THE "AMYTAL TEST" IN PATIENTS WITH MENTAL ILLNESS[1]

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Recent studies have demonstrated the value of utilizing amytal sodium as a diagnostic test for the presence of brain damage (9, 10, 11). Under the influence of this drug, certain changes in orientation and awareness of illness occurred in patients with brain disease that rarely appeared in persons without demonstrable brain pathology. These changes included patterns of disorientation for place, time, and person, and verbal denial of illness and incapacity.

In addition to disorientation and denial of illness, other changes in verbal pattern and the nonverbal aspects of behavior occur in both patients with brain disease and in normals.[5] All of these aspects of behavior have contributed to an understanding of the relationship of the psychological and physiological effects of the drug and the role of language in adaptation to stress.

Until now the normals have consisted of patients with peripheral nerve, spinal root and cord lesions and miscellaneous medical and surgical conditions. There has been no systematic investigation of patients with mental illness unassociated with demonstrable brain changes.

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5 Normal is used here to refer to patients without evidence of brain disease.

The purpose of this study is, by the administration of the test to a series of patients hospitalized for mental illness, to:

(1) evaluate further the diagnostic validity of the procedure; and

(2) compare the patterns of altered symbolic expression found in mental patients with those shown by other groups.

Method

Consecutive admissions to Hillside Hospital were selected. Patients who had recently received electroshock treatment or who were clinically disoriented were excluded. Sixty-eight interviews were essayed: eight patients refused the test, three showed insufficient physiological effects, and one patient was grossly disoriented in the pretest interview, leaving a total of fifty-six patients who were adequately studied. No attempt has been made to classify the patients according to clinical diagnosis, although most were considered to have schizophrenic or depressive reactions. Thirty-four women and twenty-two men were tested, the ages ranging from sixteen to sixty-five, with a median of thirty-six years.

Test Procedure

Immediately before and during the administration of amytal sodium, each patient was examined systematically for orientation and awareness of illness. These questions were based on previous observation of certain patterns of disorientation and denial observed in patients with brain disease (6, 7) and are as follows:

What is your main trouble? Why did you come here? Where are you now? What do you call this place? What kind of place is this? Where is this place located? How far from here do you live? Have you ever been in any other hospital of this name? Where were you last night? What is today's date? What month is this? What year is this? What time is it now? What part of the day is it? Who am I? Have you ever seen me before?

Along with the routine test, the patients were asked two additional questions to obtain further material for the study of patterns of symbolic expression:

If you could have one wish what would you wish for? Can you think of a joke?

The amytal sodium was given intravenously in a solution of 0.5

gm. in 10cc. of distilled water at a rate of 0.05 gm. per minute. As the drug was administered the patient was asked to count backwards from 100 to 1. The injection was continued until the patient showed rapid nystagmus on lateral gaze in each direction, slurred speech, errors in counting backwards and drowsiness. These were regarded as indicators of the physiological effects of the drug. The total amount injected depended on the appearance of a maximal effect of the drug. In this study the quantity given ranged from 0.2 gm. to 0.5 gm.

When the physiological action of the drug was manifest, the patient was interviewed with the same series of questions. If an error was made, the question was repeated immediately to determine its persistence. Only persistent errors have been regarded as indicative of brain disease since it has been found that normal controls may make transient mistakes (9).

Results

A. Behavior Prior to Administration of Drug

These patients as a group showed many overt indications of fear and distrust in the test situation. This was shown by the large number who refused the test altogether. Some wanted to consult their doctors or their families first, while others were too frightened to enter the examination room. Even among those who took the test there were numerous manifestations of distrust. Several were reluctant to lie down—one sitting up throughout the entire procedure, one constantly keeping one foot on the floor, and several keeping their heads raised. Many patients asked for specific details of the test—its purpose, what drug they were getting, why they were selected, whether this was a "truth test," whether the results were confidential and, commonly, whether they would go to sleep or not know what they were saying. One patient asked if he were going to be killed. Another asked that a nurse be present. Some patients asked us to postpone the procedure or said, "I shouldn't have come." These manifestations of evasion and suspicion were much more marked than were encountered when the test was administered to patients in general hospitals. Unlike patients with physical diseases who usually gave as a "wish" a statement about getting well or leaving the hospital, these patients gave many more wishes outside the immediate situation, such as "that all men in the universe should live in peace and harmony" or "good health for the

sick world," or "my daughter should marry a nice fellow." Further, there was a greater tendency for patients to answer the questions using syntax involving the third and second person as "you might say I had a slight nervous breakdown" or "my main trouble is my stepmother." Patients with physical ailments are much more apt to limit the expression of their difficulties to the first person as "I have diabetes."

B. Changes in Behavior Accompanying Amobarbital Sodium

1. *Persistent Errors: Positive Reactions*

Five of the fifty-six patients showed persistent changes of behavior similiar to those found in brain disease. In a previous report (10) positive reactions were graded from one to four plus, depending on the number of manifestations of disorientation and denial shown. On this basis, the five positive cases in this study showed a one plus reaction. The test was repeated in three of these cases and showed a persistence of the one plus result in two and a negative result in the third. Of these five patients, three showed evidence of brain disease by other methods of study. One, a boy of eighteen, had a positive face-hand test (2), an abnormal EEG record, and an elevated spinal fluid protein on two occasions. Another was a case of Parkinsonism. The third showed a memory defect on psychological tests. One was a sixty-four-year-old man who persistently referred to "Sydenham Hospital" while under the influence of the drug. He had a normal EEG and no presumptive evidence of brain disease. The other patient located the hospital in "Oakland Park" after having placed it correctly in Glen Oaks prior to receiving the drug. The second administration of the test in this man gave a negative result.

2. *Transient Errors*

Transient errors (i.e., errors which were either spontaneously corrected or corrected when the question was immediately repeated) in orientation and awareness of illness have not been regarded as diagnostic indices of brain damage. In persons with physical incapacities, the incidence is low, having been found in 16 per cent of the original series of fifty control subjects (9). In the present study, however, eighteen patients, or 32 per cent, made such errors. These included giving the incorrect year, naming the place as "Hillside Oaks" and "Psychiatric Institute" and confabulating having

been at home or in a friend's house the night before. Some patients used euphemisms such as "a place to help people get well," "a place for recuperation," "a place to teach health to sick people," "a clinic," and "the greatest hospital with the most stupendous doctors," whereas prior to receiving the drug they had simply stated that they were in "Hillside Hospital." When the questions were repeated, however, the original response was again given.

3. *Other Alterations in Language*

The use of the second or third person in response to questions about illness and hospitalization was noted twice as frequently as in the pre-drug interview. Another person became the subject of the sentence or another person performed the action or became involved in an experience, whereas previously the patient had described his symptoms in the first person. Thus the reason for hospitalization originally given by one patient as "I was getting worse and desperate for help" was changed to "the hospital had a lovely reputation." Another patient who had detailed his problems in the first person before receiving the drug talked about a friend who had cancer. The change frequently took the form of concern over the health of relatives. The wish "that I never get sick" was changed to "I wish that my kid would stay well." There was more of a tendency to employ clichés as "nothing to fear but fear" and "not for publication." There was also more selective specificity in answer to questions. Thus patients who had originally said that they had come to the hospital for some illness replied that they had come because their doctors had sent them. Other patients gave their location in a more precise way, stating for example that they were in "a treatment room leading off the corridor." Cryptic remarks were occasionally given, as in the instance of the patient who, when asked for a wish, said "If you could help me out then I wish you wouldn't, and if you could then I wish you would."

These patterns were not qualitatively different from those used by patients with physical incapacities where displacement to the third or second person, greater specificity and selectiveness of response and increased use of clichés and slang also occur.

4. *Jokes*

In many patients the response to the request to tell a joke seemed to be a symbolic representation of some problem relating to illness, hospitalization, the procedure itself or their interpersonal relations.

The content of these responses in relation to the illness will be considered in a separate paper and only the pattern will be reported here. Of fifty-three patients, fifteen did not respond either before or during drug administration. Eleven patients answered by referring literally to their difficulties as "It would be a good joke if I could go home," or "The joke is my being here." Six patients used this type of personal reference both before and during the administration of the drug, while five responded in this fashion only after injection. Thirty-two patients gave the usual form of structured joke, the account of the action or experience of some third person symbolizing some aspect of the patient's problems or motivation. Usually patients who responded to the question in this fashion in the pre-drug interview used the same pattern after the injection. Seven told the same joke, while different stories were related in fifteen instances. Here the tendency was toward a more allegorical representation of the problem. Eight patients told a joke before receiving the drug but not after, while eight related a story only with the drug.

5. *Psychomotor Reactions*

These changes included withdrawal, overactivity, alterations in mood and the appearance of comic or melodramatic "ludic"[6] behavior. Twelve patients showed withdrawal reactions. In the extreme form the patient failed to respond to any questions for periods ranging from several minutes to half an hour. In other instances the questions had to be repeated several times to elicit a response, there was incoherent mumbling or neologisms, and incomplete sentences were used. As such times the withdrawal appeared to be a selective process, since the inadequate response occurred primarily with questions relating to the patient's illness. When questions of a more innocuous nature were asked, such as the date or time of day, the patient often answered quickly, clearly and completely. Marked withdrawal has been unusual in control patients in general hospitals but has occurred frequently in patients with brain disease. Ten patients were overactive during the test. Usually this consisted of restlessness, shivering, rhythmic movements of the head, hips or legs, eye blinking, or repeated fussing and adjusting of clothing. One patient showed behavior which resembled catatonic posturing.

[6] Ludic is the term used by Jean Piaget (5) to describe the play, imitating and pretending aspects of behavior in young children. See also Weinstein et al. (8).

Alterations in mood were noted in sixteen patients. The predominant change was in a euphoric direction, although in two cases the patient became tearful and depressed toward the close of the interview. Euphoria was shown by increased smiling, giggling or laughing, joking and expressions of well-being. Some patients commented that they thought they had "one drink too many." Paranoid attitudes as indicated by threatening remarks and gestures and cursing were sometimes intermingled with euphoric manifestations. Thus one patient, who said he felt good and "would like this more often," answered with such expressions as "What do you think it is, you goddamn fool" and "How the hell would I know." The incidence and degree of these euphoric and paranoid reactions was comparable to those previously found in both normal control and brain diseased groups.

Varying degrees of ludic behavior were shown, but were especially prominent in sixteen patients. In several cases this behavior was noted in counting backwards while the drug was being injected by variation in tempo, alternately slow and fast, or use of a sing-song rhythm. One patient barked out the numbers in a staccato fashion, while another overemphasized the pronunciation in telephone operator fashion. One patient responded throughout the interview with an exaggerated syllabic accent and dramatic pauses. Another used "French" expressions such as "Oo, la, la." Several staggered excessively when brought back to the ward, particularly when they were in sight of the other patients. One patient, who acted in a dramatic, comic manner throughout the test, spontaneously remarked, "I need applause." Such ludic behavior is difficult to grade statistically but was in general more marked than had been observed in the previously studied control groups.

Six women patients showed some form of altered sexual behavior under the influence of the drug. This ranged from holding the examiner's hand and such remarks as "dear" to the behavior of one patient who tried to kiss the examiner. A few others manifested hip movements suggestive of sexual activity or partly exposed themselves in restless leg movements.

Discussion

The results of the study provide further evidence of the validity of the procedure as a diagnostic test for the existence of structural brain disease. Of the fifty-six patients tested, "positive" results were

obtained in five. The others showed behavior more like that of patients without evidence of brain damage in that they did not develop enduring patterns of disorientation or persisting delusional denial of illness and incapacity. In a previous study of psychotic patients in a state hospital (9), only one of twenty-five, a sixty-four-year-old woman hospitalized for thirty-five years, had a positive result, a one plus response. This compares with a figure of 1 to 2 per cent positive in over one hundred and fifty normal controls and an incidence of 65 per cent in over four hundred patients with brain disease tested in two general hospitals. It may be concluded that while it is possible for a patient without demonstrable brain disease to yield a positive result, the difference between patients with brain disease and other groups is statistically significant.

In three of the five cases giving positive results, there was other evidence of brain disease. One patient had Parkinsonism, in another the clinical history and finding suggested a chronic encephalitis, while in the third, degenerative or arteriosclerotic disease of the brain was likely. One of the other positive results was found in a patient over sixty years of age. Adequate control studies on the effect of age on the results of this test have not yet been completed. It is possible, however, that positive reactions may occur in older persons comparable to the finding of slow waves in the EEG record (1) and to changes in the perception of simultaneous tactile stimuli (2, 3). These results suggest that in a group of patients with "functional" psychoses there are some with disease of the brain which may be demonstrated by the application of appropriate methods of examination. The amytal procedure and the face-hand test of perceptual function introduced by M. B. Bender and associates (2) are examples of such techniques and should be employed as part of the diagnostic work-up of a mental hospital.

In considering the alterations in symbolic expression shown by these patients it is necessary to review some data relating to the mechanisms of disorientation for place and time and denial of illness. These phenomena are not *defects* directly attributable to brain damage in the sense that they are the manifestations of the *loss* of a functional modality represented in some area of the brain. They are, rather, forms of adaptation or defense that the patient uses in situations of stress in a milieu of altered neural function. In disorientation, the misnamed time or place is the symbolic representation of some motivation of the patient, usually related to his illness, not a manifestation of memory defect. Thus the patient

is apt to state a time antedating his illness; to give the name of a small hospital or a place where he has been for some trivial illness; to locate the hospital near his home; or to confabulate that he has left the hospital. In effect, the patient is expressing his problems in another language where places, persons and times are not used in their original referential context but as vehicles for the expression of the individual's own motivations. Although an impairment of brain function is necessary to provide the type of neural organization for the maintenance of this new symbolic system, the behavior itself is the result of the interaction of a number of factors—what Wikler (12) has called the organism-environment-observer complex. This includes not only the neural organization, but the fact of the disability itself, the patient's motivation to be well, the interpersonal situation of the interview, and the patient's previous life experience and personality. For example, if the interview is carried out with sterile water, there are very few changes in language. Patients with similar brain lesions may show markedly different reactions under amytal sodium because of different types of personality and attitudes toward incapacity. It is quite conceivable that if this test were carried out under very stressful conditions as in a concentration camp, then disorientation and delusional denial might occur in persons without evidence of brain damage.

In interpreting the effects of barbiturates one must distinguish between purely neurophysiological manifestations such as nystagmus and alterations in the EEG record, which occur universally, and adaptive symbolic changes such as withdrawal, ludic behavior, humor, disorientation and changes in syntactical tense and person. It has been pointed out that even such indubitable neurological manifestations as drowsiness and ataxia operated as language as well. The amytal procedure is a stressful one and, contrary to popular belief, the drug does not "abolish" anxiety but rather provides a milieu where it is converted much as a schizophrenic uses a delusional system or a dreamer expresses a problem in hallucinatory personifications.

The relation of humor to other forms of symbolic adaptation was of interest. Some of the jokes given used the mechanism of disorientation as in the case of the patients who referred to a hospital (West Hill) as "Mess Hill," or to "Hillside Cabaret." Others used verbal denial, as stating that the reason for coming to the hospital was "because I'm well." In the usual structured joke the patient represented his problems in language involving third persons, more

material symbols (often relating to sex, food, death and violence) and the past tense.

From this study one cannot state that mental illness is or is not an "organic" condition. What can be stated is that these patients exist in a very stressful environment. This is evident not only by behavior before receiving the drug but by the larger number of transient errors in orientation and awareness of illness, the greater occurrence of ludic behavior and withdrawal and the more frequent use of clichés, euphemisms and expressions involving the third and second person as compared to the responses of patients in a general hospital.

Summary

1. The amytal test was given to fifty-six patients in a mental hospital. Five patients, three with other evidence of brain damage yielded a positive result. The results are interpreted as giving further evidence of the value of the procedure as a diagnostic test for brain damage.

2. Mental hospital patients showed more transient disorientation and denial, more withdrawal and ludic behavior and more changes in the syntactical aspects of language than did a group of patients with physical disabilities, but without evidence of brain damage previously studied in a general hospital.

3. It is considered that this greater use of means of symbolic adaptation is additional evidence that patients with mental illness operate in a milieu of greater stress than patients with physical incapacities.

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Recent studies have demonstrated the value of utilizing amytal sodium in a diagnostic test for the presence of brain damage, (1) (2) (3). Under the influence of this drug, certain changes in orientation and awareness of illness occurred in patients with brain disease that rarely appeared in persons without demonstrable brain pathology. These changes included patterns of disorientation for place, time and person and verbal denial of illness and incapacity.

In these studies, other patterns of altered symbolic expression were found in addition to the changes in orientation and awareness of illness occurring in the presence of brain disease. It was indicated that these changes in verbal pattern and non-verbal aspects of behavior contributed to an understanding of the psycho-physiological effects of the drug and the role of language in adaptation to stress.

Until now the control groups have consisted of patients with peripheral nerve, spinal root and cord lesions and miscellaneous medical and surgical conditions. There has been no systematic investigation of patients with mental illness unassociated with demonstrable brain changes.

The purpose of this study is, by the administration of the test to a series of patients hospitalized for mental illness, to:

1) evaluate further the diagnostic validity of the procedure, and

2) compare the patterns of altered symbolic expression found in mental patients with those shown by other groups.

METHOD

Consecutive admissions to Hillside Hospital were selected. Patients who had recently received electro-shock treatment or who were clinically disoriented were excluded. Sixty-eight interviews were essayed, eight patients refused the test, three showed insufficient

physiological effects, and one patient was grossly disoriented in the pre-test interview, leaving a total of 56 patients who were adequately studied. No attempt has been made to classify the patients according to clinical diagnosis, although most were considered to have schizophrenic or depressive reactions. Thirty-four women and 22 men were tested: the ages ranging from 16 to 65, with a median of 36 years.

TEST PROCEDURE

Immediately before and during the administration of amytal sodium, each patient was examined systematically for orientation and awareness of illness. These questions were based on previous observation of certain patterns of disorientation and denial observed in patients with brain disease (4) (5) and are as follows:

What is your main trouble? Why did you come here? Where are you now? What do you call this place? What kind of place is this? Where is this place located? How far from here do you live? Have you ever been in any other hospital of this name? Where were you last night? What is today's date? What month is this? What year is this? What time is it now? What part of the day is it? Who am I? Have you ever seen me before?

Along with the routine test, the patients were asked two additional questions to obtain further material for the study of patterns of symbolic expression:

If you could have one wish what would you wish for? Can you think of a joke?

The amytal sodium was given intravenously in a solution of 0.5 Gm in 10cc. of distilled water at a rate of 0.05 Gm per minute. As the drug was administered the patient was asked to count backwards from 100 to 1. The injection was continued until the patient showed rapid nystagmus on lateral gaze in each direction, slurred speech, errors in counting backwards and drowsiness. These were regarded as

indicators of the physiilogical effects of the drug. The total amount injected depended on the appearance of a maximal effect of the drug. In this study the quantity given ranged from 0.2 Gm to 0.5 Gm.

When the physiological action of the drug was manifest, the patient was interviewed with the same series of questions. If an error was made the question was repeated immediately to determine its persistence. Only persistent errors have been regarded as indicative of brain disease since it has been found that normal controls may make transient mistakes (1).

RESULTS

A. Behavior Prior to Administration of Drug.

These patients as a group showed many overt indications of fear and distrust in the test situation. This was shown, by the large number who refused the test altogether. Some wanted to consult their doctors or their families first, while others were too frightened to enter the examination room. Even among those who took the test there were numberous manifestations of distrust. Several were reluctant to lie down - one sitting up throughout the entire procedure, one constantly keeping one foot on the floor, and several keeping their head raised. Many patients asked for specific details of the test - its purpose, what drug they were getting, why they were selected, whether this was a "truth test", whether the results were confidential and, commonly, whether they would go to sleep of not know what they were saying. One patient asked if he were going to be killed. Another asked that a nurse be present. Some patients asked us to postpone the procedure or said "I shouldn't have come." These manifestations of evasion and suspicion were much more marked than were encountered when the test was administered to patients in general hospitals. Unlike patients with physical diseases who usually gave as a "wish" a statement about getting well or leaving the hospital, these patients

gave many more wishes outside the immediate situation, such as "that all men in the universe should live in peace and harmony" or "good health for the sick world" or "my daughter should marry a nice fellow." Furthermore, these was a greater tendency in this group to express their difficulties in terms of some other person as "you might say I had a slight nervous breakdown" or "my main trouble is my stepmother."

B. Changes in Behavior Accompanying Amobarbital Sodium.

1) Persistent Errors: Positive Reactions

Five of the 56 patients showed persistent changes of behavior similar to those found in brain disease. In a previous report (2) positive reactions were graded from one to four plus depending on the number of manifestations of disorientation and denial shown. On this basis, the five positive cases in this study showed a one plus reaction. The test was repeated in three of these cases and showed a persistence of the one plus result in two and a negative result in the third. Of these five patients, three showed evidence of brain disease by other methods of study. One, a boy of 18, had a positive face-hand test (6), an abnormal EEG record, and an elevated spinal fluid protein on two occasions. Another was a case of Parkinsonism. The third showed a memory defect on psychological tests. Neither of the remaining two positive cases had other signs of brain disease. One was a 64 year old man who persistently referred to "Sydenham Hospital" while under the influence of the drug. He had a normal EEG and no presumptive evidence of brain disease. The other patient located the hospital in "Oakland Park" after having placed it correctly in Glen Oaks prior to receiving the drug. The second administration of the test in this man gave a negative result.

2) Transient Errors:

Transient errors (i.e. errors which were either spontaneously corrected or corrected when the question was immediately repeated) in orientation and awareness of illness have not been re-

garded as diagnostic of brain damage. In persons with physical incapacities, the incidence is low, having been found in 16% of the original series of 50 control subjects (1). In the present study, however, 18 patients, or 32%, made such errors. These included giving the incorrect year, naming the place as "Hillside Oaks" and "Psychiatric Institute" and confabulating having been at home or in a friend's house the night before. Some patients used euphemisms such as "a place to help people get well," "a place for recuperation," "a place to teach health to sick people," "a clinic" and "the greatest hospital with the most stupendous doctors," whereas prior to receiving the drug they had simply stated that they were in Hillside Hospital." When the questions were repeated, however, the original response was again given.

3) Other Alterations in Language.

The use of the second or third person in response to questions about illness and hospitalization was noted twice as frequently as in the pre-drug interview. Another person became the subject of the sentence or another person performed the action or became involved in an experience whereas previously the patient had described his symptoms in the first person. Thus the reason for hospitalization originally given by one patient as "I was getting worse and desperate for help" was changed to "the hospital had a lovely reputation." Another patient who had detailed his problems in the first person before receiving the drug talked about a friend who had cancer. The change frequently took the form of concern over the health of relatives. The wish "that I never get sick" was changed to "I wish that my kid would stay well." There was more of a tendency to employ clichés such as "nothing to fear but fear? and ?not for publication." There was also more selective specificity in answer to questions. Thus patients who had originally said that they had come to the hospital for some illness replied that they had come because their doctors had sent them. Other

patients gave their location in a more precise way stating for example that they were in "a treatment room leading off the corridor." Cryptic remarks were occasionally given as in the instance of the patient who, when asked for a wish, said "if you could help me out then I wish you wouldn't, and if you could then I wish you would".

These patterns were not different from those used by patients with physical incapacities where displacement to the third or second person, greater specificity and selectiveness of repponse and increased use of cliches and slang were noted under the influence of the drug.

4) Jokes:

In many patients the response to the request to tell a joke seemed to be a symbolic representation of some problem relating to illness, hospitalization, the procedure itself or their interpersonal relations. The content of these responses will be considered in a separate paper and only the pattern will be reported here. Of 53 patients, 15 did not respond either before or during drug administration. Eleven patients answered by referring to their own difficulties in the first person such as "it would be a good joke if I could go home" or "the joke is my being here." Six patients used this type of personal reference both before and during the administration of the drug while five responded in this fashion only after injection. Thirty-two patients gave the usual form of structured joke. In these, the account of the action or experience of some third person appeared to symbolize some aspect of the patient's problems or motivation. Usually patients who responded to the question in this fashion in the pre-drug interview used the same pattern after the injection. Seven of these patients told the same joke while diffenent stories were related in 15 instances. Here the tendency was toward a more allegorical representation of the problem. Eight patients told a "joke" before receiving the drug but not after, while eight related

related a story only with the drug.

5) Psychomotor Reactions:

These changes included withdrawal, overactivity, alterations in mood and the appearance of comic or melodramatic "ludic" behavior. Twelve patients showed withdrawal reactions. In the extreme form the patient failed to respond to any questions for periods ranging from several minutds to half an hour. In other instances the questions had to be repeated several times to elicit a response; there was incoherent mumbling; or neologisms and incomplete sentences were used. At such times the withdrawal appeared to be a selective process since the inadequate response occurred primarily with questions relating to the patient's illness. When questions of a more innocuous nature were asked, such as the date or time of day, the patient often answered quickly, clearly and completely. Marked withdrawal has been unusual in control patients in general hospitals but has occurred frequently in patients with brain disease. Ten patients were overactive during the test. Usually this consisted of thythmic movements of the head, hips or legs, eye blinking, or repeated fussing and adjusting of clothing. Sometimes the patients became very restless, sat up in bed, and insisted on having a cigarette. One patient showed prolonged shivering of his entire body for several minutes. Another showed behavior which resembled catatonic posuting, spontaneously holding one arm in the air for several minutes and then holding it in various positions placed by the examiner.

Alterations in mood were noted in 16 patients. The predominant change was in a euphoric direction, although in two cases the patient became tearful and depressed toward the close of the interview. Euphoria was shown by increased smiling, giggling or laughing, joking and expressions of well-being. Some patients commented that they thought they had "one drink too many." Paranoid attitudes as indicated

by threatening remarks and gestures and cursing were sometimes intermingled with euphoric manifestations. Thus one patient, who said he felt good and "would like this more often," answered questions with such expressions as "what do you think it is, you goddamn fool" and "how the hell would I know." The incidence and degree of these euphoric reactions was comparable to those previously found in both normal control and brain diseased groups.

Varying degrees of ludic behavior were shown, but were especially preminent in 16 patients. In several cases this behavior was noted in their counting backwards while the drug was being injected. Some varied the tempo of their counting, alternately slow and fast, or used a sing-song rhythm. One patient barked out the numbers in a staccato fashion while another over-emphasized the pronunciation in telephone operator fashion. One patient responded throughout the interview with exaggerated syllabic accent and dramatic pauses. Another used "French" expressions such as "Oo, la, la." Several staggered excessively when brought back to the ward, particularly when they were in sight of the other patients. One patient, who acted in a dramatic and comic manner throughout the test, spontaneously remarked "I need applause." Such ludic behavior is difficult to grade statictically but was in general more marked than had been observed in the previously studied control groups.

Six women patients showed some form of altered sexual behavior under the influence of the drug. This ranged from holding the examiner's hand and verbal remarks such as calling them "dear" to the behavior of one patient who tried to kiss the examiner. A few others manifested hip movements suggestive of sexual activity or partly exposed themselves in restless leg movements.

DISCUSSION

The results of the study provide further data regarding

the validity of the procedure as a diagnostic test for the existence of structural brain disease. Of the 56 patients tested "positive" results were obtained in five. The others showed behavior more like that of patients without evidence of brain damage in that they did not develop enduring patterns of disorientation or persisting delusional denial of illness and incapacity. In a previous study of psychotic patients in a state hospital (1), only one of 25, a 64 year old woman hospitalized for 35 years, had a positive result of one plus. This compares with a figure of 1 to2% positive results in over 150 normal controls and an incidence of 65% in over 400 patients with brain disease tested in two general hospitals. It may be c ncluded that while it is possible for a patient without demonstrable brain disease to yield a positive result, the difference between patients with brain disease and other groups is statistically significant.

In three of the five cases giving positive results there was evidence of brain disease. One patient had Parkinsonism, in another the clinical history and findings suggested a chronic encephalitis, while in the third, degenerative or arteriosclerotic disease of the brain was likely. A positive result was found in one patient in this study as well as in one of the patients previously tested in a state hospital who were over 60 years of age. Adequate control studies on the effect of age on the results of this test have not yet been completed. It is possible, however, that positive reactions may occur in older persons comparable to the finding of slow waves in the EEG record (7) and to changes in the perception of simultaneous tactile stimuli with age(8). These results suggest that in a group of patient with "functional" psychoses there may be some with disease of the brain which may be demonstrated only by the application of appropriate methods of examination. The amytal procedure and the face-hand test of perceptual function introduced by M.B. Bender and associates (6) are examples of such techniques and should be employed as part of the

diagnostic work-up of a mental hospital.

In considering the alterations in symbolic expression shown by these patients it is necessary to review some previous data relating to the mechanisms of disorientation for place and time and denial of illness. It has been shown that these phenomena are not defects directly attributable to brain damage in the sense that they are the manifestations of the loss of a functional modality represented in some area of the brain. They are, rather, forms of adaptation or defense that the patient uses in situations of stress in a milieu of altered neural function. In disorientation, the misnamed time or place is the symbolic representation of some motivation of the patient, usually that of becoming well and going home not a manifestation of loss of memory. Thus the patient is apt to state a time antedating his illness; to give the name of a small hospital or a place where he has been for some trivial illness; to locate the hospital near his home; or to confabulate that he has left the hospital. In effect, the patient is expressing his problems in another language where places, persons and times are not in their original referential context but as vehicles for the expression of the individual's own motivations. Although an impairment of brain function is necessary to provide the type of neural organization for the maintenance of this new symbolic system the behavior itself is the result of the interaction of a number of factors - what Wikler (9) has called the organism-environment-observer complex. This includes not only the neural organization, but the fact of the disability itself, the patient's motivation to be well, the interpersonal situation of the interview, and the patient's life experience and personality. For example, if the interview is carried out with sterile water there are no changes in language. If the examiner does not question the patient he usually goes to sleep. Patients with similar brain lesions may show markedly different reactions under amytal sodium because of different types of personality and attitudes toward incapacity.

Control patients with physical disabilities unassociated with brain disease, when questioned under amytal sodium, also show alterations in language. They do not deny their incapacities in enduring delusional fashion nor do they show lasting disorientation for place or time. They do however, "misinterpret" questions about illness and hospitalization, talk of their problems in terms of another person and use euphemisms, humor, slang and cliches. In a previous study (3) it was pointed out that when the patient introduced another person after receiving the drug he was not necessarily revealing what had hitherto been "repressed" but was often expressing his feelings in a new symbolic organization. The effect of the drug, when used in the fashion that has been employed, appears to be that of adding to the stress of the environmental situation and of altering the neural organization to furnish the background for the increased use of adaptive mechanisms.

In previous studies (3) (10), we have discussed the significance of the euphoria and ludic behavior that is often noted with amytal sodium. It was pointed out that this behavior could not be interpreted simply in anatomical-physiological terms such as "cortical depression" or as a "release of inhibition." Rather, they are symbolic modes of adaptation in the non-verbal sphere comparable to the concomitant changes in verbal language. One cannot state that the drug makes patients less inhibited or more inhibited. Some patients tell jokes before, but not after the injection while others do so only while under the influence of the drug, indicating that a failure per se to tell a joke does not represent "inhibition" which is "released" physiologically by the drug. Patients were asked to tell jokes because in humor, the patient often expresses his problems not in a formal referential context but in a symbolic pattern utilizing transient denial, disorientation and displacement to another person. For example, when asked why he came to the hospital a patient might reply, because "I'm well," and when asked where he was, might answer

"Hillside cabaret." If he persists in such responses, it may be an indication of brain disease, but if the responses are transient and especially if suffixed by "ha, ha" they are considered as jokes. One woman expressed her feelings about the hospital where she had formerly been a patient by referring to it as "Mess Hill." In these situations the patient is utilizing the name of the hospital as a symbolic device for the representation of his problems.

These patients, in their responses to the procedure appeared to resemble the normal group in more respects than they did the group with brain damage. They did not directly deny the existence of problems nor did they show lasting patterns of disorientation. The symbolic defenses were of the same type used by the normal group. They did use them, however, to a greater degree as evidenced by the larger number of transient errors in orientation and awareness of illness, more ludic behavior and much more unresponsiveness and withdrawal. These responses, coupled with observation of the pre-injection behavior, suggests that the total situation contains more stressful features than are encountered when the test is used with patients in a general hospital.

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