

PSYCHOLOGICAL TEST PERFORMANCE IN PATIENTS OVER SIXTY.
II. PARAPHRENIA, ARTERIOSCLEROTIC PSYCHOSIS AND
ACUTE CONFUSION.

By BARBARA HOPKINS, B.A., and MARTIN ROTH, M.D.Lond.,
M.R.C.P., D.P.M.,

Department of Clinical Research, Graylingwell Hospital,
Chichester, Sussex.

INTRODUCTION.

THE previous paper of this series (Roth and Hopkins, 1953) described test performance in senile and affective psychosis. The same tests have been administered to patients in three other diagnostic groups: paraphrenia, arteriosclerotic psychosis, and acute confusional states. These five clinical categories account for the majority of mental hospital admissions in patients over the age of 60.

The three additional groups will be described mainly by relating their test performance to that of the senile and affective psychotics, who in symptomatology, natural history and test performance fell into two distinct groups. This comparison has resulted in the following conclusions:

The paraphrenics are placed by their test performance with the affective patients, the combined groups being markedly superior to the senile psychotics. The arteriosclerotic patients as a group are inferior in test performance to the affective group, but the relatively better intellectual preservation which is usually described in this disorder compared with senile psychosis is to some extent confirmed by their test scores. Patients who undergo an acute confusional episode not complicating some other psychiatric disorder tend to fall into two distinct categories, the majority of testable patients obtaining test scores which place them well above the senile psychotic range.

PROCEDURE.

The testing procedure has already been described. The patients were drawn from consecutive admissions over a period of about a year and as far as possible every patient was tested. Clinical and psychological investigations were carried out independently; the diagnosis was not invariably the same as that made by the doctor in charge of the case.

Three tests were used: the Vocabulary sub-test from the Wechsler-Bellevue Scale (Wechsler, 1944), a shortened form of the Progressive Matrices (Raven, 1950), and an Information test composed of a series of questions about personal information, orientation, and public events. The Digit Span test was not used in the present investigations, as it was found to produce some degree of overlap between the affective and senile groups, and has no other claim to be considered as a test of memory or of premorbid or current intellectual functioning.

Test performance in the affective and senile groups has already been described. The composition of these two groups has been slightly altered for comparison with the three additional clinical groups.

The *affective group* consists of all patients in the first and second series described in the first paper of this series who were aged 70 or above. Patients under the age of 70 were excluded because there is a slight tendency for younger patients to obtain higher scores, so that the age difference between the groups creates a bias in favour of the affective patients. In the two series of affective disorders already described there were 30 patients who were aged 70 and above. The 30 patients included 11 men and 19 women, of whom 4 were certified, 22 were voluntary, and 4 on seven-day urgency order. None of them was untestable, and 20 did all three tests.

The *senile group* includes all the senile psychotics originally described, with an additional 8 patients admitted since. There are now 28 patients in this group, 20 women and 8 men; 25 were certified and 3 were on urgency order. Six were totally untestable, and 14 attempted all three tests.

Using the test of significance to be described, and considering only those patients who attempted all three tests, the differences between the affective and senile groups are significant at the 1 per cent. level on all three tests.

Paraphrenia.

The patients classified in this group were those in whom a well-organized system of paranoid delusions (usually with auditory hallucinations) existed in the setting of a well-preserved personality and affective response. That many patients with paranoid psychoses in old age are in the initial stages well-preserved has been previously recognized (Bumke, 1936; Rothschild, 1945, 1947), but such cases have been classified as paranoid varieties of senile psychosis on the assumption that the eventual outcome was one of disintegration of the intellect and personality. However, there are reasons, from a study of the natural history of such cases (Roth, 1953), for classifying them separately from senile psychosis. While in general the symptomatology of these patients conforms with that of the more familiar cases of paraphrenia occurring at an earlier age, there are certain peculiarities of the condition in old age which will be described elsewhere. In all but one of these cases symptoms of illness first appeared after the age of 60.

There were 13 women and 2 men with this diagnosis; 9 were certified, 2 on urgency order, and 4 were voluntary. One patient was completely deaf and so deluded and hallucinated that it was impossible to make any contact with her. Twelve of the remaining patients attempted all three tests.

Arteriosclerotic Psychosis.

Patients classified in this group were those in whom dementia was associated with focal signs and symptoms indicative of cerebrovascular disease, or in whom a remittent or markedly fluctuating course at some stage of the disease process was combined with any one of the following features—emotional incontinence, the preservation of insight, or epileptiform seizures. These are well-known

criteria for the diagnosis of arteriosclerotic psychosis. The importance attached to evidence of cerebrovascular disease requires no explanation. A fluctuating or remittent course was made a leading criterion because of the consistency with which it presents as a feature of dementing processes associated with established cerebrovascular occlusion. The diagnosis was, however, made conditional upon the presence of one of the three remaining criteria so as to provide some further guarantee that the underlying degenerative process was likely to be of a focal or patchy rather than of a diffuse character as in the case of senile psychosis. However, it is realized that investigation of the underlying changes in the brain (which it is planned to do in cases that come to autopsy) may not show in all cases pathological lesions that are sharply distinct from those observed in the cases classified with senile psychosis. It has been shown, nevertheless, that the separate classification of these cases from those with a picture of senile psychosis is justified not only by differences in the clinical picture which separate them into two relatively well-defined groups, but also by differences in outcome observed in follow-up studies (Roth, 1953).

Of the 22 patients in this group, 12 had cerebrovascular signs and symptoms. Twenty had a remittent or fluctuating course, and the remaining 2 had such severe aphasia that changes in contact with their environment or level of consciousness were impossible to evaluate. Twelve patients showed emotional incontinence and the same number preservation of insight, while epileptiform attacks were observed in 8 cases. (In addition, a systolic blood pressure of over 180 mm. was recorded in 12 patients.) There were 7 men and 15 women; 9 were certified, 6 were on urgency order, and 7 were voluntary. Two were untestable on account of gross aphasia. Fourteen did all three tests.

Acute Confusional State.

This was defined as any condition of rapidly evolving clouding of consciousness produced by some extraneous or transient cause or for no discoverable reason, where the history of the patient's level of adjustment to the demands of daily life failed to provide evidence of previous dementia.* Here, again, follow-up studies have shown that it is valid to classify cases separately from senile and arteriosclerotic psychosis. Where clouding of consciousness occurred as a complication of a very acute affective or paraphrenic psychosis the cases were classified with the appropriate main disorder.

There were 8 men and 9 women admitted in an acute confusional state. In 7 of these the confusion was a complication of acute chest infection—acute bronchitis in 3, pneumonia in 3, and a flare-up in a bronchiectasis in 1. Of the remaining 10, 1 was a post-traumatic epileptic, in 1 confusion followed an abdominal operation and in 8 no specific cause could be discovered, and these were therefore classed as "non-specific" confusions. Ten were certified, 5 were on urgency order, and 2 were voluntary. In 3 cases it was impossible to make any contact; all of these patients died within 12 days of admission; 7 of the remaining 14 attempted all three tests.

* Theoretically, the occasional cases of general paralysis of the insane or cerebral tumour that present with clouding of consciousness as their first manifestation would be covered by this definition. No cases were met with in this series, but if identified they would have been excluded, as the aim was to define a group of cases which there was no good *a priori* reason for associating with dementia.

The numbers in each group are not strictly representative of the numbers who were admitted. A few patients who died shortly after admission or in whom treatment began immediately after admission were not examined. The affective patients were admitted over a period of about nine months, compared with a period of about a year over which patients in the other clinical groups were admitted. About two-thirds of the affective group have been excluded as they were under the age of 70.

There are no significant differences in age between any of the five groups.

RESULTS.

The raw data for the five groups are given in Figs. 1 to 4. The histograms cover the scores observed by all patients who attempted one or more test.

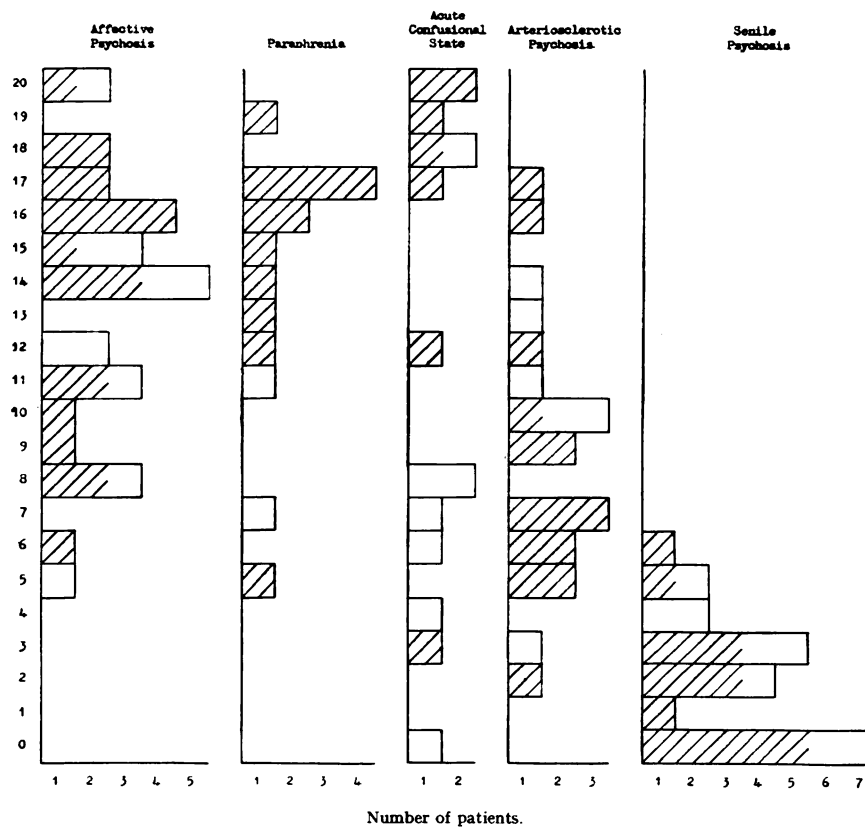


FIG. 1.—Distribution of Information test scores.

The hatched areas include only those patients who did all three tests, and therefore represent identical samples for each test.

In order to ensure that identical samples should be compared for each test, measures of central tendency and distribution and estimations of statistical significance have only been calculated for those patients in each group who attempted all three tests. It can be seen from the histograms that exclusion of

those patients who for one or another reason did not do all three tests tends to increase the average scores for the groups; there is a tendency for those patients who do not do all the tests to do badly on those which they do attempt. This is most marked in patients with confusional states.

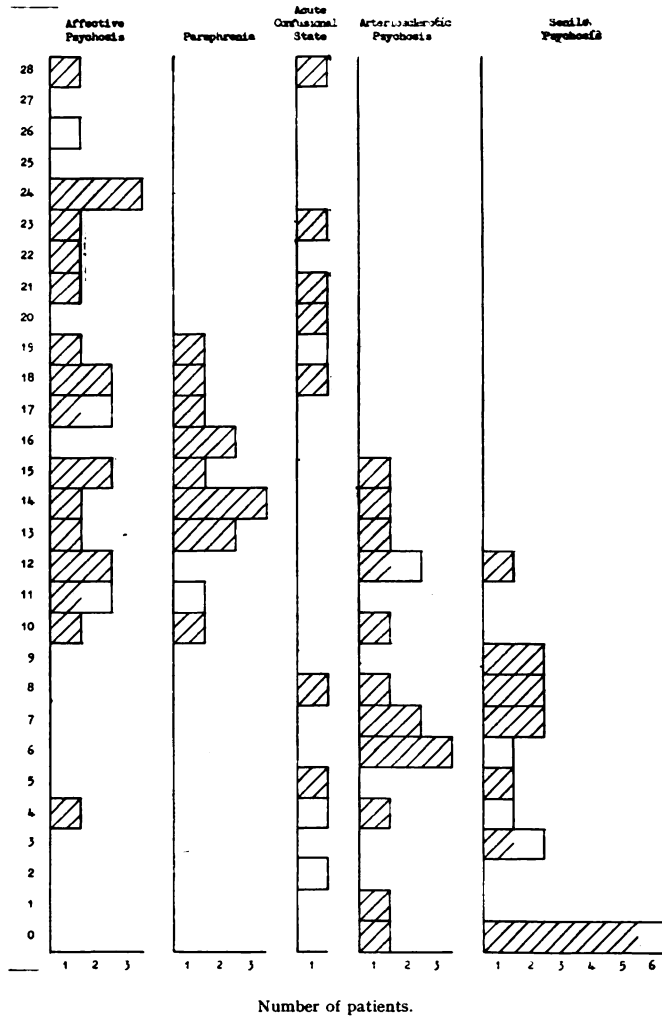


FIG. 2.—Distribution of Matrices scores.

Including only those patients who did all three tests, the mean, medians, and ranges for age and test scores are given in Table I. It can be seen from this table that the mean scores of paraphrenic and confusional patients class them with the affective group. The means for the arteriosclerotic psychotics are consistently lower than for the affective group and consistently higher than for the senile group.

The probability of a found difference in two groups occurring if they are samples drawn at random from the same population has been estimated by a

TABLE I.—Means, Medians and Ranges for Five Clinical Groups.

	N = 20. Affective psychosis.	N = 12. Para- phrenia.	N = 7. Acute confusional state.	N = 14. Arterio- sclerotic psychosis.	N = 14. Senile psychosis.	
Age . . .	Mean . . .	73.4	75.6	71.0	76.0	78.1
	Median . . .	73	74.5	72	72	79
	Range . . .	70-85	65-86	61-80	61-80	67-88
Information test	Mean . . .	13.7	14.8	15.6	8.4	1.9
	Median . . .	14.5	16	18	7	2
	Range . . .	6-20	5-19	3-20	2-17	0-6
Matrices . .	Mean . . .	17.2	14.9	17.6	7.8	4.8
	Median . . .	17.5	14.5	20	7	6
	Range . . .	4-28	10-19	5-28	0-15	0-12
Vocabulary .	Mean . . .	10.2	11.2	10.4	8.1	5.6
	Median . . .	10	11	11	8	7
	Range . . .	3-16	7-14	5-15	3-12	0-11
Summed scores	Mean . . .	41.0	40.91	43.6	24.2	12.4
	Median . . .	42	41.5	49	22	13.5
	Range . . .	21-64	28-49	19-61	8-40	0-24

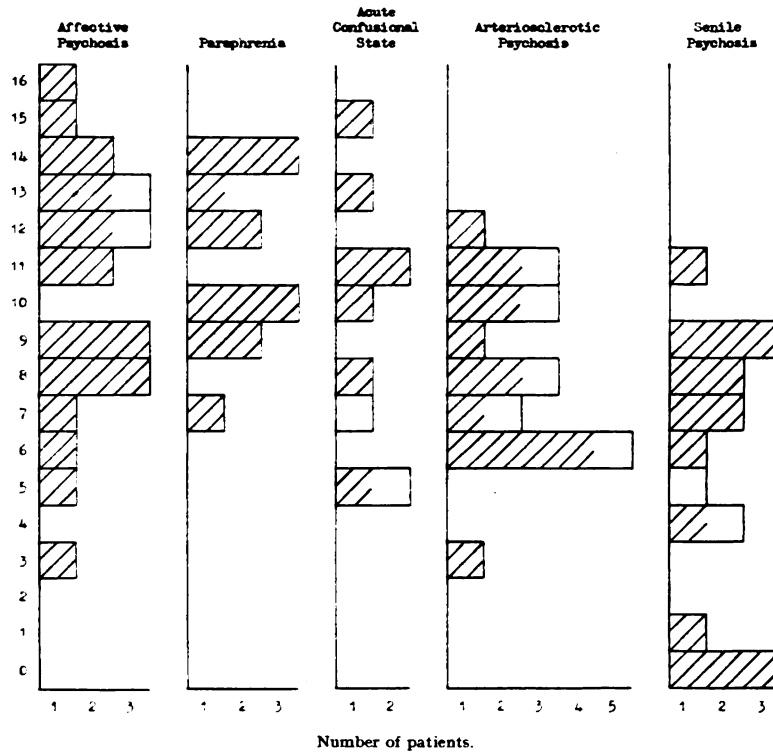


FIG. 3.—Distribution of weighted Vocabulary scores.

technique described by Festinger (1946).^{*} This method has been used to compare the paraphrenic, confusional and arteriosclerotic patients with the senile and affective groups. Values of d are recorded for the summed scores on each of the three tests; it is justifiable to sum the individual test scores, since the tests agree in ordering the groups in the same way. Table II gives

TABLE II.—Values of d and P : Summed Scores.

	Affective psychosis.		Senile psychosis.	
	d .	P .	d .	P .
Paraphrenia	0.75	> .05	7.0	< .01
Arteriosclerotic psychosis	7.46	< .01	4.58	< .01
Acute confusional state	1.72	> .05	6.29	< .01

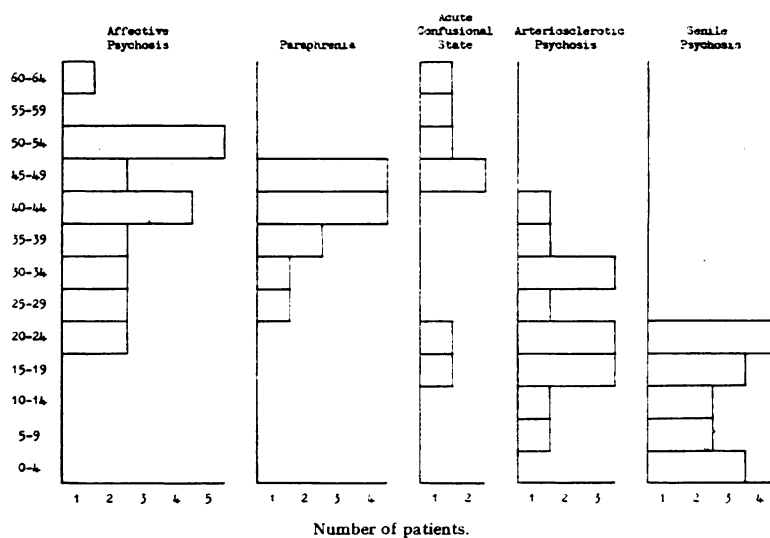


FIG. 4.—Distribution of grouped summed scores for three tests.

the values of d for each comparison and shows whether this value gives a confidence level of 1 per cent. or 5 per cent. The exact confidence levels for a given value of d are not available.

This test was also applied to the scores for the separate tests, and more detailed results will be described for each of the three clinical groups.

The test performance of the paraphrenics is not significantly different from that of the affective group on any tests. Their scores on all tests are signi-

* This test is based on the statistic d , which is the absolute deviation of the mean of the ranks of one sample from the mean of the ranks of the combined samples.

$$d = \frac{Rn}{n} - \frac{|n + m + 1|}{2},$$

where n is the number of cases in the smaller sample, $n + m$ is the number in both samples together, and Rn is the sum of the ranks of the cases in the smaller sample. Tied values were assigned mean rank values. The test is less sensitive than one which takes into account the actual values of the scores obtained, and is used here because it makes no assumptions as to the nature of the distribution of scores in the groups, nor does it assume equality of intervals between scores.

ificantly higher than those of the seniles. It appears that a well-knit and persistent system of paranoid delusions occurring in later life in a setting of preserved affect is not usually associated with a dementia such as is seen in senile psychosis.

The arteriosclerotic psychotics occupy an intermediate position between the senile and affective groups. They do not differ significantly from the affective patients on the Vocabulary test, but make significantly lower scores on the Matrices and Information test. The mean scores are consistently higher than for the senile group, but the difference is significant only in the case of the Information test; on the Matrices there is little difference between the senile and arteriosclerotic groups.

Results obtained at a single point of time, and on such a limited range of tests, are unlikely to reflect accurately a clinical condition which is described as exhibiting patchy deterioration and fluctuations in intellectual level. Re-testing after short intervals of time would be necessary to evaluate the variability which is a characteristic of the disorder. It is also probable that a more detailed analysis of test response and spontaneous conversation and behaviour in the test situation would reflect some of these variations. In some patients, for instance, there were inconsistencies of response, discrepancies between statements made in answer to questions and those emerging in spontaneous talk or which could be inferred from behaviour, errors which were atypical compared with those made by patients in other diagnostic groups, and spontaneous descriptions of fluctuations in memory and level of awareness.

The acute confusional states, as a group, did not differ significantly on any of the tests from the affective patients and were superior on all tests to the senile psychotics; on the Vocabulary test, however, the level of confidence was only .05. There is a tendency for the patients to fall into two separate distributions with a small range of scores unoccupied. Although there are no significant differences between this and the affective group, the data suggest that this may be because one section of patients is inferior, and one superior, to the main body of affective patients. The interpretation of results is limited by the fact that there is such a small number in the group, and also because the results obtained by the seven patients who did all three tests are somewhat different from those obtained by the group taken as a whole; within these limits it is worth drawing some tentative conclusions because their test performance has not been described elsewhere.

Variability within the group is partly related to the duration of the confusional episode. At the time of testing, several patients had emerged or were emerging from the acute phase of the illness, which lasted a few days, or in one case only a few hours. It was found, however, that even patients who were acutely clouded in consciousness at the time of testing were usually sufficiently in contact with their real environment to make scores placing them above the range of scores in senile psychosis, although the latter usually presented a much less florid picture. There were three patients who at the time of testing were described in the clinical notes as confused, disorientated, deluded, hallucinated, restless, etc., and who later became clear in consciousness; this change was reflected in increased test scores. Although their test performance was marked

by perseveration, incoherent and irrelevant talk, and often by visual and auditory hallucinations, which made testing difficult, their contact with the environment was better maintained than was the case with senile psychotics.

A similar result was seen in two depressive patients who were clouded at the time of testing.

Follow-up studies have shown that there are clear-cut differences in the histories of patients in this diagnostic group. Six months after admission the majority are either dead or discharged from hospital, with few patients in the intermediate category of in-patient. This situation may be comparable with the fact that their test scores also tend to place them into two categories. Of ten patients who did both the Matrices and Information tests, six were classified by their scores with the affective group and were discharged symptom-free within 12 weeks of admission; of the two who were classified with the senile group, one died six weeks and one twelve weeks after admission; two were not unequivocally classed with either group, and one of these is discharged and the other is an in-patient, having been discharged and readmitted. It is possible that the severity and duration of the confusion is related to test performance, and that this, in addition to the severity of the precipitating illness, has some prognostic significance.

DISCUSSION.

The method of classification used in this investigation was identical with that used in an investigation into the fate of patients over 60 years admitted to this hospital during 1934, 1936, 1948 and 1949; this follow-up study provided strong evidence for the independence of the five clinical groups (Roth, 1953).

A distinct pattern of outcome is shown by each group. At six months after admission, 58 per cent. of patients with affective disorder admitted in recent years are discharged, the same percentage of patients with senile psychosis are dead, three-quarters of the paraphrenics are in-patients in hospital; while the acute confusional group shows an approximately equal proportion of discharged and dead (40-45 per cent.). Cases with arteriosclerotic psychosis show a more even spread in the three categories of outcome, with 45 per cent. in-patients, 33 per cent. dead, and also a substantial proportion of discharged (21 per cent.). These differences in outcome are well maintained after two years from the time of admission, except that in the case of arteriosclerotic psychosis mortality has risen steeply to 70 per cent. to make the two-year outcome only a little better than that of senile psychosis. These differences are to a considerable extent independent of differences in age.

All patients with a typical depressive symptom-complex were classified with the affective psychoses, and every patient showing a well-knit delusional system was placed in the paraphrenic group, even if, as in one case of depression and one of paraphrenia, the history gave evidence of early dementia in addition to the predominating disorder. The differences between groups to be discussed have not therefore been increased by any form of selection apart from the diagnostic criteria laid down for the five disorders, but represent

differences which are present in an unselected sample of case material. Nor, clearly, can any differences which have been found be ascribed to any special merit in the particular tests used.

In our previous paper it was shown that the affective and senile psychoses, in whom there are such marked differences in outcome, may also be clearly distinguished by their performance in psychological tests. In the present investigation it was found that paraphrenia was also sharply differentiated from senile psychosis, from which it showed in addition a different pattern of outcome. When the results of the follow-up and psychological studies are taken together, the practice (sanctioned by many of the classical accounts) of labelling disorders of old age with depressive or systematized paranoid symptoms as "depressive" or "paranoid" forms of senile psychosis would appear to be open to question. It may overlook distinctions that are important for treatment and prognosis as well as for further investigation of the aetiological aspects of mental illness in the old.

Cases of acute confusional states did not perform differently as a group from the affective patients. The majority of patients in this group fell into the range of scores occupied by most of the affective cases, and as was pointed out, there was a tendency for these patients to be discharged from hospital within a relatively short time of admission. This provides some confirmation for the view which has been recently stressed by a number of authors (Robinson, 1945; Wexberg, 1945; Roth, 1952, 1953) that there is a group of patients manifesting acute attacks of clouding of consciousness not necessarily due to a progressive organic change in the brain of the kind that determines the clinical picture and course of the senile and arteriosclerotic psychoses. The number in this group was small, and no conclusions would be justifiable at present as to the value of tests in predicting outcome, but the suggestion offered by the findings here, that psychological test performance may prove to give some aid in prognosis, deserves to be followed up in a larger number of cases.

There is no account of test performance in paraphrenia or acute confusional states in the literature of mental testing, and it is therefore impossible to relate these conclusions to other investigations.

In the conditions discussed so far there is a fairly close correspondence between probable aetiology and clinical course on the one hand and psychological test performance on the other. In affective psychosis and paraphrenia, and in many cases of acute confusion, the illness is not considered to be associated with progressive cerebral degenerative processes, a view which is supported by the results of two-year follow-up studies in case material classified according to identical criteria (Roth, 1953). In their test performance these three groups are indistinguishable one from another, but are almost entirely distinct from senile psychosis, a disorder which is considered to be progressive and degenerative in character.

This broad distinction is not so clearly maintained, however, when arteriosclerosis and senile psychosis are taken together; there is a less clear-cut difference in test performance between those disorders on the one hand whose clinical picture and natural history suggest a progressive degenerative process,

i.e., the senile and arteriosclerotic psychoses, and those on the other whose symptoms and outcome are those of relatively benign disorders likely to be functional in aetiology, or at least fundamentally different in aetiology in most cases from the senile-arteriosclerotic group. This is because the arteriosclerotics as a group are superior in performance to the senile psychotics, and a number of individuals in the group make scores which overlap with those of the affective and paraphrenic patients. This relatively better performance of arteriosclerotics is consistent with clinical accounts of the disease which describe intellectual impairment as both more patchy or focal and less pronounced than in senile psychosis. It is also to be expected in view of the fact that an episode of acute clouding of consciousness, as for example that following a mild cerebrovascular accident, may bring a patient into hospital before his intellectual impairment is so severe that he would need hospital care on account of dementia alone. Arteriosclerotics appear also to have made better test scores than senile psychotics in other psychometric investigations, although the authors have not been concerned with differences between the two diagnostic groups (Shakow, Dolkart and Goldman, 1941; Rabin, 1945; Botwinick and Birren, 1951).

Arteriosclerotic psychosis is undoubtedly a cerebral disease causing progressive dementia, and the pattern of outcome of this disorder two years after admission resembles that of senile psychosis. The fact that some of the arteriosclerotic patients in the present series were indistinguishable in test performance from some of the affective psychotics, in whom there was no evidence for a progressive dementing illness, suggests that the dementing process is not invariably manifested, at least in the earlier stages of the illness, in clearcut intellectual impairment of the kind which separates senile from affective psychosis. Impairment of intellectual function is probably the most common single component of a dementing process, but there are cases of progressive deterioration caused by cerebral arteriosclerosis as well as by general paralysis, alcoholism, and in a proportion of cases, by epilepsy, which while ultimately showing impairment of intellectual function, may present in the early stages of their illness with deterioration of personal habits, decreasing initiative, blunting or incontinence of emotion, or impairment of social judgement and behaviour.* These patients often reveal no lack of intelligence in their conversation and general behaviour, and it is not surprising that cognitive tests may fail to detect intellectual deterioration in such patients when a diagnosis of degenerative organic disease can be made in the absence of cognitive changes. This does not necessarily imply that the tests are not sufficiently "sensitive" to detect changes; it may be that the cognitive changes measured by the tests are not invariably present in the early stages of the

* A typical affective symptom-complex has been claimed to be one such early manifestation of senile and arteriosclerotic psychosis. Such cases do undoubtedly occur, but clinical and follow-up studies of a large case material (Roth, 1953) have shown this mode of onset to be relatively rare in senile psychosis and not very common in cerebral arteriosclerosis. An ill-sustained depressive or manic colouring or episodes of paranoid misinterpretation are of course common in the course of the latter, although it would appear to be rare for such features to occur in pure form before the appearance of signs and symptoms of dementia. Reports on the detailed symptomatology of the five groups of disorders discussed here are in preparation.

illness, or are not of the kind which the test is designed to measure. It should also be pointed out that not all aspects even of intellectual ability are destroyed at the same time, or at the same rate, by the organic diseases of the brain that cause dementia. In the present group of arteriosclerotics one case appeared to be a Korsakov syndrome, and her score on the Information test placed her with the senile psychotic group, while on the Matrices she was placed well in the affective group. The majority of patients, however, did better on the Information test, the most consistent pattern of scores for this group being a very low Matrices score with a relatively good performance on the Information test.

The number of patients with degenerative disease whose test scores overlap with those of the relatively benign group of disorders, i.e., affective and paralytic psychoses and acute confusional states, is small in comparison with the total number of hospital admissions in this age-range, since the unpredictability of psychological performance described here is confined to cases with cerebral arteriosclerosis. Cases with senile psychosis, by the time they are admitted to hospital, show a more uniform involvement of all aspects of intellectual functioning and personality, and their dementia is so advanced that their psychological performance is sharply differentiated from patients with recoverable or non-dementing disorders. It may be, of course, that the material at this hospital is in this respect unrepresentative, and this possibility can be decided only by investigations elsewhere on material classified according to the same criteria, but there is reason to believe, from figures describing mortality and discharge rate for seven mental hospitals in different parts of the country (Cook, Dax and Maclay, 1952), that the clinical material in this age-group at this hospital is unlikely to be markedly unrepresentative of the country as a whole.

At the time of admission to hospital the five diagnostic groups are placed by their test scores into three categories. The fact that patients from different diagnostic populations are also drawn from different populations in respect of test performance adds support to the evidence obtained in clinical and follow-up investigations, that affective psychosis, paranoid psychosis in a setting of well-preserved personality, and many cases of acute episodes of clouding of consciousness without pre-existing dementia, are clinical phenomena that deserve classification separately from the two main groups of degenerative disorders. It remains to be seen whether the differences in test performance are maintained after a period of years following admission.

In spite of the fact that patients in all groups, with the exception of senile psychosis, make a wide range of scores, there is a degree of consistency within the groups; each of the three groups delimits a range of scores which includes the majority of patients in the group and excludes the majority of patients in both of the others. The establishing of a consistent trend which is typical for each category of patient makes it possible to identify those patients who are, in respect of test performance, atypical of the diagnostic groups from which they are drawn. Such patients show deviations in one aspect of their intellectual functioning which has been found to be closely related to the illness for which they are admitted to hospital. It remains to

be investigated how far these deviations are related to other variations in clinical picture and prognosis.

SUMMARY.

(1) Three tests were given to consecutively admitted patients aged 60 and above, who fell into the diagnostic categories of paraphrenia, arteriosclerotic psychosis and acute confusional state. Test performance in each group was compared with that in affective psychosis and senile psychosis, which have previously been described.

(2) Test scores placed the paraphrenics and cases of acute confusion with the affective group. The scores of arteriosclerotic patients fell somewhere between the senile and affective group. Senile psychotics showed a distribution of scores almost wholly distinct from that shown by affective psychosis, paraphrenia and acute confusion. The distribution in the case of arteriosclerotic psychosis showed some overlap with the effective and the senile groups.

(3) The fact that the scores fall into three different distributions provides some support for the view derived from clinical and follow-up studies that affective psychosis, paraphrenia and many cases of acute confusion in old age deserve separate classification from the two main groups of organic psychosis. It also supports the validity of the distinction drawn on clinical grounds between senile and arteriosclerotic psychosis.

Our thanks are due to the South-West Metropolitan Regional Hospital Board for their financial support, and to Dr. Joshua Carse for his help and encouragement.

REFERENCES.

- BOTWINICK, J., and BIRREN, J. E., *J. Consult. Psychol.*, 1951, **15**, 145.
 BUMKE, O., *Lehrbuch der Geisteskrankheiten*, 1936. Munich.
 COOK, L. C., DAX, E. C., and MACLAY, W. S., *Lancet*, 1952, *i*, 377.
 FESTINGER, L., *Psychometrika*, 1946, **2**, 97.
 RABIN, A. I., *J. gen. Psychol.*, 1945, **32**, 149.
 RAVEN, J. C., *Guide to Using the Progressive Matrices*, 1950. London.
 ROBINSON, G. W., in *Mental Disorders in Later Life*, 1945, ed. O. J. Kaplan, p. 281. California: Stanford.
 ROTH, M., *Proc. R. Soc. Med.*, 1952, **45**, 369.
Idem, paper read at the Annual Meeting of the British Medical Association, Dublin, 1952. To be published 1953.
Idem and HOPKINS, B., *J. Ment. Sci.*, 1953, **99**.
 ROTHSCHILD, D., in *Mental Disorders in Later Life*, 1945, ed. O. J. Kaplan, p. 233. California: Stanford.
Idem, *Geriatrics*, 1947, **2**, 155.
 SHAKOW, D., DOLKART, M. B., and GOLDMAN, R., *Dis. Nerv. Syst.*, 1941, **2**, 43.
 WECHSLER, D., *The Measurement of Adult Intelligence*, 1944, 3rd ed. New York.
 WEXBERG, L. E., in *Mental Disorders in Later Life*, 1945, ed. O. J. Kaplan, p. 135. California: Stanford.