

# THE SIGNIFICANCE OF ABSTRACT AND CONCRETE BEHAVIOUR IN ELDERLY PSYCHIATRIC PATIENTS AND CONTROL SUBJECTS

By

**BARBARA HOPKINS, B.A.**

*Late Assistant Lecturer in Psychology  
Institute of Psychiatry, London*

and

**FELIX POST, M.B., M.R.C.P., D.P.M.**

*Physician  
The Bethlem Royal Hospital and The Maudsley Hospital*

## A—INTRODUCTION

THE recognition of a well-established psychosis due to arteriosclerotic or senile brain changes rarely presents any difficulty. However, increasing numbers of elderly people are seen with affective, paranoid, or neurotic manifestations, and it is sometimes very difficult to decide whether their symptoms present prodromata of an organic psychosis, or whether in the absence of degenerative brain disease they are occasioned by a variety of endogenous and environmental causes leading to a "functional" psychiatric illness.

Possibly the importance of mild or early dementia when assessing a patient's illness has in the past been overstressed, since depressive illness in the aged is sometimes associated with intellectual impairment of a pattern closely resembling that of dementia, with complete restitution following recovery from the affective disorder (Lange, 1928; Madden *et al.*, 1952); on the other hand, the presence of signs of impairment such as memory defects and habit deterioration need not affect the response to E.C.T. of severely depressed and agitated patients (Mayer-Gross, 1945). But the outlook for lasting recovery from a mental breakdown seems so much better where there is no dementing process at work that the clinician continues to examine his elderly patients carefully for evidence of irreversible intellectual impairment or personality deterioration.

A summary of the literature on testing for intellectual impairment in elderly patients suggests the following conclusions: (1) Dementia which is clinically clearcut, or confined to a specific diagnosis such as arteriosclerotic or senile dementia, is revealed in a low I.Q. in intelligence tests, and in quotients indicative of deterioration such as the Babcock Efficiency Index (Botwinick and Birren, 1951), (2) Where the impairment is not of a gross kind, or when the tests are used to compare patients within an already restricted range of disorders, the impairment is not revealed by the I.Q., nor by ratios comparing verbal with non-verbal tests (Hall, 1952; Pinkerton and Kelly, 1952). It has been claimed, however, that tests based on the concept of abstract thinking (Hall, 1952) and those taking into account the reasoning used by the patient in reaching the right or wrong answer (Pinkerton and Kelly, 1952), demonstrate an impairment which is not revealed by the usual quantitative methods.

The work of Goldstein and Scheerer on brain-injured patients led them to make a distinction between two attitudes, the abstract and concrete, which they describe as "capacity levels of the total personality" (Goldstein and Scheerer, 1941). They suggest that in pathological brain functioning, "test results can be evaluated only by analysing the *procedure* by which the patient has arrived at his results" (p. 17). They present modifications of tests already in use, such as the Colour-Form Sorting test and the Kohs Blocks test, which enable such an analysis to be made, and suggest that while the normal person is capable of assuming both the concrete and abstract attitudes, the abnormal individual is limited to the concrete approach. "If this be true, tests that permit us to rate the performance of a patient according to this line of demarcation would have a diagnostic value of practical and theoretical import" (p. 30).

Although the exposition in their Manual implies that failure or success in assuming the abstract attitude on these tests is dependent on whether cerebral functioning is normal or abnormal, there is in fact little published information about the performance of normal or abnormal persons on the tests in the modified form adopted by Goldstein and Scheerer. It is generally implied that failure to perform the tests at an abstract level occurs primarily in patients with brain damage or disease and in certain schizophrenics. Bolles (1937) found that eight year old children of normal intelligence were capable of dealing abstractly with the test material. In an analysis of a number of psychological tests used for the evaluation of brain injury, Armitage (1946) reports the performance of 45 control subjects on, among others, the Goldstein-Scheerer Cube Test. Half of the controls were, in fact, psychiatric patients suffering from mild affective disorders, but all controls, of whom 12 were older than 35, solved the test problems at once or after only one or two auxiliary procedures to induce an abstract attitude had been given, though 15 per cent. were described as of only dull normal intelligence. Weigl's Colour-Form Sorting Test in its original form and without experimental variations was used in patients with well localized brain lesions by McFie and Piercy (1952), who found that even in this form the test was too simple, as only about 50 per cent. of the cases with dominant hemisphere lesions were unable to pass it. Most of their 74 subjects were over 40, the oldest being 66, and only 4 were described as of below average intelligence. Cleveland and Dysinger (1944) reported a striking degree of concreteness using the object-sorting test in senile psychotics.

#### B—METHOD OF PRESENT INVESTIGATION

The impression has been gained that the Goldstein tests are being used in many neuropsychiatric centres for the diagnosis of "early dementia", and it was felt that the geriatric unit of this hospital might be especially suitable for testing their usefulness, because to it are admitted elderly patients of a type likely to respond favourably to psychotherapeutic, social or physical measures; at the same time, some of these patients show definite, others only dubious, evidence for the presence of organic brain disease or degeneration, and it is desirable to discover a reliable measure of the degree and type of organic impairment.

A preliminary investigation with this aim in mind was reported by the authors to the Second International Gerontological Congress in 1951. The tests used included the Colour-Form, Cube, and Colour Sorting Tests, and the main conclusion was that none of these 3 tests discriminated between patients grouped by the psychiatrists according to the amount of organic involvement. This was

largely on account of the striking concreteness of most patients: only one of forty-nine had been able to perform all three tests at an abstract level, though fifteen patients had been judged clinically to be entirely free from psycho-organic features. This finding led to the examination of 2 control groups, one of young and one of elderly normal people, and the remainder of this paper will give an account of the investigation of abstract and concrete behaviour in elderly psychiatric patients, in elderly people without mental abnormalities, and in young "normal" adults.

(1) *Description of the three groups.* The patient group (A) consisted of 32 men and 17 women ranging between the ages of 60 and 84 years (mean age 68·88). Most of them exhibited affective disturbances, some with neurotic or paranoid colouring, but schizophrenics and paraphrenics were excluded. Though in most cases the clinical picture was of a psychotic degree of severity, only a few patients of the unit had to be excluded from this study because they were too severely disturbed to co-operate in the psychological examination; at the time of testing, no patient had received convulsive therapy during the present illness.

The control group (B) of old people free from psychiatric disorders consisted also of 32 men and 17 women ranging between the ages of 60 and 87 (mean age: 68·71). They were in- or out-patients of two neighbouring hospitals suffering largely from arthritic conditions or convalescing from cardiac or respiratory disorders; they present the final selection of a larger number of patients thought to be free from emotional or intellectual disorder by the doctors and nurses in charge; many had been rejected (by F.P.) as on administering a simple questionnaire of orientation, recent memory, and information, a suspicion of senile intellectual deterioration had arisen; others were found to be suffering from emotional disturbances, and three subjects refused to co-operate, though the purpose of the examination was frankly and fully explained to everybody. This control group (B) then was thought to be free from mental disorder, or deterioration other than from age, and had been matched for sex and age (within quinquennial groups) with the elderly psychiatric patients; both groups were similar in socio-economic structure, most members belonging to the skilled working class.

The young control group (C) consisted of 26 men and 20 women ranging between 15 and 39 (mean age: 26·85). They were members of the administrative and domestic staffs of this hospital, who had been approached as a group with a request for help in this piece of research; only two people refused or evaded testing. As otherwise all employees under 40 in certain departments were tested, there was no selection bias due to volunteering; on the other hand, this group was not matched with the other groups in sex composition and contained a larger proportion of unskilled workers with an associated lower intelligence.

(2) *Method of Testing.* The psychiatric group (A) was tested with the Raven Progressive Matrices (1950) and the Synonyms Section of the Mill Hill Vocabulary Test (1950) by the junior doctors in charge. The Goldstein-Scheerer Cube Test, the Gelb-Goldstein Colour Sorting Test, and the Weigl-Goldstein-Scheerer Colour-Form Sorting Test (1949) were administered by B.H. The two control groups were only examined with the Synonyms Section of the Vocabulary Test, the Cube Test and the Colour-Form Test, as it was thought wise to limit testing to one brief session of from 20 to 45 minutes. The B-group was tested by F.P. The C-group was kindly tested for us by Miss B. Loeffling, while engaged on another project financed by a research grant from the Board of Governors of this hospital. The directions and criteria laid down by Goldstein

and Scheerer in their Monograph (1941) were strictly followed, and the three testers were able to reduce any possible differences of method or interpretation by personal discussion. They deviated from Goldstein and Scheerer only in not persisting with the Cube Test after the subject had been failing to assume the abstract attitude in more than two designs, as for obvious reasons they did not wish to produce catastrophe reactions in patients or controls.

(3) *Method of Scoring Tests.* Goldstein and Scheerer point out that any quantitative scoring should be based on qualitative observations and they specifically disclaim the possibility at the present time of elaborating "a definite scale of tests graded according to a more or less concrete and more or less abstract attitude involved" (p. 30). Performance on the Colour-Form and Cube Tests was therefore graded as either "abstract" or "concrete". "Abstract" performance on the Colour-Form Test was that in which the subject was able to sort the pieces both for colour and shape, without patterning, and to shift from one category to the other, regardless of whether he was successful immediately the material was presented, or whether he needed to learn from the various helping procedures. "Abstract" performance on the Cube Test was that in which all the designs were correctly reproduced from the small, unlined design, either when this was first given or after the patient had succeeded in correctly reproducing the design at any of the later stages.

#### C—RESULTS AND EVALUATION

(a) *Psychiatric Group (A):* The subjects were placed in the following three categories by the two psychiatrists working with the cases on the basis of history, physical examination, and mental state, which included assessment of degree of orientation, remote and recent memory for personal and general events, general knowledge, retention of test items, grasp and recall of a test story, and some simple arithmetical tasks. The classification was based also on several weeks of clinical observation so that full allowance was made for failure due to agitation and preoccupation.

*Category I:* Psychiatric illness not associated with any intellectual impairment or organic brain disease.

*Category II:* Illness associated with very mild or dubious organic impairment, as indicated, for instance, by slight and doubtful memory defects or personality deterioration.

*Category III:* Illness associated with organic brain disease, including cases of presenile and senile dementia, of cerebral arteriosclerosis, and chronic G.P.I.

There were no significant differences in mean age for the three groups.

The patients (Table I) showed a striking degree of concreteness, regardless of whether they were considered on clinical grounds to be suffering from an "organic" or a "functional" disorder. Only one patient (who was in Category I) was able to assume the abstract attitude on all three of the Goldstein tests; 54 per cent. were concrete on all three tests, while another 20 per cent. were abstract on two tests and 24 per cent. were abstract on one test. Even on the Colour-Form test, which is usually considered the least difficult, well under half the patients were abstract, though they had all received ample demonstration and modification of the procedure.

Analysis of variance was carried out for the Matrices and Synonyms tests. The Mill Hill Vocabulary scores showed no obvious trend and the difference between the groups was insignificant. The Matrices raw scores were lowest in

TABLE I  
*Summary of Test Performance in Patient Group*  
*(S.D.s in brackets)*

		Clinical Category		
N		I 15	II 18	III 16
Mean Age	..	66.93 (5.35)	70.33 (5.95)	69.06 (5.70)
Mean Synonyms Score	..	18.07 (6.64)	19.72 (6.10)	19.00 (6.93)
Mean Matrices Score	..	27.60 (8.82)	25.89 (10.69)	22.06 (10.60)
Cube Test	Abstract	5	3	3
	Concrete	10	15	13
Colour-Form Test	Abstract	6	6	5
	Concrete	9	12	11
Colour-Sorting Test	Abstract	2	5	1
	Concrete	13	13	15

the organically impaired group, and highest in the completely unimpaired group, but the differences were not statistically significant. The difference between the Matrices and Vocabulary scores was also taken as a single score comparable with the ratio of verbal to non-verbal score, which is the basis of most current measures of deterioration. The differences between the three groups were again in the expected direction but statistically insignificant. This is not perhaps surprising, as even the "organic" group contained only subjects who could be reliably tested and who were by no means severely demented.

Using only the "abstract-concrete" dichotomy as defined by Goldstein, it was clear that the presence of concreteness in the individual tests was as characteristic of the "functional" disorders of old age as of the psycho-organic illnesses. The fact that so many of the "functional" patients turned out to be concrete in their test performance and thus, according to Goldstein, ought to be looked on as suffering from organic impairment, was the main source of the tests' failure to discriminate between the three clinical groups. Nine out of the eleven cases where the patients had succeeded in adopting the abstract attitude on two or three tests had been placed in Categories I or II by the psychiatrists; the two remaining patients had been allocated to the organic group not on account of any deterioration in mental ability as shown on clinical assessment, but solely on the basis of their histories or neurological findings.

The number of tests in which failure occurred was certainly not related to the severity of the psychiatric disorder. There was, for instance, no tendency for concreteness to be specifically associated with severe depression.

All patients were followed up for at least one to slightly over two years by personal examination (31) or by correspondence with relatives or hospitals (18). Definite evidence of organic cerebral involvement had appeared in only one of the fifteen patients originally classified as without doubt free from brain damage; two cases of the eighteen where there had been some suspicion of early dementia should now be classified as definitely organic, and in all but four of the sixteen organic cases the original classification was confirmed. The outcome of cases can also be classed under three headings: (1) Returned to, and remaining in, usual health; (2) Recurrent ill-health responding to psychiatric in- or out-patient treatment; and (3) Dead, or in chronic hospital or nursing care.



We again find significantly worse outcome in the group of patients originally classified as definitely organic (Table II). Taking clinical groups I and II together, because of the small numbers,  $\chi^2=10.3070$ ,  $P=0.01$ .

Reclassifying the patients in the light of their later histories did not alter the relationship between clinical judgment and test performance. Thus, the fact that so many of the patients had been markedly concrete in their test performance did not have any prognostic significance, nor did it indicate that they were suffering from any rapidly progressive cerebral disorder.

TABLE II  
*Outcome in Patient Group*  
Clinical Category

Outcome				Clinical Category		
	I and II	III	Total			
1	15	2	17			
2	12	4	16			
3	6	10	16			

(b) *Comparison of A-group with Control Groups B and C*: The composition of the control groups of mentally healthy old people and of normal young adults has already been described, and the test results are summarized in Table III.

TABLE III  
*Summary of Test Performance in Three Groups*

	N	Age		Synonyms Score		Cube Test			Colour-Form Test		
		Mean	S.D.	Mean	S.D.	A <sub>1</sub>	A <sub>2</sub>	C	A <sub>1</sub>	A <sub>2</sub>	C
		Group A	49	68.88	5.75	18.98	6.23	4	7	38	7
Group B	49	68.71	6.22	18.51	6.55	9	23	17	9	18	22
Group C	46	26.85	5.77	13.61	7.32	35	5	6	19	13	14

A<sub>1</sub>=Abstract at First Attempt.  
A<sub>2</sub>=Abstract at Final Attempt.  
C=Concrete.

They will now be compared with one another and with Group A under separate headings.

(i) *Sex*. There were no significant differences between men and women in any of the three groups.

(ii) *Intelligence*. The only measure applied to all three groups was the Synonyms section of the Mill Hill Vocabulary Test; the difference between the mean scores of the two elderly groups (A: 18.98; B: 18.51) was insignificant, but as was mentioned above, the young adult group was less intelligent (Mean score C: 13.61), this difference being significant at the 0.1 per cent. level ( $C.R.=3.36$ ).

(iii) *Relationship between Synonyms Score and Ability to Abstract (Table IV)*. This was assessed by comparing, in each group, the mean Synonyms score of the abstract with the concrete individuals. In all three groups, for the Cube Test, the individuals whose performance was abstract made significantly higher scores than those whose performance was concrete. For the Colour-Form Test, the difference in Synonyms score between abstract and concrete subjects was significant for both of the older groups but not for the young subjects.

TABLE IV

*Critical Ratios and Levels of Significance for Differences in Mean Age and Synonyms Score for Abstract and Concrete Subjects*

	Age		Synonyms Score	
	Cube Test	Colour-Form	Cube Test	Colour-Form
Group A	Not significant	Not significant	2.32 (P<0.05)	2.28 (P<0.05)
Group B	2.59 (P<0.05)	2.62 (P<0.05)	2.74 (P<0.01)	2.08 (P<0.05)
Group C	Not significant	Not significant	2.06 (P<0.05)	Not significant

(iv) *Relationship between Matrices Score and Ability to Abstract.* In the patient group, the only one to whom the Matrices was administered, the abstract subjects made a higher mean score in both the Cube and Colour-Form Tests (raw score differences 8.93 and 5.88 respectively).

(v) *Relationship between Age and Abstractness.* This was assessed by (1) comparing the two groups of young and old normal subjects, and (2) by comparing the mean age of the abstract and concrete individuals in each of the three groups. The older normal group was found to be more concrete than the younger (and less intelligent) one, though the difference was only significant at the 5 per cent. level in both tests ( $\chi^2$  for Cube Test 6.0685, for Colour-Form test 5.8797). On both tests, in all three groups, the mean age of the concrete subjects was higher than that of the abstract subjects. The only group in which the differences were significant, however, is that of the older normal subjects (Table IV). It appears that under the age of 40 increasing age may not make serious inroads on the ability to abstract, whereas in the late sixties and early seventies there is a more marked increase in concreteness with age. This trend is less in evidence in our psychiatric patients over 60, who tend to lack the abstract attitude even in the early sixties.

(vi) *Relationship between Psychiatric Illness and Abstractness.* The psychiatric patients were compared with the control group with whom they had been matched for age and sex, and who were of similar intelligence. The Colour-Form test does not discriminate between these two groups ( $\chi^2=1.0648$ ), but on the Cube test the psychiatric patients are more concrete than the normal old people, this difference being significant at the 0.1 per cent. level ( $\chi^2=18.2740$ ).

(vii) *Role of "Learning" and other Factors.* The main feature in which the test procedure described by Goldstein and Scheerer differs from tests used by earlier investigators, is that the subject is given a number of simplified stages, success at which enables him to assume the abstract attitude even if he had been concrete at first presentation of the problem. An attempt was therefore made to find what effect these helping procedures had in producing the various differences found between the three groups. This was done by (1) comparing the groups on their first attempts at the tests, without reference to their performance after the helping stages had been given, and (2) by considering only those patients who were concrete at first, and comparing the groups in respect of their ability to learn the abstract attitude (see Table III).

(1) On the Colour-Form Test, discrimination occurred to the same extent, whether the additional stages were given or not, i.e. the difference between the younger and older normal subjects was significant at the 5 per cent. level in both cases, and between the older normal subjects and patients was not significant in either case. On the Cube Test, discrimination was better between the older and younger subjects if the additional stages were not given (taking into account the first attempt only,  $\chi^2=31.7687$ ), but the additional stages increased

the discrimination between patients and their controls. Classifying according to performance on the first attempt does not discriminate between the two older groups while classifying according to the final performance discriminates at the 0.1 per cent. level. The reason for this would appear to be that there are so few individuals in either group who are abstract at first, that classification according to the first attempt gives only a very limited scope for discrimination.

(2) The subjects who were concrete at the first attempt were divided into two groups: those who after completing the additional stages, were abstract when re-presented with the original instructions, and those who were still concrete. When initially concrete subjects were compared in this way, neither the Cube Test nor the Colour-Form Test discriminated between the younger and older normal subjects. Both tests discriminated at the 1 per cent. level between the psychiatric patients and their elderly controls ( $\chi^2$  for Colour-Form Test=8.7330, for Cube Test=16.3050). Both these methods of assessment suggest that the additional stages may be of value, in that they tend to reduce the differences between different age groups and to increase the difference between patients and their controls.

#### D—DISCUSSION

A number of practical and theoretical points arise from this investigation. From the practical point of view, there is for example the observation that only 28 of the 46 young adults were abstract on both the Goldstein tests given. This is a disturbing observation in view of the following statement in Goldstein and Scheerer's monograph: "Indubitably there is some impairment if the subject fails even in only one of the tests" (p. 30). Although both the occupational level of this group and the fact that the mean Synonym score is lower than that obtained by the two other groups suggest that these controls were somewhat below average intelligence, the findings indicate that it would be rash to diagnose organic impairment in a person of dull or even average intelligence on the basis of failure in the Colour-Form or Cube tests.

Secondly, the diagnostic value of the tests within the patient group is limited to the finding that nine out of the eleven patients who were abstract on two or three out of three tests had been classified by the clinicians as free from definite organic intellectual impairment. Thus the preservation of the abstract attitude in elderly psychiatric patients is evidence against the presence of organic disease or deterioration, but failure to assume the abstract attitude has no diagnostic significance. The tests cannot be used in a positive sense to identify "early dementia".

From the theoretical point of view, there are three findings. First, there is some relationship between intellectual level and the ability to abstract; this is a not unexpected result. Secondly, in the group of mentally healthy old people there was found to be an inverse relationship between age and ability to solve problems in an abstract fashion. Below the age of 68 there was no decline in this ability from the young adult level, but beyond this point there was partial or complete failure on the two Goldstein tests. Only four of the twenty-five subjects over 68 formed exceptions, and none of these was older than 75.

Thirdly, the factor of age does not entirely account for the widespread concreteness among the psychiatric patients. In the case of the Colour-Form test, as there was a negligible difference between patients and controls, the additional factor of psychiatric illness seems to be irrelevant. In the case of the Cube test, the difference between the two groups suggests that psychiatric



illness as well as age is responsible for failures in abstraction; if individuals who were abstract are allocated to the control group and those who were concrete to the patients group, then 70 per cent. of the total number are correctly classified by this test. It is of particular interest that the difference between the groups lay not so much in their capacity to reproduce the designs correctly at first, but in their ability to learn from the simplified presentation.

Organic cerebral disease is not responsible for the difference, as the "organic" patients did no worse than the remainder, with the result that the difference is still significant if the controls are compared only with patient groups I and II. As was shown by the follow-up study, the inability to abstract need not signalize the presence of a rapidly progressing dementing process. The possibility remains that it may indicate a slow general mental decline or senile personality change which has facilitated the occurrence of affective or other psychological disturbance. Against such an assumption is the finding that there was no significant difference in the amount of concreteness between patients who had developed psychiatric illness for the first time late in life, and perhaps in the wake of a hypothetical senile or involitional personality change, and those with a history of attacks of nervous or mental disorders since early adult life.

It has been shown in several recent investigations that changes in cognitive function may be produced by psychiatric illness without either cerebro-pathological findings or schizophrenic thinking disorder. Hall and Crooks, for instance, (1952) found that neurotic patients, including depressives, did worse than normal controls in verbal and non-verbal learning tests. "They show a marked and significant tendency to lapse in their performance in both tasks, and they tend to forget what they have learned." In our study, in which the majority of patients were suffering from depression, it was again the lack of ability to learn from helping procedures, rather than initial performance, which discriminated the patients from their controls. Inferiority in the performance of a variety of cognitive tests has also been shown to be characteristic both of functional and organic patients when compared with normal people (Shapiro and Nelson, in preparation for publication). It may well be that increased concreteness, in the sense used by Goldstein and his co-workers, is one of several types of cognitive impairment produced by functional psychiatric disorders at all ages.

#### SUMMARY

Forty-six healthy adults between the ages of 15 and 39, 49 people over 60 without mental disorders or deterioration, and 49 psychiatric patients over 60, were examined for their ability to assume the abstract attitude on some of the tests used by Goldstein and his collaborators. The two groups of subjects over 60 were matched for age and sex.

The following conclusions were reached:

1. A large proportion of young adults were unable to assume the abstract attitude: concreteness appeared to be associated with low verbal ability, but even some subjects of average intelligence as measured by a verbal test were unable to solve problems in an abstract fashion.
2. In the great majority of mentally healthy subjects, abstract ability was preserved into the second half of the seventh decade; after the age of 68 the abstract attitude became increasingly rare.
3. Psychiatric patients over 60 were significantly more concrete on the Cube test than their controls; most of the patients with a relatively small degree of concreteness were confirmed by follow-up study to be suffering from "functional" psychiatric syndromes, but complete inability to adopt the abstract attitude was not diagnostic of an organic mental disorder.
4. The differentiating value of the Goldstein tests used appears to be limited to the negative finding that preservation of the abstract attitude in elderly people makes the presence of organic cerebral disorder unlikely. Failure in test performance does not necessarily indicate the presence of brain damage.

Finally, it is suggested that research into the relationship of abstract behaviour with age, general mental ability, learning ability, and the presence of psychological disorders, might be profitable.

## ACKNOWLEDGMENTS

Our thanks are due to Mr. M. B. Shapiro for his continuous interest and critical advice, to Dr. D. W. Kay for his help with the diagnostic grouping of the cases, and to Dr. T. A. M. Johns, Physician to the Camberwell Group of Hospitals, who selected our control patients.

## REFERENCES

- ARMITAGE, S. G., *Psychol. Monographs*, 1946, **60**, No. 1.  
BOLLES, M. M., *Arch. Psychol., N.Y.*, 1937, No. 212.  
BOTWINICK, J., and BIRREN, J. E., *J. Consult. Psychol.*, 1951, **15**, 145.  
CLEVELAND, S. E., and DYSINGER, D. W., *J. Abnor. and Soc. Psychol.*, 1944, **39**, 368.  
GOLDSTEIN, K., and SCHEERER, M., *Psychol. Monographs*, 1941, **53**, No. 2.  
HALL, K. R. L., *J. Ment. Sci.*, 1952, **98**, 256.  
*Idem* and CROOKES, T. G., *ibid.*, 1952, **98**, 273.  
LANGE, J., in *Burke, Handb. d. Psychiat.*, 1928, Spec. Vol. 2.  
MADDEN, J. J., LUBAN, J. A., KAPLAN, L. A., and MANFREDI, H. M., *J.A.M.A.*, 1952, **150**, 1567.  
MCFIE, J., and PIERCY, M. F., *J. Ment. Sci.*, 1952, **98**, 299.  
MAYER-GROSS, W., *J. Ment. Sci.*, 1945, **91**, 101.  
NELSON, E., and SHAPIRO, M. B., 1954. In the Press.  
PINKERTON, P., and KELLY, J., *J. Ment. Sci.*, 1952, **98**, 244.  
RAVEN, J. C., *Guide to using the Mill Hill Vocabulary Scale*, 1950. London.  
*Idem*, *Guide to using the Progressive Matrices*, 1950. London.