

PSYCHOLOGICAL TEST PERFORMANCE IN PATIENTS OVER SIXTY.
I. SENILE PSYCHOSIS AND THE AFFECTIVE DISORDERS OF
OLD AGE.

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INTRODUCTION.

AFFECTIVE disturbances are a common consequence of organic brain lesions of varying aetiology, and it is to be expected that the differentiation between affective symptoms of "functional" origin and those resulting from organic lesions would become an increasingly difficult problem in an age-range which is particularly susceptible to pathological cerebral changes. In fact the classical accounts of mental disorder in old age convey the impression, by their emphasis on the depressive form of senile psychosis, that an affective disorder appearing in senescence is commonly the manifestation of some cerebral degenerative process. This is one of the sources of the widely prevalent view in contemporary clinical practice that there is a large group of cases in which dementia and a depressive (and less often a manic) symptom-complex are associated. The overlap being large, an ill-defined line of demarcation is held to exist in old age between the organic degenerative diseases and the affective illnesses of a "functional" kind.

A recent study of case material of patients over the age of 60 admitted to this hospital, however, suggested that in the population under investigation, senile psychosis, the disorder which accounted for the largest proportion of degenerative diseases, could be clearly distinguished from the affective disorders, with little overlap between the two types of syndrome. The distinction made initially on the basis of the history and presenting symptoms of the illness was borne out by the status of the patient after intervals of six months and two and a half to three years (Roth and Morrissey, 1952). Since one of the outstanding features of senile psychosis is, by definition, a failure of memory and intellectual functioning, a number of tests were administered to patients falling into these two diagnostic categories to determine whether the differentiation between them made on the grounds of clinical picture and natural history was supported by their performance in a standardized test situation.

PROCEDURE.

The results to be presented are drawn from a wider investigation into the performance on psychological tests of an unselected sample of patients over the age of 60 who were admitted to this hospital over a period of nine months. An attempt was made to examine every patient, and the only reason for a patient

being omitted from the study was an administrative one, e.g., when the patient died or was discharged within a few days of admission.

The group of affective disorders contained 15 men and 31 women, with a median age of 67 years. It consisted mainly of patients with the depressive symptom-complex, but contained also one case of cyclical obsessional state, four cases of mania and two cases of disorders dominated by hypochondriacal symptoms. They represent about half of the affective cases admitted to the hospital during the period, the remaining patients being used as a check on the reliability of the conclusions for this group. Of the 46 patients, 4 were certified, 37 were voluntary, and 5 were admitted on a seven-day urgency order.

The senile psychotics were 8 men and 12 women with a median age of 78 years, of whom 18 were certified and 2 on a seven-day urgency order. Senile psychosis was here defined as a condition with a history of gradual and continually progressive failure in the common activities of everyday life, and a clinical picture dominated by failure of memory and intellect and disorganization of the personality where these were not attributable to specific causes such as infection, neoplasm, chronic intoxication and cerebral arteriosclerosis.

There were three diagnostic categories in addition to affective and senile psychosis—paraphrenia, acute confusion and arteriosclerotic psychosis; the psychological performance of these three clinical groups will be described in the second paper.

In the expectation, based on previous experience (Roth and Morrissey, 1952), that there would be a small overlap between the affective and senile psychotic groups, it was decided to allocate patients with a mixed picture according to the character of the predominant feature in the presenting clinical disorder. Accordingly one patient with a severe agitated depression who was considered clinically to exhibit also an early dementia was classified with the affective disorders, and one patient who had vaguely reiterated suicidal ideas before admission, without manifesting a true depressive symptom-complex, was grouped with the senile psychotics.

There was a wide range of educational and occupational levels within each group. No attempt was made to equate the groups for this variable, but the affective group did not appear to be drawn from a population which was intellectually superior to that of the senile psychotics.

The tests were administered in two or sometimes more sessions. When a patient was out of contact or too hostile, restless or agitated to co-operate, one or more attempts were made before testing was abandoned. Of the 66 patients, 7 were found to be completely untestable; they were comatose, or gave responses irrelevant to the questions asked or instructions given. No patient had had E.C.T. before testing during the present admission.

Four tests were used. The first was the Vocabulary sub-test from the Wechsler-Bellevue Scale (Wechsler, 1944). This was substituted for the Mill Hill Vocabulary test during the early part of the work, a fact which accounts for the smaller number of patients given this test. Only two patients could not understand the instruction to define words; they repeated or spelled the words, gave examples of their use, or told stories about them.

The second was the Digit Span sub-test from the same scale. All the

patients understood the instructions ; that some obtained zero scores is due to the fact that any raw score below 6 is given a weighted score of 0. Both these sub-tests were administered and scored according to Wechsler's instructions and are reported as weighted scores.

The third was the Progressive Matrices, 1938 version (Raven, 1950). The instructions were modified and elaborated, and if necessary repeated during the course of the test. (This was hardly ever necessary for the affective group.) Set E was never administered, and in sets B, C, and D, the series was discontinued after four consecutive failures and the next series started, thus enabling nearly every patient to complete the test. A score of zero (and in most cases, any score of less than 5) implies that a patient could not be made to grasp the instructions in spite of the most painstaking explanations. Zero scores are included in the tables as long as the patient appeared on other grounds to be in contact with the examiner, understood that he had to select one of the insets at the bottom of the page to fit into the pattern at the top even when he gave no evidence of understanding the principle of selection, and seemed to be making an effort to find the correct inset. A score of zero or slightly above means virtually that the patient could not understand the explanation, and this represents a separate category rather than a point along a continuum of scores ; the justification for including such a performance in the analysis of results is that only one case of affective disorder (a manic) and no normal control failed to understand the explanation and act accordingly, so that failure to do this has an almost unequivocal diagnostic significance. Clearly, this test is not appropriate as a measure of ability within the range of demented patients.

The fourth test was an Information test consisting of ten questions concerned with orientation for time, place, and person, and ten with well-known public events, persons, and dates. Six patients also made a score of zero on this test, but in every case the examiner was satisfied that they understood the questions, on the grounds that they answered relevantly, though inaccurately, and were able to take part in a coherent conversation on other topics, such as the weather or their early life. Subjects unable to do this were included with the seven patients regarded as inaccessible.

All patients except the seven mentioned above attempted the Information test, but a number were dropped on the others, because of physical disabilities or because of agitation or outright refusal. Excluding from consideration the patients who did not attempt all four tests would have so diminished the numbers in the already small senile psychotic group that every test score obtained has been included in the analysis. The reasons for exclusion have been given for both diagnostic groups, so that the possible bias introduced by this selection can be taken into account.

The apparently haphazard choice of tests requires some explanation. The original plan was to use a vocabulary test, which within limits gives an assessment of an individual's premorbid intellectual level, a test for which there is some evidence that it measures a subject's current reasoning ability, and a memory test ; the purpose of the investigation was to examine every patient even where his mental and physical condition appeared to make him unsuitable for testing. No attempt was made to evaluate different degrees of intellectual

impairment within the diagnostic groups, as to which in any case no clinical judgment was made; nor are the tests used claimed either to give a comprehensive assessment of these patients' abilities or to measure any known specific psychological function. It had already been found, however, that of a number of tests tried out, the Vocabulary, Digit Span and Information tests were the only ones on which even very deteriorated patients could grasp and retain the instructions and co-operate in carrying them out; the Matrices test, which hardly fulfilled even this criterion, was kept because it seemed unlikely that any comparable test would give a good distribution of scores within the affective groups while still enabling the senile psychotics to understand the nature of the test. In spite of its apparent unsuitability, the choice of the Matrices proved to be justified by the clearcut differences in performance it showed between the two diagnostic groups.

RESULTS.

Of the patients suffering from affective disorders, one was stuporose and completely incontactable, and died seven days after admission. All the other patients attempted the Information test. Four could not be tested on the Matrices because of defective vision, and 5 because they were too agitated or refused outright to co-operate. One was too deaf to be given the Digit Span test, 4 refused or were too agitated. Twelve were not given the Wechsler Vocabulary sub-test as this was substituted for the Mill Hill Vocabulary test during the course of the investigation; a further 5 were too disturbed or hostile.

Of the senile psychotics, 6 were not sufficiently in contact to respond to any tests except in a random and irrelevant way. All of these patients died within seven weeks of admission. The remaining 14 were able to respond to the Information test in a manner which was appropriate to the topic in hand. One refused to do the Matrices, and one patient could not be persuaded to direct her attention to the instructions. One refused to repeat digits, and another was too deaf. Of the 9 patients with whom the Wechsler Vocabulary was attempted, one refused.

TABLE I.

		Affective psychosis. I.	Affective psychosis. II.	Senile psychosis.	Controls.
Age	Number	45	39	14	14
	Median	67	67	78	77.5
	Range	60-86	60-85	67-85	65-85
Information Test	Number	45	39	14	14
	Median	14	17	2	15.5
	Range	5-20	8-20	0-5	13-19
Matrices	Number	36	37	12	12
	Median	16.5	20	4.5	13
	Range	4-36	10-40	0-9	10-19
Vocabulary	Number	28	37	8	—
	Median	11	10	5.5	—
	Range	3-18	6-17	0-11	—
Digit Span	Number	40	35	12	11
	Median	7	7	3	6
	Range	0-13	2-14	0-7	3-10

Test scores for the two groups are summarized in Table I and in Figs. 1 to 4. It is clear from these results that the scores for the senile psychotics were extremely low on the Matrices and the Information tests, and that both of these tests discriminated between the two groups with a high degree of efficiency. On each of these tests there was one case of affective disorder whose score was equal to or below that of the highest score made by a senile psychotic; if the scores on the two tests are simply added together, the summated score results

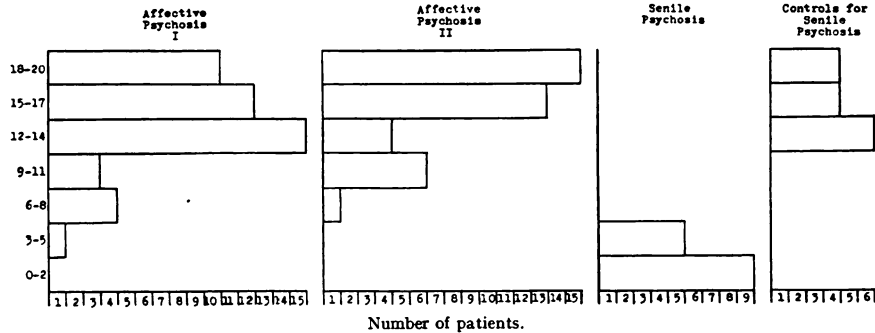


FIG. 1.—Distribution of grouped scores on Information test.

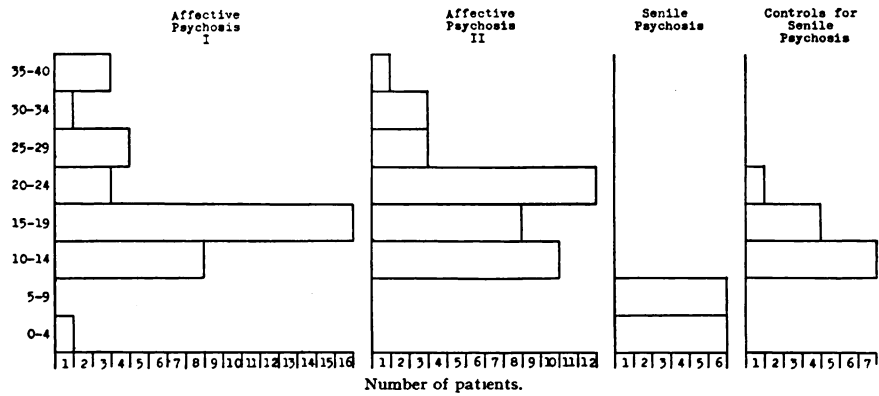


FIG. 2.—Distribution of grouped scores on Matrices test.

in two separate distributions with no overlap for those patients who attempted both tests.*

While there is also a gross difference in median score between the two groups on the Vocabulary, the overlap on this test is much greater. Four senile psychotics obtained scores approaching the median score of the affective group.

* The significance of the differences can be tested by calculating the deviation of the mean rank of one sample from that of the combined samples (d). The frequency with which a given value of d would occur if the two groups were random samples from the same parent group can be derived from the tables published by Festinger (1946). These frequencies are less than once in a hundred for the Matrices, Information, and Digit Span tests, and less than five times in a hundred for the Vocabulary. It must be pointed out that while tests of significance show that the senile and affective groups are drawn from different populations with respect to their test performance (the question with which this paper is concerned), the probabilities do not enable any precise comparisons to be made between the four tests, since the number of patients in the groups varied from one test to another.

All four were in good social contact, and able to carry on a rational and interesting conversation in spite of the fact that they had not the slightest idea of where they were, of their age, or of any of the outstanding events in their environment. This finding is not unexpected, in view of the fact, for which there is considerable evidence from various sources, that while the ability to define words eventually disintegrates so that all types of ability are reduced to a uni-

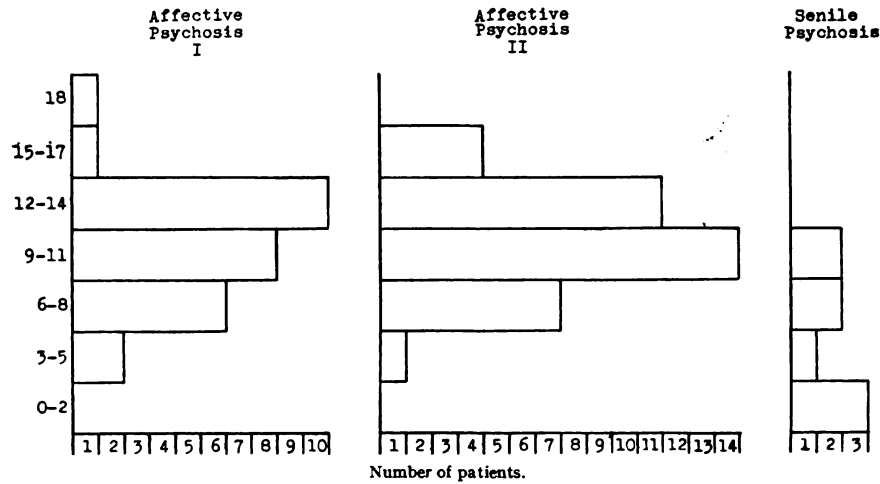


FIG. 3.—Distribution of grouped scores on Vocabulary test.

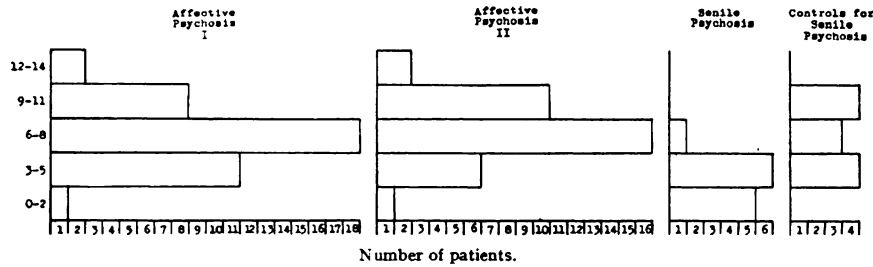


FIG. 4.—Distribution of grouped scores on Digit Span test.

form level of dementia, it tends to deteriorate later than other abilities, and may remain in a state of relatively good preservation even in a setting of gross dementia (Babcock, 1930 ; Hunt, 1944).

The same conclusion applies to the Digit Span test. It has been reported that even in Korsakov syndromes, where a gross memory defect is present, the ability to repeat digits is usually unimpaired (Zangwill, 1943), and in an investigation made by Botwinick and Birren, who compared the performance of senile and arteriosclerotic psychotics with that of normal controls on the Wechsler-Bellevue Scale, this sub-test was the only one which failed to discriminate between the two groups at the 1 per cent. level (Botwinick and Birren, 1951a).

Three possible factors which could have accounted for the inferior performance of the senile psychotic group had to be considered. The first was that the

motivation and willingness to co-operate were more impaired than in the affective patients. As far as it could be assessed by observation, however, any disturbances in motivation were in favour of the senile group; none of them appeared to be depressed, some were mildly euphoric, and most of them were delighted to see the psychologist, invited her to visit them frequently, responded with pleasure to praise and flattery, and usually had a confidence in their own ability which was unshaken by the most obvious deficiencies when they actually did the tests. Many of the affective cases, on the other hand, were extremely agitated, retarded, anxious, and fearful that their test performance would "go against them," or considered that it was an impertinence to ask them to do tests at all.

The second factor to be considered was that the patients were tested shortly after admission when the senile psychotics might have been undergoing transient confusional states. This possibility could not be checked by retesting in all cases. Of those tested, 6 died within periods of six days to 14 weeks after admission without any improvement in their clinical state being observable, 1 was discharged, and 2 more have been admitted too recently for retesting. An attempt was made to retest the remaining 7 after intervals ranging from two to five months, but test results could only be obtained from 5. In each case scores on all tests remained unchanged or had deteriorated, with the exception of one patient who made an increased score on the Vocabulary test alone. The clinical condition of all the patients was unchanged or had deteriorated.

The third factor which could have accounted for the difference between affective disorder and senile psychosis was that of age. The median age of the senile psychotic group was 11 years in excess of that of the affective group. The performance of the small number of very old patients suffering from an affective illness suggested that age *per se* does influence the test scores, but the oldest members of the affective group performed consistently better than the youngest senile psychotics. The numbers of very old affective psychotics were too small, however, for an age-to-age comparison to be made. This question was therefore investigated by administering the tests (excluding the Vocabulary) to patients from the convalescent and chronic wards of a general hospital. These controls were matched for age, sex, and as far as possible, occupational level, with the 14 senile psychotics; they were not suffering from psychiatric or relevant neurological disorders. All of the controls were willing and able to co-operate, once testing had been started, and all understood the instructions. Five were bed-fast.

The test results of the controls are given in Table I and in Figs. 1, 2 and 4. There was no overlap between the controls and senile psychotics on either the Matrices or the Information tests; on the Digit Span, 4 of the controls obtained scores which were as low as the highest score made by a senile psychotic. These results indicate that age can be discounted as a factor which in itself is responsible for the poor performance of the senile psychotics.*

The results are open to criticism on the grounds that they are restricted to

* The test of significance which was used in comparing the senile and affective groups is inapplicable to the seniles and controls, as the individuals were matched. For various reasons the *t*-test is inappropriate here. The differences could clearly not have arisen if the controls and seniles had been drawn from the same population.

one sample of patients which may have been unrepresentative, and might not be confirmed if the procedure were repeated on a fresh sample. The numbers of senile psychotics admitted have not been sufficiently large to allow for a check on this possibility, but a second series of affective disorders has been examined. These were 14 men and 25 women with a median age of 67 years, of whom 37 were voluntary and two on urgency order. One of these was too agitated to do any tests other than the Information test, and one did not do the Matrices because of defective vision; another was foreign-born and was not given the Vocabulary test, and 3 were too deaf to repeat digits.

The results for the second group, which are given in Table I and Figs. 1 to 4, are similar to those obtained by the original group, except that the former made rather higher scores on the Information and Matrices tests, apparently because there were fewer cases of extreme agitation in this series. No patient in this group made scores falling within the senile psychotic range. The difference between the two groups was not therefore dependent on the affective group being an unrepresentative sample. A second sample of senile psychotics is now in process of examination.

A second source of error could have been introduced by the fact that scores made in the tests used tend to change from one occasion to another even when repeated on normal individuals, while many patients in this investigation underwent marked changes in clinical condition which would be expected to influence the scores to an even greater degree. Several writers have pointed out that the reliability of the Matrices is low, especially in the lower ranges of scores into which most of our patients fell (Desai, 1952). It is unlikely that the Information test used here had a high order of reliability, especially as some of the questions asked, such as the patient's whereabouts, would be expected to be answered more accurately with increased stay in hospital. However, it seems clear that these limitations have not significantly affected the degree of differentiation between the two groups; although differences in scores occur on retesting, no case of affective disorder made a change of score which would have reclassified him with the senile psychotic group, nor did any senile psychotic make a change of score such as to place him with the affective group. This observation is based on retesting the 5 senile psychotics already mentioned, and on 13 cases of affective disorder retested on the Matrices, and 16 on the Information test.

It is impossible to relate the test performance of these patients to that of the general population except in the case of the Digit Span and Vocabulary sub-tests, for which the mean scores of the affective group were 6.60 and 10.37 respectively for the first series, and 7.13 and 10.81 respectively for the second series. These are almost identical with those obtained by the control group described by Botwinick and Birren (1951a).

DISCUSSION.

A previous investigation had suggested that two of the commonest psychiatric conditions in elderly patients, the affective and senile psychoses, constitute two distinct nosological entities which are rarely associated. Differences in the natural history of the disorders assessed by the status of patients after

intervals of six months and two years supported the conclusion initially based on the character and development of the symptoms. Further support for this differentiation is provided by the fact that there is a clear-cut difference in the performance of the two groups on psychological tests.

At first sight the conclusion that senile psychosis is a condition which can be clearly differentiated from that of affective psychosis by reference to performance on two simple tests may appear to be inconsistent with the experience of clinical psychologists and much of the published work in this field. These tend to suggest that the assessment of the degree of dementia is a matter of the greatest difficulty, requiring refined and elaborate procedures, or the evaluation of "qualitative" features of the patient's performance or his reactions to the test situation. However, the results reported here are not necessarily inconsistent with these views. Most of the work in this field has been concerned with a problem which is related to but not strictly comparable with the question which the present investigation set out to answer. We were looking for possible differences in psychological performance between two strictly defined groups, one judged clinically to be suffering from a progressive dementing disorder, and the other manifesting an affective symptom-complex and not judged to be dementing on clinical grounds. Most of the workers in this field, on the other hand, have tried to evaluate differences in the degree of dementia within the senile psychotic group or within a wide range of psychiatric disorders irrespective of the specific diagnosis.

Only three investigations are reported which are concerned with test performance in senile psychosis when the latter is taken as a diagnostic category. The performance on the Wechsler Scale of 31 senile psychotic and arteriosclerotic psychotics has been compared with 50 normal controls who were matched for age, sex, and occupational status (Fox and Birren, 1950; Botwinick and Birren, 1951*a*, 1951*b*). Differences between the control group and the total experimental group were significant at the 1 per cent. level for the IQ and for each individual sub-test with the exception of the Digit Span, and to this extent are in line with those found in the present investigation. The median IQ of the nine senile psychotics in the group was 83; the mean IQ of the controls was 102; there is, however, a considerable amount of overlap between the two groups. This greater overlap in scores may have been partly due to the fact that the patients in their experimental group were younger than our senile psychotics, and also to the fact that only 31 patients were selected from an enormous number of possible candidates. One basis of selection was that they were ambulatory, able to read, reply to questions about their age and occupation, etc.; this suggests that many of the most deteriorated patients were excluded, while in the present study, patients were only excluded after it had proved impossible to obtain any real response from them.

Botwinick and Birren's results are similar to those obtained by Rabin (1945), who administered the Wechsler Scale to 15 senile psychotics. The mean scores are almost identical for most of the sub-tests, although as a group, Rabin's patients were nearly ten years older. Rabin found, however, that there were no significant differences on mean sub-test scores between the senile psychotics and three other groups, namely arteriosclerotics, "miscellaneous psychotics,"

and "non-psychotics." Although he comments that the total scores on the senile and arteriosclerotic groups are "quite low" in comparison with the others, inspection of the scores suggests that the differences in IQ would have been eliminated had they been corrected for age according to Wechsler's formula, and Rabin himself concludes that age rather than differential diagnosis is the factor affecting performance.

If the results of the two reports quoted are taken together, they imply that there is a definite (though not overwhelming) difference between the performance of normal persons and senile psychotics, but a negligible difference between senile psychotics and other diagnostic groups. Without any details as to the criteria for diagnostic classification, it is difficult to evaluate Rabin's finding, which is quite inconsistent with ours, since the cases of affective disorder in our population were not only sharply differentiated from the senile psychotics, but appeared to fall not far short of normality as far as it was possible to assess their relationship to the normal population.

Shakow *et al.* (1941), comparing arteriosclerotic and senile psychotics with normal controls on a version of the Wells-Martin Memory Scale, found differences which were small but in the expected direction. From their conclusion that "psychosis adds only a little to an already marked disturbance of function" (by age), it appears that their senile psychotics represented a very different population from ours, either because the diagnostic criteria were different, or because their sample was unduly influenced by the fact that only patients were included who were "representative" according to the standards adopted by these authors.

The fact that the two groups fell into two almost wholly distinct distributions also appears to be unexpected in view of the widely accepted opinion that in this age range there is a considerable association between symptoms characteristic of the "functional" and of the organic disorders. It could be objected that the results obtained merely serve to support a diagnostic classification which, in emphasizing the gross and obvious differences between the affective and senile psychoses, obscures the more subtle distinction between those patients whose illness is comparable with an affective disorder occurring in earlier life, and those in whom the symptoms are associated with a progressive and irrecoverable disease process leading inevitably to dementia. The assumption that some patients whose illness is clearly affective in character are in fact early cases of senile or arteriosclerotic psychosis, and will in a few years be indistinguishable from those patients who are admitted to hospital in a condition of virtual helplessness, is implicit in the psychologist's efforts to elaborate tests of early dementia for use in this field. It is held that the presence of some degree of intellectual impairment will modify the course of the presenting illness by preventing or retarding the patient's recovery or his response to treatment, by affecting the quality of the remission, or by increasing the probability of a relapse; or it may lead to a change in the actual nature of the symptoms, so that new features characteristic of the degenerative disorders will be superimposed on or substituted for the original illness.

There is, however, some evidence to suggest that senile psychosis rarely commences with what appears to be a typical affective psychosis. If in a

proportion of cases the affective symptoms represent the first changes in a dementing process, it would be expected that some of the senile psychotics in this series would have presented initially with affective symptoms. In fact, however, as far as could be ascertained, the history of the illness in all these patients was one of a progressive dementia, and only one patient had a history of a depressive illness, from which she had recovered without hospitalization many years before the onset of the dementia. Reference has already been made to the other case of senile psychosis with a short-lived depressive episode before admission.

Conversely, a proportion of those patients whose presenting illness is unequivocally affective in nature would be expected to develop "negative" symptoms after the illness had progressed for a time. The evidence from the earlier series of patients already mentioned (1948) and from a second study of patients admitted in 1949 (Roth, 1953) is that among the discharged patients the emergence of a senile psychotic condition is rare, while chronic patients still in hospital continued to exhibit the affective symptom-complex with which they were first admitted. While this finding cannot be directly applied to the present series, the status at six months after admission of the 46 patients in the affective group gives a similar outcome, suggesting that at least in this respect they are comparable with the 1948 and 1949 admissions. The proportions were 65 per cent. discharged, 11 per cent. dead, and 24 per cent. in-patients, compared with 57 per cent. discharged, 6 per cent. dead, and 37 per cent. in-patients for the 1949 series. The median ages of the three series are similar: 67 for the 1948 series, 66 for the 1949 series and 67 for the present study. Moreover, there are 11 readmitted patients in the present sample of affective psychosis and the subsequent sample whose first psychiatric illness occurred after the age of 60, and whose former admission had been at least two years before the present one, the actual intervals ranging from two and a half to seven and a half years. These patients were all admitted with a recurrence of the symptoms of which they originally complained, and in no case was the clinical picture one of dementia, nor were their test scores any lower than those of patients whose present admission was the first one.

These data are of course merely suggestive, and are presented as evidence against the probability that the affective group included many patients whose affective symptoms were the first indications of a degenerative disorder.

It is concluded, therefore, that the performance of patients in a standardized test situation provides objective and independent support for the differentiation between affective disorder and senile psychosis based on the evaluation of case histories and clinical state. While the investigation was not planned in order to evaluate the usefulness of tests as a contribution to clinical diagnosis in individual patients, the clear-cut differences in test scores suggest that the cognitive aspects of a dementing process in old age might be most consistently described by reference to the senile psychotic group, and provide a rough basis for describing the status of patients in other diagnostic categories in whom the assessment of intellectual impairment may be clinically a more difficult problem. The test performance of these other diagnostic groups will be described in the second paper.

SUMMARY.

(1) Tests were administered to 46 patients with affective disorder, and 20 senile psychotics, who were drawn from a series of patients over the age of 60 admitted to this hospital. Results on one or more tests were obtained from 59 subjects.

(2) The ability of the senile psychotics to define words and repeat digits was relatively well preserved in some cases, but on the Matrices test and a test for orientation and knowledge of public affairs the groups fell into two almost exclusive distributions.* The test performance of general hospital patients indicated that age alone was not responsible for the difference between the two diagnostic groups.

(3) These results support the conclusion based on clinical and follow-up studies that senile psychosis and affective psychosis are relatively independent disorders which are rarely associated.

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* The reliability of this finding was partially checked by administering the tests to a second sample of 39 cases of affective disorder, whose performance proved to be similar to that of the first sample.