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SPEED OF PERFORMANCE ON MENTAL TESTS  
AMONG PSYCHONEUROTICS.

by G.A.Foulds. (Runwell Hospital)

Section I reports the findings of previous investigators into problems of speed of performance on mental tests and the effect of distraction on speed and accuracy of performance.

The majority of the subjects of the investigation were psychoneurotic in-patients and the tests used were Progressive Matrices, the Mill Hill Vocabulary Scale, the Thematic Apperception Test and the Porteus Mazes.

Section II deals with the scores obtained by individuals suffering from different forms of psychoneurotic illness on Progressive Matrices and the Mill Hill Vocabulary Scale and the ratio between these scores when Progressive Matrices is used with and without a time limit. The main finding is that anxiety states, reactive depressives and obsessionals have a considerably higher general intellectual ability:vocabulary ratio than psychopaths and hysterics. This result is contrary to previous findings. An explanation of this difference, partly in terms of speed of performance, is offered.

Section III is concerned principally with the productivity and fluency of subjects on the Thematic Apper-

ception Test and subsidiarily with analysis of the content of their stories.

Section IV deals with temperamental differences, particularly with regard to speed of performance, on the Porteus Mazes.

Experiments are reported in Section V which were designed to determine the effect of distraction and of electroconvulsive therapy on Maze performance in general and on psychomotor retardation in particular.

Section VI interrelates the results reported in the preceding Sections and shows that there are significant, though relatively low, correlations between the speeds of performance on the tests used. The main concern has, however, been with the significance of the findings for diagnostic and psychodynamic purposes rather than with the existence or non-existence of a general speed factor.

Section VII contains a general summary together with the main conclusions to be drawn from the investigation.

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## I. INTRODUCTION.

### A. The aim of the investigation.

The general purpose of this study has been to extract, from a small battery of tests, the maximum information about aspects of the intellectual, temperamental and personality characteristics of psychoneurotics and to relate such information to clinical syndromes in the hope of providing some diagnostic 'signs' which are both objective and psychologically meaningful.

Whilst some information about both cognitive and orectic aspects of an individual can be obtained from any test procedure, the Mill Hill Vocabulary Scale and the Progressive Matrices (1938) were selected primarily for their contribution to intellectual assessment, the Porteus Mazes principally for temperamental and the Thematic Apperception Test for personality assessment.

It was thought that information additional to the main purpose of these tests could be obtained by recording the preferred speed of work. This involved focussing attention on temperamental differences in the manner of performance of

each test. Temperament has been used in Allport's sense (1937) as referring to "the characteristic phenomena of an individual's emotional nature, including his susceptibility to emotional stimulation, his customary speed and strength of response, the quality of his prevailing mood, and all the peculiarities of fluctuation and intensity in mood; these phenomena being regarded as dependent upon constitutional make-up, and therefore largely hereditary in origin." This definition would be still more acceptable with the word 'principally' after 'dependent'.

The more specific aim of the investigation was to relate the preferred speed of work to the characteristic features of the different psychoneurotic groups and to study the anomalies. For this latter purpose in particular the principle of congruence (Allport & Vernon, 1933) proved of great value. Allport (1937) stresses the wide gap between the type of consistency demonstrated by the correspondence of measures, and the radical consistency with which clinical psychology deals. The weakness of the method which seeks only correspondence of measure is, according to Allport, that it seeks such correspondence only between the peripheral activities of many people and not down through the structure of the single personality. An additional weakness of the purely horizontal approach, particularly when group testing of large numbers is involved, is the increased risk of invalid results in particular instances. Still more serious is the fact that observation



of signs indicative, for example, of inadequate motivation is rendered more difficult so that invalid results are more likely to remain undetected. While attention, in the present study, is most often directed to the horizontal approach, it is hoped that sufficient regard has been paid to the vertical approach to avoid some of the dangers of the former method when used exclusively.

Although intertest correlations have been reported, the intention was not to determine the relative generality or specificity of a speed factor or factors. The tests chosen were not, therefore, speed tests and in no case was such a measurement the main purpose of the test.

Schafer (1948) regrets that most research into the clinical value of tests has attempted to correlate the test 'signs' with diagnosis rather than with characteristics of thinking and behaviour. Such studies have then tried, in his opinion by reasoning rather than by experiment, to determine which personality characteristics assumed to be widespread among the members of any diagnostic group, were responsible for the frequent occurrence of the established 'sign'. Consequently Schafer tries in the first place to relate the various 'signs' to specific identifying characteristics of each syndrome and to diagnosis only secondarily.

It is probably still a matter of some uncertainty whether the method advocated or the method deplored by Schafer is the more hazardous. The procedure adopted in the present investigation has, however, been first to formulate hypotheses with regard to certain differences to be expected on the basis of clinical observations between various diagnostic groups, then to set up more specific hypotheses to account for the observed differences and to test these experimentally.

B. The subjects:

The subjects of the investigation were psychoneurotics admitted to Runwell Hospital - with a few exceptions noted in the appropriate sections - during the years 1949 to 1951. As the hospital runs four out-patient clinics per week the in-patient cases are probably, in the main, relatively severe.

The test population has been divided into groups on the basis of the final psychiatric diagnosis. This is often considered a reprehensible procedure, even by those who have accepted teachers' estimates as a validatory criterion for

tests of intelligence. There can be little doubt that psychiatric diagnoses are somewhat unreliable; there can be little doubt that, at least within the present nosological framework, psychiatric patients are somewhat unreliable. Where diagnosis is based on presenting symptoms or on clusters of such symptoms this is obviously inevitable. Such diagnosis is essential though insufficient. Some more constant reference point is needed such as the individual's temperament or personality structure.

Clinical syndromes provide little basis for preventive psychiatry. What is perhaps needed is a more extensive and intensive knowledge of the type of people who are liable to develop particular forms of illness. The need is no less in the shock therapies, psychotherapy and psychosurgery. Prediction of the outcome of such treatments may depend to a considerable extent on the more enduring personality traits. We need to know what manner of man the patient was before his illness and what manner of man he is likely to become.

It seems reasonable to hope that the clinical psychologist will be able to help in differentiating between the relatively constant and the ephemeral aspects of the person. Awareness of this need and the difficulty, for the psychologist, of making this differentiation has sometimes led to disagreement between the psychiatric and psychological diagnoses.

In the present investigation the initial psychiatric diagnosis was always known to the psychologist at the time of

testing. The psychological diagnosis took the form: The test protocol is characteristic of patients who in the past have been diagnosed as such and such. The psychologist was, therefore, predicting from considerable, but unsystematized, experience what the characteristic test features of each diagnostic group would turn out to be. These predictions were available to the psychiatrist within a week or two of the patient's admission.

The psychological diagnosis of patients tested for this study was, in fact, in agreement with the initial psychiatric diagnosis in 75% of cases and with the final diagnosis in 83%. Where changes were made in the psychiatric diagnosis they were, therefore, more often than not towards agreement with the psychological diagnosis. It is improbable that the influence of the psychological on the psychiatric diagnosis was so great as seriously to affect the validity of the comparisons of the test scores of these various psychiatric groups. This methodological limitation was accepted in preference to the withholding of information which might prove to be of therapeutic value.

The influence of the psychiatric on the psychological diagnosis is still more difficult to assess. Where the psychiatric and the psychological diagnoses have differed it cannot be concluded that one is more valid than the other, but merely that the problem is sometimes viewed from a different angle. Enthusiastic clinical psychologists who seek to sweep away the accumulated experience of psychiatry may find themselves in the position of Mark Twain who, at the age of fourteen, thought

his father unbelievably ignorant and was astonished, at the age of nineteen, to discover how much the old man had learned in five short years.

C. The tests.

The following tests made up the short battery:-

(1) Progressive Matrices (1938). This test was used both without a time limit to assess general intellectual ability and with a time limit to assess general intellectual efficiency. For the meaning assigned to these terms see below (pp. 20 & 29).

(2) The Mill Hill Vocabulary Scale was used to assess the fund of general non-technical information acquired by the individual. It was thought that the ratio between the scores on this and the Progressive Matrices test might be of some diagnostic significance.

(3) The Thematic Apperception Test was included for its value as a diagnostic tool and as an indicator of psychodynamic conflicts. Since the main specific purpose of the investigation is the study of speed of performance in mental tests, content analysis has been treated incidentally rather than in full detail.

(4) The Porteus Mazes. Certain modifications in the administration and scoring of this test have been made with a view to increasing its value as an indicator of temperamental differences.

The battery was kept short since it is believed that patients can be overtested. It may be that as a certain, as yet undefined, limit is exceeded one is increasingly differentiating between those who are, and those who are not, bored.

A second reason for the shortness of the battery was that group testing was deprecated. In order to secure maximal co-operation it is essential that the subject should feel that the results are being used, at least in part, to help him - except, for example, when severe feelings of unworthiness are present, when it may be necessary to deny this and to stress the fact that the test results may eventually be of value to others.

None of the subjects refused to co-operate in their early sessions; but three did so when asked to repeat tests at a later stage. One was a male psychopathic drug addict who had been in and out of mental hospitals for a decade. The second was a male psychopath some years younger who was directly influenced against doing the tests by the veteran. The third was a female psychopath with imperfect realisation of her disinclination for discharge. She was re-admitted a few months later and adjusted ominously well to hospitalisation.

#### D. Speed of performance.

Murphy (1947) claims that there are at least three types of phenomena involved in what is commonly referred to as speed.

The first stage or level he classifies as physiological and instances the relatively rigid and unalterable rate of embryological development varying from species to species and from individual to individual. He includes at the physiological level, too, a group factor of speed in certain verbal tests which were shown by Rounds (1928) to be highly correlated with reflex action. Second level traits he regards as habits not necessarily correlated or even directly related, such as speed of talking, of walking and of writing, when these are not carried to their physiological limit. These may be specific adaptations to different types of problems. Klineberg's work on racial differences in speed and accuracy (1927) is cited as an example of a third level trait. Klineberg found that Yakima Indians moved more slowly and accurately than white people and Murphy goes on to suggest that the competitive culture of whites has made a rather central value of accomplishment, and that speed is an expression of the resulting 'architectural' pattern of personality. This, Murphy believes, is so much a part of the whole that it can be safely studied only as a stage three trait.

While it may be of some value to bear this classification in mind, it is apparent that, at least in relatively complex tasks, more than one level may be involved. His second and third levels seem particularly difficult to disentangle. In the main, however, the greater part of psychological work on preferred speed might be said to be principally concerned with second level traits.

Speed of reaction and of performance in a wide variety of tasks have been extensively investigated with conflicting results. There appears to be no general agreement about the relationship between speed in simple and complex tasks. Trow (1925), Sisk (1926) and Lanier (1934), for example, found insignificant correlations; whereas positive correlations were found by Aitkens, Thorndike & Hubbel (1902), Downey (1924) and Studman (1935).

Reaction times, whether simple or discriminate, do appear to correlate relatively highly according to Perrin (1921), Kennedy (1930) and Lanier (1934).

Tests involving both speed and complex mental functions have been reported by Gates (1921) and Sutherland (1934) to give rather low correlations and by Clark (1924), Garrison (1929) and McFarland (1930) to give relatively high intercorrelations.

Mental fluency tests were reported by Studman (1935), Notcutt (1943) and Petrie (1948) to be highly intercorrelated. Cattell (1933 a, b) found that fluency correlated highly with surgency - surgency and desurgency being almost interchangeable with extraversion and introversion. Hysterics are usually considered - for example, originally by Jung (1923) and more recently by Eysenck (1947) - to be more extraverted than anxiety-depressives. The resemblance between extraversion and surgency is so close that one can justifiably conclude that hysterics would be generally considered to be more surgent than anxiety-depressives. The present investigation provides some



indirect support for Cattell's conclusion in that hysterics were found to be more fluent than anxiety-depressives, though in a task somewhat more complex than any involved in his tests (vide III, B).

Several investigators, including Wyatt (1913), Clark (1924), Peak & Boring (1926), McFarland (1930) and Bernstein (1924) believe speed to be one aspect of intelligence; whereas Sisk (1926), Seashore (1930), Travis & Young (1930), Kennedy (1930) and Tinker (1944) found no significant relationship between speed and intelligence. The findings of the present investigation are in line with this latter view in so far as preferred speed of work is concerned (vide II, C). In view of the complexity of this problem as shown by the work of Wild (1927), and of the uncertainty which still exists, it is surprising to find so many intelligence tests in which the score incorporates even 'possible' speed of work.

Reviewing investigations on the interdependence of speed and accuracy, Himmelweit (1946) suggests that "Tests in which intelligence plays a predominant rôle (Thorndike, 1915) showed a positive correlation between speed and accuracy. Tests where no intelligence is involved, and where the tasks are primarily of a manipulative character, intercorrelated negatively for speed and accuracy (Burt & Fry, 1934; Tiffin, 1943). Low and insignificant correlations were obtained when tasks were not of the manipulative type involving a moderate degree of intelligence (Longstaff & Porter, 1928)".

Himmelweit herself found two factors - speed and accuracy - which were independent of each other on the four paper-and-pencil tests that she used, but which were significantly correlated negatively on the Track Tracer. She suggests that speed and accuracy are interdependent when the task is of a manipulative kind and one in which mistakes are immediately evident to the subject. On the paper-and-pencil tests mistakes were not pointed out. Hysterics were found to belong to the speed preference and dysthymics (i.e. anxiety states and reactive depressives) to the accuracy preference type. The difference between the scores of the two groups was suggestive in the case of speed and statistically significant in the case of accuracy. Though no experiments were designed to test these particular findings, the present study provides some suggestive support (vide II & IV).

Finally, after surveying the literature on speed of performance, Himmelweit puts forward the suggestion that "several speed factors exist which are relatively unrelated to one another. The assumption of a number of speed factors would account for the high intercorrelation of the reaction time tests on the one hand, and of the mental fluency tests on the other. Tasks of the sensory motor type appear to lie halfway between the semi-automatic and the eductive tests and to intercorrelate with one another to a moderate degree".

Rimoldi (1951) came to the conclusion that any general factor of speed which might exist could have but a limited

influence owing to the existence of definite clusters of speed - for example, motor speed, speed of cognition, speed of perception and reaction time.

Murphy (1947) regards the speed factor at the physiological level as much more generalised than at the habit level. Speed of walking, of talking, of writing, &c., though quite characteristic of the individual, may be relatively independent of each other. The 'congenial pace' (Allport & Vernon, 1933) of the individual is moulded by cultural influences and by different personal motivations. Among these different personal motivations must be considered those of a neurotic type. Indeed, when one comes to consider mental patients, the word congenial becomes less appropriate and one is concerned with the effect on the former 'congenial pace' of the illness.

#### E. Distraction.

Previous work on distraction has been mainly concerned with the effect of external stimuli such as loud noises, flashing lights, &c. on speed and, more particularly, accuracy of performance at a given task. Such stimuli were found to have very little effect on intelligence test performance (Hovey, 1928; Super et al, 1947). The effect of distraction on energy expended on particular tasks has been studied (Morgan, 1916; Laird, 1929). Morgan's subjects were submitted to a barrage of noises whilst engaged in a task similar to typewriting. He found that most subjects could increase their speed without loss

of accuracy. Weber (1929), however, using pleasant stimuli, reported considerable losses in output. The extent of interference brought about by distracting stimuli will depend in part upon their value to the individual and upon his expectations. Baker concluded that the distracting effect of dance music depended on the attitude of the individual. If he were led to believe that the music would facilitate his work, it would probably do so and conversely (Baker, 1937).

Woodworth (1938) argues that when an individual engages actively in two simultaneous performances usually one or both of them suffers some impairment. He cites experiments by Speich, Mager and Pauli in support of his contention. Speich (1927) found that when a free association test was combined with a simultaneous counting task, the associative responses tended to the relatively low level of rhyming and word completion - responses to sound rather than to meaning. Again, Mager (1920) claimed that where two tasks are so simple that when presented alone one hundred per cent success is almost always obtained, there is a considerable falling off when they are presented together. He concludes that simultaneous performance does not often, if ever, occur. An explanation in terms of rapid fluctuations or deflections of attention would now be generally accepted, although McQueen (1917) did find that there may very occasionally be simultaneous attention to the two tasks as separate or that the processes may even combine into 'a psychical fusion', usually through rhythmisation. Flugel (1928) considered, for example, that improvement on the Kraepelin adding sheets was connected with a decrease of subjective fluctuation.

Pavlov believed that any distracting stimuli might break up an animal's adjustment and interfere with conditioning, extinction and differentiation (Pavlov, 1927). He, therefore, had a special laboratory built to exclude distracting stimuli and thus excluded, at the same time, much of psychology. This, whilst perhaps legitimate for his purposes, resulted in much oversimplification, which was less legitimate, among his psychological followers.

Harmon (1933) states that if adding under the same distracting conditions (gramophone) be continued day after day, a second adjustment takes place and output is maintained without consumption of more energy as estimated by basal metabolic rate. This appears to be the familiar habituation process.

Downey (1924) found that writing was facilitated by distraction. In her experiments the original activity was, of course, of a quasi-automatic type. Jastrow & Cairnes (1891) reported one case of a subject who added or read much more quickly when tapping rapidly.

Mitchell (1914) noted an improvement in the judgment of weights when the subject had to count. This was considered to be a task in which prompt judgments were more accurate than those which were more carefully assessed. Apart, however, from any speeding up of decision that may have occurred, it seems possible that the introduction of counting resulted in a partial deflection of attention and a consequent reliance on subliminal cues. Murphy (1947) claims that in a state of

dissociation the sensory threshold is lowered. He would presumably seek to explain Mitchell's results in terms of dissociation, which he uses in the very broad sense of incomplete integration or weakening of the tendency towards systematic organisation of mental activities. The important issue, he believes, is whether two acts can be carried out at the same time, both of which require a high degree of organised conscious control. He believes that they can and illustrates his point with the case of the airman re-living the scenes of his boyhood whilst making an exceedingly difficult forced landing (Stratton, 1925). He regards this type of dissociation as due solely to intense concentration and not to conflict. It seems improbable, however, that the airman was concentrating on the two activities simultaneously. The manipulative aspect of 'the landing activity' would presumably be largely habitual even in such difficult circumstances, whilst the judgment aspect would not presumably be continuous. Furthermore, it seems likely that judgments made at high speed are more accurate when based on subliminal cues. Again, it is by no means clear that re-living boyhood experiences requires a high degree of organised conscious control. Obviously intense concentration does not always involve such dissociation except possibly if we consider as Murphy presumably would, all mental events in the focus of attention as dissociated from those in the margin of attention, though this is surely part of the systematic organisation of mental activity. If we include under the heading of dissociation

all perceptual selectivity, we must, on Murphy's definition, conclude that the completely systematic organisation of mental activity would comprise conscious apprehension of all stimuli within the subject's sensory field.

Stratton's airman was, in any case, almost certainly in a state of conflict even if only for a second. He wished presumably to attend to the processes necessary for ensuring a safe landing. It may also be presumed that he was afraid at the moment that he realised his predicament and, as Freud pointed out, "it is surely of the essence of an emotion that we should feel it, i.e. that it should enter consciousness" (Freud, 1915). Re-living the experiences of childhood may perhaps then be viewed as an unconscious device for deflecting attention and thus of reducing or even obliterating fear, though the explanation for the emergence of this particular substitute activity would require a psychodynamic interpretation. The memories would probably tend to deflect attention from the fear rather than from the manipulative activity, since the latter would be serving the more basic need and is in any case over-learned and largely habitual. It may further be presumed that the substitute activity would interfere less with the major activity than would a rapidly mounting panic. This would, indeed, be a dissociative process in that the fear reactions would have been separated off from the stream of consciousness, though they might well re-emerge after the danger was over. Had there been no boyhood memories fear and aircraft manipulation

would have vied with each other by rapid fluctuations between the focus and margin of the field of attention. Neither could be said to have been separated off into independent functional unities. Dissociation would not, therefore - certainly not in the psychiatric sense - have taken place. This explanation is, of course, highly speculative. The intention in introducing it is to suggest that it has a higher a priori probability than Murphy's explanation in that it is consonant with more of the experimental findings on 'divided attention'. In panic states or agitated melancholia the fear reactions hold the focus of attention more or less uninterruptedly and a method has to be found of breaking up this persistent disintegrative reaction pattern. Such a method may involve partial dissociation as, for example, when electroconvulsive therapy results in circumscribed, selective amnesias such as are described by Janis & Astrachan (1951). The same process may be at work in Sargant's drastic apomorphine treatment (Sargant, 1951). He gives them something else to think about.

The effect of distraction on performance has clearly interested psychologists for many years; but few, if any, of these investigations have been primarily concerned with psychoneurotic subjects. The distraction technique has been introduced in the present enquiry with the specific intention of attempting to elucidate some of the causes of the observed differences in 'congenial pace' among psychoneurotic subjects.



## II. THE EFFECT OF SPEED ON THE RATIO OF PROGRESSIVE MATRICES TO MILL HILL VOCABULARY SCORES.

### A. Introduction.

It appeared probable that the obsessional patient who, on leaving his home, had to return three times to make sure the gas was off, would take a long time to complete an intellectual task involving the choice of one out of a number of possible solutions. No such hindrance seemed likely in the case of the hysteric who had developed a partial paralysis of one leg and who, when not attending to this disability, remained bland and even cheerful. On the basis of many such observations certain group differences in speed of work on Progressive Matrices were predicted, namely that obsessionals, reactive depressives and anxiety states would all work more slowly than psychopaths or hysterics.

The Mill Hill Vocabulary Scale and the Progressive Matrices (1938) were accordingly given to a group of psychoneurotics. It was made clear to the subjects that they had unlimited time in which to do the tests. The time actually taken on the Progressive Matrices was, however, recorded unobtrusively.

Raven (1948b) describes the Matrices test as "a test of a person's present capacity to form comparisons, reason by analogy, and develop a logical method of thinking regardless of previously acquired information." In the same paper

he appears to use the term 'ability' as synonymous with 'present capacity'.

Shakow (1946) uses 'capacity' to mean the level of performance which a subject can potentially reach under optimal conditions. By 'capability' he means the upper limits of functional ability under ordinary day-by-day conditions. By 'ability' is meant a level of performance in daily activity which is not interfered with by temporary factors such as fatigue, emotional upset, passing physical illness, lack of glasses, hearing aids, or by poor external conditions generally. He speaks of 'achievement level' when any of these factors is present.

It is assumed in the present investigation that the psychologist rendered the external conditions for testing sufficiently propitious to justify the use of the term 'ability level' for the vast majority of the results obtained on the untimed Matrices. This is an assumption with no derogatory implications with regard to Shakow's useful distinctions. The term 'ability' is, therefore, being used synonymously with Raven's 'present capacity'. The distinction has been made in order to allow of the use of the word 'capacity' as an inference from the ability score together with all relevant extra and intra-test evidence. The term, as here used, therefore, approximates

more nearly perhaps to Shakow's 'capability' than to his somewhat impractical 'capacity'.

B. Speed of work and the ratio of general intellectual ability to vocabulary.

More than 80% of all psychoneurotics admitted during 1949 and 1950 have been tested. The remainder were missed at random. There were no subjects in this group who could not be persuaded to do the tests.

In order automatically to eliminate the effect of age on test performance, subjects were graded according to their percentile rank relative to normal men of their own age (Raven, 1950). The gradings for both tests were as follows:-

1 = 95th percentile and over; 2 = 90th to 94th percentile;

3 = 75th to 89th; 4 = 50th to 74th; 5 = 26th to 49th;

6 = 11th to 25th; 7 = 6th to 10th; 8 = 5th percentile and

below. In addition to eliminating the effect of age, it becomes possible to make a direct comparison of the performances on each of the tests.

Table 1 records the results obtained from psychoneurotics of both sexes combined on the Mill Hill Vocabulary test and on the untimed version of Progressive matrices. Figures for Synonyms and Definitions represent the mean number of correct answers.

Table 1. Results on Progressive Matrices (1938) untimed and the Mill Hill Vocabulary Scale for two hundred and five Runwell psychoneurotics.

Diagnosis.		Ob.	RD.	AS.	Hy.	Ps.
Number.		19	35	63	48	40
Age. Mean.		38.53	38.17	35.29	35.50	30.98
S.D.		11.22	10.02	11.81	12.04	9.15
Synonyms. Mean.		29.16	24.66	27.37	28.67	26.10
S.D.		5.36	7.01	6.39	6.73	7.05
Definitions. Mean.		26.74	22.34	24.97	26.81	24.05
S.D.		5.18	7.02	6.10	7.02	6.60
$\frac{\text{Def.}}{\text{Syn.}} \times \frac{100}{I}$		91.70	90.59	91.23	93.51	92.15
M.H.V. grade. Mean.		4.32	5.39	4.73	4.29	4.80
S.D.		1.26	1.43	1.34	1.60	1.42
P.M. grade. Mean.		2.95	4.54	3.97	4.21	4.53
S.D.		1.67	1.93	1.54	1.66	1.79
t =		3.32	3.14	4.44	0.32	1.42
P.M. time. Mean.		74.47	54.71	55.21	43.02	47.10
S.D.		33.46	32.60	32.02	19.73	28.87

Ob = Obsessionals; RD = Reactive Depressives;

AS = Anxiety States; Hy = Hysterics; Ps = Psychopaths.

P.M. = Progressive Matrices; M.H.V. = Mill Hill Vocabulary.

These results may be compared with those obtained at the Crichton Royal Institution.\* The group represents 54% only of total psychoneurotic admissions and is, therefore, a less adequate sample. In addition, subjects were left alone in a private room and were not, as at Runwell, under constant supervision.

\* The writer wishes to thank Dr. P. K. McCowan and Mr. J.C. Raven for permission to include this material.

The chief result of this difference in procedure appears to have been that Crichton Royal subjects spent twenty to twenty-five minutes (or two cigarettes) longer on the Progressive Matrices. At the time of testing the Crichton Royal Institution was a private hospital. The expected score differences between the two hospitals follow from this fact.

Table 2. Results on Progressive Matrices (1938) untimed and the Mill Hill Vocabulary Scale for one hundred and seventy-one Crichton Royal psychoneurotics.

Diagnosis.		Ob.	RD.	AS.	Hy.	Ps.	Normals.
Number.		20	20	75	39	17	80
Age.	Mean	36.30	35.05	36.45	31.95	26.00	23.58
	S.D.	8.84	10.08	9.76	9.44	6.72	5.87
Synonyms.	Mean	30.30	31.25	31.53	29.05	32.12	26.06
	S.D.	5.09	6.52	5.49	5.86	6.48	6.70
Definitions.	Mean	28.10	30.90	30.57	28.59	30.59	23.91
	S.D.	5.29	5.92	5.89	5.31	6.56	6.72
$\frac{\text{Def.} \times 100}{\text{Syn.}}$		92.74	98.56	96.96	98.42	95.24	91.75
M.H.V. Grade.	Mean	4.15	3.65	3.72	4.13	3.12	4.49
	S.D.	1.27	1.71	1.52	1.57	1.53	1.51
P.M. Grade.	Mean	3.00	2.65	2.96	3.67	2.76	4.51
	S.D.	1.73	1.19	1.46	1.91	1.83	1.86
	t =	3.46	3.01	4.54	1.72	0.82	
P.M. time.	Mean	100.45	79.50	80.69	74.86	64.69	35.55
	S.D.	55.78	34.79	40.63	31.75	34.39	12.90

Tables 1 and 2 show that the trends in the two hospitals are remarkably similar.

Obsessionals clearly take very much longer than any other group. In the Runwell material the t values for the differences on time taken between this group and the remainder were as follows:- Hysterics 3.86 (significant at the 0.1% level of confidence); Psychopaths 3.33 (1% level); Anxiety States 2.23 (5% level) and Depressives 2.10 (5% level). The remaining t values were Anxiety States and Hysterics 2.46 (2% level); Depressives and Hysterics 1.89 (not quite significant at the 5% level); Anxiety States and Psychopaths 1.33; Depressives and Psychopaths 1.06 and the other two pairs below 1.

37% of the dysthymics against 18% of non-dysthymics took more than an hour on the test; 9% of dysthymics against 18% of non-dysthymics took less than twenty-five minutes.

Table 3 shows the results obtained on the two tests by Runwell and Crichton Royal dysthymic and non-dysthymic men and women separately and combined.

It should be noted that a relatively low figure for Progressive Matrices or Mill Hill Vocabulary grade represents a relatively good performance. A high ratio of Progressive Matrices grade to Mill Hill Vocabulary grade, therefore, represents a low ratio of general intellectual ability to vocabulary.

Table 3. Results on Progressive Matrices (1938) untimed and the Mill Hill Vocabulary Scale for Runwell and Crichton Royal dysthymic and non-dysthymic men and women separately and combined.

<u>Runwell</u>	No.	P.M. grade.		M.H.V. grade		$\frac{PM}{MHV} \times \frac{100}{I}$
		Mean	S.D.	Mean	S.D.	
Dysthymic:						
men	51	3.16	1.44	4.37	1.24	72.3
women	66	4.61	1.73	5.20	1.82	88.7
both	117	3.97	1.74	4.84	1.40	
Non-dysthymic:						
men	43	4.28	1.75	4.60	1.54	93.0
women	45	4.40	1.68	4.44	1.54	99.1
both	88	4.34	1.73	4.52	1.54	
<u>Crichton Royal</u>						
Dysthymic:						
men	31	2.61	1.24	3.55	1.54	73.5
women	84	2.99	1.47	3.85	1.48	77.7
both	115	2.89	1.41	3.77	1.50	
Non-dysthymic:						
men	19	2.74	1.44	3.16	1.50	86.7
women	37	3.73	2.06	4.16	1.62	89.7
both	56	3.39	1.93	3.82	1.65	

The women are seen to have a relatively lower ratio of general intellectual ability to vocabulary in both groups, though the difference is slight with the exception of Runwell dysthymics. The trend is, however, similar in both sexes and in both hospitals.

The original standardisation of the tests with adults was based on the scores of men only. There were no significant differences in speed of work for men and women. At Runwell

male dysthymics were of higher intellectual ability than all other groups; at Crichton Royal female non-dysthymics were of lower intellectual ability. The explanation of this is not clear and speculations would inevitably, at this stage, be lengthy and irrelevant to the main argument.

The Vocabulary grade is lower than the Matrices grade in every group. In both hospitals the mean of the difference between the grades on the two tests was significantly different from zero at least at the 1% level of confidence with obsessionals, reactive depressives and anxiety states, but not at all significant with hysterics or psychopaths. The *t* values (for correlated means) are shown in Tables 1 and 2. In view of this finding, however, eighty nursing applicants and Occupational Therapy students were tested at the hospital as a check on the original standardisation. While this check is far from conclusive, the results, included in Table 2, clearly confirm the accuracy of the original standardisation.

In both hospitals then the psychopaths and hysterics had lower ratios of general intellectual ability to vocabulary than the remainder (the dysthymics). It may be thought that dysthymics, being more disturbed emotionally, would be less able to express their knowledge. This would show more clearly in the Definitions, where the subject has to recall remote over-learned material, than in the Synonyms where the subject has merely to recognise a connexion known to him in



the past. This view is not borne out by the consideration of the Synonyms-Definitions ratio. The closer approximation between the Synonyms and Definitions score with Crichton Royal subjects is in line with normal expectation. The two scores tend to close up as the total score increases (Raven, 1948a).

Table 4 shows the mean discrepancies on each of the five sets of Progressive Matrices.

Table 4. Mean discrepancies from three hundred and ten normals on Sets A, B, C, D and E of Progressive Matrices (1938) for one hundred and seventeen dysthymics and eighty-eight non-dysthymics.

	A	B	C	D	E
Dysthymics	-.09	-.05	-.05	+.29	-.10
Non-dysthymics	+.17	-.03	-.11	+.14	-.17

The differences, though slight, support the view that dysthymics are more persistent than non-dysthymics. Relative to the performance of non-dysthymics, dysthymics tend to do rather better towards the end of the test and rather worse at the beginning. This latter point supports the findings on the Porteus Maze test and the tentative conclusion that the dysthymics experience greater difficulty in adjusting to an unfamiliar situation (Foulds, 1951).

The present results show that dysthymics have a high, and non-dysthymics a low, ratio of Progressive Matrices to Mill Hill Vocabulary scores. This result is quite contrary

to the findings reported by Himmelweit (1945) and Eysenck et al (1947). It is necessary, therefore, to attempt to account for this difference.

The two investigations are not directly comparable since, in the Maudsley enquiry: (i) The subjects were Service personnel rather than Civilian; (ii) Group rather than individual testing was employed; (iii) The Synonyms rather than the Synonyms and Definitions form of the Mill Hill Vocabulary Scale was used; (iv) Certain assumptions with regard to changes in test performance with age had to be made as the tests had not then been standardised on the higher age groups (Foulds & Raven, 1948); (v) The Progressive Matrices was given with a time limit of twenty minutes rather than without any time limit; (vi) Patients were divided into groups on the basis of test performance only rather than on the psychiatrists' diagnoses. The case records were then examined to determine whether the individuals in each test performance group had certain clinical features in common which distinguished them from other groups.

In spite of these differences in procedure it was considered that some broad comparisons could be made.

### C. Ratio of general intellectual efficiency to vocabulary.

In order to determine whether the difference in the results of the Maudsley and of the present investigation was due to the use of the timed and untimed versions of the Matrices,

thirty dysthymics and thirty non-dysthymics were given the twenty-minute version of the test. After twenty minutes they were then asked to complete the test in their own time. The proportion of women to men in each group was closely comparable with the proportion in the groups whose results were shown in Table 3.

The term 'general intellectual efficiency' is used to denote scores obtained on the timed Matrices, that is the use of one's general intellectual ability to complete problems whose correct solutions involve the formation of comparisons, reasoning by analogy, etc., within a prescribed time.

Table 5. Results on Progressive Matrices (1938) after twenty minutes and on completion and on the Mill Hill Vocabulary Scale for thirty dysthymics and thirty non-dysthymics.

	Dysthymics.		Non-dysthymics.	
	Mean	S.D.	Mean	S.D.
M.H.V. grade	4.60	1.22	4.60	1.10
P.M. timed	5.47	0.80	5.27	0.96
P.M. untimed	4.00	1.38	4.57	1.43

The Matrices score of non-dysthymics was superior to that of the dysthymics at the end of twenty minutes and inferior on completion. The mean raw score gains after twenty minutes were: dysthymics 7.77; non-dysthymics 3.90. The critical ratio of the difference between the means of the difference between Matrices timed and untimed for both

groups was 2.83 and was therefore, significant at the 1% level of confidence. This method is, of course, open to the objection that some subjects may, during the first twenty minutes, have put speed before accuracy. Had such subjects been told initially that they had unlimited time, they might have scored still higher. Comparison between the results in Table 5 for the twenty-minute version of the Matrices and the results shown in Table 1 provides sufficient evidence that the different modes of administration of the Matrices result in radically different ratios with the Vocabulary test. The comparison of the two sets of results in Table 5 is merely confirmatory. In any event a comparison between the absolute grade values on the untimed test in Tables 1 and 5 suggest that the objection raised above is of little importance.

It would appear, therefore, that relative to non-dysthymics, dysthymics have a low ratio of general intellectual efficiency to vocabulary. Eysenck's (1947) method of proof that the differences found in the Maudsley investigation were not due to speed of work seems open to objection. Progressive Matrices was used as an untimed test and the NIIP 33 as the timed test. The degree of correlation between a timed and an untimed test will vary according to the generosity of the time limit. An untimed test and a timed test in which the allowance is ten hours will have a high correlation (assuming the factor loadings are similar - an assumption which cannot readily be made in this case since the two tests had a correlation of .66 only).

Twenty minutes is perhaps a less generous allowance for Progressive Matrices than the times employed in NIIP 33.

May (1921) reported a correlation of 0.965 between scores on the Army Alpha test after the standard time and after a second period of double the standard time. Walters (1927) gives a correlation of 0.934 for scores at the end of a stated time and on subsequent completion of the test. Sutherland (1934) commenting on these findings says "these and other similar results prove definitely that the differentiation for intelligence by a time-limit test is certainly not affected to a noteworthy extent by the imposition of a time limit."

The correlation between the timed and untimed Matrices for sixty psychoneurotics of 0.83 is sufficiently low to be worthy of note and suggests that Sutherland's conclusion may be less valid for a group of mental patients who may be assumed to be temperamentally more heterogeneous. This view is supported by the fact that for one hundred normal subjects the correlation between Matrices time and score is +0.15, which, though not significant even at the 5% level of confidence, is higher than the corresponding correlation of -0.04 for one hundred and twenty-five psychoneurotics. This supports the conclusion of Slater (1938) that the preferred rate of work is largely independent of intelligence.

#### D. Discussion.

Relative to non-dysthymics, dysthymics have a high ratio of general intellectual ability and a low ratio of general intellectual efficiency to vocabulary. This change in ratio is clearly attributable to the rather inflexible tendency of the dysthymics to work much more slowly than non-dysthymics. This tendency is related either to temperament or to symptomatology, but not to intellectual achievement. In the light of these results the practice of giving time credits in a test of "intelligence", such as the Wechsler-Bellevue, seems curious.

Relative to normal subjects psychoneurotics have a high ratio of general intellectual ability to vocabulary. Relative to non-dysthymics, dysthymics have a high ratio of general intellectual ability to vocabulary.

Two possible explanations must be considered:-

1. Relative to the general population, psychoneurotics fall below their optimal level on the Vocabulary test. This is especially true of the dysthymic group. In the Synonyms test these subjects fail to recognise a relationship of similarity; in the Definitions test they fail to recall a correlate. If this view be correct, patients re-tested immediately before discharge as recovered or improved should show a significant score increase. One hundred and six subjects so tested showed a mean raw score increase from 55.58 to 56.67 only ( $r = 0.893$ ). This result supports the

generally accepted view that vocabulary is among the most stable of test measurements (Wells, 1927; Babcock, 1930). The view that there has been a failure of recognition and recall appears improbable.

2. Psychoneurotics have never acquired vocabularies as large as those of normal subjects of comparable general intellectual ability. Dysthymics have never acquired vocabularies as large as those of non-dysthymics of comparable general intellectual ability.

Rapaport (1945) claims that vocabulary is mainly dependent on the wealth of the early educational environment and is refractory to improvement by later schooling and life experience. Although Rapaport is probably thinking of something more than mere formal education, this is likely to be the best assessment that it is possible to make of the more general cultural environment of the individual. Gilbert (1935) has reported that vocabulary is relatively independent of formal education.

In the present investigation the dysthymic group has had as good educational opportunities as the non-dysthymic group. 70% of the former group as against 67% of the latter had elementary schooling only. The explanation for the relatively poor vocabulary of the dysthymics must be sought elsewhere. As non-technical vocabulary, as well presumably as technical, increases quite rapidly after the school-leaving age, it appears that the acquisition of such words may be dependent rather on increased reading and/or increased social communication and/or specific aspects of the intellectual

functioning of members of the different nosological groups. Rapaport seeks to explain the high ratio of Vocabulary to Performance of hysterics and the low ratio of obsessionals on the Wechsler-Bellevue in the last-mentioned terms. The results are not, of course, directly comparable with the present findings. They are rather more comparable with the findings reported by Himmelweit, with which they agree, since credit is given to speed in all five sub-tests of the Performance Scale and to one only in the Verbal Scale.

Repression is considered by Rapaport to be most characteristic of hysteria and the use of this dynamism is thought to become increasingly widespread. The acquisition of an extensive range of information is thus hindered. It may be argued, however, that the function of repression in hysteria is to separate off a limited area of personality in order that the remainder may function more normally. Of such is dissociation. Again, when the repressed wish has been converted into a physiological symptom, there may be less interference with the individual's normal mental functioning. Furthermore, repression may be considered to be equally characteristic of anxiety states and obsessionals in so far as "displacement is an effect of repression instigated by the censor" (Dalbiez, 1941). The effect of displacement is that innumerable stimuli may provoke an anxiety reaction even though the individual remains unconscious of their relationship to the original anxiety-provoking situation. If this view be



correct, the danger zones are more widespread for the dysthymics than for the hysterics and, to follow out Rapaport's argument, there will be less freely available knowledge to which new knowledge can be readily assimilated. Dysthymics will, therefore, tend to accumulate not more but less vocabulary.

This argument has been developed at some length since the possibility exists that those whose principal dynamism of defence is dissociation will tend to work more quickly than those who employ the dynamism of displacement. This, if true, might be due to dissociation freeing the individual from prolonged disorders of mood, unlike displacement, and thus leaving him freer to concentrate on the activities provided by the psychologist.

Arguments based on the specific character of the intellectual functioning of people suffering from different forms of psychoneurotic illness are, however, somewhat speculative. The most plausible view would nevertheless appear to be that an unduly large proportion of psychoneurotics have fallen further below the maximal use of their intellectual capacity in the past than is customary among normal subjects and that this is particularly true of dysthymics. Whether this be due to the existence long before the actual breakdown of subneurotic symptoms cannot be determined from the present study. An independent study of eight cases of paranoia sensitiva did, however, confirm a previous impression that perhaps the most helpful line of enquiry would

be into the correlation between the Matrices to Vocabulary ratio and sociability.

Several writers (Davidson, 1939; Brody, 1942; Shakow, 1946) have emphasized the limitations of the Vocabulary Test as a valid indication of a person's former optimal general intellectual ability, at least in the case of the severest disorders such as hebephrenic schizophrenia and general paresis. The present findings, however, cast serious doubts on its validity for this purpose with psychoneurotics. It appears possible that Jastak's claim that mental levels based on vocabulary scores are valid and accurate in not more than 10% of mental patients (Jastak, 1949) may well be approximately correct.

#### E. Conclusions.

The main conclusions from the present investigation are that:-

1. Anxiety states, reactive depressives and obsessionals had a considerably higher ratio of general intellectual ability to vocabulary than did psychopaths, hysterics and normals. Possible explanations for this high ratio have been discussed, but further detailed investigation is needed.
2. The psychopaths and hysterics had a somewhat higher ratio of general intellectual efficiency to vocabulary than did dysthymics, but this difference was not statistically significant.
3. Hysterics and psychopaths worked more rapidly on Progressive Matrices than anxiety states and reactive depressives and more

particularly obsessionals.

Differences in speed of work appeared to account for the reversal of ratios in conclusions 1 and 2. The tentative suggestion has been made that those whose principal dynamism of defence is dissociation may tend to work more quickly than those who employ the dynamism of displacement.

### III. THE THEMATIC APPERCEPTION TEST.

#### A. Introduction.

"The T.A.T. draws forth no more than twenty small samples of the subject's thought. To suppose these will invariably provide a skeleton of total personality is unduly optimistic" (Murray, 1943). With this warning no experienced clinical psychologist is likely to disagree. The present aim has been to provide a method of analysing and quantifying the content of the responses which minimises dependence on hypotheses derived from outside the test situation and to relate the results to the amount produced and, more particularly, to the rate of production.

It was anticipated that psychopaths and hysterics would speak more fluently than anxiety states, obsessionals or reactive depressives, that their stories would be longer and that the content of the stories would differ in a characteristic way.

Dysthymics, preoccupied with their anxiety or their sense of guilt, might well be unable to free themselves sufficiently from this bondage to enable them to indulge in imaginative play. Many of the stimuli presented might immediately be perceived as danger signals, and have to be re-organized or ignored to avert further distress. Thus an acutely anxious man, fearful of his own aggressive impulses, stated, after much stammering, that the revolver

on the floor in picture 3BM was a bottle of ink spilt on the carpet.

Hysterics, on the other hand, might be expected to have dissociated impulses unacceptable to the conscious self. Having thus disowned them, they would then be free to indulge them surreptitiously by projecting them on to the characters of their stories.

Thus the hysteric, who described the girl on the beach in 9GF as going to bathe in the nude and as being subsequently seen by a party of men, denied any such incident or desire.

Under such circumstances great fluency and productivity might be expected.

Ten pictures only were used throughout, these were:-  
for men - 1, 2, 3BM, 4, 5, 6BM, 7BM, 8BM, 12M and 13MF and for  
women - 1, 2, 3GF, 4, 5, 6GF, 7GF, 8GF, 9GF and 13MF.

The instructions followed those of Rapaport (1946) and included the four questions: (i) What is the situation? (ii) What might have led up to the situation? (iii) What might the people be thinking or feeling about the situation? (iv) What might the outcome of the situation be?

The investigator recorded the stories in shorthand, sitting at an angle of about forty-five degrees behind the subject. Lack of skill in this operation resulted in an artificial ceiling at fifty to sixty words per minute, since this overall average, of course, included bursts of much higher speeds. 7% of subjects hit this ceiling and had to be requested to speak more slowly. No reactive

depressives or obsessionals came anywhere near this limit.

After pauses of approximately thirty seconds the appropriate one of the four standard questions - "What is the situation?" &c. - was interjected. The only other questions employed were for clarification, such as "she has lost someone near to her"... "Whom has she lost?".

Despite these limitations on quantitative accuracy, previous experience with the test had suggested that four measurements were of great value:- Starting time, total words, total time and words per minute. The starting time represents the number of seconds elapsing between the presentation of the picture and the beginning of the story.

The allocating of T.A.T. responses to various categories is not, as Valentine & Robin first assumed (1950), an objective procedure. Such classification cannot even be assumed to be a subjective procedure of high reliability. If in one experiment with the T.A.T. classifiers A and B start with carte blanche, the likelihood of obtaining a high reliability coefficient is slender. The different methods of analysis advocated, for example, by Rotter (1940), Murray (1943), Rapaport (1946), Tomkins (1947), Shorr (1948), Aron (1949), Rosenzweig (1949), Symonds (1949) and Valentine & Robin (1950) bear witness to this.

If A presents a series of categories to B with the injunction to fit the responses to them, the likelihood of obtaining satisfactory agreement will be greatly increased. This method has its own serious limitations. In a second experiment the optimal

chance of obtaining agreement could only result from an acceptance by C of A's original classificatory scheme and so on through D, E, F &c., thus setting up a dictatorship of A and decreasing the likelihood of the classification being an adequate representation of the basic data. Standardisation of the T.A.T. in a manner acceptable to the majority of psychologists using the tests is a distant, if not indeed unattainable goal.

The dictatorship of A (the present writer) method was used. The justification for the choice was more than four years regular experience with the test during which time some four hundred protocols had been obtained from a wide variety of mental patients. The protocols used in the present study were submitted to three judges for classification into the given categories. The three judges were respectively a final year Psychology Student, an experienced Occupational Therapist and a Secretary. If a consistent method of analysis could thus be found, however partial, this would serve as a check on more intuitive clinical appraisals and would make possible the comparison of results obtained before and after treatment, leading perhaps to prediction from the pre-treatment results of the outcome of treatment. From this type of data might emerge hypotheses which could later be subjected to more rigorous experimental procedures. Pictures could perhaps be designed and a rather more controlled technique employed to elucidate specific problems.

B. Productivity and Fluency.

Rosenzweig (1949) published norms for fifty men aged 27.5 years (S.D. 6.0) and fifty women aged 27.5 (S.D. 6.3) for all but the words per minute category. Pictures 5, 6GF, 8GF and 12M were not, however, used. The general means (for all pictures and both sexes) he gives as follows:- reaction time 20 seconds (range 14 - 29); total time 3.7 minutes (range 2.8 - 4.7); total words 143 (range 114 - 181).

Rosenzweig's sample cannot, of course, be regarded as an adequate control group of normal subjects for this study, but a comparison is of some interest.

Table 6 gives the mean for starting times (Rosenzweig's reaction times) for the five psychoneurotic groups in the present study. It also includes the number of subjects in each group (N), Age, Progressive Matrices (P.M.), and Mill Hill Vocabulary (M.H.V.) scores.

Table 6. Starting times of psychoneurotic groups.

Diagnostic group.	N	Age	P.M.	M.H.V.	S.T. time. M.	S.D.
Psychopaths.	36	30.7	40.0	50.7	15.11	10.26
Hysterics.	44	34.1	38.4	53.6	19.00	18.85
Anxiety States.	39	35.8	39.9	50.8	26.56	21.86
Depressives.	27	38.7	37.2	53.5	28.70	22.53
Obsessionals.	14	38.7	43.4	56.5	26.21	19.35



The differences between psychopaths and anxiety states and psychopaths and depressives are significant at the 1% level of confidence (C.R. 2.94 and 2.92). The difference between psychopaths and obsessionals is significant at the 5% level (C.R. 2.04).

Table 7 gives the means for total words (productivity) for the same groups.

TABLE 7. Productivity of psychoneurotic groups.

Groups.	total words.	
	M.	S.D.
Psychopaths.	1368.61	617.13
Hysterics.	1614.20	720.04
Anxiety states.	1154.23	450.81
Depressives.	924.44	360.54
Obsessionals.	1303.93	550.29

Three differences are significant at the 0.1% level of confidence: hysterics and depressives (C.R. 5.35); hysterics and anxiety states (C.R. 3.53) and psychopaths and depressives (C.R. 3.58). Two differences are significant at the 5% level: depressives and obsessionals (C.R. 2.33) and anxiety states and depressives (C.R. 2.29).

Table 8 gives the mean total time spent on the test by each group.

TABLE 8. Time taken on test by psychoneurotic group.

Groups.	total time.	
	M.	S.D.
Psychopaths.	37.78	13.32
Hysterics.	46.68	23.16
Anxiety states.	43.74	22.13
Depressives.	41.30	14.96
Obsessionals.	42.57	13.23

Only one difference was significant even at the 5% level: hysterics and psychopaths (C.R. 2.19).

Table 9 gives the mean words per minute for each group.

TABLE 9. Fluency of psychoneurotic groups.

Groups.	Words per minute.	
	M.	S.D.
Psychopaths.	37.06	11.34
Hysterics.	36.45	9.28
Anxiety states.	30.41	12.49
Depressives.	23.22	6.45
Obsessionals.	30.29	7.59

Two differences are significant beyond the 0.1% level of confidence: hysterics and depressives (C.R. 7.07) and psychopaths and depressives (C.R. 6.18). Two are significant at the 1% level: anxiety states and depressives (C.R. 3.06) and depressives and obsessionals (C.R. 2.97). Four differences are significant at the 2% level: hysterics and obsessionals; hysterics and anxiety states; psychopaths and obsessionals, psychopaths and anxiety states. The respective C.R.'s are: 2.50, 2.48, 2.45 and 2.44.

Only, therefore, between psychopaths and hysterics on the one hand and anxiety states and obsessionals on the other did Fluency fail to differentiate.

Only one of the twenty differences between the means for men and women was significant even at the 5% level of confidence, male anxiety states being more fluent than female (C.R. 2.49 - 21 females and 18 males). The sexes were, therefore, combined for consideration of the sub-groups.

For the broader groupings of dysthymic and non-dysthymic, the sexes have been kept separate. Table 10 shows the means and standard deviations for the forty male and forty female patients in each of the groups.

TABLE 10. Productivity, fluency &c. of forty male, forty female dysthymics and non-dysthymics.

	Non-dysthymics		Dysthymics	
	Male	Female	Male	Female
Starting Time:				
Mean	18.00	16.60	27.35	27.10
S.D.	18.39	11.20	19.71	15.03
Productivity:				
Mean	1483.00	1524.50	1227.37	978.37
S.D.	704.44	609.76	523.44	357.87
Total time:				
Mean	40.47	45.07	42.57	42.87
S.D.	19.62	19.83	20.18	16.87
Fluency:				
Mean	38.02	35.42	30.77	25.15
S.D.	11.20	9.22	10.38	9.79

There are no significant differences in the total time category. Dysthymic men were significantly more fluent than dysthymic women (C.R. 2.49). Apart from this there were no sex differences. The three remaining categories all showed differences between the two female groups at the 0.1% level of confidence - starting time: C.R. 3.55; productivity: C.R. 4.89; fluency: C.R. 4.87. The corresponding figures for men were: 2.19 (5% level); 1.84 (not significant); 3.01 (1% level).

The correlations of age with fluency on the T.A.T. and of Progressive Matrices score and fluency were both below 0.1; but fluency and Vocabulary score correlated 0.30. Examination of the mean Vocabulary scores of the five sub-groups makes it clear that the differences in fluency cannot be explained in terms of Vocabulary level.

The characteristic pattern with respect to the four quantitative categories for each group relative to the remainder may be described thus:-

Psychopaths begin their stories very quickly, produce a moderate amount, spend a short time on the test, but talk very rapidly.

The speed of psychopaths may be due, in part, to the fact that either their conflicts are more deeply repressed or, as many psychiatrists believe, that they do not exist intrapsychically. In either case there is likely to be relatively little division of attention.

The fact that these subjects spend a shorter time on the test than hysterics may reflect a lesser degree of ego-involvement in the stories, which is perhaps borne out by the content analysis. They are more concerned with displaying their virtuosity as story-tellers than with revealing themselves vicariously in the stories. In addition, resistance is more often met with in this group, ranging from truculence to facetiousness.

Hysterics tend to start their stories quickly, though the variability is greater than in other groups. This is attributable to the fact that a minority of subjects spent a long time preparing 'literary' stories before actually beginning to speak. They produce long stories and talk rapidly for a long time. They often enjoy the situation. When they say so, there is little doubt about the diagnosis.

Anxiety states, relative to psychopaths and hysterics, start slowly, produce less than any but reactive depressives, talk at a moderate speed for a moderate time. They are more variable in the two latter respects than the other groups. With regard to fluency, the greater variability is due to the sex difference mentioned above.

Reactive depressives start slowly, produce very brief stories in a moderate time and produce them very slowly.

Obsessionals start slowly, produce stories of moderate length in a moderate time at a moderate speed.

Marked deviations on any particular picture from the subject's own mean for all pictures often aided the clinical analysis of the stories.

C. Content analysis.

1. The method. Since content analysis bears only indirectly on the main purpose of this study, only part of the total material has been treated. The analysis is confined principally to the female subjects and to pictures 3GF, 6GF, 9GF and 13MF.

The method of analysing the data is somewhat similar to that originally employed by Kent & Rosanoff (1910) with the Word Association Test in that responses are recorded on a frequency table. Owing to the almost unlimited number of minor variations in the responses on the T.A.T. it was, however, necessary to group together similar responses. This method has been applied to the T.A.T. by Rosenzweig (1949) and by Valentine & Robin (1950). The elaborations of this type of method discussed by Raven (1948c) and applied by Foulds (1950) to the Controlled Projection Test, have now been further developed.

Stories were analysed in terms of the four questions "What is the situation?" &c. A fifth section was added in the case of some pictures for particular comments on the appearance of the people or objects in the picture.

When alternative stories were given an attempt was made

to get the subject to select one of the two; where they could not do so, the dominant one only was classified. If a response occurred in fewer than 10% of the records of all four groups, it was entered under 'Sundry'. It is here, of course, that much of the most personal and clinically significant material is to be found.

All three judges agreed in their classification of 67% of items, two out of three agreed in 29%. A fourth judge was called in for the 4% in which there was no agreement.

2. Results. Table 11 gives the frequency of classified responses for forty female dysthymics and forty female non-dythymics (hysterics).

TABLE 11. Responses of dysthymic and nondythymic women to picture 3GF.

Situation:	Dythymics.	Hysterics.
Quarrel with husband.	7	10
" " parents.	3	11
" " people.	4	1
Illness, death, loss of husband.	7	4
" " " " parent, child.	8	3
" " " " a person.	3	3
Ill or troubled in herself.	7	6
Sundry.	0	2
Unspecified.	1	0

	Dysthymics.	Hysterics.
Led up:		
Husband, parents, people to blame.	4	11
Self to blame.	4	5
Blame unspecified.	5	3
Illness, death &c. of husband, parent &c.	16	10
Own illness or inadequacy.	9	6
Sundry.	1	4
Unspecified.	1	1
Thinking, feeling:		
Grief.	15	12
Depression, dejection.	14	14
Anger.	3	4
Shock.	4	5
Anxiety.	4	5
Outcome:		
Recovers.	20	11
Breaks down, seeks consolation &c.	4	12
Separation from husband, parents.	2	10
Forgiven by husband, parents.	4	2
Unspecified.	10	5

Dysthymics tend to produce illness themes, usually of parents or husband; whereas hysterics tend to produce quarrelling with parents or husband. Where there have been quarrels hysterics are much more liable than dysthymics to blame other people rather than either to take the blame on themselves or to leave the question open. There are no differences between the groups with regard to the emotion attributed to the girl.

Hysterics tend to break down, dysthymics to recover. Separation from parents or husband is much commoner among hysterics, unspecified conclusions among dysthymics.

If a subject's story be classified as: quarrel with husband, husband to blame, anger, separation from husband: that subject



would have a dysthymic score of  $7 + 4 + 3 + 2 = 16$ . The hysteric score would be  $10 + 11 + 4 + 10 = 35$ . For the present purposes, where there are only two groups, the final score for that picture on the dysthymic-hysteric scale would be +19 (H - D score). A similar procedure can be applied to pictures 6GF, 9GF and 13MF. The results can then be summed. By this means 82.5% of the subjects can be correctly diagnosed on their story content, using the final psychiatric diagnosis as the criterion. Approximately 72% of cases in which a subsidiary diagnosis was given were correctly diagnosed, using the dominant diagnosis as the criterion; whereas approximately 88% of cases, in which a 'pure' diagnosis was made, were correctly diagnosed. The percentages of correct diagnoses for each separate picture were: No.3 = 66; No.6 = 71; No.9 = 71; No.13 = 77.

Table 12 shows the results for picture 6GF.

TABLE 12. Responses of dysthymics and hysterics to picture 6GF.

	Dysthymics.	Hysterics.
Situation:		
Man and woman quarrelling.	4	17
Man making advances.	9	13
Undramatic domesticity.	25	6
Sundry.	2	3
Not specified.	0	1
Led up:		
Man wants affair with woman.	9	16
Man accusing woman of infidelity &c.	2	9
Undramatic domesticity.	24	9
Sundry.	4	5
Not specified.	1	1

## Dysthymics.                      Hysterics.

## Thinking, feeling:

Woman surprised or displeased.	23	11
Woman guilty, shocked, frightened.	13	20
Woman pleased or undisturbed.	3	6
Not specified.	1	3

## Outcome:

Happy, but undramatic.	12	3
Woman gets own way.	4	6
Man gets own way.	9	9
Woman resists advances.	3	11
Woman does not resist advances.	4	5
Sundry.	1	1
Not specified.	7	5

Dysthymics describe a quiet domestic scene in which husband and wife are discussing whether or not to go to the cinema, where to go for their holidays and so on. The wife is surprised or somewhat displeased because her husband wants to go to the pictures or doesn't want to go to Eastbourne or something of that sort.

Hysterics, on the other hand, state that the couple have been quarrelling. He has caught her writing to a lover and she feels guilty, or he is making improper suggestions and she is shocked.

For dysthymics the ending is happy, but undramatic; for hysterics the woman resists the man's advances.

From the scoring method outlined above it is possible to pick out the most typical and atypical dysthymic and hysteric records. The most typical dysthymic record for this picture, given at a speed of eight words per minute, was as follows:-

"I should say the husband has just come home from the office or somewhere.....(and)....she looks rather surprised over something....(what)...perhaps he has got a rise...(outcome)...perhaps he has asked for a rise so many times, well, you know, she is surprised."

The typical hysteric story, at about forty-three words per minute was:-

"Here is a woman..who apparently..it looks as though she likes entertaining...and so it looks as though she's entertaining...she's having..a kind of party for a few friends..girls and boys (patient's age 32) it looks as though she's flabbergasted about something...the young man who is usually her companion at such parties appears to have said something that has upset her....(what) I don't know...I think he wants to be perhaps alone with her and he's asking her to bring the party to a close...it's her party and her apartment you see, and he's asking her to bring the party to a close and send them home so they can be alone together...she's surprised at this ...and surprised at her companion making such a remark and yet she is curious...she likes this man...and at the same time she is kind of afraid of him and yet she knows there's nothing to be afraid of..she trusts him ..but she's just curious about him...usually when they go out together, if it's in his car, wherever it is.. she has never had anything to complain about...she has always found him most trustworthy...but on this particular occasion she's just that little bit afraid ...she's wondering if one of these days...the obvious might happen and so she just doesn't know what to do ....he's begging of her to let them have the evening together...but she likes company...she enjoys her friends' company..the other boys and girls....she doesn't know what to do...(outcome) the outcome of it ..well..I think perhaps she just does as he wishes and brings the party to a close...and they spend the evening together in her apartment...but she finds nothing happens...they smoke and drink and talk and play music and have a wonderful evening...and then eventually as night is coming on..well, in fact, it's early morning, he says goodnight to her..and for some unknown reason she is relieved that he is going... because she was afraid of something....she was afraid he would make love to her..and she was afraid that her weakness would make her give in...but he doesn't make love to her and she did not give in...and, as she tumbles into bed, she thinks to herself, how silly of me to be afraid...is that all right?"

Table 13 gives the results of picture 9GF for the same groups.

TABLE 13. Responses of dysthymics and hysterics to picture 9GF.

	Dysthymics.	Hysterics.
Situation:		
Girl running from woman or man.	9	18
Women, or others, in danger from elements.	11	13
Girl running to friends, or something pleasant.	11	3
Girl running from something.	4	0
Sundry.	5	6
Led up:		
Girl chased by man, or having affair.	4	13
Someone bathing, or wrecked, cut off by tide, or other danger.	10	13
Girl and man have quarrelled, or women have.	12	5
Girl sees friends &c. in distance, or is going to bathe.	6	2
Sundry.	3	3
Not specified.	5	4
Thinking, feeling:		
Girl frightened.	14	25
Girl depressed, worried &c.	12	7
Girl enjoying herself.	5	2
Sundry.	5	3
Not specified.	4	3
Outcome:		
Someone is saved.	5	11
Girl commits, or attempts, suicide.	5	6
Girl remains dominated by other woman.	4	3
Happy, but undramatic.	7	2
Girl escapes from, or leaves, man.	2	4
Sundry.	4	5
Not specified.	13	9

The characteristic response for dysthymics is that the girl has seen some friends in the distance or that she is running off to bathe. Despite the absence of norms, it would probably be safe to say that this is a misinterpretation of the girl's expression, which would probably suggest fear, anxiety or something of the sort to the majority of normal people. She may, however, be depressed or worried if someone is in danger.

Hysterics state that the girl is running away from a man, or sometimes from the other woman because of a man, or she is making a dash to save someone from the sea. She is frightened.

The outcome of the story is unspecified in the case of the dysthymics, or it may end happily but undramatically; whereas, in the hysterics' story, a dramatic rescue takes place - although sometimes the wife arrives too late to save the husband from drowning.

The typical dysthymic protocol, given at about twenty-four words per minute, was as follows:-

"I don't know whether it is the sea or.....  
I should say it is two girls on holiday and one has suddenly seen someone in the distance who she thinks she knows and she has got up suddenly to meet them ...and it is some friends of hers and they join up and make up a party for the day and enjoy the day together."

The typical hysteric story, at about fifty words per minute, was:-

"Strangely enough this has got a, this is a spiteful picture to me and, although it portrays two women, I can't help feeling..there is a man in it somewhere in this story....it has two sides to it..one woman is racing along..she is frightened of something, she has definitely got some fear, the other one is gloating over that other one's fear, her sneaking look round the tree..she makes no effort whatever to help that person, she holds back and rather enjoys seeing that other person being hurt...I think that is the sea in the distance, it looks like waves and that again portrays fear and, although there is not much in the picture, I feel there is something sexual in this picture, I can't really say what it is, I just don't know, there is divided love in two ways, one ..I can't see this picture at all as it is painted, not at all...there is something furtive about the person who is hiding I'm afraid I'm very muddled about this picture...as you look at it it is just two women and the sea and the trees, but it doesn't imply that to me at all, I feel I would like to express this picture in my own way, but with none of that scenery and yet it implies something sexual to me, but I don't know why...that woman could be running to protect a child, but I don't think so, because when a child is in danger I don't think there are many women who wouldn't want to help, but if it was a man, a man she loved, but couldn't have, she might stand by."

For the final picture the two male groups are included - forty anxiety-depressives and forty non-dysthymics, made up of twenty-eight inadequate psychopaths and twelve hysterics. Table 14, therefore, gives the frequency of classified responses for four groups.

TABLE 14. Responses of male and female dysthymic and hysterics to picture 13MF.

Situation:	Dysthymics.		Hysterics.	
	Male.	Female.	Male.	Female.
Dead or ill - wife (daughter).	7	20	9	13
Dead or ill - woman.	8	5	3	7
Murdered &/or sexually injured - wife	2	3	8	3
" " " " - woman	11	8	10	14
Intercourse without injury.	4	2	6	1
Woman tempting man.	4	0	0	1
Sundry.	0	2	3	1
Not specified.	4	0	1	0
Led up:				
Sexual intercourse or desire.	10	6	13	6
Illness.	7	13	7	8
Man's jealousy, cruelty &c.	4	2	2	6
Woman's infidelity.	2	4	3	4
Woman's frigidity, rejection of man.	1	1	4	3
Quarrelling (non-sexual).	2	1	4	4
Sundry.	3	4	1	4
Not specified.	11	9	6	5
Thinking, feeling:				
Man grieved or distracted.	14	21	14	17
Man remorseful.	14	10	12	12
Man in despair re own future.	0	1	5	2
Man indecisive.	4	4	2	3
Sundry.	1	2	1	5
Not specified.	7	2	6	1
Outcome:				
Man desolated &/or seeks help.	5	5	3	9
Man soon recovers or leaves woman.	8	5	4	8
Man 'beats it', escapes consequences.	1	0	6	0
Man hanged or imprisoned.	5	2	4	7
Man gives self up, or commits suicide.	1	4	5	3
Woman recovers.	0	4	1	2
Sundry.	5	6	5	3
Not specified.	15	14	12	8
Details:				
Furniture, books &c. mentioned.	12	14	8	13
Woman's nakedness mentioned.	13	4	13	14
Exclamations on seeing picture.	4	8	3	7
Poverty of circumstances.	5	4	4	8

The ratios for sex to illness themes are approximately:- For male psychopaths (and hysterics) 2 : 1, for male dysthymics and for female hysterics 1 : 1 and for female dysthymics 1 : 2. If the figure on the bed be taken as the wife or (very rarely) the daughter, she will most probably be described as dead or ill - except by male psychopaths, who are about equally likely to state that the wife has been murdered after sexual assault. If, on the other hand, the figure be described vaguely as the 'woman', she is more likely to be sexually assaulted with or without murder. Sexual intercourse takes place without physical disaster more commonly in the stories of males than of females.

Females more often than males describe the man as grieved or distracted, particularly the dysthymics. Five male psychopaths described the man as in despair about his own future after he had killed the woman. Unspecified responses were much commoner among males than among females, who, however, had more responses falling in the Sundry category.

Most commonly the outcome was unspecified, rather less so among female hysterics, who were equally inclined to say that the man was desolated and/or sought help. Seven subjects out of eighty stated that the man 'beat it' or otherwise escaped the consequences of a misdeed. Six of the seven were male psychopaths.

Male psychopaths were less inclined than the remaining groups to describe the furniture, books &c. in the room. This was actually commonest among obsessionals, particularly when the



number of items mentioned was taken into account. Female dysthymics more often than the remainder refrained from commenting on the woman's nakedness.

As in picture 4, which has not been presented here, females were more inclined to make shocked exclamations on first seeing the picture. Hysterics were particularly prone to say, for example, "Isn't it shocking!" and then to spend a considerable time on the picture. Female hysterics were also more liable to mention the apparent poverty of the circumstances - usually with a strong implication that this was the man's fault for not working harder &c. This attitude is neatly illustrated in Guido Vitale's translation of a Chinese poem called 'The Brown Shrew':-

"Scolding because her husband does not buy cosmetic  
   for her,  
 But when he has bought cosmetic then she does not  
   use it...  
 Scolding because her husband does not buy a wardrobe,  
 When he has bought the wardrobe, she does not put her  
   things there;  
 Scolding because her husband has not bought a cord,  
 When he has bought a cord, she hangs herself,  
 And frightens her husband to death."

The typical female dysthymic record, spoken at about nine words per minute, was as follows:-

"This looks as though the husband has lost his wife  
 .....(how) through illness, I suppose....that's  
 all I can see in that.....(what happens to him)..  
 what do you mean?... (what does he do) can't do any-  
 thing can he....(feeling) broken-hearted I should  
 think.....that's all I can say for that one."

The typical hysteric record was given at about thirty-five words per minute:-

"Oh dear! that picture....that woman's not dead... she's alive you know..she's waiting for that man to wake up...don't know whether she can arouse him... very sexual, sensual...don't know...can she be shy? ...his face is covered...can't tell what sort of man he is...how could he resist a woman like that....but to me he hasn't gratified that woman's desires or she would have covered herself up...she is waiting for him...he is afraid...she's quite passive....different from that one (a reference to picture 4) it's waiting ...she's waiting...she is exposing herself to him and she's leaving the alternative to him...the alternative for him wouldn't be right, you see, to love her in the way she wants him..but the physical attraction is terrible...don't know that it belongs particularly to that woman...can't see her face...it's just her breast that is so lovely to him..he's hiding away from it... trying to hide away from it...I don't know whether he'll take his hands away from his face and look at her...if he does he won't be able to resist her, or whether he'll walk out of that room and shut the door ...I can't tell you."

The most atypical dysthymic record for picture 13, given at a speed of about thirty-six words per minute, was as follows:-

"Well, there is a man overcome with remorse turning his back on a young woman with no clothes on lying on a bed with a sheet over her...well, he..he is dressed himself so he has spent the night with her, oh he is not married to her, he has spent the night with her but he suddenly wakes up early in the morning while she is still asleep and..and..can't think of anything except..anyway he gets up without disturbing her and gets dressed and he is going to creep out without waking her up..he takes a last look at her, but is filled with shame and he leaves anyway and tries to lead a better life, and the girl, when she does wake up, is furious that he has left her and tries to find him again..but, as he was only a chance acquaintance and she doesn't know where to look for him, what kind of work he does, or anything like that, she never finds him."

That appears to resemble more closely the hysteric type of record. The most atypical hysteric record, at about twenty-three words per minute, was:-

"Well, it could be father and daughter...I think, I think the man is too old to be her husband and I suppose she is very ill and he is very unhappy ...it might have been caused because they are poor....(outcome) well, if somebody helps them she might get better....(and) well, it could be the beginning of better things because the situation came about when people realised things about them they had not realised before."

That appears rather closer to the typical dysthymic type of story.

There was less satisfactory discrimination between the male than between the female groups. Whether this was due to a greater homogeneity in the psychoneuroses of men, to a greater number of wrong diagnoses for reasons other than homogeneity, could not be determined by this experiment.

Shocked exclamations were much less frequent in the records of men, aggression was more often acted out, sex themes were more common, in picture 13 intercourse did occasionally take place without disaster though followed by feelings of remorse, anti-social behaviour was sometimes allowed to go unpunished. In the main, however, sexual intercourse was regarded as an extremely hazardous undertaking fraught with the most dire physical and psychological consequences. The effect of the sex of the tester is another relatively unknown factor here.

The greatest difference on the test lay between male psychopaths on the one hand and female dysthymics on the other. This seems a clinically valid antithesis. Both fundamentally believe in the omnipotence of thought. The psychopath has only to want something to happen for it to be in process of happening; the obsessional has only to want something not to happen for it to be in danger of happening.

D. The relationship between content, productivity and fluency.

The relationship between content, productivity and fluency is being considered for the forty female dysthymics and forty hysterics discussed in the previous section. Table 15 shows the means and standard deviations of the two groups on these scoring categories for pictures 3, 6, 9 and 13.

TABLE 15. Content, productivity and fluency scores of dysthymics and hysterics.

Score.	Dysthymics (40)	Hysterics (40)	S.D. within groups
'Dysthymic'	184.125	137.600	32.323
'Hysterics'	143.700	171.900	25.563
Productivity	117.250	161.825	79.034
Fluency	25.900	34.025	10.235

The relative efficiency of the four variables for distinguishing between the groups can be expressed by the percentage of the total variance accounted for by distinguishing between the means. The 'dysthymic score' accounts for 34.7% of the variance, the 'hysterics score' for 23.8%, the fluency score for 13.9% and the productivity score for 7.5%. The first three variables are

significant at the 1% level of confidence and the last at the 5% level.

The following correlations were obtained from total variances and covariances (79 d.f.):- Productivity and fluency 0.361; productivity and 'dysthymic' score -0.313; productivity and 'hysteria' score 0.128; fluency and 'dysthymic' score -0.335; fluency and 'hysteria' score 0.165; 'dysthymic' score and 'hysteria' score -0.237.

Weights for the best possible combinations of from one to four variables were calculated. However, the discrimination provided by Content score alone was not increased significantly by adding Productivity and Fluency, even with optimum weights. These latter scores may, of course, add appreciably to the discriminative value of the test where other groups are concerned.\*

Dysthymics produce briefer stories at a slower rate and the stories that they do produce differ from those produced by hysterics.

There are no significant differences between the means of any pair of the ten pictures for productivity and fluency. The content of the stories naturally varies with different pictures. Of the six pictures that have been analysed in full No.13 has the highest discriminative value (vide III, C, 2.), followed by 9 and 6, 3, 4, 1. The remaining four have been discarded on the basis of clinical experience without putting their discriminative value to any statistical test. From a consideration of

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\* The writer is greatly indebted to Mr. Patrick Slater for advice on the statistical treatment in this section.

these pictures it appears probable that the more provocative, the more ego threatening, pictures have the higher discriminative value. This would follow from the fact that dysthymics tend to take the line of least resistance by adhering firmly to the details of the picture itself or, if they stray from it, by producing stories which have been classified as 'undramatic domesticity'. They remain well within the bounds of their own actual experience. Even the relatively low-level creativity required for the production of simple day-dreams probably calls for greater effort.

The hypothesis, which is put forward in greater detail and tested in the next section, is that awareness of their own emotional disturbance is so persistent and pervading with dysthymics that competing stimuli must have a more than usually high positive valence before they can be held in the focus of attention uninterruptedly.

In the case of hysterics, the more provocative the picture the more they will elaborate their stories. The hysteric seems partially to dissociate the extremely conventional aspect of her personality from the more unruly covert aspects. She can thus enjoy consciously condemned activities by failing to recognize them as part of her 'self'. She will, therefore, tend to produce lengthy stories and, because of her absorption even indulgence in them, she

will produce them fluently.

Thus she appears fascinated by sex, that is attracted and repelled in almost equal degree. Improper suggestions are being made. She is exhilaratingly frightened and regretfully resistant. She is being chased by a man; but, like Robert Louis Stevenson, she finds it better to travel hopefully than to arrive. Stories told in novelettish style often imply day-dreams of romantic love which have been shattered by the shiftlessness or brutishness of her husband. This severe setback presumably tends to increase the dissociation between day-dream and reality. The attitude just below the surface of her prim, romantic conventionalality is aptly illustrated, however, by Balzac's young lady who, when pursued by a lustful man, tripped over a blade of grass. The dynamism itself is, however, more nearly explained by substituting the word 'thought' for 'did' in Nietzsche's graphic dictum: My memory says that I did it, my pride says that I could not have done it, and in the end, my memory yields.

#### E. Summary.

1. The administration of the test has been described and the method of classifying the responses to it.
2. The type of story produced by dysthymics has been shown to differ from that produced by hysterics. A crude method of measuring something of that difference has been described.

3. Examples of the most typical stories, selected by the scoring method, for 'dysthymia' and for 'hysteria' were given in order to illustrate the fact that (a) the results obtained by this method are, in the main, congruent with the clinical diagnosis and (b) hysterics, because of their dissociative capacity, are at least partially, able to indulge in their fantasies.
4. Productivity and fluency correlated 0.361; productivity and 'dysthymic score' -0.313; productivity and 'hysteria score' 0.128; fluency and 'dysthymic score' -0.335; fluency and 'hysteria score' 0.165; 'dysthymic score' and 'hysteria score' -0.237.
5. It has been shown that hysterics tend to start their stories more quickly than dysthymics and to tell longer stories at a higher speed.
6. A possible explanation was offered for the low productivity and fluency of dysthymics and for the high productivity and fluency of hysterics.
7. This explanation reinforced the suggestion made in the previous section of the relationship between dissociation and high speed on the one hand and displacement and slowness on the other.



#### IV. CHARACTERISTIC DIFFERENCES IN MAZE PERFORMANCE AMONG PSYCHONEUROTICS.

##### A. Introduction.

Psychiatrists frequently look to clinical psychologists to provide some objective measurement of the depth or intensity of affective disturbances such as anxiety and depression. The present investigation attempts partially to meet this need and to help clarify the problem of psychomotor retardation.

Objective measurements can, of course, be made only of the presumed effects of a subjective state. The most relevant subjects among psychoneurotics are those commonly diagnosed as anxiety states or reactive depressives. Some relevant symptoms appear to be a reduction in the ability (a) to arrive at a firm decision (vacillation); (b) to think or act at a speed sufficient to allow of adjustment to a given situation (retardation); (c) to maintain adequate muscular control and co-ordination (tremor); (d) to concentrate; (e) to recall recently acquired information.

The Porteus Maze Test, with some modifications in the administration and scoring, appeared likely to provide the possibility of measuring the effects of these symptoms. If such measurements could be made, the test should theoretically differentiate between dysthymics on the one hand and hysterics and psychopaths on the other. This, therefore, constitutes the first stage in the attempted validation of the test procedure.

Since affective disturbance implies some degree of awareness of one's own mental state, the attention of dysthymics should be divided more frequently than that of hysterics or psychopaths. This would appear to be a sufficient explanation for some of the symptoms mentioned above, notably vacillation, retardation and lack of concentration. The assumption is made that a quasi-automatic activity, when combined with performance of the test, would serve temporarily to obliterate awareness of the affective disturbance, and that consequently the performance of the dysthymics would become much more like that of the hysterics and psychopaths. This constitutes the second stage in the attempted validation of the test procedure. A third stage could be provided by studying changes in test performance concomitant with changes in the clinical condition of the subjects.

#### B. Modifications in the administration of the Porteus Mazes.

Recent developments in the use of the Porteus Mazes (Porteus, 1942) and Le Test du Labyrinthe (Chapuis, 1949) have emphasized the manner in which these tests are done, whilst still recognizing the value of assessing the ability to do them.

Chapuis regards his test as a test of intelligence and character: 'Une épreuve d'intelligence, il peut s'agir aussi d'un problème de mémoire, d'adresse manuelle, etc. n'est point, par cela même, un bon test de caractère. Tout dépendra, d'une part, des possibilités d'observation qu'elle offre à l'examineur et, d'autre part, de l'influence réelle des facteurs caractériels sur

le rendement obtenu' (p. 66). Consequently, he uses the speed/accuracy ratio to give a global score. For the remaining character traits he is content to rely on subjective evaluation, when, in many cases, objective measurements could have been made without distortion of the findings. The italicized part of the above statement (present writer's italics) leads to serious confusion. Any influence of cognitive on orectic functions, or the converse, should be regarded as a limitation rather than as an additional merit in a test.

In the Porteus Mazes deductions are made from the number of times the subject lifts his pencil, cuts corners, crosses lines, etc., contrary to instructions. Such failures to comply with the prescribed manner of doing the test can be scored objectively and correlated with the ability to thread the mazes correctly. It would, therefore, appear legitimate to consider what Porteus calls the qualitative and quantitative aspects separately.

The ability to thread mazes is thought by Porteus to depend on qualities that are best described by such terms as prudence, forethought, planning. He points out that many psychologists have tended to regard the Maze Test as a test of some aspect of intelligence rather than as a temperament test, and this he attributes to the fact that in the majority of investigations the test has correlated as highly as +0.6 to +0.7 with the Binet Test (Porteus, 1946). In addition, he states that its interpretation as a test of temperament would be aided by the further separation of the intellectual from the temperamental factors involved (Porteus, 1942).

The modifications to be reported in this paper which have been made in the administration and scoring of this test have had as their principal object the heightening of the temperamental and the lowering of the intellectual factors. Porteus warns that timing the test alters its nature (Porteus, 1946). For the reason mentioned above, this, therefore, constitutes the main modification in the administration. The total time taken was recorded by Vernon (1937) and conclusions drawn with regard to the subject's cautiousness or impulsiveness. In the present study timing was unconcealed but unstressed. It was, therefore, left to the subject to decide whether to attach greater importance to speed or accuracy. Times were recorded, to the nearest second, from the instruction to start to the commencement of tracing (starting time) and from the beginning to the end of tracing (tracing time). The total tracing time was recorded in units of 15 sec. In Babcock's view 'There is a causal relation between time as shown in poor efficiency' (on a variety of tests) 'and lack of ability to make normal adjustments' (Babcock, 1941, p. 146). Even those who do not accept all the implications of this statement will agree that an unduly/<sup>large</sup> proportion of psychoneurotic and psychotic subjects deviate markedly from the normal tempo in many diverse activities. It was, therefore, anticipated that these two scoring categories would be among the most important.

As a necessary consequence of timing the test, the same maze form is used throughout and is not removed after a mistake has been made. A pilot survey soon demonstrated that some subjects made so many mistakes that the record was rendered indecipherable.

Subjects were, therefore, stopped after two wrong directions had been taken in years 5 - 11 and after four in years 12 and 14 and adult I and II. Since the correlation between total wrong direction score and total time taken was as low as +0.27 with sixty normal subjects and +0.02 with sixty psychoneurotics, this did not seriously interfere with the usefulness of timing and probably less so than if some subjects were permitted to penetrate every nook and cranny.

The complete instructions given to subjects were as follows:

Year 5 presented. Tester says: In this test you have to start at the letter S and trace your way through the maze and out at the one opening provided. You must not lift your pencil, cross any lines, nor go up any road that is blocked. Should you do so by mistake, you still must not lift your pencil, but should trace your way back again. You must not trace the maze in the air. You may only use one hand in working out the problem; the other should be used to steady the paper. In each case wait for the word 'Go'. Right, start at the S and trace your way through. Go.

Years 6 and 7. Repeat the italicized phrases above.

Years 8, etc. Say simply: Are you ready? Go.

The Tester demonstrates with year 5 by tracing, with great care, a course down the middle of the first passage and at right angles round the first bend.

### C. Modifications in the scoring.

It was considered that it would be of interest to assess not only the number of times that a subject embarked on a wrong passage, but how far he went before he discovered his error. All wrong passages were, therefore, marked off on a master key

form into three sections, and a weighting was given in accordance with the number of sections entered. The writer subsequently discovered that he had been anticipated in this device by Chapuis (1949). Chapuis does not, however, consider the ratio between the wrong direction score and the weighted wrong direction score.

Porteus weights lifted pencils, cut corners, etc., on the basis of differences found between normal and delinquent children, and then sums the scores from each category to give a global qualitative score. This seems to the present writer to be a mating of incompatibles and psychologically meaningless, particularly as the different scores are given an additional weighting by the varied means and standard deviations. This point and many others are discussed by Tizard (1951) in a detailed critical survey of the Porteus Mazes. These categories are, therefore, in the present instance kept separate, with the exception of cut corners and crossed lines, which correlated +0.74 and followed the same pattern in all the groups tested.

In accordance with the practice of Porteus, lifted pencils or crossed lines in the first third of each test were noted separately. (Crossed lines were subsequently taken to include cut corners and crossed lines). Three judges were asked to assess Wavy Lines using Porteus's own criteria.

D. Differences in performance due to sex, age and psychoneuroses.

1. Sex.

The male group comprised twenty-two members of the Research Unit of a photographic manufacturing company and eighteen psychiatric nurses, the female group nine from the Research Unit,

thirteen psychiatric nurses and eighteen occupational therapists. Since the similarities and differences between occupational therapists and male research workers are paralleled by those between male and female nurses, the sample is probably valid for the present purpose. The groups were matched for age and Progressive Matrices score (1938, untimed): males 24.25 years  $\pm$  4.52 and 49.92  $\pm$  8.12; females 24.30 years  $\pm$  4.79 and 50.25  $\pm$  7.52.

The following abbreviations are used throughout the tables:

St.T.	= starting time in secs.	L.P.	= lifted pencils.
T.T.	= tracing time in units of 15secs.	C.L.	= crossed lines.
W.D.	= wrong direction taken.	W.L.	= wavy lines.
W.W.D.	= weighted wrong direction score.		

Table 16. Maze results of forty male and forty female subjects.

	St.T.	T.T.	W.D. in 1st third of any maze.	W.D.	W.W.D.	$\frac{W.D.}{W.W.D.} \times \frac{100}{1}$	L.P.	C.L.	W.L.
40 men:									
Mean	22.50	19.90	35%	9.06	16.22	55.9	4.77	13.45	2.82
S.D.	11.51	6.90	--	5.39	9.99	--	4.74	10.97	1.88
40 women:									
Mean	26.62	25.00	36%	10.32	16.90	61.1	5.67	12.02	2.47
S.D.	14.44	11.96	--	4.97	9.79	--	4.23	10.35	2.52

The only statistically significant difference between means was in total tracing time, the male group working more quickly (C.R. 2.34). The difference between the mean starting

times was 1.41 times the standard error of the difference. In the remaining categories this value was still lower.

Twelve men as against three women lifted their pencils or crossed lines in the first two mazes (for  $n = 1$ ,  $\chi^2 = 6.65$ , a highly significant difference).\* Six men as against one woman had a weighted wrong direction (W.W.D.) score of more than twice the wrong direction (W.D.) score ( $\chi^2 = 3.91$ ). There were, therefore, more men who made a large number of gross errors. If we consider impulsiveness to be responsible for a loss of accuracy associated with speed, then more young men than young women showed themselves to be impulsive.

## 2. Age.

A group with a mean age of 33.30 years (S.D. 6.40) was compared with a group of having a mean age of 20.42 (S.D. 2.25). The respective Progressive Matrices scores were: 50.97 (S.D. 7.83) and 50.57 (S.D. 6.22). The older group comprised twenty-two members of the photographic unit and eighteen hospital staff, fourteen being women; in the younger group the corresponding numbers were twenty-one, nineteen and eighteen. Maze scores are shown in Table 17.

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\* All subsequent  $\chi^2$  values are for one degree of freedom. Values greater than 3.84 are, therefore, significant at least at the 5% level of confidence.



Table 17. Maze results of forty subjects over 25 years and forty subjects 25 years and under.

	St.T.	T.T.	W.D. in 1st third of any maze.	W.D.	W.W.D.	$\frac{W.D.}{W.W.D.} \times \frac{100}{I}$	L.P.	C.L.	W.L.
40 older:									
mean	35.37	21.47	35%	7.77	12.50	62.2	4.55	10.52	2.42
S.D.	19.65	8.41	--	5.04	9.92	--	4.01	8.75	2.29
40 younger:									
Mean	19.95	21.47	35%	10.65	18.22	58.5	5.72	12.95	2.37
S.D.	10.39	10.71	--	4.61	8.67	--	5.17	8.25	1.85

The older subjects spent a significantly longer time considering the problem before starting to trace (C.R. 4.39). They then proceeded to work just as quickly as the younger subjects. Their initial prudence, however, resulted in fewer wrong directions being taken (C.R. 2.66). In addition, there were significantly more of the younger group who made gross errors, 7 to 1 ( $\chi^2 = 5.00$ ). Twelve of the younger group against three of the older lifted pencils or crossed lines in either or both of the first two mazes ( $\chi^2 = 6.65$ ).

### 3. Psychoneurosis.

Sixty subjects from the normal group and sixty psychoneurotic subjects were next compared. Again the groups were matched for age and Progressive Matrices score. The mean age of the normal group was 27.35 (S.D. 8.31) and of the psychoneurotics 27.35 (S.D. 7.42). The mean Matrices scores were 44.48 (S.D. 9.55) and 44.60 (S.D. 9.90), an approximately normal Matrices distribution. The normal group contained thirty-one and the psychoneurotic group

thirty-six women. The latter group was unselected as regards nosological category, but, in fact, comprised twenty hysterics, twenty-two anxiety states, eleven reactive depressives and seven obsessionals. This is a larger percentage of obsessionals than one would expect to get in a larger unselected group. The maze results are presented in Table 18.

Table 18. Maze results of sixty normal and sixty psychoneurotic subjects.

	St.T.	T.T.	W.D. in 1st third of any maze.	W.D.	W.W.D.	$\frac{W.D.}{W.W.D.} \times \frac{100}{1}$	L.P.	C.L.	W.L.
60 normals:									
Mean	29.78	24.02	34%	11.02	19.17	57.5	6.62	12.38	2.67
S.D.	21.77	10.71	--	5.16	10.93	--	5.13	10.06	2.07
60 neurotics:									
Mean	64.50	35.77	39%	9.65	17.63	54.7	9.30	12.85	3.28
S.D.	70.57	18.70	--	5.87	12.91	--	8.84	11.59	2.67

Normal subjects were significantly quicker both in starting and tracing (C.R. 3.64 and 4.23), and they tended to lift their pencils less often (C.R. 2.03); but the other scoring categories showed no significant differences between the groups.

Nine psychoneurotic subjects to two normals made more than half their errors of direction in the first third of any maze ( $\chi^2 = 4.90$ ). Twenty psychoneurotics to ten normals have a W.W.D. score of more than twice their W.D. score, i.e. have a large number of gross errors ( $\chi^2 = 4.44$ ). Twenty-four psychoneurotics to twelve normals lifted their pencil or crossed lines in one or both of the first two mazes ( $\chi^2 = 5.71$ ).

A comparison between the variances on the maze results for the two groups indicates a greater scatter amongst the psychoneurotics. It may, therefore, be that the test is differentiating between types of temperament which are represented in their more extreme forms in the different psychoneurotic groups. The correlations presented in Table 19 between Progressive Matrices and the various maze scores at least suggest that temperamental factors enter more into psychoneurotic performance at the expense of the general intellectual factor. If this assumption be correct, the test may well be expected to differentiate more adequately between the psychoneurotic subgroups than between psychoneurotics and normals.

Table 19. Correlations between Progressive Matrices and Porteus Mazes.

	St.T.	T.T.	W.D.	W.W.D.	$\frac{W.D. \times 100}{W.W.D.}$	L.P.	C.L.	W.L.
60 normals: Matrices score	+0.28	-0.31	-0.64	-0.71	+0.46	-0.12	-0.08	0.00
60 neurotics: Matrices score	+0.14	-0.12	-0.55	-0.53	+0.49	+0.02	+0.02	+0.07

All correlations over 0.25 are significantly different from zero.

There is a slight tendency for those with high intellectual capacity to consider the mazes for a longer time before starting and then to work more quickly than those of lower capacity. They have a much more marked tendency to make fewer errors of direction and for these to be of a less gross type.

E. Comparison of the results of the psychoneurotic subgroups.

The relative scarcity of obsessional neurotics of low intellectual capacity made it impossible to match this group very closely with the other groups. The mean ages and matrices scores were as follows: psychopaths: 35.47 (S.D. 6.52) and 38.63 (S.D. 11.69); hysterics: 35.20 (S.D. 9.92) and 38.38 (S.D. 10.60); anxiety states: 35.58 (S.D. 12.10) and 38.80 (S.D. 10.11); reactive depressives: 36.20 (S.D. 10.14) and 38.73 (S.D. 12.09); obsessionals: 35.92 (S.D. 11.44) and 43.56 (S.D. 8.71).

With the exception of the W.D. scores, the correlations with Progressive Matrices are not so high as to distort unduly the comparisons with the obsessional group. The group is, however, not comparable with the remaining groups in one other major particular. Sixteen of the twenty-five obsessionals were out-patients.\* The subjects were much younger and worked very much more quickly than the hospital obsessionals. It may well be, however, that the groups are in fact more comparable on this account, since obsessionals are probably much more resistant to hospitalization than other psychoneurotics. While a random sample of in-patients will include relatively mild hysterics and anxiety states, it will include only severe obsessionals.

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\* The writer is greatly indebted to Dr. Henry Wilson and Dr. Davy of the London Hospital and to Dr. Noel Harris and Dr. W. Haynes of the Middlesex Hospital for permission to test these patients.

Table 20. Scores of psychoneurotic subgroups on the Maze test.

	St.T.	T.T.	W.D. in 1st third of any maze.	W.D.	W.W.D.	$\frac{W.D.}{W.W.D.} \times \frac{100}{1}$	L.P.	C.L.	W.L.
30 psychopaths:									
Mean	45.40	29.77	34.6%	12.03	20.87	57.6	7.00	11.80	2.77
S.D.	32.30	12.77	--	5.52	11.77	--	6.41	8.49	1.77
45 hysterics:									
Mean	44.22	34.49	36.3%	12.56	22.24	56.5	7.93	12.24	2.67
S.D.	38.88	16.51	--	5.84	13.07	--	8.00	11.23	2.22
45 anxiety states:									
Mean	76.71	37.27	38.4%	11.36	20.31	55.9	11.00	15.56	3.78
S.D.	85.82	18.52	--	5.83	12.91	--	9.26	14.81	2.66
45 reactive depressives:									
Mean	84.00	47.35	39.4%	10.27	18.73	54.8	11.49	8.29	3.09
S.D.	88.55	25.53	--	6.10	13.88	--	11.98	7.92	2.68
25 obsessional:									
Mean	60.36	38.44	35.1%	8.44	14.24	59.3	5.96	6.88	1.44
S.D.	57.47	15.75	--	3.84	7.56	--	4.77	6.51	1.60

Table 21 shows the critical ratios of the difference between the various means. Figures in italics represent differences significant at the 1% level of confidence, those in brackets being just short of significance at the 5% level.

Table 21. Critical ratios of the difference between the means in Table 20.

	St.T.	T.T.	L.P.	C.L.	W.L.
Psychopaths					
Anxiety states	2.21	2.08	2.21	-	1.98
Psychopaths					
Depressives	<u>2.67</u>	<u>3.94</u>	2.10	(1.80)	-
Psychopaths					
Obsessionals	-	2.21	-	2.44	<u>2.92</u>
Hysterics					
Anxiety states	2.30	-	-	-	2.15
Hysterics					
Depressives	<u>2.76</u>	<u>2.84</u>	-	(1.94)	-
Hysterics					
Obsessionals	-	-	-	2.53	<u>2.67</u>
Anxiety states					
Depressives	-	2.14	-	<u>2.91</u>	-
Anxiety states					
Obsessionals	-	-	<u>3.00</u>	<u>3.39</u>	<u>4.59</u>
Depressives					
Obsessionals	-	-	<u>2.72</u>	-	<u>3.22</u>

It will be seen from Table 20 that the test does not differentiate at all between psychopaths and hysterics. Whereas the sex distribution in the anxiety, depressive and obsessional groups is much more even both here and in general, women predominate in hysteria and men in psychopathy. The largest of the differences obtained in the present experiment may well be due to this different sex-loading, since normal men were found to trace more quickly than normal women. It would appear, therefore, that there is no basic difference between these two groups in respect of the temperamental factors assessed by the Maze test. On the Progressive Matrices and Thematic Apperception

Test the tempo of hysterics and psychopaths shows a much greater degree of resemblance than does that of any other two groups. A similar result is obtained from the consideration of the ratio between Progressive Matrices and the Mill Hill Vocabulary grade. These results, therefore, open up the possibility that such differences as exist between the two groups may, in part, be due to the cultural expectations of the individual and later of the psychiatrists making the diagnosis.

Mead (1949), Dollard and others (1944) have claimed that there are certain modes of behaviour which are considered by society to be appropriate to males and not to females and conversely. These modes of behaviour vary widely from one cultural pattern to another. Adherence to these acceptable modes will normally be conducive to satisfactory personal and social adjustment. It is probable that there are certain deviations from the mode which are more acceptable than others. It may well be that hysteria, owing perhaps to the taboo on tenderness, is less acceptable in men in our society than is psychopathy. Certainly many psychopathic murderers, film stars and politicians are greatly admired by both sexes, albeit sometimes covertly, whereas male hysterics are considered unmanly and somewhat despicable. Female psychopaths, on the other hand, are probably less acceptable to our society than hysterics. They certainly were to the Victorians. They tend to be persecuted by other women, who, however, write about them and read about them in Forever Amber,

The Wicked Lady and Gone with the Wind. To men they may sometimes be exciting, but never admirable.

To summarize the characteristic mazes of each of the nosological groups relative to the present test population:  
Psychopaths and hysterics: \*start without prolonged delay and then proceed rapidly with a relatively smooth, evenly flowing line. This is not, however, quite adequately under control since they cross a relatively large number of lines. They might be said to be somewhat impulsive and careless. Since the pencil is most frequently lifted at choice points and these subjects tend to hesitate less at such points, they have a low score for lifted pencils. On entering a cul-de-sac they characteristically wheel about immediately this is observed without manifest signs of tension, such as an increase in the waviness or pressure of the line or lifting of the pencil.  
Anxiety states: perhaps because of their inability readily to make decisions, start slowly and then work reasonably quickly; but their progress is jerky and accomplished only with a very tremulous line, which results in their crossing many lines. It is noticeable that the lines tend to become more wavy after an error has been committed. Brundage, in a private communication cited by Porteus (1946), calls this type of reaction 'shatter'. Chapuis (1949, p. 73) writes: 'L'anxiété nerveuse en presence de toute situation plus ou moins inédite se traduit

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\* Italics represent data scored on the test, the remainder being direct observations or inferences.



fréquentement, au T.L., par un tracé peu sûr et tremblé ne s'expliquant point par des troubles graphiques proprement dits.'

Reactive depressives: The tempo is slow throughout. This perhaps enables them to avoid crossing an undue number of lines. Their defects appear to be defects of attention. They are slow to adjust to the total situation, making rather frequent errors in the early stages and forgetting to heed the instruction about lifting the pencil. There is a slight tendency for depressives to proceed further up blocked roads than other subjects. They can sometimes be observed to stop, say they have gone wrong, and then continue further in the wrong direction. Such errors are often accompanied by self-depreciatory remarks, which the tester has ample time to record. Many subjects seem to gain added enjoyment from the test after they have made an error, though this is less frequent in the case of the depressives.

There is a slight, but not significant, tendency for anxieties and depressives to enter a blocked passage more frequently in the first third of any maze than the other groups. They are also rather more prone to lift their pencils or to cross lines in the first two very simple mazes. The finding of Porteus that these errors are due to impulsiveness is difficult to reconcile with the present results (Porteus, 1942, p. 34).

Obsessionals: Rather slow tempo throughout, relative freedom from very gross errors of direction, few lifted pencils, firm

straight lines down the centre of the channel and careful right-angled cornering with consequently very few crossed lines. Chapuis appears to be writing of normal people of a mildly obsessional character when he comments that 'Au T.L. le tracé anguleux est déjà en soi, dans la majorité des cas, un signe de propreté et exactitude, comme il révèle aussi fréquemment une nature simple et droite - sans énormément de souplesse' (p. 81). The low W.D. and W.W.D. scores may, in the present instance, be due in part to the higher intellectual capacity of this group.

Clearly the main differentiation on this test is between normals, psychopaths and hysterics on the one hand and anxiety states, reactive depressives and obsessionals on the other. The test does, however, show considerable differences in the pattern of performance among the clinical groups making up the dysthymic group. Differentiation between normals, psychopaths and hysterics is less satisfactory. It would appear, therefore, that poor maze performance, under the present method of administration, is most closely linked with the presence of anxiety and depressive features.

Porteus (1942) claims very considerable differences between normal children and delinquents and between normal adults and criminals. He appears, however, to have been content with only approximate matching for intelligence and to have accepted the Stanford-Binet test for this purpose. One would certainly expect that the Porteus Mazes correlated more highly with Progressive Matrices than with the Stanford-Binet.

Close examination of his table (p. 19) suggests that the W.D. score of the bus drivers was very much lower than that of the criminals, though unfortunately he does not present all the information on this point. If this were so, and the usual correlation between Binet scores and W.D. scores is  $-0.6$  to  $-0.7$ , it would be difficult to reconcile this result with even the approximate matching for intelligence which he claims.

V. THE EFFECT OF DISTRACTION AND OF ELECTRO-CONVULSIVE  
THERAPY ON PSYCHOMOTOR RETARDATION.

A. Introduction.

In the somewhat barren literature on the subject of retardation MacCurdy's work (1925) still stands out, despite some apparent inconsistencies, and still represents perhaps the mostly widely held point of view. 'Retardation', says MacCurdy, 'is a direct expression of deficient psychic energy. Painful thoughts are slow. Often in our daily life the thought of something unpleasant suddenly "blocks" our mental processes and we are temporarily incompetent. Such a sudden inhibition is a miniature depression - when any personal topic produces such an interference with thought, the reaction has developed to a definitely psychotic degree.' He also writes: 'This phenomenon of preoccupation with conative incompetence suggests that mental activity is not cut off at its source, that it is not non-existent, but rather that it is constantly striving for expression against some inhibitive force which persistently represses it.' Again, 'retardation seems to be a blocking in response to milder and milder occasions for mental pain as the depression increases in gravity...the preoccupation of the patient's attention with his disability suggests that repression is in operation.'

Retardation is introduced first in terms of deficient psychic energy - the decelerating machine analogy - but this

view is not maintained. 'The thought of something unpleasant suddenly blocks our mental processes' heralds the confusion. It is only previous, or constructive thoughts presumably that are blocked. Some mental activity is still going on. There is no void, since we are thinking of something unpleasant; in fact we are preoccupied with our 'conative incompetence', which suggests to MacCurdy that mental activity 'is not cut off at its source'. MacCurdy seems sometimes to have forgotten that these preoccupations are themselves mental activities presumably using up 'psychic energy'. It is not that painful thoughts are necessarily slow, but that other more constructive thoughts are slowed up by the intrusion of painful thoughts. An agitated melancholic may be extremely fluent in recounting the supposed causes of her anguish. It is when she is asked to do something else that she may become slow. Again, do not the preoccupations suggest that displacement rather than repression is in operation - though, of course, displacement presumes repression? Attention and affect have perhaps been displaced from the original guilt-laden situation to the avowed inability to concentrate, to the failure of 'memory', to the unspecified wickedness, to the commission of the undefined but unforgivable sin.

Wiener (1948) suggests that the persistent worry of the anxiety neurotic may use up so much of his neuron pool that he is relatively incapacitated from carrying out other processes of thought. The vicious circle that the cyberneticists call positive feed-back may even incapacitate the individual almost

completely, more and more of the neurons being incorporated in the system. The more extreme incapacity would presumably be seen in cases of agitated melancholia.

Despite his caustic comments on physical treatment in psychiatry, Wiener - perhaps because of his adherence to a mechanistic viewpoint - does not appear to envisage any means of intervening in a circulating system other than by violent physical assault. It will be shown that such a means does exist. Explanations of retardation in terms of oscillations of attention, breaking up of behaviour patterns, availability of neurons, etc., are not necessarily incompatible, but may be partial and biased.

It is widely recognized that fear is experienced before and after, rather than during, a dangerous activity which engages the entire attention. A rugby footballer may sustain a cut without either becoming aware of it or feeling any pain until the end of the game. Less strenuous pursuits may have a similar effect; the pain-threshold may, in fact, be raised by as much as 45% if the subject be asked to memorize and repeat numbers (Wolff & Goodell, 1943). The Roman Catholic tells his rosary to help exclude distracting thoughts. Distracting attention from the visual to the auditory field may affect the electrical activity of the brain; for example, a subject wearing plus 1.0D lense spectacles found the visual field 'uninteresting', but the alpha rhythm showed some blocking. A ticking watch close to the ear brought about a reappearance of the alpha rhythm (Adrian, 1944).

Other evidence on the importance of the value of the stimulus to the subject is found in Weber's report (1929) that some of the most considerable losses in output occurred when pleasant distracting stimuli were used, such as beautiful music or humorous anecdotes. The significant feature is, however, the compelling nature of the interest rather than its feeling-tone. The depressed patient's brooding over his sinful past will be much more distracting to him than a Mozart symphony.

When confronted with the Maze test situation not one patient suffering from an anxiety state has yet been either unwilling or unable to do the test in some fashion. The new behaviour pattern, the test situation, might, therefore, be said to break up the more habitual pattern, the recurrent anxiety. Somehow the neurons are made available. The subject can attend, at least intermittently, to the behaviour pattern which he has tacitly accepted. In approximately 10% of cases of agitated melancholia the subject is quite unable to do the test. The habitual behaviour pattern cannot be disrupted for a sufficiently long time. He, or more probably she, cannot attend to the presented situation. Possibly no neurons are available.

If the Maze test fails to absorb sufficient of the dysthymic's attention to exclude affective competition, engagement in a subsidiary task may temporarily bring about such an exclusion. In the experiments to be reported the intention was to begin with minimal distraction and, if this proved ineffective, to increase the complexity of the distracting stimuli until some observable change in performance was produced.

Previous work on distraction has been mainly concerned with the effect of external stimuli such as loud noises, flashing lights, etc., on speed and accuracy of performance at a given task (Hovey, 1928; Super et al, 1947), sometimes coupled with an assessment of energy expenditure (Laird, 1929; Morgan, 1916). Where the subject has engaged actively in both tasks, the original activity has been of a quasi-automatic type (Downey, 1924). The majority of these investigations have been carried out with normal subjects; with mentally disturbed patients there would be no certainty that such external stimuli as lights and noises had been perceived at all. It was, therefore, preferable that in the present investigation the subject should engage in some overt activity.

Clearly the effect produced will vary with the relative simplicity or complexity of the two tasks. Since maze tracing is a relatively complex task, it was considered that the present need would best be met by a simple subsidiary activity and, since intermittent distracting stimuli produce more effect than continuous stimuli, the latter kind was preferred.

Three conditions, therefore, seemed desirable for minimal but certain distraction: (a) that the subject should engage in some overt activity; (b) that the distracting stimulus should be simple; (c) that it should be regular. Accordingly, after performance of the test in the manner described in IV. B., the subjects were asked to perform the test again under the same conditions with the one exception that they were to repeat numbers after the tester. The tester counted 1, 2, 3 etc., at intervals



of approximately two seconds.

It was predicted that: (i) without distraction in either test, immediate re-test would result in an increase in speed of performance on the second test in both the dysthymic and non-dysthymic groups as a consequence of increased familiarity or practice; (ii) with distraction on the second test, immediate re-test would result in a significantly greater speed of performance with the dysthymic group on the supposition that the counting would temporarily obscure the anxiety or depression, or break up this behaviour pattern and that practice effect would be operating in the same direction; (iii) with distraction on the second test, immediate re-test would result in no significant change in speed of performance with the non-dysthymic group on the supposition that the counting would cause a partial deflection of attention which would operate in a direction opposite to that of the practice effect.

#### B. Results of immediate re-test on Mazes.

##### 1. With distraction.

Seventy-five psychoneurotics were tested, fifteen in each of the subgroups. The ordinary form was given first and the distraction form immediately afterwards in the same testing session. Table 22 shows the scores on the distraction form of the test expressed as a percentage of the scores on the ordinary form. The features of the performance here scored separately are Starting Time, Tracing Time, Weighted Wrong Direction Score,

## Lifted Pencils, Crossed Lines, Wavy Lines.

Table 22. Scores on distraction form as percentage of score on ordinary form for seventy-five psychoneurotics.

	St.T.	T.T.	W.W.D.	L.P.	C.L.	W.L.
Hysterics.	75	89	118	66	136	111
Psychopaths.	80	91	127	79	124	<u>95</u>
Anxiety states.	<u>75</u>	69	111	45	169	91
Depressives.	47	64	<u>123</u>	56	164	97
Obsessionals.	52	71	110	42	171	90

With three minor exceptions, psychopaths and hysterics tend to be characteristically different from the dysthymics. The former group was, however, younger. The oldest fifteen dysthymics were therefore discarded, leaving twelve anxiety states, ten depressives and eight obsessionals, and Table 23 gives the results of the remaining thirty dysthymics and thirty non-dysthymics. The dysthymic group had a mean age of  $32.37 \pm 6.91$  and a Progressive Matrices (1938 untimed) score of  $41.00 \pm 9.00$ ; the corresponding figures for the non-dysthymic group were  $31.13 \pm 9.62$  and  $41.23 \pm 11.24$ . Starting times are given in seconds, tracing times in quarter minutes in Tables 23, 24 and 25.

Table 23. The ordinary and distraction forms of the Mazes with thirty dysthymic and thirty non-dysthymic subjects.

	Dysthymics.		Non-dysthymics.	
	Mean	S.D.	Mean	S.D.
Ordinary form:				
St.T.	56.10	57.72	33.87	20.19
T.T.	35.87	18.27	24.57	8.52
W.W.D.	18.90	11.81	19.73	12.60
L.P.	7.40	6.81	6.37	6.56
C.L.	7.80	9.52	13.23	11.00
W.L.	2.30	2.18	2.47	1.89
Distraction form:				
St.T.	27.97	19.46	26.37	15.21
T.T.	23.50	8.31	22.07	8.39
W.W.D.	22.87	13.36	24.40	12.31
L.P.	3.87	5.12	4.60	5.19
C.L.	12.47	13.40	16.90	10.51
W.L.	2.20	1.89	2.53	1.94

The critical ratio between the means of the dysthymics and non-dysthymics on the ordinary form indicated differences significant at least at the 5% level of confidence on three of the scoring categories; whereas, on the distraction form, there were no such significant differences. The relevant critical ratios were: starting time: ordinary form 1.99; distraction form 0.36; tracing time: 3.07 and 0.66; crossed lines 2.04 and 1.42.

In order to determine whether or not dysthymics show the greater increase in speed under distracting conditions, irrespective of initial speed under non-distracting conditions, the ten slowest dysthymics and the ten quickest non-dysthymics were discarded. The tracing times of the remaining subjects were then compared. The means on the ordinary form were: dysthymics  $29.00 \pm 8.07$ ; non-dysthymics  $28.95 \pm 7.04$ ; on the distraction form the respective means were  $21.40 \pm 6.22$  and  $25.90 \pm 7.56$ . Whereas the difference between the means for the two groups on the ordinary form of the test is not at all significant, the critical ratio of the difference between the means on the distraction form is 2.05.

While, therefore, there may possibly be a slight tendency for the gain in speed to be greatest with those who were initially very slow, the presence or absence of emotional disturbance is clearly of much greater importance. Presumably, therefore, many dysthymics would, but for their illness, have performed unusually quickly.

Predictions (ii) and (iii) (vide V, A) are, therefore, supported by the results of this part of the experiment.

## 2. Without distraction.

Another thirty dysthymics and thirty non-dysthymics were given the non-distracting form of the test twice in the one session. The dysthymics group (thirteen anxiety states, ten depressives, seven obsessionals) had a mean age of  $37.20 \pm 12.57$  and Progressive Matrices score of  $37.93 \pm 13.09$ ; the correspond-

ing figures for the non-dysthymic group (nineteen hysterics, eleven psychopaths) were  $34.93 \pm 12.22$  and  $38.77 \pm 11.04$ .

Table 24 showed the scores on the non-distraction form of the test and on re-test with the same form.

Table 24. Scores for two performances of the non-distraction Mazes with thirty dysthymic and thirty non-dysthymic subjects.

	Dysthymics		Non-dysthymics	
	Mean	S.D.	Mean	S.D.
Ordinary form:				
St.T.	55.07	47.25	46.77	46.17
T.T.	37.33	16.27	29.67	13.54
W.W.D.	21.20	15.09	18.40	8.76
L.P.	13.20	12.83	7.07	6.61
C.L.	9.60	10.14	11.47	11.20
W.L.	1.97	2.20	2.20	2.41
Re-test with ordinary form:				
St.T.	42.63	35.26	34.77	33.46
T.T.	31.93	16.74	22.90	7.43
W.W.D.	18.27	12.38	16.50	7.73
L.P.	8.37	8.86	5.80	6.66
C.L.	11.80	10.67	13.23	9.77
W.L.	1.73	1.96	1.73	2.06

Table 25 shows the St.T. and T.T. scores (recorded in Table 24) on the second test expressed as a percentage of the scores on the first test and the St.T. and T.T. scores (recorded in Table 23) on the second test as a percentage of the scores on the first test. O = ordinary form; R = re-test on ordinary

form and D = distraction form.

Table 25.  $\frac{R(\text{St.T. and T.T. scores})}{O(\text{St.T. and T.T. scores})} \times \frac{100}{I}$  and  $\frac{D(\text{St.T. and T.T. scores})}{O(\text{St.T. and T.T. scores})} \times \frac{100}{I}$   
for two groups of thirty dysthymics and thirty non-dythymics

	Dythymics				Non-dythymics			
	$\frac{R}{O} \times \frac{100}{I}$		$\frac{D}{O} \times \frac{100}{I}$		$\frac{R}{O} \times \frac{100}{I}$		$\frac{D}{O} \times \frac{100}{I}$	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
St.T.	89.50	37.19	66.33	29.32	86.97	31.32	91.03	74.69
T.T.	84.03	18.55	70.30	18.75	82.83	27.27	91.43	22.77

From this table it can be seen that the effect of immediate re-test with the non-distraction form was to increase the speed of performance in both groups to an equal extent. The following effects of distraction on Maze performance may, therefore, be noted: (i) an increase in speed of work with dysthymics, the mean of the difference between the O:R and O:D ratios being significantly different from zero (for St.T.'s,  $t = 2.27$ ; for T.T.'s  $t = 2.61$ ); (ii) no increase in speed of work with non-dythymics. There is, in fact, a slight, though not significant, decrease.

Other possible effects of distraction which require further confirmation are: an increase with both groups in the number of errors of direction and in the number of crossed and wavy lines; a decrease with both groups in the number of lifted pencils.

Morgan (1916) found that a typist submitted to a barrage of noises could actually increase speed of work without loss of accuracy. Physiological recordings indicated that more energy was expended on the performance. The original activity was, however, a quasi-habitual one, so that one would expect considerable reserves of energy to be available. This is much less true in the case of the generally unfamiliar and complex task of maze tracing, so that the considerable changes in the performance of the dysthymics are not likely to be attributable merely to an increase in effort. This seems particularly so in that the most severely depressed or obsessional patients drive themselves to the point of desperate striving even at the first performance. There is probably little reserve of effort left in such cases.

If the present results be more adequately accounted for by the assumption that retardation may be largely due to partial deflection of attention, the technique described may contribute towards the formidable task of measuring the depth and intensity of the affective disturbance and towards further elucidation of the concept of retardation. Psychiatric discussion of the problem of retardation has remained, for the most part, at the purely descriptive level. Even if, in spite of the findings of Cameron (1942), McFarland & Goldstein (1939) and others, psychomotor retardation be treated as an effect of metabolic or other physical changes, then these changes are of such a nature that the effect can be temporarily offset by purely psychological means of a very simple type.

Further evidence could be provided for or against the hypothesis put forward in this paper by testing subjects suffering from a depressive illness both before and after a course of, for example, electroconvulsive therapy.

Before E.C.T. the starting and tracing times under distraction should be considerably shorter than for the non-distraction form. If E.C.T. blots out or breaks up the depressive pattern, the discrepancy between the distraction and non-distraction forms should be greatly reduced. The suggestion is, therefore, that the effect of counting 1, 2, 3 and of a course of electroconvulsive therapy have at least one important feature in common - the weakening or breaking up of certain behaviour patterns promoted by affective disturbances. Since E.C.T. has a somewhat more enduring effect it may allow older behaviour patterns to be re-established. Prolonged distraction techniques such as Occupational Therapy may produce a similar result.

Since the previous depressive groups were all psychoneurotics and since the majority receiving E.C.T. are psychotic, two such groups were first tested to determine whether or not there was any essential difference in their performances.

C. Maze results of reactive depressives and melancholics.

Each group consisted of seventeen subjects matched for age, sex and Progressive Matrices score. The reactive depressives included five men, the mean age was 49.3 years



(S.D. 9.8), the mean Matrices score 30.9 (S.D. 11.9); the melancholics included three men, the mean age was 49.8 years (S.D. 9.7), the mean Matrices score 31.3 (S.D. 9.2). The two groups were given the Porteus Maze Test without and then with distraction. The results are shown in Table 26.

Table 26. Maze results without and with distraction of seventeen reactive depressives and seventeen melancholics.

	Reactive depressives		Melancholics	
	Mean	S.D.	Mean	S.D.
Ordinary form:				
St.T.	54.71	43.04	120.53	164.02
T.T.	47.65	18.87	70.53	40.61
W.W.D.	24.35	12.25	22.82	18.63
L.P.	15.65	12.84	27.59	34.23
C.L.	8.76	7.40	12.71	12.31
Distraction form:				
St.T.	28.88	11.50	45.06	37.21
T.T.	32.24	24.52	44.12	21.72
W.W.D.	25.82	11.94	26.47	18.54
L.P.	9.47	12.18	16.76	20.62
C.L.	11.59	11.39	14.88	10.91

Only one difference between the two groups was significant at the 5% level of confidence. On the ordinary form of the test the melancholics were slower on tracing time. They were slower on the other three speed measurements, but the scatter was too great in the case of St.T. scores for useful statistical comparison. None of the six remaining scoring categories produced a significant difference. The

effect of distraction was similar for both groups in all categories. All the characteristics of the performance of reactive depressives are, therefore, applicable to melancholics, usually in a more marked degree.

D. Maze results before and after E.C.T.

Thirty subjects were tested and the group was made up of twelve melancholics, two manic-depressives (in the depressive phase), eleven anxiety-depressives and five cases in which the differential diagnosis between psychotic and psychoneurotic depression was uncertain. There were twenty-three women and seven men. Both before and after a course of E.C.T., consisting of from six to twelve treatments, the ordinary form of the test preceded the distraction form, each being given at the same session. The results are shown in Table 27.

Table 27. Results from the ordinary and distraction forms of the Mazes before and after E.C.T.

	Ordinary form before E.C.T.		Distraction form before E.C.T.	
	Mean	S.D.	Mean	S.D.
St.T.	56.00	41.49	33.04	21.38
T.T.	53.27	33.00	37.06	21.44
W.W.D.	26.87	15.14	27.27	14.39
L.P.	23.80	27.70	14.13	16.13
C.L.	12.60	8.97	14.60	10.73
	Ordinary form after E.C.T.		Distraction form after E.C.T.	
	Mean	S.D.	Mean	S.D.
St.T.	43.83	36.03	35.40	33.13
T.T.	38.37	18.88	33.17	16.30
W.W.D.	19.77	11.44	22.17	11.47
L.P.	6.83	6.87	5.13	6.97
C.L.	9.10	8.77	10.23	7.81

On the Maze test distraction has presumably a slightly unfavourable effect on the W.W.D. score counter-acting the small practice effect noted in Table 24. The improvement after E.C.T. is not significantly greater than might be expected merely from practice effect (i.e. the mean of the difference between the two W.W.D. scores in Table 24 is not significantly less than the mean of the difference between the W.W.D. scores on the ordinary form pre- and post-E.C.T. The C.R. of 1.73 is, however, suggestive).

There is a steady reduction in the number of lifted pencils with each performance. Both distraction and re-test have been shown to improve this score. To these two facts may perhaps be added a lessening of the depression after E.C.T., which would fit in with earlier results on depressives and normals and with the continued and statistically significant drop in L.P. score between tests 2 and 3 ( $t = 2.89$ ).

The Crossed Lines score is slightly increased with distraction, which is in keeping with previous results. There is, however, a substantial drop in C.L. score after E.C.T., since re-test without E.C.T. has been shown (Table 24) to result in an increased C.L. score.

The effect of distraction on the starting and tracing times before E.C.T. is as expected from the results shown in Tables 23 and 26. Times on the ordinary form after E.C.T.

are similar to those on the distraction form before E.C.T. - the mean St.T. would have been considerably closer but for one exceptionally slow subject. Distraction certainly does not have the same speeding up effect after E.C.T as it has before; the mean of the difference between the O:D ratios pre- and post-E.C.T. being significant for both St.T. and T.T. (for St.T.  $\kappa = 2.50$ ; for T.T.  $\kappa = 4.44$ ). This finding supports the hypothesis which this experiment was designed to test.

It may be concluded, therefore, that the effect of distraction on speed of performance in the Maze test is a useful method of assessing the intensity of an affective disturbance.

Sargant (1951) writes that, after E.C.T., 'thought rumination is dispersed; recently formed attitudes lose their hold on the patient, and older established patterns of thinking are restored with the abolition of those often diametrically opposed to them which supervened during the illness'. The experiments now reported indicate that distraction may have a similar though, in the present circumstances, temporary effect. It may achieve this effect by drawing the attention away from the affective disturbance; whilst E.C.T. in some way reduces the intensity of the unpleasant affect and thus enables the activity with which it is competing to dominate consciousness more frequently than had previously been possible.

E. Summary.

- (1) Certain modifications were made in the administration and scoring of the Porteus Mazes with a view to emphasizing the temperamental factors involved in its performance. Particular attention was given to speed of performance.
- (2) Differences in performance due to sex, age and psychoneurosis were studied, and a comparison made between the results obtained from subjects suffering from different forms of psychoneurotic illness.
- (3) The test was found to differentiate more clearly between psychoneurotic groups than between psychoneurotics and normals.
- (4) The characteristic performances of psychopaths, hysterics, anxiety states, obsessionals and reactive depressives were described. Speed of performance decreased in that order.
- (5) The problem of psychomotor retardation among dysthymics was discussed briefly.
- (6) It was predicted that a certain type of distraction would temporarily obscure or break up the pattern of affective disturbance and would result in a speeding up of performance on the Maze test in the case of dysthymics, but no such speeding up in the case of non-dythymics. Both these predictions were upheld by the experimental findings.
- (7) It was predicted that after electroconvulsive therapy dysthymics would give a score pattern more akin to that of the non-dythymics. This was borne out by the experimental findings. The effect on Maze performance of distraction and E.C.T.

was, therefore, similar. An explanation in terms of partial deflection of attention was suggested.

(8) It was claimed that the effect of distraction on speed of performance and certain other scoring categories on the Maze test is a useful method of helping to assess the intensity of an affective disturbance.

## VI. INTERRELATIONSHIP OF THE TESTS.

A. Trends.

In the psychoneurotic population of the present investigation none of the four major measurements of speed - Matrices time, T.A.T. fluency, Maze total time, Maze starting time - was significantly correlated (at the 5% level of confidence) with age or with Matrices score, the highest correlation being +0.14 for Matrices time and age (one hundred and twenty-five psychoneurotics).

Groups of normal subjects were obtained for the Progressive Matrices and Maze tests, but not for the T.A.T. For one hundred subjects the correlation between Matrices time and score was +0.15. This, though not significant at the 5% level of confidence, was higher than the corresponding correlation for the psychoneurotic group (-0.04). It nevertheless tends to confirm the conclusion of Slater (1938) that the preferred rate of work is relatively independent of intelligence.

In the previous section it was noted that for sixty normal subjects Matrices score correlated +0.28 and -0.31 with Maze starting and total times respectively; for psychoneurotics the corresponding correlations were only +0.14 and -0.12. These results suggest that the more

temperamentally homogeneous the group the more will general intellectual ability affect speed of performance in these tests. Clearly, differences in preferred speed of work exist even within normal groups in which the individuals have been equated for age and intellectual ability. The differences between these preferred speeds are either exacerbated by the development of a psychoneurotic illness or they are completely overlaid. The former seems the more probable.

The correlations for the three principal speed measurements in the psychoneurotic population were as follows: Quickness on Mazes (total time) and high T.A.T. fluency +0.307 (one hundred and forty subjects); quickness on Matrices and high T.A.T. fluency +0.233 (one hundred and seventy subjects) and quickness on Matrices and Mazes +0.168 (one hundred subjects). The first two correlations are significant at the 5% level of confidence.

Allport & Vernon (1933) report an average correlation of +0.168 for fourteen speed variables in their own study, whereas the majority of studies report correlations in the region of +0.45. They attribute this discrepancy largely to differences in 'set' and to tasks which are too similar. The figures in the present investigation are clearly much closer to that given by Allport & Vernon. This perhaps lends some support to the claim with regard to the heterogeneity of the tests used.



It appears, therefore, that a psychoneurotic subject who works quickly on one of these tests will have a slight tendency to do so on the others and that his speed of work will be relatively independent of his age and of his general intellectual capacity.

A psychoneurotic group which, as a group, works quickly on one of these tests will have a strong tendency to do so on the others. On all five speed measurements - Matrices time, T.A.T. fluency and starting time, Maze total time and starting time - psychopaths and hysterics tend to be quicker than the remaining groups. Reactive depressives tend to be slower than anxiety states on all but Progressive Matrices. An insufficient number of obsessionals has been tested to enable comparison between this and other groups to be made with confidence, but it appears likely that obsessionals may be characterised principally by their slowness on Progressive Matrices. This test probably provides greater opportunities for their habitual checking and re-checking.

The characteristic performances of psychopaths and hysterics may be summarised thus:- On the Progressive Matrices they tend to work more slowly than normal subjects, but quicker than dysthymics. Relative to normal subjects they tend to have a high ratio of general intellectual ability to vocabulary; relative to dysthymics they tend to have a low ratio of general intellectual ability to vocabulary, but a high ratio of general intellectual efficiency to vocabulary.

On the Thematic Apperception Test they respond more quickly to the pictures than do the dysthymics, and speak more fluently. Psychopaths, however, tend to spend less time on the test than hysterics and to produce rather less. Hysterics are the most productive of all the groups. The content of the stories of psychopaths and hysterics is markedly different from that of dysthymics, particularly in the more frequent introduction of sex themes.

On the Maze test both groups start and then proceed to trace more slowly than normal subjects, but more quickly than dysthymics. Their scores on wavy lines, crossed lines and lifted pencils tend to fall between the extremes set up by the other psychoneurotic groups.

Anxiety states, reactive depressives and obsessionals have a high ratio of general intellectual ability and a low ratio of general intellectual efficiency to vocabulary as compared with psychopaths and hysterics. They tend, particularly the obsessionals, to work more slowly.

On the Thematic Apperception test, they all start more slowly and speak more slowly, particularly the reactive depressives who are also much less productive. The themes are lacking in dramatic quality.

On the Maze test, they all tend to start more slowly and work more slowly, again particularly the reactive depressives. Anxiety states and reactive depressives tend to lift their pencils more often, the obsessionals less often, than psychopaths and hysterics. This applies equally to the wavy lines score.

Anxiety states tend to cross more, reactive depressives and obsessionals fewer, lines than the other two groups.

When the Maze test is given under distracting conditions, anxiety states, reactive depressives and obsessionals tend to increase their speed of work, while psychopaths and hysterics tend to decrease their speed.

#### B. Anomalies.

Since the correlations between speed measurements on the tests, though positive, are not high, the interrelationship between measurements in individual cases must be considered and explanations sought for apparent anomalies. Three possible explanations at least seem to stand out:-

1. Possible differences at the physiological level. Any such differences might help to account for anomalies between members of a group. Thus a depressed patient with a high 'physiological speed' might still perform quickly on all three tests relative to depressives as a group in spite of some retardation due to the illness and conversely for the hysteric with low 'physiological speed'.

2. Fluctuations of mood. Not all anxiety states are equally anxious all the time, not all depressives are equally depressed all the time. Among hysterics partial dissociation with emotional lability is the rule. Superficial day-to-day variations in humour may coexist with the deeper, more persistent mood disorder. Such variations may account for some of the observed anomalies between the different test results of a

particular individual or even between members of a group.

3. Congruence rather than correlation. Responses to particular tests may be made in the service, as it were, of the illness. This follows very closely the Allport & Vernon principle of congruence, the integration of behavioural acts in terms of the goal they serve. The purpose of an individual neurotic may lead to his utilization of different test situations in ways which, though producing quantitatively uncorrelated results, may be congruent. A few examples, picked at random from those showing some anomalies, may help to illustrate this point.

Mrs. V.T. aged 32. Initial diagnosis: Reactive depression. Final diagnosis: Hysteria. Married, after unsatisfactory love affairs, and adopted a child, which the psychiatrist thought she might have ceased to want. (T.A.T. picture 3: Story concerned a woman horrified at finding her child had fallen down stairs and broken its neck. Protestations of love and grief followed.) Described clinically as very emotional, irritable and depressed, but with periods of calmness. Maze total time was, in this case, the only anomaly.

Mill Hill Vocabulary Grade III-. Progressive Matrices Grade III- in 38 minutes. She accepted the test situation, but showed no real interest. She needed some urging to complete the Matrices. From the fact that she completed the most difficult Set, E, in approximately the same time as D, it appeared that the problems had become too difficult for her and that effort was, at best, perfunctory. Some complaints of inability to concentrate were made. Scores falling in the same

grade on the two tests occur more frequently in hysteria than in reactive depression.

Mazes: starting time 33 secs; total time 60 (i.e: 14m. 49s.). The patient's attitude to having to return for a second session was one of surliness. This was an accentuation of her mood in the first session. In the Maze test there is a face to face relationship with the tester and an inevitable awareness of errors on the part of the subject. After a series of errors she complained "These lines seem to dazzle you, I can't think" &c. This emphasising of the agonies to which the psychologist was subjecting her was clearly an indirect expression of aggression which slowed her up very considerably.

T.A.T. starting time 27 secs; total words 4890; words per minute 39. Here the subject found ample opportunity for indirect expressions of aggression (as in picture 3 mentioned above), consequently she quickly became absorbed in the test and produced one of the longest protocols at a high fluency rate. High hysteria score (45):

Since no systematic attempt was made to predict variations from session to session, reasoning is here ex post facto even though direct observations were made at the time. In this case it does, however, appear that a sufficient explanation of the anomaly in the Mazes would be provided by a combination of mounting aggression and different forms of indirect expression of that aggression, these different forms being in part determined by possibilities inherent in each of the test situations.

Miss P.A. aged 28. Initial differential diagnosis: ?Schizophrenia ?Psychopath. Final diagnosis: Psychopath. Described as sullen and morose. Claimed auditory hallucinations of two months' duration. Anomalies: Both Maze times.

Mill Hill Vocabulary Grade III-. Progressive Matrices Grade IV in 36 minutes. Total discrepancy score 10, suggesting an invalid result. Frequent complaints of interference by voices. This slowing up process was counterbalanced by her filling up many items without much thought.

T.A.T. starting time 12 secs; total words 1695; words per minute 35. Score: (31) moderate to high hysteria (psychopathy). Produced several unusual stories, but not of the bizarre schizophrenic type.

Mazes. On arrival at the department for her third session she thought that she had to repeat the Progressive Matrices - probably because another patient, with whom she had become friendly, had to do so. She announced that it would be no use. "I wouldn't do any better. I can't concentrate because of the voices" &c. During the Maze test she frequently shut her eyes tightly, which naturally hindered her progress. The 'voices', which were telling her not to do the test, were an obvious and poorly simulated fabrication for one who had been a mental nurse. Her main purpose, of convincing the psychologist that she was hallucinated, probably explains the unduly poor Matrices performance with 'normal' speed, the high productivity and fluency on the T.A.T. (in which she was able to indulge in pseudo-bizarre thinking) and the extremely slow Maze performance.

Mrs. A.C. aged 52. Initial and final diagnosis: Chronic anxiety state with hypochondriacal features. Lived with mother to whom she was considered to be very attached, but just prior to admission she began to show a hostile attitude towards her. She was described as timid and fearful on admission; stream of talk quick in spasms. Here the slight anomaly lies in the T.A.T. times and Maze starting time.

Mill Hill Vocabulary Grade IV. Progressive Matrices Grade III- in 144 minutes. She showed considerable agitation with pressure of talk which naturally interfered with her concentration on the non-verbal problems.

Mazes. Again she showed marked agitation. She plunged rapidly into the mazes, made errors early on, reacted to her own errors by freezing up, relieved the tension by another impulsive burst and so on. Starting time 14 secs; total time 48 ( 11m. 54s).

T.A.T. Starting time 9 secs; total words 1120; words per minute 31. Whereas pressure of talk slowed her up on the non-verbal tests, on the T.A.T. it resulted in average fluency. Much of the verbiage was, however, either repetitive or irrelevant. Her first story, for example, began thus: "Is it something to do with wireless, to do with aeroplanes? Looks like a little boy studying...looks like to do with aeroplanes...the little boy has been studying aeroplanes..." Later in the story she realised that the object was, in fact, a violin. The content score of -4 placed her just in the dysthymic group. The total test diagnosis in this case was, however, agitated melancholia with hysterical features.

Miss M.Y. aged 33. Initial and final diagnosis: Reactive depression, retarded.

Mill Hill Vocabulary Grade IV. Progressive Matrices Grade IV in 37 minutes - the anomaly in this case. She was of well below average intellectual ability and was soon unable to grasp the method of working and resorted to a simple matching technique which required little thought. This example illustrates clearly the inadequacy of the test as a speed test and the necessity, for that purpose, of dealing only with problems which are successfully solved (Slater, 1938).

Mazes: Starting time 98 secs; total time 85 (2lm. 14s.). Here the effects of retardation and dullness are convergent rather than conflicting.

T.A.T. Starting time 26 secs; total words 965; words per minute 27. Responses tended to be short and descriptive only.

Mrs. E.T. aged 42. Initial diagnosis: Anxiety hysteria. Final diagnosis: Hysteria. Reported as deriving considerable pleasure from her numerous and inconstant symptoms.

Mill Hill Vocabulary Grade III-. Progressive Matrices Grade III+ in 62 minutes - the one anomaly. This subject was inordinately fond of being interviewed and gave the impression, during the Matrices session, that she was seeking to prolong the contact. She made repeated attempts to draw the tester into conversation. Her psychiatrist volunteered the information that he always felt in danger of being raped. Her over-



riding interest was certainly the discussion of her symptoms and foibles. This naturally slowed up her Matrices performance.

Mazes. Starting time 26 secs; total time 22 (5m. 23s.). Conversation during the Maze session was confined mainly to the intervals between individual mazes. The psychologist was, for example, asked to note that the subject was more successful in mazes which tended to go more from right to left than from left to right. Almost in the same breath he was given credit, undeservedly, for the fact that, being a psychologist, he would already have noted this.

T.A.T. Starting time 11 secs; total words 1350; words per minute 47. Although her chronic volubility was given full scope in the T.A.T., her productivity was only high:average. From the subsequent lengthy monologue on her symptoms, it was apparent that she regarded the test as a rather dull curtain-raiser. This may, in part, account for the fact that her Content score of -67 placed her well over on the dysthymic side. Thus, on the basis of the tests alone, the diagnosis seemed to be in doubt; clinically, on the other hand, she was undoubtedly a chronic hysteric.

## VII. CONCLUSIONS AND OUTLOOK.

Since subsidiary conclusions have been listed in the appropriate sections, it is proposed now to deal only with some of the broader conclusions and possibilities for future research.

It is claimed that the general aim of the investigation has, in part, been achieved. Considerable information concerning aspects of the intellectual, temperamental and personality characteristics of psychoneurotics has been extracted from a small battery of tests. These results have been related to clinical syndromes in a way which provides diagnostic indicators which are objective and sometimes psychologically meaningful. Unfortunately some of the results remained unexplained. In most instances provisional interpretations have been offered, which, however, require further investigation.

It has been shown that psychopaths and hysterics tend to work more quickly on widely different types of psychological tests than do anxiety states, reactive depressives or obsessionals. The last three groups are the more likely to employ the dynamism of displacement. Guilt feelings, for example, aroused in connection with problem A, tend to spread to other personal problems B, C, D &c. Confrontation with relatively impersonal problems in the form of psychological tests creates a conflict of attention. This, in turn, it has been claimed, leads to retardation. The congenial pace of the individual has been modified by his mental illness. A technique was used which was aimed at distracting attention from the personal problems, leaving the individual freer to attend to the test. This resulted in a considerable speeding up of performance.

The hysteric, on the other hand, who has succeeded in

disassociating the self from problem A may be free to attend more completely to new stimuli. The congenial pace remains relatively unmodified. Even a forbidden desire, connected with problem A, may be indulged at the daydream level - as has been shown in the T.A.T. - provided dissociation has been more or less complete.

Where, in individual cases, one or more of the preferred speed measurements have been atypical for the group to which the individual has been assigned, an attempt has been made to account for the anomaly by invoking the principle of congruence. It is fully recognised that this study follows but haltingly in this respect in the steps of Allport & Vernon. Now that at least provisional characteristic patterns of test performance have been established for different psychoneurotic groups, further research might profitably be directed to predicting, on the basis of psychiatric and social histories, the anomalies likely to occur in individual cases.

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