums, destructiveness, and stereotypy. New symptoms are tremors and emotional

tenseness. It is notable here again that lobotomy seems to have attacked those symptoms connected with the activity level, causing the patient to cease "fighting the disease" and thereby rendering him a safer associate for others. The psychologist's rating is therefore E (reduction in morbid symptoms).

Case 13 (ML). This 49 year-old catatonic woman is the eldest of four siblings. She is single, having been admitted to Longview in 1923. Her father died of tuberculosis at an unknown date, though her mother is still living. She had a common school education, and worked in a laundry at a very low salary prior to admission. Onset of catatonia was gradual at first, but was ostensibly intensified by an attack of influenza. Upon admission the patient had active auditory hallucinations, was disoriented, inaccessible, and extremely untidy. She thought she was awaiting murder. A long series of entries in the record covering the period 1923 to 1941 add up to "unchanged." She is described as destructive, unclothed, demented, and noisy. In 1942 there is a history of convulsive attacks covering a period of two months. Medical findings at this time were negative. After electroshock treatments in 1945 the patient remained "mumbling, uncommunicative, and inaccessible." When lobotomy was indicated in 1948 the psychiatrist noted that ML's speech was still "a word salad jargon," and that she was "deteriorated, schizophrenic, untidy, and silly."

Psychological Findings. First contact revealed a mumbling, ruminative, untidy woman with a child-like expression, who kept repeating "_____ not crazy, no, _____ not crazy, don't talk to the doctor, no, no!" In view of her constant stream of talk attention could not be focussed on material requiring continuous effort. It was discovered, however, that orientation questions

could be answered automatically if they were quickly and forcefully interjected. Some of the questions and answers were as follows: (1) What day of the week is it? Easter Sunday. (Actually Tues., Feb. 10). What year is it? 1921. (Actually 1948). Who is the president? Wilson. What is this (thumb)? What you put in your mouth.

She did know the name of the hospital and the approximate time her mother had visited. There was lack of rapport, inappropriate affect, and excitability. Before and after lobotomy there were routine attempts at testing, but results were identical to those reported above. Loss of symptoms on the behavior inventory was -23 per cent, including all the preoperative traits with stereotypy, indefatigability, overactivity, and inappropriate laughter being added. The psychological rating for ML is F (unimproved).

Case 14 (CS). This 22 year-old catatonic comes from a family of six siblings. She completed high school and thereafter worked about a year as nurse's aid in a hospital training program. Prior to graduation from high school, however, she began to tell frequent lies at home and would become enraged when explanations were demanded. In March, 1947 she announced she was going to Philadelphia on a vacation, and no word was received of her whereabouts until her return in June. Immediately after her arrival she packed her clothes again, stating her intention to leave home to reside at the YWCA. By August, 1947 she was found in a Detroit hospital under an assumed name, falsely believing she was pregnant and twice attempting suicide. When her behavior became aggressive, hostile, and destructive she was transferred to Wayne County

Receiving Hospital where constant physical restraint was necessary. She was extremely profane, hyperactive, and uncooperative, condemning in a loud voice her parents, the hospital, the doctors, and the world in general. Treatment at the Receiving Hospital consisted of daily insulin shock for a month. She was sufficiently calm after this to be transferred to Longview on October 10, 1947. Her behavior here was characterized by periods of extreme excitability alternating with periods of mutism and lethargy. She refused to eat voluntarily and was in restraint much of the time. Therapy consisted of 16 electric followed by 27 insulin shock treatments. By March, 1948 her condition remained the same, and assaults upon attendants and other patients became daily occurrences. Lobotomy was indicated in April, 1948.

Psychological Findings. Examination revealed a young, disheveled, powerful, profane woman who threatened to murder the examiner and attendants upon being approached. She refused to answer any questions and kicked at the test material when proffered. Condemnations of particularly vile nature were directed toward members of her family, particularly the mother. The following day testing was again tried, but the patient was screaming at the top of her lungs and had ripped her way out of two restraints in addition to kicking out a window. Four days later the patient at examination was quiet, sluggish, and withdrawn. She would answer no questions, but when the Rorschach cards were held before her she responded with "fire" and "flame" on cards II and VIII, while saying that card IX "could be part of the world." Preoperative testing was abandoned. Two lobotomies were performed

two weeks apart. During psychological examination two weeks after the second operation it was noted that the patient was quiet and cooperative. This did not net scorable test responses, however, since she begged to defer testing until she felt better. No episodes of violence were reported during the patient's period on the hospital ward. During the third postoperative week, when the patient had been removed to her former ward, testing was accomplished, with all tests except the Rorschach being scorable. At this time the patient was pleasant, cooperative, and appropriate in affect. When asked about her previous attacks of violence she seemed embarrassed, saying, "I was so much more nervous then; I won't ever be that way again, and I want to apologize for it." Testing under C condition was completed seven weeks later, with the same compliant attitude remaining. For a period of about four months CS was kept on a rehabilitative ward, participating in psychodrama sessions concurrently. These appeared hopeful and considerable progress was noted. By the beginning of December, 1948, however, a gradual return of the preoperative symptoms had occurred, and the patient was again transferred to the refractory ward. In the table below test results are summarized.

TABLE 11

[illegible]

In this record one cannot dwell upon psychometric changes, since preoperative testing was not possible. Condition B tests were administered on the 25th postoperative day, while those of condition C were given on the 78th postoperative day. The shorter tests reveal improvement in scores throughout condition C. Especially notable is the freeing of high level abstraction (proverbs) and pictorial memory. The verbal, performance, and full scale IQ values are substantially elevated during the second Wechsler administration. In the B condition Wechsler marked impairment is notable in those subtests concerned with judgment, reality testing, identification with others, planning ability, and concentration on visually perceived material. This record is not that of the usual schizophrenic, but coincides with the configuration frequently found in the paranoid. Examination of the Wechsler record for C condition shows impairment in the same abilities, but to a much less marked degree. In fact, the only test showing appreciable scatter is Picture Completion (Mod. M scatter, -3.00). Empirical evidence has in the past shown this test to be most sensitive to depressive trends. In the case of the Rorschach we have but one record (condition C). At this time the patient was

well behaved on the ward, with hopes for her recovery being highest. The lack of Dd, indicating a perfunctory approach to the test, and the two FV's, indicating overvalence to inferiority ideas, are the only marks of individuality in an otherwise normal quantitative record. Qualitatively the record is not suggestive of pathology, except for two responses of "women with their heads off," confirming perhaps the patient's hostility to her mother. Apparently this stage of the patient's postlobotomy history was a critical one where prognosis hung in the balance. Recent indications are that she has lapsed back to some of the symptoms noted preoperatively. The attendants rating shows a 30 per cent reduction in symptoms. Those symptoms eliminated include disorientation, fluctuation of attention, overactivity, diurnal incontinence, homicidal trends, and the suicide obsession. The attendants further note that even though some morbid symptoms persist, the patient appears less anguished than before. In view of these observations the psychological rating is D (better hospital adjustment).

Case 15 (LD). This patient is a 37 year-old unmarried hebephrenic who is the third oldest of seven siblings. She completed the seventh grade and left school to do domestic and unskilled factory work. She made a poor adjustment to her job and to fellow workers. All her life she was insistent upon having her own way, and exhibited temper tantrums if thwarted. She is said to

have received one marriage proposal, but since the man was of another religion it was not accepted. After numerous complaints about her health she was taken to a chiropractor for treatment. Shortly afterward she became destructive, unmanageable, and incoherent. When she climbed up to the roof of her home and threatened to jump off she was rescued and brought to Longview for observation. Upon admission in 1933 she was shallow in affect, incoherent in speech, and manneristic. For the following 15 years her condition failed to improve in spite of repeated electroshock and metrazol treatments. By early 1948 the psychiatrist noted that because of her continued presence on the refractory ward in almost constant restraint lobotomy could be considered to simplify nursing care.

Psychological Findings. Preoperative examination revealed a well nourished woman in restraint having a childish expression rigidly maintained in spite of repeated questioning. Throughout the period she remained mute, unable to recognize colors or name simple pictured objects. An interested and loquacious patient nearby informed the examiner that "L is a vampire." When asked why she believed this, the bystander said, "Well, she's always tryin' to bite you and she says she's after your blood." Other attempts at testing during the preoperative week found the patient mute. Postoperative testing was attempted periodically. On the 18th postoperative day she correctly named the hospital, but refused to speak thereafter. When given a pencil she wrote her name, but when further asked to write "United States of America", she made a long series of figure 8's covering the entire

page. This was the only instance in which she responded appropriately to simple commands. The nurse stated that LD has been mute since lobotomy, but that she eats well and is not abusive or assaultive. The behavior inventory shows a 54 per cent reduction in symptoms, although the ones remaining decisively point to a severely deteriorated schizophrenia. The chief symptoms relieved are euphoria, restlessness, insomnia, talkativeness, overactivity, irritability, tantrums, tenseness, and need for physical restraint. The psychologist's rating, based upon this evidence as well as clinical observation is D (better hospital adjustment).

Case 16 (WD). This 32 year-old hebephrenic male stems from a broken home in which the father was alcoholic. He completed the 11th grade in school, and thereafter worked as a laborer and salesman of household articles. He has one sister three years older than himself. The present attack began prior to 1940, and is described as gradual in onset. He wandered away from home and did not disclose where he had been. He stated that the radio was talking about him and could not be dissuaded in this belief. After an attempted suicide and statements of being persecuted, he was finally admitted to Longview in 1940. Admission data reveal he was violent, requiring restraint, although orientation was intact. Insight into his illness was not pronounced and judgment was inadequate. The progress record is especially active. During an eight-year period he underwent several electroshock series as well as insulin therapy. Interspersed with this information is a long history of escapism, violence, numerous encounters with the police, assaults, absences with leave and without leave, various somatic complaints and difficulties, divorce proceedings and exhibitionism. The patient's mother constantly attempted and succeeded in getting him released from the hospital, only to have

him returned by the police and other state hospitals. Treatment has usually proved temporarily effective, but psychotic regression is always forthcoming. On the ward WD loses his temper over trifles and will hit or kick other patients while seemingly in an autistic state. As a last resort lobotomy was recommended in April, 1948.

Psychological Examination. Preoperative examination indicated that here was an individual pleasant and cooperative on the surface, but possessing considerable implicit hostility. He seemed eager to make a good impression, never admitting a lack of knowledge even on the most difficult questions. Though possessing no real interest in the task, he systematically tried all items, prefacing each answer with "That would of course be ____." The examiner was always addressed as "sir" or "doctor," and when any question which could be considered personal was asked the patient would avoid an answer by misinterpreting the question. Attitudes of the patient toward testing were consistent through the three administrations except for the Rorschach in the C condition. Upon looking at the first card he said, "That looks like a bee." When the examiner nodded and handed him the next card, he repeated in a precise and stilted manner, "That looks like a bee, too." This continued through the first five cards at which time the examiner repeated the directions carefully and pointed out that he had

seen many other things the first two times. In spite of all urging and encouragement the patient stubbornly insisted that all the blots looked like bees and nothing else. Three succeeding attempts at two-week intervals elicited nothing but "bee" responses. In view of the patient's performance at previous sittings, it was felt that the particular perseveration shown in the last Rorschach record arose from hostility rather than inability to perform. The table below summarizes test results under the three conditions.

TABLE 12
CASE 16 (WD) TEST SUMMARY

	A	B	C
Pic. Sim.			
M. Span Obj.			
Proverbs	10	5	16
AAA Series	0	0	0
Orientation	10	10	10
Place			
Time	4	4	4
Person	3	2	2
Recent Events	4	4	4
Color Naming	3	2	3
Color Sub.	28	30	29
Own Name, USA	90	60	61
	OK	OK	OK

	A	B	C
Info.	7	7	7
Compr.	9	1	5
D. Span	7	9	13
Arith.	10	10	10
Simil.	13	8	12
Vocab.	9	8	10
V. IQ	18	88	102
P. Arr.	5	6	7
P. Comp.	9	5	9
B. Design	9	11	10
O. Assem.	9	7	9
D. Sym.	8	8	9
P. IQ	90	89	98
F.S. IQ	95	88	100
Det. %	0	0	0

[illegible]

Changes in scores postoperatively on the shorter tests tend to cancel one another. Pictorial memory span rises from 10 to 16, speed in dealing with new symbols (Color Substitution) is increased, though the total orientation score is slightly lower. The preoperative Wechsler showed high positive scatter on verbal concept formation (Similarities) and high negative scatter on planning ability (Picture Arrangement). In the C condition the scatter tendencies of the two tests remain the same, while a sharp reduction in contact with reality (comprehension) occurs. Since the latter is a malign indication, we suspect that lobotomy may have hastened the break with reality. Another notable feature is the increase in Digit Span indicating relief from anxiety. This finding is consistent with the rationale of lobotomy in that ability to attend has been freed of depressing emotional effects. In the Rorschach results it is possible to compare only the A and B conditions. The flat, stereotyped, coarctated, and constricted record in the immediate postoperative period is consistent with what we have come to expect after lobotomy (Cf., 43). The productivity ($R=34$) of the former record has been obliterated, the hold on reality ($F+\% = 64$) has been lost, and the responsiveness to others ($H+Hd = 9$) has been reduced. The second record is perseverative, impotent,

and lacking in minimal concern and self-appraisal. The reasons for complete failure on the Rorschach in C condition cannot be determined, though it is probable we have part of the answer in the B record (lack of motivation, emotional tone, and originality). The behavior record indicates a 57 per cent reduction in symptoms, these being disorientation, euphoric episodes, somnolence, sarcasm, stereotypy, vesical incontinence, tantrums, catalepsy, homosexual trends, muteness, neologistic behavior, tenseness, escapism, need for physical restraint, religiosity, and speech blocking. Psychometric improvement in this case is non-existent, but clinical change is sufficiently impressive to bring the psychological rating up to C (open ward status).

Case 17 (MK). This patient is a 39 year-old hebephrenic who has one younger brother and whose parents are living but divorced. According to her mother she was a talented child, being graduated from a Cincinnati high school with honors. She had leading parts in plays and sang in school musical productions. After serving as hostess in a tea shoppe and working as a clerk at a soap manufacturing company, she began to experience hallucinations. After cutting herself severely with a pair of scissors she explained it was done in order to prove her great love for people. After quitting work she spent the succeeding two years at home, becoming more and more deviant in her behavior. Six weeks prior to admission to Longview she underwent an appendectomy; the surgeon noted "her strange psychological state" at this time and recommended psychiatric treatment. After four weeks at a private sanitarium she was returned home, whereupon she struck her mother and threw objects at other members of the family. Admission to Longview in March, 1933

found her "loosely hallucinated, showing marked sexual deviation of the masochistic type, and insisting that colored people were her brothers and sisters." At first she responded to treatment and was given a trial visit at home. After two months she was returned in an excited state. From 1934 to 1948 regular courses in insulin and metrazol were administered, but these did not arrest the disease. In 1940 she was described as negativistic, seclusive, asocial, and silly. By 1943 she was "more deteriorated, neologistic, verbigerative, and hallucinated." Lobotomy was indicated in April, 1948.

Psychological Findings. At time of preoperative examination MK was out of contact with her surroundings, ruminative, and inappropriate in affect. Her attention was impossible to hold; she carried on conversation with imaginary persons. Color naming was tried without success, although she did name five pictured objects. Orientation scores were zero with answers given repeatedly with the phrase, "Oh, I don't know!" Neologistic utterances were prominent, though there was no aggressive or assaultive behavior. On the 15th postoperative day testing was again attempted with identical results. Periodic reexamination found the patient withdrawn and inaccessible. Improvement in the form of symptom loss was unimpressive. Included in the 16 per cent symptom reduction were talkativeness, restlessness, and extreme rumination. No new behavior traits were noted. The psychologist's rating is E (reduction in morbid symptoms).

Case 18 (AL). This 54 year-old hebephrenic woman

comes from a successful professional family of three siblings. Up to the time she successfully completed work on an advanced college degree her father would permit no male companions to visit her. At age 13 she underwent an operation for dilation of an infantile womb and in the same year had an appendectomy. After graduation she became active in community activities, believing that although she was unattractive to men she could compensate for this by intellectualism and social participation. It is her mother's opinion that disillusionment in her professional field was prominent in the etiology of the disease. She worked at a large industrial plant, but was discharged. She was also released from the next two jobs because of prepsychotic behavior. In 1930 she was admitted to a private sanitarium in Cincinnati for treatment, was returned home for two years, then was admitted to a Maryland sanitarium where she remained from 1932 to 1942. During this entire period she was actively hallucinated with ideas of reference and somatic delusions. Intensive psychotherapy as well as metrazol and insulin failed to bring improvement. By 1942 she was described as violent, incontinent, and assaultive; she possessed a peculiar clacking noise made by sticking out her tongue, grimacing, and puckering her lips. After admission to Longview in November, 1942, shock therapy was indicated, but this left her still a delusional hebephrenic, talking constantly of animals inside her, of sex, venereal infection, and mythological characters. By 1948 the psychiatrist summarized in part, "This is a 54-year-old woman who has been psychotic for 19 years. At present, her speech is practically a word salad, consisting of sexual references and delusions concerning animals. Her only activity is the mannerism of thrusting out her tongue...Recently she has not been violent....Her mother is anxious for her to have a lobotomy....The prognosis is certainly not good even if the operation were performed.

Psychological Findings. Examination revealed a stout, gray-haired woman, grimacing and grinning in a silly fashion, who greeted the examiner ceremoniously. She seated herself across the table and stated she knew it was time for a medical inspection of the ward,

although she wished to apologize for conditions inasmuch as the personnel the state had been providing recently was inexperienced. She placed her forehead down on the table and said, "I think you'll have to make a midline incision. Go right ahead; I'm not squeamish about these matters." She explained that her chief difficulty was the presence inside her stomach of a bull and several rabbits. Orientation to place was unimpaired, though person and time orientation were poor. She refused to take any tests except the Rorschach; the ink blots she considered as biological slides and was fascinated by them. After lobotomy her attitude was unchanged toward testing. She would respond enthusiastically to the Rorschach, but to no others. In the following table, quantitative summaries of the three Rorschach administrations are presented.

TABLE 13
CASE 18 (AL) TEST SUMMARY

RORSCHACH			
	A	B	C
R	35	31	27
W	12	3	4
D	21	24	15
Dd	2	4	8
M	0	0	1
ΣC	4	5.5	8.5
F+%	31	60	44
F%	80	84	67
A%	43	52	37
P	2	5	3
M:C	0:4	0:5.5	1:8.5
W:M	12:0	3:0	4:1
FM	0	0	0
S	2	1	2
CW	2	1	0
C			
B			
A			
C			
CF			
FC			
FY			
YF			
FV			
RT BL			
RT C			
T/R			
H			
Hd			
A			
Ad			
An			
C	3	2	3
B	4	2	2
A	0	1	1
C	1	0	0
CF	0	0	0
FC	0	0	0
FY	0	0	0
YF	0	0	0
FV	0	0	0
RT BL	0	0	0
RT C	8"	7"	5"
T/R	6"	7"	4"
H	36"	37"	x
Hd	0	1	1
A	8	3	8
Ad	8	9	7
An	7	7	3
C	7	7	7

The Rorschach protocol of this patient under condition A is that of a deteriorated schizophrenic. The high percentage of vague W, the low F+%, low P, disappearance of M, pure C, and abundant verbalizations of the neologistic and peculiar type constitute a massing of psychotic signs. Responses included combination words like "a rabbit-bear," "a calf-cat tail," and peculiar phrasing like "an antrium affair," "lower jaw effect," and "the yellow in place of vision." In addition, however, there are four responses containing Y and indicating anxiety. The immediate postoperative condition (B) shows a better structuring. The patient's grip on reality is greatly strengthened, more popularly seen percepts arise, emotional lability is somewhat curbed, and a more normal approach to the task is evidenced. Strange responses are nevertheless present in the form of "a throat choked affair" and "uterine or abdominal effects." Y determinants disappear, indicative of a release from anxiety. The C record, obtained nine weeks after operation, leads us to believe that the improvements noted were temporary. Concern for objective matters, for conventionality, and for logical control of thought processes have disappeared. Irrelevant comments and peculiar phrases become more abundant. These include

"starvation affair" and a statement that "it reminds me of being on the German side and they were burning folks - the minister and his assistant." In all three records scoring was difficult; the inquiry was distasteful to the patient and one was forced to use arbitrary criteria in determining which answers constituted responses. The attendants note a 39 per cent loss of symptoms, these being restlessness, tactlessness, insomnia, talkativeness, stereotypy, destructiveness, homicidal trends, circumstantiality, feeding problem, escapism, and need for restraint. The psychological rating is therefore D (better hospital adjustment).

Case 19 (DS). This 18 year-old hebephrenic is the youngest of three brothers. During the time he attended school he was pushed by his parents to emulate his more intelligent brothers. He attended vocational high school, but failed in mathematics and developed severe inferiority feelings. Up to 1945 his parents state he was neat, clean, active in sports and liked by every one. At that time he began completely to disregard his personal appearance. He ran away from home, and was picked up by Pittsburgh police at 2 A.M. the next morning. He resisted returning home, stating he hated his mother because she did not treat him "tough enough." Upon arrival at home he would do nothing but sit, stare into space, and grimace. He was treated privately with insulin and electroshock, but when improvement was not forthcoming he was transferred to Longview in February, 1946. Since that time extended series of electroshock brought temporary remission of symptoms, but psychotic behavior kept returning. The patient escaped three times, but was returned either by the police or his father. Considerable friction between the patient and his parents has been noted. When they visit him on the ward he is at first glad to see them, but after a time becomes argumentative.

He refuses to eat all the food they bring him, and becomes annoyed when they insist. In occupational therapy this patient did poorly, and because of this his father's request that he be given permission to work in an uncle's store was not granted. In July, 1947 he offered so much resistance to shock treatment that it was necessary to transfer him to the refractory ward. At the request of his parents lobotomy was performed in March, 1948.

Psychological Findings. At time of preoperative examination this patient was cooperative and well motivated. He was a tall, awkward, somewhat manneristic adolescent, who appeared tense and tremorous. When he became excited there was a noticeable speech block. All tests were effectively administered during A, B, and C conditions. The patient came to trust the examiner, and discussed many of his problems during the session. Following are complete test results.

CASE 19 (DS) TEST SUMMARY

	<u>A</u>	<u>B</u>	<u>C</u>
Pic. Sim.	A	A	A
M. Span Obj.	14	14	12
Proverbs	3	1	3
AAA Series	10	10	10
Orientation			
Place	5	5	5
Time	5	5	5
Person	4	5	4
Recent Events	5	4	5
Color Naming	66	41	95
Color Sub.	148	87	120
Own Name, USA	OK	OK	OK

	A	B	C
Info.	11	11	9
Compr.	7	5	9
D. Span	4	6	6
Arith.	3	9	9
Simil.	8	9	8
Vocab.	9	9	9
V. IQ	82	91	93
P. Arr.	6	7	7
P. Comp.	6	8	11
B. Design	6	5	6
O. Assem.	7	9	8
D. Sym.	4	3	4
P. IQ	68	80	75
F.S. IQ	73	84	83
Det. %	48	24	32

[illegible]

Low level abstraction, memory for pictured objects, and mental speed in a simple perceptual act are all above average for adults. Orientation is intact in all spheres. High level verbal abstraction and synthesis is poorly handled, though it is doubtful whether this patient could have solved proverbs in his premorbid state. The Wechsler scores in the preoperative condition point strongly to chronic schizophrenia, with impairment of attention, concentration, and visual motor speed. In the first post-operative condition (B) there is a restriction of the vocabulary scatter, with especial improvement in attention, concentration, and planning and anticipation ability. There is a greater impairment of judgment in practical situations, but the crippling effects of anxiety are reduced. By the time the C condition is reached the Wechsler scattergram has lost most of its psychotic signs and reveals a picture close to that of the neurotic depressive as described by Rapaport. On the Rorschach psychometric improvement was likewise evidenced. On the A record an F+ of 43 was strong indication of regression below the level of reality testing. Rigid restriction of emotional responsiveness was clear, as was the lack of social responsiveness. In the B record a rather typical picture of flatness and stereotypy appears. Two months later, however, the grip

on reality appears secure ($F+%$ = 83) and emotional reactivity is appropriate. Postoperatively, we are dealing with an adolescent who appears essentially neurotic rather than psychotic. Anxiety (Hd , x , low Z) and depression (high $F%$, high $F+%$, high $A%$, low W) are much in evidence. Whether the depressive trends will crystallize at a neurotic or a psychotic level cannot be determined at present, although there is little hope that the home environment of this patient will prove any less traumatizing than before hospitalization. The attendant's rating indicates a 48 per cent reduction in symptoms. Those symptoms eliminated are dullness, insomnia, mannerisms, stereotypy, indefatigability, indecency, destructiveness, nakedness, tantrums, delirium, masturbation, homosexuality, escapism, and hypochondriacal complaints. In view of these findings the psychological rating is B (discharge and satisfactory home adjustment).

Case 20 (SS). This 22 year-old hebephrenic girl is the only child of separated parents. Up to admission to Longview she lived with her mother who was a waitress of marginal financial status. Before deserting his family the patient's father was a sullen and abusive alcoholic. In 1942 the patient began to have fits of anger, cutting up her clothes and refusing to eat. The mother informed the Juvenile Court that her daughter was a mental case. She was accordingly sent to Child Guidance Home for a period of ten days, then was returned home. She threatened her mother with murder, cursed, cut off her hair, and announced she was going to run away. When she refused to return to Child Guidance, her mother called the police.

General Hospital transferred her to Longview in December, 1943, where she received a course in insulin therapy. Early in 1945 homosexual activities were reported on the ward, and these continued into 1948. In May, 1948 the patient was noted to be silly, irrelevant, refractory, and homosexual; lobotomy was requested at this time by the mother.

Psychological Findings. Preoperative examination revealed an asthenic, loquacious, euphoric, and impulsive young woman who informed the examiner she was "unsincere." She approached the tests in an impulsive fashion, disregarding directions and making frequent errors. Homosexual proclivities were readily elicited, though her descriptions of this behavior were vague. She stated she was in a home for working girls undergoing a "rest cure." After operation her attitudes toward testing were unchanged, answers being given in a perfunctory and uncritical fashion. All tests were scorable except the C condition Rorschach, which was unusually repetitious and perseverative. In the table following, summaries of results for the three conditions are listed.

TABLE 15
CASE 20 (SS) TEST SUMMARY

	SHORT TESTS		
	A	B	C
Pic. Sim.			
M. Span Obj.	D	B	C
Proverbs	10	11	11
AAA Series	0	0	0
Orientation	10	10	10
Place			
Time	3	2	4
Person	1	1	0
Recent Events	5	3	3
Color Name	4	1	3
Color Sub.	19	26	29
Own Name, USA	65	85	54
	OK	OK	OK

	WECHSLER-BELLEVUE		
	A	B	C
Info.	6	4	4
Compr.	2	2	1
D. Span	6	6	7
Arith.	0	1	2
Simil.	3	4	2
Vocab.	6	6	1
V. IQ	65	65	57
P. Arr.	1	1	1
P. Comp.	3	1	4
B. Design	1	1	2
O. Assem.	7	13	7
D. Sym.	5	9	7
P. IQ	54	65	55
F.S. IQ	56	62	54
Det. %	45	29	0

	RORSCHACH		
	A	B	C
R	40	10	
W	11	7	
D	22	3	
Dd	7	0	
M	1	0	
ΣC	2	0	
F+%	47	40	
F%	85	100	
A%	50	100	
P	7	3	
M:C	1:2	0:0	
W:M	11:1	7:0	
FM	0	0	
S	0	0	
CN	0	2	
CF			
FC			
FY			
FV			
RT BL			
RT C			
T/R			
H			
Hd			
A			
Ad			
An			
Cg			
Ls			

Abstraction and concept formation are deficient on all levels. Proverbs proved impossible for this patient; she was unable to translate the proverb even to literalistic terms. Time orientation is notably impaired, and it is clear that no orientation sphere benefited from lobotomy. The very low scores on the Wechsler-Bellevue preclude scatter analysis. Though the impairment is extreme throughout the scale, it is especially acute in concentration, judgment, planning, and reproductive visual-motor ability. The score of 1 in all three administrations of the Picture Arrangement test can only be interpreted as a complete lack of voluntary control over thought processes. Thus, in any situation involving restraint or consideration of the future effects of an action this patient would fail. Clinical observation as well as the progress record of SS confirms this. The preoperative Rorschach reveals a lack of regard for reality, poor adjustment to other persons, inappropriate control of affects, and constricted impoverished mentality. Qualitatively it abounds in arbitrary responses, peculiar verbalizations, and absurd percepts. On card III two automobiles were seen because "there ain't an auto fence around them." On card VIII Dd 22 is "a green thing like a dragon that doesn't go up hill." Conflict in the sex sphere is indicated by

repeated references like "a faded caterpillar," "parts of dead fly's flesh," and "dirt." "There's not a man here" was a comment on card V. On card X area D 1 was Santa Claus "because of the weight." In condition B the excess verbalizations were greatly reduced. Stereotypy and constriction have gone the limit. The record is flat, vague, and impotent. By the time condition C was reached these processes have rendered the record useless. It would appear that either lobotomy hastened the psychotic regression of this patient or failed to arrest its accelerated pace. The 73 per cent symptom loss reported by attendants may appear surprising in view of the psychometric picture. It should be noted, however, that here, as in the case of MC, the patient is more psychotic in the psychological sense, but easier to care for on the ward. This is a result of the lowered activity level, since symptoms disappearing are restlessness, talkativeness, insomnia, aggressivity, destructiveness, homicidal trends, tenseness, escapism, need for physical restraint, profanity, homosexuality, masturbation, inappropriate humor, playfulness, tantrums, nakedness, etc. In postlobotomy cases such as these (and they are frequent) we note the social as opposed to the therapeutic value of lobotomy. From a psychometric viewpoint the

patient is worse, but in terms of all factors considered in the rating scale the final psychological evaluation is D (better hospital adjustment).

Case 21 (AR). This patient, diagnosed schizoaffective, comes from a family of seven sisters and one brother. She has been married three times, and is 38 years of age. Pre-psychotic personality is described as "life of the party, charming, clever, excellent singer and impersonator, fastidious." The patient has always suffered intense menstrual pain; her husband states she drank a pint of whiskey a night for relief. She has wanted children all her life, but reproductive organs have not developed beyond the infant stage. In 1946 first symptoms of illness were noted. The patient visited friends in Florida, and was seemingly in good spirits until being thrown from a bus and receiving a hip injury. Next day she called her husband and "talked irrationally, acted rudely, and stated she did not want to come home." The following week he received word that she had been admitted to a Florida sanitarium. When he arrived to see her he was told she was in constant restraint. After electroshock treatment she was returned home as improved. Soon thereafter she had a violent argument with a neighbor, and was admitted to General Hospital. Upon being released she visited her parents, again became violent, and was brought to Longview in July, 1946. Electronarcosis was employed with good results, but relapses occurred. Lobotomy was indicated in March, 1948.

Psychological Findings. Preoperative examination revealed an attractive, well-groomed, pleasant woman who was well oriented, intact, and cooperative. She stated she had been "excited" on certain past occasions, but averred she was well enough to return home. All tests in the A series were successfully administered. On the 15th postoperative day, however, the patient was found in restraint. She had attacked another patient the night

before without warning. Although she recognized the examiner, her face appeared mask-like, and her manner sullen and morose. The orientation series was attempted, but lack of rapport was evident. The patient began to curse hospital authorities, attendants, and other patients. Testing was abandoned at that time, but was attempted each three days until the 30th postoperative day, when all tests except the Rorschach were completed. During the ninth postoperative week tests under condition C were administered. At this time the patient was in a state of remission, and rapport was excellent. Such normal periods may last many weeks or months, only to be broken by periods of extreme violence, delusional behavior, refusal to eat, and homicidal trends requiring almost constant physical restraint. Test results for the three conditions are depicted in the following table.

TABLE 16
CASE 21 (AR) TEST SUMMARY

SHORT TESTS			
	A	B	C
Pic. Sim.			
M. Span Obj.	11	D	A
Proverbs	5	0	1
AAA Series	10	10	10
Orientation			
Place	5	2	5
Time	4	5	4
Person	5	5	4
Recent Events	5	1	5
Color Name	45	39	40
Color Sub.	70	80	80
Own Name, USA	OK	OK	OK

WECHSLER-BELLEVUE			
	A	B	C
Info.	6	2	5
Compr.	6	3	7
D. Span	7	10	9
Arith.	7	1	4
Simil.	8	2	6
Vocab.	7	3	1
V. IQ	87	69	78
P. Arr.	6	1	5
P. Comp.	6	3	7
B. Design	6	3	6
O. Assem.	10	5	6
P. Sym.	5	3	4
F.S. IQ	87	65	78
Det. %	9	0	0

RORSCHACH			
	A	B	C
R	17		
W	5	x	
D	10		
Dd	2		
M	0		
ΣC	0		
F+%	63		
F%	100		
A%	88		
P	5		
M:C	0:0		
FM	0		
S	0		
C	24		
CF	3		
FC	16		
FY	5		
FV	0		
RT Bl	1		
RT C	79		
T/R	88		
H	58		
Hd	8		
A	0:1		
An	2		
Hh	0		
A	0		
B	x		
C	0		
21"	0		
36"	0		
46"	0		
100"	0		
55"	0		
49"	0		
100"	0		
2	0		
5	0		
10	0		
0	0		
2	0		

The point of interest in the shorter tests is the impairment of verbal abstraction ability in both B and C conditions. Proverb interpretations after operation became literalistic. On the Wechsler Full Scale IQ a long term postoperative drop of nine points is noted. This can be traced to an almost complete inability to respond on the Vocabulary subtest. In the C condition she was unable to generalize the qualities of simple objects like "box". Instead of defining a "box" she said, "I had one - it was pretty." In answer to the request to define "letter" she answered, "business letters and love letters." Words like "bad," "brave," and "nuisance" brought complete blocking. Vocabulary scores below the central tendency of other tests have been described as characteristic of simple schizophrenia, certain psychopathies, and some mental deficiencies. In these cases it has appeared as a developmental aberration - that is, a hampered development rather than an impairment. The fact that patient AR achieved a pre-operative vocabulary score comparable to other verbal subtests, then showed impairment after lobotomy, is indicative of an individual deficiency not as yet explained. Aside from this, the other postoperative impairment is on the Arithmetic (or concentration) subtest. Whether or not

this is related to the vocabulary deficiency cannot at this writing be determined. The Rorschach changes are in the direction of psychometric improvement. The increase of F+%, decrease of F%, reduction of A%, more P, emergence of FC, and greater emphasis on H and Hd bear out this statement. The appearance of FM, though representing an immature creativity, is at least an improvement over the coarctation noted preoperatively. This development is concurrent with the release of an appropriate amount of affective energy. Turning to the behavior record, we note that attendants see no symptom loss. In fact, the patient shows a 12 per cent gain in this respect. Tremors, extreme suspiciousness, and more frequent need of physical restraint are mentioned as additional traits. More recent reports, however, indicate that the patient has made steady progress. "Schizoaffective attacks" are less frequent, and absence with leave has been permitted with no misbehavior reported. Psychodrama has been utilized with apparently satisfying results. In view of these developments as well as the Rorschach indices of improvement, the psychologist's rating is C (open ward status).

CHAPTER IV

RESULTS: GROUP SUMMARIES; CONCLUSIONS

Essential Data Regarding Patients. In Table 17 below, patients are arranged alphabetically within diagnostic categories. Duration of illness is estimated from the social history and dates from the time relatives of the patient first became aware of symptoms severe enough to constitute mental disease. Marital status refers to the condition at time of operation, with D signifying divorced, S single, and M married. Number of siblings refers to the brothers and sisters living at time of first hospital admission. The present status rating by psychiatrist and psychologist is in terms of a six point scale where A indicates probable discharge from the hospital and economic self-sufficiency, B indicates probable discharge and satisfactory adjustment to home routine, C indicates open ward status and occasional absence with leave, D indicates better hospital adjustment and easier ward care, E indicates fewer morbid symptoms, and F indicates no improvement. The psychiatrist's rating is based chiefly upon his personal observations, whereas the psychologist's rating is a composite of psychometric results, clinical observation, and statements of nurses and attendants.

TABLE 17

SUMMARY OF ESSENTIAL DATA - ALL PATIENTS

Pt.	Sex	Age	Diagnosis	Duration Illness (Months)	Lobotomy Date (1948)	Highest School Grade Completed	Marital Status	No. of Siblings	% Symptom Loss 1/	Rank Order of Symptom Loss	Present Status Rating by Psychiatrist	Present Status Rating by Psychologist
1. DA	F	33	Paranoia	54	13 Sept.	13	D	0	63	2	D	B
2. EH	M	29	Paranoia	102	12 July	8	S	2	36	9	E	F
3. VH	M	38	Paranoia	15	23 Aug.	13	S	0	22	15	C	C
Mean		33		57		11		1	40		D	D
4. GA	M	31	Manic Dep. Psychosis	157	28 June	12	S	7	13	18	F	F
5. IT	M	40	Manic Dep. Psychosis	120	17 May	10	D	3	28	14	C	D
Mean		36		139		11		5	21		D	E
6. JB	F	51	Psychosis with Mental Deficiency	202	5 April	6	M	3	18	16	F	E
7. OJ	F	22	Psychosis with Mental Deficiency	60	23 Feb.	7	S	2	33	11	D	D
8. ER	M	26	Psychosis with Mental Deficiency	100	12 July	7	S	3	0	19	F	F
Mean		33		121		7		3	17		E	E
9. EC	F	18	Catatonia	9	19 Apr.	10	S	1	36	10	D	C
10. MC	F	33	Catatonia	16	23 Feb.	8	M	2	46	7	C	D
11. ED	M	37	Catatonia	151	15 Mar.	13	S	1	53	5	D	C
12. EG	M	33	Catatonia	108	13 Sep.	9	S	0	32	12	F	E
13. ML	F	49	Catatonia	300	28 June	7	S	3	-23	21	F	D
14. CS	F	22	Catatonia	6	5 April	13	S	2	30	13	D	D
Mean		32		98		10		2	29		D	D
15. LB	F	37	Hebephrenia	175	3 May	7	S	6	54	4	D	D
16. WD	M	32	Hebephrenia	94	7 June	11	M	1	57	3	B	C
17. MK	F	39	Hebephrenia	182	17 May	12	S	1	16	17	D	E
18. AL	F	54	Hebephrenia	192	7 June	20	S	2	39	8	D	D
19. MS	M	18	Hebephrenia	25	15 Mar.	9	S	2	48	6	B	B
20. SS	F	22	Hebephrenia	56	23 Aug.	8	S	0	73	1	D	D
Mean		30		121		11		2	48		C	D
21. AR	F	38	Schizoaffective Psychosis	24	3 May	8	M	7	-12	20	D	C
Mean		38		24		8		7	-12		D	C
Mean of Total		31		102		10		2	32		D	D

1/ Attendants' Rating.

The subtotal averages by diagnostic category as well as those for all 21 patients are not particularly meaningful in view of the small number of cases. Bearing this in mind, we note that the "average patient" is 31 years of age, has been ill 8 1/2 years, completed the tenth grade, has two siblings, experienced a 32 per cent reduction in symptoms, and can be expected to make a better hospital adjustment. The ratings of the psychiatrist and psychologist for the total group coincide, although those of the former are more optimistic with regard to the manic-depressives and hebephrenics. The discrepancy between the two ratings in the case of DA, a paranoid woman, can be traced to the improved psychometric results. The postoperative personality structure, especially as revealed by the Rorschach, was considered less psychotic.

Comparing the 7 patients with the best postoperative status (psychologist's ratings B or C) with the 7 having the poorest postoperative status (E or F) we find that the average patient of the second group was 6 years older, had 2 1/2 fewer years of schooling, had been ill over 3 times as long, had more siblings, and experienced only 1/3 the symptom loss.

From examination of the table as a whole one can conclude that the modest objective of rendering the

TABLE 18

RESULTS OF SHORTER TESTS FOR A AND C CONDITIONS

Pt./Sex	Memory Span		Orientation Series (No. Correct out of 5)										Color Naming			Color Substitution										
	Pic. Sim.	Objects	Proverbs			AAA Series			Place			Time			Person			Recent Events								
			A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C								
																			A	C	A	C	A	C	A	C
(1) DA F	A	A	14	11	9	10	9	10	10	10	5	5	5	4	4	5	3	5	33	0	30	0	66	0	71	0
(2) EH M	A	B	10	3	2	0	9	9	9	3	2	3	1	3	1	4	3	35	0	32	0	90	0	76	0	
(3) WH M	A	A	10	11	9	9	9	10	10	5	5	4	5	5	4	5	5	45	0	38	0	120	2	91	0	
(6) JB F	D	A	0	7	0	0	0	10	10	2	3	1	2	3	1	3	1	70	0	61	0	X	X	(180)a	0	
(7) OJ F	C	D	3	10	0	0	0	5	10	1	1	1	1	1	4	1	1	300	0	55	1	X	X	(120)a	0	
(8) ER M	D	B	2	6	0	0	0	7	9	4	4	1	1	3	3	3	3	X	X	(61)a	2	X	X	X	X	
(9) EC F	D	C	2	4	1	3	9	10	4	5	3	3	4	4	4	4	3	75	0	47	0	200	0	108	0	
(10) MC F	B	C	5	10	3	0	10	10	3	4	1	4	1	4	1	4	3	118	0	47	1	130	0	75	0	
(16) WD M	C	B	10	16	0	0	10	10	4	4	3	2	4	4	4	4	3	28	0	29	0	90	0	61	0	
(19) DS M	A	A	14	12	3	3	10	10	5	5	5	5	4	4	4	4	5	66	1	95	0	148	2	120	0	
(20) SS F	D	C	10	11	0	0	10	10	3	4	1	0	5	3	3	4	3	19	0	29	0	65	1	54	0	
(21) AR F	B	A	11	12	5	1	10	10	5	5	4	4	5	4	5	4	5	45	1	40	0	70	0	80	0	
Mean	C	B	7.6	9.4	2.7	2.2	9.2	9.8	3.7	3.9	2.7	2.7	3.5	3.4	3.5	3.4	75.8		45.7		108.8		81.8			
t	1.40	1.48			1.03		1.54										1.61				2.59*					
p	.20	.15			.30		.15										.15				.05					

**: Scored A,B,C or D.
a: Omitted from calculations.

patient more amenable to routine hospital care through lobotomy has been achieved. If certain personality deficits are evidenced after lobotomy these are milder in comparison to the preoperative condition.

Results of Shorter Tests. The tests utilized in this phase of the battery are: (1) Picture Similarities, (2) Memory Span for Objects, (3) Proverbs, (4) Agnosia, apraxia, aphasia series, (5) Orientation series, (6) Color Naming, and (7) Color Substitution. These have been described in Chapter II. In Table 18 below all results for individual patients are presented. The mean score of each test is calculated by using an N of 12. In the t -ratio calculations, N was 12 except on Color Naming and Color Substitution where it was 11 and 9 respectively (see Appendix II). On these two tests failure to perform under either A or C condition could not be considered merely a zero score, but an inestimable number of seconds. Hence, only patients yielding a score in seconds under both conditions were considered. Maximum attainable scores are A for Picture Similarities, 20 for Memory Span, 10 for Proverbs, 10 for AAA Series, and 5 for each of the three orientation spheres.

The Picture Similarities test is presumed to indicate the level of concept formation and categorical thinking. It requires the patient both to note common properties of pictured objects and to verbalize them. As measured here, these abilities appear not to have deteriorated after lobotomy. Most patients achieved better scores in the C or second postoperative condition.

Memory Span for Objects is a test indicated for patients recovering from shock conditions, head injuries, and post-convulsion twilight states. It probably involves voluntary recall as well as attention and concentration processes on simple levels. As measured by this test there is no postlobotomy deficit in such factors. The mean score of 9.4 after operation is closer to the average adult score of 11 than was the preoperative one.

Proverb Interpretation (or explanation) proved a difficult task for these subjects. High level abstraction ability does not appear in those of marginal intellect or below. It is a function indicated by many investigators to be damaged permanently by lobotomy. All the present patients were virtually impotent on the test in the immediate postoperative state, but most regained the ability after eight weeks. The group level, however, remained permanently below that of the preoperative condition.

The Agnosia, Apraxia, Aphasia Series required simple acts of significance in detecting auditory, visual, manual, and speech aphasia, auditory and visual agnosia, and limbkinetic apraxia. It was anticipated that brain damage of the lobotomy type might give rise to disturbance in this area. Findings indicate that, if anything, patients performed these tasks with greater ease after operation. The demands of the test, however, are slight. What appears to be a better performance may be a result of release from anxiety and rumination rather than an actual release from aphasic symptoms.

The measures of Orientation to Place, Time, Person, and Memory for Recent Events yielded no postlobotomy changes. The mean performances for all patients suggest that orientation to place was most intact, whereas temporal orientation was most disturbed. Poorest orientation in all spheres is noted in OJ, JB, and ER, the three mentally deficient psychotics. The paranoids DA and WH, as expected, are among the patients showing best orientation.

The Color Naming test is considered a good measure of mental speed, being virtually independent of educational achievement. The average speed of healthy adults in naming the 50 colors is 50 seconds. The

average for the lobotomy patients is 69.5 seconds pre-operatively and 47 seconds in the second postoperative condition. The improvement after lobotomy in this simple perceptual act, though not statistically significant, points to greater freedom from tension and anxiety.

The Color Substitution test is the only measure in the short series yielding a significant change after operation. This task was introduced as a measure of the readiness with which an individual can deal with arbitrarily substituted symbols in a simple and familiar perceptual act. One of the chief reasons for failure in this task was the perseveration of the older habit of naming the colors. Some patients were blocked, while others did well at first only to "regress" under the pressure of speed to color names instead of assigned numbers. The significantly better scores after operation were not necessarily anticipated. Hypothetically, they may refer to the detachment of emotion from the task, thus facilitating the same improvement in attention noted on other tests.

Results of the Behavior Inventory. This measure (See Appendix I) consisted of two lists of traits (or symptoms) which were used by attendants and nurses as a check list for describing patients' behavior.

The first list was used prior to the operation and eight weeks following it. The second list was employed during the second postoperative week, and was filled out by the hospital ward nurse (See Chapter II, p. 37). Each item was carefully explained by the examiner before the attendant or nurse checked it. In list I all traits may be regarded as undesirable except 46, 54, and 55, whereas list II contains additional items descriptive of the convalescent period following lobotomy. In Table 19 below, 29 most frequently mentioned traits of the preoperative period are listed. The total number of patients showing each trait is listed for both the preoperative and second postoperative conditions. The percentage loss of the trait after lobotomy is also indicated.

Table 19 reveals that homicidal trends, delirium, destructiveness, need for physical restraint, indecency, and silly laughter all show losses of 60 per cent or more. The salient feature of these traits is that their presence in a given patient renders him dangerous and refractory, a hazard to the safety of other patients as well as himself. They are also closely related to the activity level of the individual, and their elimination greatly facilitates custodial care. The next group, showing a postoperative loss of 30 to 59 per cent,

TABLE 19

INCIDENCE OF PRINCIPAL SYMPTOMS
REPORTED BY ATTENDANTS IN 21 PATIENTS

	CONDITION		% LOSS	RANK
	A	C		
1. Dullness	18	13	28	18
2. Irritability	17	13	24	22
3. Destructive	16	6	63	3
4. Aggressive	16	13	19	23
5. Fluctuation of Attn.	16	14	13	25
6. Restlessness	16	10	38	13
7. Disorientation	15	11	27	19
8. Incontinence (rectal)	15	11	27	20
9. Silly Laughter	15	6	60	6
10. Talkativeness	14	6	57	7
11. Incontinence (vesical)	14	13	7	27
12. Mannerisms	13	8	39	12
13. Tantrums	13	6	54	9
14. Slowness	12	10	17	24
15. Tactlessness	12	8	33	14
16. Poor Judgment	12	17	-42	28
17. Sarcasm	11	10	9	26
18. Indecency	10	4	60	5
19. Nakedness	10	6	40	11
20. Inappropriate Humor	9	6	33	15
21. Profanity	9	6	33	16
22. Homicidal Trends	9	1	89	1
23. Delirium	9	3	67	2
24. Feeding Problem	9	4	56	8
25. Blocking in Speech	9	6	33	17
26. Rumination	8	6	25	21
27. Need for Phys. Restraint	8	3	63	4
28. Regard for Relatives	8	13	-63	29
29. Emotional Tension	8	4	50	10
All Other Symptoms	100	58	42	
Mean			35	

includes talkativeness, feeding problems, tantrums, emotional tension, nakedness, mannerisms, restlessness, tactlessness, inappropriate humor, profanity, and speech blocking. These constitute a more miscellaneous group, though the common denominator of a relatively high activity level is still identifiable. The third group, reflecting a postoperative loss below 30 per cent, includes dullness, disorientation, rectal incontinence, rumination, irritability, slowness, fluctuation of attention, sarcasm, and vesical incontinence. These are more difficult to characterize, though many of them are symptoms of deeper psychotic regression. They appear to be types of behavior showing lack of cerebral dominance with consequent loss of integration among cortical, subcortical, and spinal levels of function. If such is the case, it is not strange to find them refractory to a therapeutic measure involving interruption of the fronto-thalamic tracts. The two traits showing a decided increase after lobotomy are regard for relatives and poor judgment. The first trait can be accepted as evidence of improvement, since affection and regard for family members is socially desirable. The increase in poor judgment, a negative process, may not necessarily be attributable to lobotomy. In fact, there may actually be no increase in poor judgment, since this rather vague

trait might only become apparent after elimination of the more attention arresting types of behavior. It is realized that the behavior inventory presents the serious defect of overlapping categories as well as various semantic shortcomings. These appear less consequential when it is remembered that its function is that of descriptive adjuvant to the more standardized psychometric findings.

Another approach to the behavior record percentages is arbitrarily to divide them into two lists. The first list includes traits pathognomic of mental disease, while the second includes traits described as "exaggerated normal." The mean percentage reduction after operation is calculated for each list as presented in Table 20.

As can be seen in the table average postoperative trait loss is 43.6 per cent for the pathognomic group and 32.6 per cent for the "exaggerated normal" group. Such a situation is not inconsistent with the rationale of prefrontal lobotomy, since one would expect a therapeutic measure to attack the characteristic symptoms associated with neuropsychiatric disease.

TABLE 20

PER CENT LOSS OF SYMPTOMS PATHOGNOMIC OF MENTAL DISEASE
COMPARED TO "EXAGGERATED NORMAL" SYMPTOMS

<u>SYMPTOM</u>	<u>P</u>	<u>EN</u>
1. Dullness		28
2. Irritability		24
3. Destructive	63	
4. Aggressivity		19
5. Fluctuation of Attn.		13
6. Restlessness		38
7. Disorientation	27	
8. Incontinence (rectal)	27	
9. Silly Laughter		60
10. Talkativeness		57
11. Incontinence (vesical)	7	
12. Mannerisms	39	
13. Tantrums	54	
14. Slowness		17
15. Tactlessness		33
16. Sarcasm		9
17. Indecency		60
18. Nakedness	40	
19. Inappropriate Humor	20	
20. Profanity		33
21. Homicidal Trends	89	
22. Delirium	67	
23. Feeding Problem	56	
24. Blocking in Speech	33	
25. Rumination	25	
26. Physical Restraint	63	

Mean = 43.6 Mean = 32.6

As yet no mention has been made of the behavior record results for the B or first postoperative condition. The traits for List II were arranged to be checked as either temporary or persistent. The symptoms most frequently noted in patients on the hospital ward are presented in Table 21 below. The temporary and persistent columns are mutually exclusive, since no patient could be included in both lists. The "percentage of total" values are arrived at by dividing the number of patients showing the symptom by 21, the total number of patients in the study.

Table 21 serves to indicate in a rough way the immediate postoperative sequelae of lobotomy. All symptoms except infection of head wound and temperature elevation are apparently capable of persisting over a considerable length of time, with dullness, incontinence, and restlessness particularly notable. Convulsions following lobotomy occurred in only one case in this series, although previous investigators indicate that this symptom does not usually appear until after the ninth postoperative month.

TABLE 21
MAIN SYMPTOMS NOTED ON HOSPITAL WARD

	TEMPORARY SYMPTOMS		PERSISTENT SYMPTOMS		COMBINED TEMPORARY & PERSISTENT	
	No. of Pts.	% of Total	No. of Pts.	% of Total	No. of Pts.	% of Total
1. Incontinence (vesical)	12	57	8	38	20	95
2. Incontinence (rectal)	12	57	8	38	20	95
3. Temperature Elevation (over 2°)	11	52	0	0	11	52
4. Dullness	7	33	11	52	18	86
5. Silly laughter	7	33	2	10	9	43
6. Slowness	6	29	4	19	10	48
7. Increased Appetite	5	24	3	14	8	38
8. Restlessness	4	19	7	33	11	52
9. Feeding Problem	4	19	2	10	6	29
10. Somnolence	3	14	2	10	5	24
11. Blocking in Speech	3	14	2	10	5	24
12. Infection of Head Wound	3	14	0	0	3	14

Results of the Wechsler-Bellevue Scale. Of the 21 patients studied in the present investigation it was possible to secure complete Wechsler results on 10. The remaining 11 patients were unable, for a great variety of reasons, to perform adequately on this scale. Some were capable of preoperative performance only and some of postoperative performance only. The results of all Wechsler administrations have been individually presented and discussed in Chapter III. In the present connection we shall be concerned with the 10 patients who yielded scorable results in both the A and C conditions. Since approximately 50 per cent of the total number of patients is omitted from this discussion, a sampling bias is automatically introduced. Quantitative results, therefore, are hereby prefaced with the phrase "as measured."

Table 22 below presents weighted scores on the 11 subtests for each patient under both A and C conditions. The verbal, performance, and full scale intelligence quotients as well as the deterioration percentages are included. The means and average deviations for each test are entered in the lower part of the table, and below these are to be found t-ratios and probabilities of the significance of differences between A-condition and C-condition means (See formula, Appendix II).

The last row labeled "Average Modified Mean Scatter" contains values arrived at by averaging the deviations in weighted score units of each subtest from the mean of the other subtests in its scale (performance or verbal), in the computation of which the subtest score in question is excluded.

These results reaffirm the well known principle that the subtests most resistant to change are Vocabulary, Information, and Similarities. They further support the contention that general IQ values, as measured by the Wechsler, remain stable in the postoperative state. Of greatest interest is the postoperative improvement of the scores on the Digit Span, Picture Arrangement, and Block Design subtests and the sharp reduction in mental deterioration.

The Digit Span is considered not as a memory test but as an attention test. An individual attempting the Digit Span mobilizes his energies to meet a challenge from outside reality. The degree to which he is successful would seem to depend upon how much energy is free to be utilized for the task at hand and how much is deployed by "internal" affects, needs or strivings. It follows from this principle, since lobotomy is almost a specific agent in breaking up

TABLE 22
WECHSLER - BELLEVUE RESULTS UNDER CONDITIONS A & C

	Info.		Comp.		D. Sp.		Arith.		Siml.		Vocab.		P.A.		P.C.		B.D.		O.A.		D.St.		Verbal		Perf.		Full Scale		Percent	
	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C	A	C
(1) DA	13	13	15	15	9	11	12	8	14	12	14	14	8	11	14	12	14	16	14	15	11	11	121	120	120	125	122	124	13	12
(2) EH	4	5	3	3	0	4	4	4	2	6	5	6	3	1	9	7	12	10	10	12	6	2	62	75	89	76	73	74	20	19
(3) WH	17	15	15	15	11	9	12	11	16	15	15	16	8	10	15	12	12	10	12	11	4	5	130	128	110	107	122	119	29	30
(6) JB	3	6	5	5	0	9	0	6	5	7	5	6	3	1	0	6	5	6	6	9	1	0	69	89	75	81	72	85	43	8
(9) EC	3	5	3	4	2	6	1	4	6	8	4	8	1	3	1	4	3	7	5	5	5	4	59	77	48	60	48	65	15	0
(10) MC	6	5	7	4	6	4	6	5	6	4	6	6	4	5	10	10	8	10	12	12	6	6	82	70	93	94	86	81	20	21
(16) WD	7	7	9	5	7	13	10	10	13	12	9	10	5	7	9	9	9	10	9	9	8	9	98	102	90	98	95	100	0	0
(19) DS	11	9	7	9	4	6	3	9	8	8	9	9	6	7	6	11	6	6	7	8	4	4	82	93	68	75	73	83	48	32
(20) SS	6	4	2	1	6	7	0	2	3	2	6	1	1	1	3	4	1	2	7	7	5	7	65	57	54	55	56	54	45	0
(21) AR	6	5	6	7	7	9	7	4	8	6	7	1	6	5	6	7	6	6	10	6	5	4	87	78	88	80	87	78	9	0
Total	76	74	72	68	52	78	55	67	81	80	80	77	45	51	73	82	76	83	92	94	55	52	855	889	835	851	834	863	242	122
Mean	7.6	7.4	7.2	6.8	5.2	7.8	5.5	6.7	8.1	8.0	8.0	7.7	4.5	5.1	7.3	8.2	7.6	8.3	9.2	9.4	5.5	5.2	85.5	88.9	83.5	85.1	83.4	86.3	24.2	12.2
AD	3.6	3.0	3.5	3.8	3.0	2.4	3.9	2.5	3.7	3.0	3.0	3.7	2.1	2.9	4.1	2.6	3.4	2.9	2.4	2.4	1.8	2.4	18.8	17.5	17.8	16.7	19.0	16.8	13.6	10.6
t	0.36		0.69		2.44*		1.07		0.15		0.32		3.39**		0.95		1.21		0.34		0.58		0.93		0.66		1.10		2.34*	
p	.70		.50		.05		.30		.90		.80		.01		.30		.20		.70		.60		.30		.50		.30		.05	
Ave. Mod.	0.80		0.32		-2.08		-1.72		1.40		1.28		-2.90		0.60		0.97		2.98		-1.65									
Mean Scatter	0.00		-0.72		0.48		-0.84		0.72		0.36		-2.60		1.28		1.33		2.70		-2.55									

the self-preoccupation and internalization of energies of the psychotic, that an improvement in the ability to attend would be anticipated. Such an improvement was noted in these patients.

The Picture Arrangement subtest has been suggested as a measure of planning ability and ability to anticipate. One is required to take a series of isolated pictures and arrange them into a meaningful (and temporal) sequence. When the character (person) in a picture is found in a given situation, the subject must anticipate which of several alternative situations would "logically" follow. In addition to spatial and temporal sequence relationships, we appear to be dealing with a kind of "social sense" or empathy, since the subject no doubt identifies himself with the character in the picture. (One patient demonstrated this when he said, "Here I pick up the girl and walk down the street with her.") The present results indicate that patients perform significantly better on this test post-operatively, although scores are low under both conditions. This finding appears inconsistent with that of Freeman and Watts (13, pp. 302f), who note in their postoperative patients defects in the "ability to foresee, to see before, to forecast results of certain activities" and "reduction in consecutive thinking." It is possible, however, that

the better postoperative performance of our patients on the Picture Arrangement Test is not a function of planning ability at all, but a mere concomitant of the improved attention and concentration abilities.

The third subtest showing noticeable improvement after lobotomy is Block Design. This is a visual organization test, involving analysis and subsequent synthesis of visually presented geometric designs. Motor retardation, tension, anxiety, and visual or spatial-perceptual deterioration are some of the processes of probable influence in depressing performance on this test. In the postlobotomy patients a better performance may be associated with the release from tension and depressive trends afforded by the operation.

The notable reduction in Deterioration Percentage for these 10 patients after lobotomy can be accounted for when one remembers that this measure is essentially a ratio between the Information, Vocabulary, Picture Completion, and Object Assembly subtests on the one hand and the Digit Span, Arithmetic, Block Design, and Digit Symbol subtests on the other. The former group was relatively stable during the two administrations, but the latter group showed consistent elevation of scores. This might suggest the hypothesis that tensions and self-preoccupation processes are of greater importance in the

Deterioration Percentage than the physiologic aging process itself. Recent investigations, however, shed much doubt upon the dependability of the Deterioration Index as a measure of psychotic functioning. (e.g., 21)

In concluding the discussion of Table 22, we may point out that the Modified Mean Values indicate greatest negative scatter on Picture Arrangement and Digit Symbol and greatest positive scatter on Object Assembly and Block Design. Thus, even in group averages, the subtests most vulnerable to personality disturbance retain their characteristic levels in the postoperative period.

Another measure of importance in treating Wechsler scores is the vocabulary scatter. The vocabulary subtest, as can be seen on the previous table, was quite stable, with the group mean under C condition changing only 0.3 weighted score units from that of condition A. In Table 23, which follows, the mean vocabulary scatter for 10 patients under A, B, and C conditions of each subtest is presented.

Total average scatter, obtained by simple summation of individual subtest average scatter, is gradually reduced as we proceed from A through C condition. As measured, the change from A to C appears significant in the case of the Digit Span subtest. This means an improvement in attention, whereas other verbal tests are unaffected.

TABLE 23WECHSLER - BELLEVUEAVERAGE VOCABULARY SCATTER UNDER THREE CONDITIONS FOR TEN PATIENTS
(in weighted score units)

	<u>A</u> <u>PRE-OP</u>	<u>B</u> <u>POST-OP I</u>	<u>C</u> <u>POST-OP II</u>	<u>A TO C</u> <u>T-Ratio</u>	<u>P</u>
Info.	-0.4	-0.3	-0.3	0.13	
Comp.	-0.8	-2.1	-0.9	0.08	
D. Span	-2.8	-0.4	0.1	2.37	.05*
Arith.	-2.5	-1.9	-1.0	1.26	.28
Simil.	0.1	-0.3	0.3	0.24	
P. Arr.	-3.5	-3.1	-2.6	0.97	
P. Comp.	-0.7	-0.9	0.5	0.93	
B. Design	-0.4	-0.7	0.6	1.01	.30
O. Assem.	1.2	1.7	1.7	0.64	
D. Symbol	-2.5	-1.2	-2.5	0.00	
Total Scatter	14.9	12.6	10.5		

Thus, vocabulary scatter reinforces the finding in a previous table where modified mean scatter was employed.

Rorschach Results. In presenting Rorschach findings it appears more meaningful to speak in terms of trends and qualitative differences rather than in terms of statistical measures. Out of 21 patients it was possible to secure complete Rorschach records under A and C conditions from 10. In Table 24 below results are presented for 3 paranoids (DA, EH, and WH), 2 mentally deficient psychotics (JB and OJ), 2 catatonics (EC and MC), 2 hebephrenics (AL and DS), and 1 schizoaffective (AR). The code number used for each patient in the individual case summaries of Chapter III is included here for cross reference.

For the 3 paranoids there appears to be no consistent change. In DA the approach shifts toward normal, popular percepts increase, greater emotional maturity appears, and social responsiveness emerges. In EH, an exact reversal occurs in the factors named. In WH virtually no change is noted. Since the psychologist's rating of DA was B as opposed to E and C for the other two patients, we can conclude only that the Rorschach

TABLE 24

ROSCACH RESULTS FOR TEN PATIENTS

UNDER A, B, AND C CONDITIONS

Patient
Condition

	R	(W)	(W%)	(D)	(D%)	(Dd)	(Dd%)	M	C	F+	F%	A%	P	M:C	W:M	Pure	C _F	FC	FY	YF	FV	RT			H	Ed	A	Ad	An
																						Bl	C	T/R					
1. DA	A 7	(2)	29%	(5)	71%	(0)	0%	1	1.0	100	57	57	5	1:1	2:1	0	1	0	0	0	0	20	17	43	1	0	4	0	0
	B 12	(1)	8	(11)	92	(0)	0	1	1.0	100	50	34	5	1:1	1:1	0	0	2	0	0	1	49	55	140	1	2	4	0	0
	C 12	(3)	25	(8)	67	(1)	8	0	1.0	100	67	58	7	0:1	3:0	0	0	2	1	0	0	6	7	65	2	1	6	1	0
2. EH	A 17	(3)	18%	(13)	76%	(1)	6%	0	0.0	62	82	35	6	0:0	3:0	0	0	0	1	1	0	12	7	46	4	4	4	2	2
	B 14	(1)	7	(11)	78	(2)	15	0	0.0	69	93	36	2	0:0	1:0	0	0	0	1	0	0	46	31	85	3	4	4	1	0
	C 10	(1)	10	(9)	90	(0)	0	0	0.0	50	90	20	1	0:0	1:0	0	0	0	1	0	0	25	28	65	1	3	2	0	0
3. WH	A 19	(5)	26%	(12)	63%	(2)	11%	2	0.5	86	74	68	7	2:1/2	5:2	0	0	1	1	0	0	3	9	63	2	2	11	2	0
	B 17	(7)	42	(9)	52	(1)	6	3	0.5	90	65	65	7	3:1/2	7:3	0	0	1	2	0	0	5	5	35	3	0	10	1	0
	C 16	(5)	32	(11)	68	(0)	0	3	0.5	91	68	56	7	3:1/2	5:3	0	0	1	1	0	0	5	6	29	3	2	5	4	0
6. JB	A 37	(5)	14%	(30)	81%	(2)	5%	0	13.0	55	62	19	4	0:13	5:0	7	2	1	3	0	0	7	4	41	3	5	7	2	2
	B 30	(2)	7	(24)	80	(4)	13	0	10.0	60	73	10	6	0:10	2:0	6	1	0	0	0	0	6	3	36	2	5	7	2	2
	C 29	(7)	24	(21)	73	(1)	3	0	15.5	67	52	17	5	0:15	7:0	8	3	1	1	0	0	12	8	41	2	0	6	0	6
7. OJ	A 21	(6)	28%	(12)	57%	(3)	15%	0	8.0	70	57	24	3	0:8	6:0	3	3	1	1	0	0	29	45	66	0	0	5	0	0
	B X																												
	C 24	(3)	12	(20)	83	(1)	4	0	7.0	33	67	25	4	0:7	3:0	2	3	2	1	0	0	4	5	75	1	0	6	0	0
9. EC	A 23	(14)	61%	(9)	39%	(0)	0%	0	0.0	0	96	23	0	0:0	14:0	0	0	0	1	0	0	14	16	39	0	0	5	0	0
	B 7	(5)	71	(2)	29	(0)	0	0	0.0	57	100	57	2	0:0	5:0	0	0	0	0	0	0	X	X	X	0	0	4	0	0
	C 21	(7)	33	(13)	62	(1)	5	1	3.0	60	76	67	5	1:3	7:1	1	1	1	0	0	0	6	6	43	2	0	14	0	0
10. MC	A 18	(9)	50%	(7)	39%	(2)	11%	0	0.0	50	94	50	6	0:0	9:0	0	0	0	1	0	0	10	18	48	1	1	9	0	6
	B 10	(1)	10	(8)	80	(1)	10	1	1.5	43	80	20	2	1:1 1/2	1:1	1	0	0	1	0	0	X	X	X	1	6	1	1	1
	C 21	(7)	33	(8)	38	(6)	29	0	0.0	32	90	14	2	0:0	7:0	0	0	0	1	1	0	39	29	56	1	5	2	1	3
18. AL	A 35	(12)	34%	(21)	60%	(2)	6%	0	4.0	31	80	43	2	0:4	12:0	2	1	0	3	1	0	8	6	36	0	8	8	7	7
	B 31	(3)	10	(24)	77	(4)	13	0	5.5	60	84	52	6	0:5 1/2	3:0	2	2	1	0	0	0	7	7	37	1	3	9	7	7
	C 27	(4)	15	(15)	56	(8)	29	1	8.5	44	67	37	3	1:8 1/2	4:1	3	4	0	1	0	0	5	4	X	1	8	7	3	7
19. DS	A 29	(7)	24%	(19)	66%	(3)	10%	0	0.5	43	86	38	3	0:1/2	4:0	0	0	1	2	0	1	34	68	70	0	2	11	0	2
	B 24	(5)	21	(18)	75	(1)	4	0	0.0	52	100	83	3	0:0	5:0	0	0	0	0	0	0	28	47	50	0	0	18	2	0
	C 29	(4)	14	(21)	72	(4)	14	0	1.0	83	90	70	4	0:1	4:0	0	0	2	0	0	0	55	61	81	0	2	14	6	0
21. AR	A 17	(5)	29%	(10)	59%	(2)	12%	0	0.0	63	100	88	5	0:0	5:0	0	0	0	0	0	0	21	36	46	1	1	11	4	0
	B X																												
	C 24	(3)	13	(16)	67	(5)	20	0	1.0	79	88	58	8	0:1	3:0	0	0	2	0	0	0	55	49	100	2	5	10	4	0

X: Patient unable to respond.

faithfully reflects clinical change in individuals, but does not show characteristic alterations after lobotomy in these paranoids.

For the 2 psychotics with mental deficiency we find variable results. JB gains in F+% (hold on reality) and in H compared to Hd (social responsiveness). These are nullified, however, by a further increase in uncontrolled affectivity. OJ becomes concretistic, rigid, and farther removed from reality. Motivation is reduced in both cases. One may conclude that Rorschach changes here refer not to the diagnostic category but to individual alterations following lobotomy.

The 2 catatonics yield widely divergent Rorschach changes. EC shows improvement in approach, contact with reality, conventionality, and emotional rapport. MC's postoperative records show deterioration in each of these areas. Thus, the catatonics also react individually instead of categorically.

Of the two hebephrenics AL improved under condition B in critical areas of the Rorschach, but lost her gains by the time C condition was reached. DS showed gradual postoperative improvement both in the Rorschach and in clinical status. This can be seen especially in the approach, the F+% and the P%. The hebephrenics, like

preceding groups, did not react alike to the postoperative Rorschach.

The schizoaffective patient, AR, performed better on the postoperative Rorschach. There is appropriate emotional release, reduced stereotypy, greater conventionality, more ego strength, and increased intellectual activity. In view of the clinical improvement this patient enjoyed, we can conclude that the Rorschach results are confirmatory.

Looking at the Rorschach data for all patients we note certain changes. In the W:D:Dd ratio there is a postoperative shift away from W to Dd, with D showing a small increase. Sum C drops in the B condition, but rises above the preoperative level in C condition. $F+\%$ in most patients shows a substantial gain after operation, and popular responses increase somewhat. In the C condition Reaction Time to the black cards exceeds that of the A condition, though this relationship does not hold for the colored cards. Time per Response is longer after operation, and R itself decreases. $F\%$ is high under all conditions.

From the Rorschach results certain criteria for judging clinical improvement postoperatively can be derived. These are the shifts of Approach, $F+\%$, FC,

H:Hd, and P toward the normal range as well as any type of change in the Erlebnistyp. Condition C is a better index to Rorschach status than condition B. The latter apparently represents a fluid state from which consequent restructurization is difficult to predict. It is apparent, too, that no generalization regarding postlobotomy changes by diagnostic category can be made. As a principle we may state that in these patients postoperative Rorschach changes are not predictable from preoperative records, even though psychometric change does parallel clinical change.

Summary. As a group the 21 postlobotomy patients studied in this investigation experienced personality gains far outweighing their losses. They were noticeably freer of such troublesome symptoms as homicidal trends, delirium, destructiveness, need for restraint, indecency, silly laughter, feeding difficulties, tantrums, emotional tension, nakedness, restlessness, mannerisms, profanity, irritability, and incontinence. Intellectual processes like concept formation, voluntary recall, orientation, mental speed, and symbolic substitution, all on simpler levels, did not appear damaged. The intelligence quotients as well as all other functions measured by the Wechsler-Bellevue Scale showed no significant reductions. On the

contrary, the subtests measuring attention, concentration, anticipatory planning, and a type of visual organization showed substantial post-operative gains (as measured). In the areas of functioning tapped by the Rorschach device these patients showed greater ego strength, more conventionality, better environmental contact and regard for detail, less egocentricity, and increased capacity for social adjustment. On the deficit side they were less motivated (more lethargic), less adept in abstract reasoning, and less concerned about getting well. Some individuals suffered losses in all abilities examined, and none was "cured" of his disease.

The preceding generalizations add up to the conclusion of most other investigators, that lobotomy acts to attenuate certain constellations of symptoms characterized by tension, agitation, and depression, and that it can be expected to reduce the general activity level of the individual. In so far as poor test performance is related to the presence of excessive tension, to that degree at least may we predict psychometric improvement after lobotomy.

Conclusions. The following conclusions generalize the findings of this particular investigation. They are in essential agreement with the previously reported

findings of Peters (55), the British Board of Control (3), Freeman and Watts (13), Hunt (35), and Kisker (48).

1. Patients with the lowest postlobotomy ratings compared to those with the best were older, less educated, and had been ill longer.

2. From observation of ward behavior postoperative patients showed heavy reduction in symptoms connected with the activity level (destructiveness, homicidal trends, need for physical restraint, etc.).

3. Postoperative changes on the Wechsler-Bellevue Scale revealed strong improvement in the attention and planning abilities as well as a significantly smaller degree of mental deterioration; the abilities showing the least change were those related to general verbal ability (vocabulary, information, similarities).

4. Postoperative Rorschach changes occurred in the direction of better contact with reality, a shift from vague to particularistic thinking; a reduction in egocentrism, a tendency to increased conformity, and a greater critical facility with respect to the task at hand.

5. Aside from the Rorschach and Wechsler tests, the only device yielding a significant postoperative change was the Color Substitution test. This indicated that patients showed more flexibility in dealing with new symbols.

6. In general, psychometric changes paralleled clinical change, both of which appeared related to a reduction in emotional tension. However, postoperative changes were not predictable from preoperative records.

7. No one technique for describing postlobotomy personality changes can be substituted for the combination of psychometric, clinical, and behavioral observations, although the Rorschach Technique appears to yield the best single picture of the patient's postoperative status.

BIBLIOGRAPHY

1. Atkin, I., "The Psychology of Shock Therapies and of Leucotomy," J. Clin. Psychopath. & Psychother., 7: 731-735, 1946.
2. Babcock, H., "A Case of Anxiety Neurosis before and after Lobotomy," J. Abn. & Soc. Psychol., 42: 466-472, Oct., 1947.
3. British Bd. of Control, "Prefrontal Leucotomy," Lancet, 252: 265-266, Feb. 15, 1947.
4. Cook, L. C., "Prefrontal Leucotomy with Spec. Ref. to Indications and Results," Dig. Neurol. & Psychiat., 14: 510, Sept., 1946.
5. Draper, Paul A., "Prefrontal Lobotomy in the Treatment of Schizophrenia," Dis. Nerv. Syst., 8: 77-80, Mar., 1947.
6. Edwards, Adelaide, "Four Cases of Prefrontal Leucotomy," Med. J. Ans., 2: 512-516, Oct. 25, 1947.
7. Elder, H. M., et al, "Prefrontal Leukotomy," Cal. Med., 69: 218-221, Sept., 1948.
8. Freeman, W. F., "Transorbital Leucotomy," Lancet, 2: 371-373, Sept. 4, 1948.
9. Freeman, W. & Watts, J. W., "Behavior and the Frontal Lobes," Transactions of the New York Academy of Sciences, Series II, Vol. 6: 284-310, June, 1944.
10. Freeman, W. & Watts, J. W., "Pain of Organic Disease Relieved by Prefrontal Lobotomy," Lancet, 250: 953-955, June 29, 1946.
11. Freeman, W. & Watts, J. W., "Physiological Psychology," Annual Review of Physiology, 6: 517-542, 1944.
12. Freeman, W. & Watts, J. W., "Prefrontal Lobotomy," Am. J. Psychiat., 101: 739-748, May, 1945.
13. Freeman, W. & Watts, J. W., Psychosurgery. Baltimore: Charles C. Thomas Co., 1942. Pp. xii + 337.

14. Freeman, W & Watts, J. W., "Psychosurgery," in E. A. Spiegel, Progress in Neurology and Psychiatry, 461-472, New York: Grune and Stratton, 1947.
15. Freeman, W. & Watts, J. W., "Psychosurgery", in E. A. Spiegel, Progress in Neurol. and Psychiat., 409-420, New York: Grune & Stratton, 1948.
16. Freeman, W. & Watts, J. W., "Psychosurgery during 1936-1946," Arch. Neurol. & Psychiat., 58: 417-425, Oct., 1947.
17. Freeman, W. & Watts, J. W., "Retrograde Degeneration of the Thalamus Following Prefrontal Lobotomy," J. Comp. Neurol., 86: 65-93, Feb., 1947.
18. Freeman, W. & Watts, J. W., "Schizo. in Childhood: Its Modification by Prefrontal Lobotomy," Dig. Neurol. & Psychiat., 15: 202-219, Apr., 1947.
19. Freeman, W. & Watts, J. W., "Prefrontal Lobotomy," Am. Med. Sciences, 211: 1-8, Jan., 1946.
20. Frank, J., "Clinical Survey and Results of 200 Cases of Prefrontal Leucotomy," J. Ment. Sc., 92: 497-508, July, 1946.
21. Garfield, S. & Fey, W., "A Comparison of the W-B and S-Hartford Scales as Measures of Mental Impairment," J. Consulting Psychol., 12: 259-269, July-Aug., 1948.
22. Garmany, Gerald, "Personality Change & Prognosis after Leucotomy," J. Ment. Sci., 94: 428-438, Apr., 1948.
23. Gayle, R. F. & Fishburn, G. W., "Prefrontal Lobotomy," Dis. Nerv. System, 9: 242-247, Aug., 1948.
24. Greenblatt, R. E., Arnot, et al, "Report on Lobotomy Studies at the Boston Psychopathic Hospital," Am. J. Psychiat., 104: 6, Dec., 1947.
25. Greenwood, James, "Post Mortem Findings in Prefrontal Lobotomy," Dis. Nerv. System, 9: 279-282, Sept., 1948.
26. Group for the Advancement of Psychiatry, "Research on Prefrontal Lobotomy," Report No. 6, June, 1948, 3617 W. 6th St., Topeka, Kansas.

27. Hall, B. H. and Bernstein, L. L., "Prefrontal Lobotomy - A Method of Treatment for Chronic Mental Illness," J. Kansas Med. Society, 49: 333-335, Aug., 1948.
28. Halstead, W. C., "Critical Fusion Frequency and the Prefrontal Lobes in Man," Amer. Psychologist, 2: 337, 1947.
29. Halstead, W. C., Carmichael, H. T., & Bucy, P. C., "Prefrontal Lobotomy: A Preliminary Appraisal of the Behavioral Results," Amer. J. Psychiat., 103: 217-228, 1946.
30. Halstead, W. C., Brain and Intelligence. Chicago: University of Chicago Press, 1947. Pp. xiii + 206.
31. Harlow, H. F., "Performance of Normal Monkeys and Monkeys Following Bilateral Prefrontal Lobectomy," Amer. Psychologist, 1: 463, 1946.
32. Hutton, E. L., "Contra-Indications for Leucotomy: Whom Not to Leucotomize," J. Ment. Science, 93: 333-341, April, 1947.
33. Hutton, E. L. & Bassett, M., "The Effect of Leucotomy on the Creative Personality," J. Ment. Sc., 94: 332-350, Apr., 1948.
34. Hutton, E. L., "Personality Changes after Leucotomy," J. Ment. Sc., 93: 31-42, 1947.
35. Hunt, T., "Psychol. Testing of Psychiatric Patients Undergoing Pre-frontal Lobotomy," Psychol. Bull., 37: 566, 1940.
36. Hurt, J. W., "Prefrontal Leucotomy," Med. J. Aus., 1: 638-640, 1947.
37. Kaempffert, Waldemar. "New Tests Devised to Gauge Results of Brain Operation for Emotional Disorders," New York Times, Sept. 26, 1948, p. E9.
38. Kalinowsky, L. B. & Scarff, J. E., "The Selection of Psychiatric Cases for Pre-frontal Lobotomy," Am. J. Psychiat., 105: 81-85, Aug., 1948.
39. Kisker, G. W., "The Behavioral Sequelae of Neuro-surgical Therapy: (Bilateral Pref. Lob.)," J. General Psychol., 33: 171-192, 1945.

40. Kisker, G. W., "Abstract and Categorical Behavior Following Therapeutic Brain Surgery," Psychosomatic Medicine, 6: 146-150, April, 1944.
41. Kisker, G. W., "Neuropathological and Psychopathological Implications of Bilateral Prefrontal Lobotomy," J. Nerv. and Ment. Dis., 99:1-21, Jan., 1944.
42. Kisker, G. W., "Psychological Factors in Bilateral Prefrontal Lobotomy," Ohio State Med. J., 39: 913-916, Oct., 1943.
43. Kisker, G. W., "The Rorschach Analysis of Psychotics Subjected to Neuro-surgical Interruption of the Thalamo-Cortical Projections," Psychiatric Quarterly, 18: 43-52, Jan., 1944.
44. Kisker, G. W., "Perceptual-Motor Patterns Following Bilateral Prefrontal Lobotomy," Archives of Neurol. & Psychiat., 50: 691-696, Dec., 1943.
45. Kisker, G. W., "Psychoneurological Problems Related to the Surgical Transsection of the Prefrontal Association Areas in Man," J. Nerv. & Ment. Dis., 99:343-355, April, 1944.
46. Le Fever, Harry, Verbal Comments on Lobotomy made April 1, 1948 at the Ohio State Medical Association Meeting, Cincinnati, Ohio.
47. Liebert, E. & Davis, L., "The Surgical Treatment of Psychoses," Illinois Med. J., 93: 203-206.
48. Lyerly, J. G., "Transsection of the Deep Association Fibers of the Pre-frontal Lobes in Certain Mental Disorders," Southern Surgeon, 8: 426, 1939.
49. Lyonnet, J. H., Castedo, C., and Etchegoyen, J. C., "La Leucotomia Prefrontal. Tratamiento Quirurgico de la Psicosis," Prensa Med. Argent., 33: 2003-2015, 1946.
50. McKenzie, K. G. & Proctor, L. D., "Bilateral Frontal Lobe Leucotomy in Treatment of Mental Disease," Canad. Med. Assn. J., 55: 433-441, 1946.
51. Moniz, E., Tentatives Operatoires dans Le Traitement de Certaines Psychoses. Paris: Masson and Cie., 1936.

52. Morgan, C. T., Physiological Psychology. Chapter 26. New York: McGraw-Hill Co., 1943. Pp. xii + 331.
53. Man, Evelyn, et al, "Plasma a-Amino Acids, Serum Lipids and Proteins after Prefrontal Lobotomy in Schizophrenic Patients," Yale J. Biol. and Med., 20: 175-183, Dec., 1947.
54. Parker, C. S., "Report on 100 Female Patients Treated by Prefrontal Leucotomy," J. Ment. Sc., 92: 719-733, 1946.
55. Peters, H. N., "Traits Related to Improved Adjustment of Psychotics after Lobotomy," J. Abn. & Soc. Psychol., 42: 383-392, Oct., 1947.
56. Poppen, J. L., "Prefrontal Lobotomy," Dig. of Neurol. and Psychiat., 17: 403-408, July, 1948.
57. Porteus, S. D., "Lobotomy." In P. L. Harriman, Encycl. of Psychol., pp. 363-369.
58. Porteus, S. D. & Kepner, R. D., "Mental Changes after Bilateral Prefrontal Lobotomy," Genetic Psychol. Monographs, 29: 7-115, Feb., 1944.
59. Porteus, S. D. & Peters, H. N., "Psychosurgery and Test Validity," J. Abn. & Soc. Psychol., 42: 473-475, Oct., 1947.
60. Reitman, F., "The Creative Spell of Schizophrenics after Leucotomy," J. Ment. Sc., 93: 55-61, 1947.
61. Reitman, F., "Evaluation of Leucotomy Results," Am. J. Psychiat., 105: 86-89, Aug., 1948.
62. Reitman, F., "Observation on Personality Changes after Leucotomy," J. Nev. and Ment. Dis., 105: 582-589, June, 1947.
63. Reitman, F., "Neurological Complications Following Prefrontal Leucotomy," Brit. Med. J., 1: 235-236, Feb. 16, 1946.
64. Robinson, Mary, "What Price Lobotomy?", J. Abn. & Soc. Psychol., 41: 421-436, Oct., 1946.

65. Sargent, W. & Stewart, C. M., "Chronic Battle Neuroses Treated with Leucotomy," Brit. Med. J., 4534: 866-869, Nov. 29, 1947.
66. Shorvon, H. J., "Prefrontal Leucotomy and the Depersonalization Syndrome," Lancet, 2: 714-718, Nov. 15, 1947.
67. Stroem-Olsen, R., "Prefrontal Leucotomy with Reference to Indications and Results," Proc. of the Royal Soc. of Med., 39, No. 8, June, 1946.
68. Therpe, F. T., "Prefrontal Leucotomy in Treatment of Post-Encephalitic Conduct Disorder," Brit. Med. J., 1: 312-314, Mar. 2, 1946.
69. Van Wagenen, W. P., "Observations on Changes in States of Mental Depression and Tension Following Surgical Section of Certain Frontal Lobe Pathways," Surgery, 20: 656-662, 1946.
70. Wade, M., "Effect of Sedatives on Delayed Response in Monkeys Following Removal of the Prefrontal Lobes," J. Neurophys., 10: 57-61, 1947.
71. Ward, A. & McCulloch, W., "The Projection of the Frontal Lobes on the Hypothalamus," J. Neurophys., 10; No. 4, July, 1937.
72. Watts, J. W. & Freeman, W. F., "Prefrontal Lobotomy," Am. J. Surgery, 75: 227-230, Jan., 1948.
73. Watts, J. W. & Freeman, W., "Social Adjustment in Obsessive Tension States Following Prefrontal Lobotomy," Southern Medicine and Surgery, 106, No. 7, July, 1944.
74. Watts, J. W., & Freeman, W., "Development of Prefrontal Lobotomy in the Treatment of Intolerable Pain," Southern Medicine and Surgery, January, 1948 (No page reference).
75. Watts, J. W., & Freeman, W. F., "Prefrontal Lobotomy Complications and Their Treatment," J. International Coll. of Surgeons, 11: 343-350, July-Aug., 1948.
76. Watts, J. W. & Freeman, W., "Intelligence Following Prefrontal Lobotomy in Obsessive Tension States," J. Neurophys., July, 1944, pp. 291-296.

77. Yahn, M., "Sobre a Leucotomia nas Síndromes Epiléticas," Neurobiologia, 9: 170-192, Sept., 1946.
78. Rapaport, David, Manual of Diagnostic Psychological Testing. New York: J. Macy Foundation, 1944. Pp. xiii + 239.
79. Thurstone, L. L., "Psychological Implications of Factor Analysis," Amer. Psychologist, 3: 402-408, Sept., 1948.

PRE-OPERATIVE WARD BEHAVIOR

Directions: Place an "X" before each of the following symptoms which you noted to be habitual or characteristic of the patient.

- | | |
|--|---|
| _____ 1. Dullness (lack of interest) | _____ 19. Poor judgment |
| _____ 2. Disorientation (is he aware of who he is, where he is, and the approximate date?) | _____ 20. Irritability (easily angered) |
| _____ 3. Euphoria (is his mood an unusually happy one?) | _____ 21. Stupor |
| _____ 4. Fatigability (does he tire quickly?) | _____ 22. Stereotypy (mechanical repetition of words or phrases) |
| _____ 5. Fluctuation of attention (is it difficult for him to concentrate?) | _____ 23. Indefatigability (tirelessness) |
| _____ 6. Slowness (of speech, movement, etc.) | _____ 24. Aggressive (quick to quarrel) |
| _____ 7. Restlessness | _____ 25. Sadness |
| _____ 8. Inappropriate humor | _____ 26. Profanity |
| _____ 9. Tactlessness (inconsiderateness of others) | _____ 27. Indecency (in speech or behavior) |
| _____ 10. Somnolence (extreme drowsiness) | _____ 28. Destructiveness |
| _____ 11. Insomnia (inability to sleep well) | _____ 29. Shyness |
| _____ 12. Talkativeness | _____ 30. Homicidal |
| _____ 13. Playfulness | _____ 31. Incontinent (untidy)
Can't control:
(a) urine
(b) bowels |
| _____ 14. Sarcasm (bitterness in addressing others) | _____ 32. Nakedness |
| _____ 15. Suggestibility (easily influenced by others) | _____ 33. Tantrums |
| _____ 16. Overactivity | _____ 34. Catalepsy (muscular rigidity) |
| _____ 17. Wittiness | _____ 35. Convulsions |
| _____ 18. Mannerisms (unusual repeated movements) | _____ 36. Delirium (mental confusion) |
| | _____ 37. Circumstantiality (needless details in conversations) |

- _____ 38. Masturbation
- _____ 39. Homosexuality
- _____ 40. Muteness
- _____ 41. Feeding problem
- _____ 42. Neologistic (does he make up words of his own)
- _____ 43. Ruminative (extreme pondering or talking over problems with himself)
- _____ 44. Tremors
- _____ 45. Emotional (is he "keyed up" or tense?)
- _____ 46. Cooperative (helpful)
- _____ 47. Attempts to escape (from ward)
- _____ 48. Silly laughter
- _____ 49. Suspiciousness
- _____ 50. Need for physical restraint
- _____ 51. Over-religious
- _____ 52. Complaints about health
- _____ 53. Blocking in speech
- _____ 54. Practical planning for the future
- _____ 55. Regard for relatives

1. Does the patient have any persistent delusions (that is, false beliefs or ideas about himself or others)? If so, enumerate and describe.
2. Does the patient have any persistent hallucinations (that is, does he see, hear, feel, smell or taste things which are not present)? Enumerate and describe.

POST-OPERATIVE BEHAVIOR
(On Hospital Ward)

Directions: Place an "X" before each of the following symptoms which you noted in the patient. If the symptom was temporary place the "X" in the first column; if it was persistent, place the "X" in the second column.

<u>Temporary</u>	<u>Persistent</u>	
_____	_____	1. Dullness (lack of interest)
_____	_____	2. Disorientation (was he unaware of who he is, where he is, and the approximate date?)
_____	_____	3. Euphoria (was his mood an unusually happy one?)
_____	_____	4. Fever (more than 2°)
_____	_____	5. Fluctuation (was it difficult for him to concentrate?)
_____	_____	6. Slowness (of speech, movement, etc.)
_____	_____	7. Restlessness
_____	_____	8. Inappropriate humor
_____	_____	9. Tactlessness (inconsiderateness of others)
_____	_____	10. Somnolence (extreme drowsiness)
_____	_____	11. Insomnia (inability to sleep well)
_____	_____	12. Talkativeness
_____	_____	13. Playfulness
_____	_____	14. Sarcasm (bitterness in addressing others)
_____	_____	15. Infection (of head wound)
_____	_____	16. Suggestibility (easily influenced by others)
_____	_____	17. Overactivity
_____	_____	18. Wittiness
_____	_____	19. Mannerisms (unusual repeated movements)
_____	_____	20. Poor judgment
_____	_____	21. Irritability (easily angered)

TemporaryPersistent

- | | | |
|-------|-------|--|
| _____ | _____ | 22. Stupor |
| _____ | _____ | 23. Stereotypy (mechanical repetition of words or phrases) |
| _____ | _____ | 24. Indefatigability (tirelessness) |
| _____ | _____ | 25. Aggressive (quick to quarrel) |
| _____ | _____ | 26. Sadness |
| _____ | _____ | 27. Profanity |
| _____ | _____ | 28. Indecency (in speech or behavior) |
| _____ | _____ | 29. Destructiveness |
| _____ | _____ | 30. Shyness |
| _____ | _____ | 31. Homicidal |
| _____ | _____ | 32. Incontinent (untidy)
Couldn't Control:
a) urine
b) bowels |
| _____ | _____ | 33. Nakedness |
| _____ | _____ | 34. Tantrums |
| _____ | _____ | 35. Catalepsy (muscular rigidity) |
| _____ | _____ | 36. Convulsions |
| _____ | _____ | 37. Delirium (mental confusion) |
| _____ | _____ | 38. Circumstantiality (needless details in conversation) |
| _____ | _____ | 39. Masturbation |
| _____ | _____ | 40. Homosexuality |
| _____ | _____ | 41. Muteness |
| _____ | _____ | 42. Feeding problem |
| _____ | _____ | 43. Neologistic (did he make up new words of his own?) |
| _____ | _____ | 44. Ruminative (extreme pondering or talking over problems with himself) |
| _____ | _____ | 45. Tremors |

TemporaryPersistent

_____	_____	46. Emotional (tense; "keyed up")
_____	_____	47. Cooperative (helpful)
_____	_____	48. Attempts to escape (from ward)
_____	_____	49. Silly Laughter
_____	_____	50. Increased Appetite
_____	_____	51. Suspiciousness
_____	_____	52. Need for physical restraint (other than to prevent scratching of head)
_____	_____	53. Over-religious
_____	_____	54. Complaints about health
_____	_____	55. Blocking in speech
_____	_____	56. Practical planning for the future
_____	_____	57. Regard for relatives

1. Did the patient have any persistent delusions (that is, false beliefs or ideas about himself or others)? If so, enumerate and describe.

2. Did the patient have any persistent hallucinations (that is, does he see, hear, feel, smell or taste things that are not present)? If so, enumerate and describe.

3. Do you believe this patient has been improved by lobotomy? If so, in what ways?

Appendix II

The following formula was adapted for use in the present study by Professor Herbert B. Weaver, Department of Psychology, University of Cincinnati.

Significance of the Difference between Means When Measures are Related;
Computation by the Difference Method

Applicable when: { Observations are paired for one or more relevant variables
 { Each subject is his own control

[Not applicable when groups are matched for one or more variables (parameters)]

Let: N = number of pairs of measures
 D = observed differences between pairs
 $M_D = \frac{\sum D}{N}$ = mean of observed differences between pairs (i.e., mean difference, which is equal to the difference between means) ($\sum D$ is taken algebraically)
 σ_D = standard deviation of observed differences between pairs
 σ_{M_D} = standard error of mean of observed differences between pairs

$$\sigma_D = \sqrt{\frac{\sum D^2}{N} - \left(\frac{\sum D}{N}\right)^2}$$

$$\sigma_{M_D} = \frac{\sqrt{\frac{\sum D^2}{N} - \left(\frac{\sum D}{N}\right)^2}}{\sqrt{N-1}} = \sqrt{\frac{\sum D^2}{N(N-1)} - \frac{(\sum D)^2}{N^2(N-1)}} = \frac{1}{N} \sqrt{\frac{N\sum D^2 - (\sum D)^2}{N-1}}$$

$$t = \frac{M_D - M_H}{\frac{1}{N} \sqrt{\frac{N\sum D^2 - (\sum D)^2}{N-1}}} = \sqrt{\frac{NM_D - NM_H}{\frac{N\sum D^2 - (\sum D)^2}{N-1}}}$$

$$t = \frac{\sum D}{\sqrt{\frac{N\sum D^2 - (\sum D)^2}{N-1}}} \quad (\text{when } M_H = 0)$$