

THE DOTTING TEST AS A
MEASURE OF PERSONALITY:

An experiment to determine whether there is any relationship between performance on the dotting machine and certain aspects of personality.

A thesis presented by

ADA SCHERMANN

In part fulfilment of the requirements for the degree of M. Sc. in the Department of Psychology of the University of Cape Town.

November, 1946

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

It is desired to acknowledge the assistance given by the following persons during the course of this investigation:

Professor H. A. Reyburn and Mr. J. G. Taylor of the Department of Psychology, University of Cape Town, for continuous guidance and helpful advice.

Messrs. B. J. Shub, M. Dibowitz and F. P. S. Deelman of the Rex Trueform Clothing Co. Ltd., for facilities and discussions in connection with factory personnel.

Mr. Hogwood, Principal of the Hewat Training College for permission and arrangements for the interview of students.

Mr. S. Kleinman, B.Sc.(Eng.), for adaptation of the dotting machine to the needs of the experiment.

Students of the University of Cape Town and of the Hewat Training College, and workers at the Rex Trueform clothing factory, without whose willing coöperation this experiment could not have been performed.

- CONTENTS -

	Page
Introduction	4
Part I(A) - The Personality Study	7
(B) - The Dotting Test	13
Part II - Correlation between Personality and Dotting	23
Conclusion	25
References	28
Appendix	29
Personality Ratings (Europeans)	i
Personality Ratings (Non-Europeans)	ii
Dotting Scores (Europeans)	iii
Dotting Scores (Non-Europeans)	iv
Composite Dotting Scores	vi
Split Half Dotting Scores (Europeans)	vii
Split Half Dotting Scores (Non-Europeans)	x

- INTRODUCTION -

The main purpose of this investigation was to determine whether there is any relationship between performance on the dotting machine and certain aspects of personality, namely Tension, Flexibility, Nervousness and Persistence.

The urgency of the need for a purely objective non-language test of personality came to the writer's notice when she was attempting to assess factors of personality in a group of machinists in a garment factory. The questionnaire method was adopted, the test being an oral one. The questions were given in the home language of the subject, the wording being as simple as possible, as the average educational standard of the group was just over Standard V. The average age was $18\frac{3}{4}$ years, while the average I.Q. was 83. The subjects had great difficulty in understanding the questions, the majority of which had to be discussed at length before the subjects replied. On further questioning it became apparent that the subjects had not in fact understood the questions. In a group of subjects who had attained at least matriculation standard this difficulty of interpretation did not arise.

It seems obvious that in the case of subjects possessing a low educational standard together with a low mental capacity the questionnaire method has many limitations. In dealing with an educated group one can at least assume that the language of the experiment is understood, but it is suggested that in dealing with uneducated subjects the possible misinterpretation gives rise to serious doubts as to the reliability of the results.

In this study a dotting test and a personality questionnaire were given to a hundred and fifty subjects, including Europeans and Non-Europeans. The subjects were divided into three groups.

Group I was composed of fifty European students of the University of Cape Town. Students were approached at random and invited to participate in the experiment; all those requested to cooperate did so. Group II consisted of fifty Non-European students of the Hewat Training College. These students belonged to two of the college classes which happened to be available for the experiment at the time. Groups I and II each included men and women students.

Group III was composed of fifty female garment workers, both European and Non-European. The results of this group were not subjected to further treatment in view of the unreliability of the answers to the personality questionnaire, mentioned above.

Consequently the subject-matter of this study consists of two groups of fifty students each, the one being European and the other Non-European. Although the main object of the investigation was to find an objective non-language method of assessing certain personality factors, the work fell naturally into the two groups throughout. It may be of interest, therefore, to study the comparison of the results of each group in the various tests, which have consequently been presented in a manner designed to aid such comparisons. It will be observed, however, that Part II of this study, dealing with the correlation between dotting and personality, has been based on a single group of one hundred

subjects; it was thought no net advantage would result from keeping the two groups separate at this stage.

It is of interest to note that the Non-European group showed a greater interest in and keenness towards the dotting test than the European group, although the test was presented to both groups in an identical fashion. The personality questionnaires were received with some amusement by the majority of the subjects in both groups.

- PART I(A) - THE PERSONALITY STUDY -

General. The term "personality" has been defined in a variety of ways. In the days when psychology was an offshoot of philosophy personality was thought of as an unanalysable force giving direction to action and meaning to experience. This concept is far removed from the present-day attempts to define personality as a number of factors capable of definition and measurement. It is considered irrelevant to this study to present in detail the multitude of definitions relating to personality in psychological literature. It is therefore proposed to define only those factors of personality which have been measured in this study.

Source of Personality Test. The factors Tension, Flexibility, Nervousness and Persistence were chosen because it was thought that they were representative of aspects of personality that bear on performance on the dotting machine. The presence of these factors was identified by Reyburn and Taylor in a re-analysis of material collected by J. P. Guilford and R. B. Guilford in two investigations. The personality questionnaire used by the Guilfords in their first investigation was one which Guilford and Hall had prepared and used in a study of a proposed relationship between the patellar reflex and personality. It contained eighty-nine items and was designed to reveal the traits of rhythymia and thinking introversion. The test was applied to one thousand students and thirty of the items were inter-correlated. Seven factors were extracted by Thurstone's method of centroid analysis

but only six of them were identified and named. These were Rhathymia, Shyness, Habitual Thinking of a meditative sort, Liking for Thinking of the problem-solving kind, Alertness and Depression.

The questionnaire of one hundred items for the second study was designed to bring out differences in hyper-activity. This was based on Freeman's theory that "individual differences in reactivity of nervous systems furnish the physiological basis for some important differences in personality." Freeman aided in the formulation of the questionnaire which was applied to six hundred students. Twenty-four items were used in the factor analysis. Only two of the four factors revealed were identified. These were factor N - Nervousness and factor GD - General Drive, which is characterised chiefly by a pressure towards action.

In the Reyburn-Taylor analysis of this material, four factors were found to be present in both questionnaires. They are the factors Surgency, Persistence, Flexibility and Tension. The factors Sociability, Shyness, Alertness, Liking for Thinking and Interest in Action enter only into the first battery, while Nervousness and Inhibition are present only in the second battery. Reyburn and Taylor claimed their results to be more significant and more probable than those of the Guilfords because "the rotation technique for the isolation of meaningful factors relates the factors of the two studies to each other through three common items and to other factors and traits appearing in the literature of personality measurement." Their rotation procedure was less

mechanical than that of the Guilfords which was based on the concept of simple structure.

The Investigation. In this investigation the factors Tension, Flexibility, Nervousness and Persistence were measured by means of two personality questionnaires. It was hoped to include in this work the factors Alertness and Interest in Action, but the questionnaire items dealing with them were found to be too few.

Description of Factors. Tension. The person possessing a large amount of this factor does not relax easily and tends to be active. He is impulsive, over-conscientious, does not worry and is relatively unconcerned about what others think of him. He tends to waste energy, to hustle between jobs, to hurry even when he is on time, but in spite of his hustle and hurry he has not a great output under pressure. He is easily disturbed and easily startled.

Flexibility. The flexible person is quick in his actions and can do a large amount of work in a short time. He tends to be talkative, impulsive and carefree, hustling between jobs, eating quickly and hurrying in general. He is neither slow nor deliberate, and does not introspect or meditate. He does not discuss serious questions of life with his friends, nor does he analyse their motives. "The factor is, with reference to behaviour as a whole, what fluency is with regard to speech." (Reyburn and Taylor, 1943).

Nervousness. The nervous person is easily distracted and startled. He is inclined to "doodle," to have nervous habits and to express his emotions easily. He suffers from insomnia

and is made uncomfortable by changes of work.

Persistence. The persistent person does not like to change from one type of work to another. He is neither restless nor impulsive, and enjoys thinking out complicated problems.

The Questionnaires. The Guilfords' questionnaires were used, as given by Reyburn and Taylor in their paper, "Some Factors of Temperament: A Re-examination," 1943.

Marking. The subjects answered "Yes," "No" or "Sometimes," these answers being given positive, negative or zero values respectively. The questionnaire items which had a factor load of .30 or over were listed for each factor. An item with a loading of between .30 and .69 was scored as 1, while .70 or over was scored as 2. If the sign of the answer agreed with the sign of the factor load a positive score was recorded, whereas if the signs differed a negative score was given. The magnitude and sign of the factor loads were taken from Reyburn and Taylor's paper mentioned above, the factors Tension, Flexibility and Persistence being represented therein by columns VIII, V and II respectively in Table 6, and by columns V, IV and II respectively in Table 7, and Nervousness by column III in Table 7 only. Each subject's total was recorded for each factor.

Results. The tables of scores will be found on pages i and ii of the Appendix.

The means and standard deviations in respect of each factor

were calculated separately for the European group and the Non-European group, as well as in total. An attempt was made to investigate the significance of the difference between the two groups by use of the Critical Ratio, being the difference in arithmetic means expressed in terms of the standard deviation of the difference.

Personality Factor	European Group	Non-European Group	Total
Arithmetic Means			
Tension	-.70	-1.46	-1.08
Flexibility	-2.06	-1.94	-2.00
Nervousness	.26	-.58	-.16
Persistence	.70	.78	.74
Standard Deviations			
Tension	1.77	1.84	1.79
Flexibility	4.05	4.37	4.21
Nervousness	1.96	1.72	1.89
Persistence	5.41	5.46	5.44

Personality Factor	Critical Ratio
Tension	2.10
Flexibility	.14
Nervousness	2.28
Persistence	.07

Critical Ratio calculated by the formula: Critical Ratio = (Difference in arithmetic means)/(Standard deviation of difference), where the standard deviation of the difference is the square root of the sum of the squares of the standard deviations of the two group arithmetic means.

These critical ratios show that the probabilities of the occurrence of the observed differences, were they due to chance, would be 3.6 cases in 100 for the factor Tension, 88.9 in 100 for Flexibility, 2.3 in 100 for Nervousness and 94.4 in 100 for Persistence, suggesting that there may be a significant difference between the groups in the factors Tension and Nervousness.

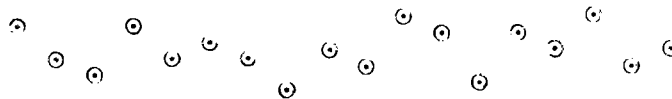
Reliability of the Personality Questionnaires. The calculation of a reliability coefficient for the questionnaire presented some difficulty. A number of methods was examined, but all were discarded. The data did not lend themselves to the split halves method; repetition of the test was considered, but it was felt that the memory factor would influence the scores; an alternative form of the test is not in existence. The members of the European group were not all known to any one person and consequently a method of ranking by impartial judges could not be used. This last method, although practicable in the case of the Non-European students (all of whom were known to one or two teachers), was discarded on the grounds of lack of objectivity. Although this method is in common use and has met with a certain amount of success, the writer is of the opinion that the correlation coefficient obtained by the comparison between a "self-rating" and rank according to a teacher, is specifically a correlation between those two sets of results and hardly a measure of the reliability of the test itself.

For these reasons, no attempt was made to measure the reliability of the questionnaires.

- PART I(B) - THE DOTTING TEST -

The Apparatus. The dotting machine used in this investigation was a portable model, the design being Rivers's modification of the McDougall machine mentioned below. Essentially the apparatus is a clockwork mechanism designed to carry a continuous strip of paper under an aperture in the lid of the machine, at a controllable speed. The aperture was rectangular in shape, being 15 mm. by 24 mm., the continuous paper strip passing immediately beneath it in a direction parallel to the shorter sides.

The paper having circles printed on it in the centre of each of which was a small dot, the task of the subject was to mark the paper in a certain manner as it passed beneath the aperture.



The circles were arranged in an irregular manner on the paper, which was 25 mm. wide. Each circle was 2 mm. in diameter, "the horizontal distance of each dot from the last (i.e. the interval in the direction of motion) being always 5 mm., the extreme lateral deviation of the dots being 15 mm., and no dot deviating by more than 7 mm. from the line of its predecessor." (Burt, 1909)

Previous Experiments. The dotting machine was originally designed by McDougall to measure sustained voluntary attention, and is described by him in a paper presented in 1905. Since its appearance in 1905 the dotting machine has been much modified, and used

particularly in the study of fatigue. Rivers re-designed it soon after it first appeared and used it to study the influence of alcohol and other drugs on fatigue. It was again used in connection with fatigue by May Smith and her findings were published in 1915 in a continuation of the paper presented by McDougall in 1905. She says that the "dotting machine proved to be a very fine indicator of the mental changes resulting from loss of sleep, alcohol, opium, strychnine and the interference of one drug with another."

In a paper "Experimental Tests of General Intelligence" presented by Cyril Burt in 1909 he gave a detailed account of a number of tests in which he included the dotting apparatus. He found that "the test which correlated most with all the other tests and consequently heads the hierarchy is the dotting test." He gave the dotting test on two occasions to a group of thirty elementary-school children and obtained a reliability coefficient of .86.

In connection with the present study the most important reference to the dotting machine is in a paper by May Smith, published in 1930, on "The Nervous Temperament." Her definition of so-called nervous temperament was "failures of emotional adjustment." Each subject was interviewed for about twenty minutes and nervous "symptoms" were recorded as well as the results of dotting performance. The McDougall-Schuster type of machine was used, in which the circles are printed spirally on a paper disc. The subject marked the circles as they appeared in an aperture

and had to mark at an increasing rate until no more dots could be marked. Five successive dots missed constituted break-down point. The method of marking adopted was the number of circles marked before break-down point was reached. She found that a correlation of $.39 \pm .03$ existed between the dotting test and the nervous symptoms in a group of clerical workers ranging in age from sixteen to sixty years. In factory workers she found the correlation between the dotting test and age to be $.30 \pm .04$, and between symptoms and dotting $.33 \pm .04$. For students the correlation between symptoms and dotting was found to be $.45 \pm .04$.

The Present Investigation. The dotting experiment was performed by the same two groups of subjects as had answered the personality questionnaires.

Each subject, having been handed a pencil, was given the following instructions:

"Please stand over here. Do you see this circle with a dot in it?" Demonstration. "I want you to draw a line starting from the centre of the circle." Demonstration. "Try to dot each one as it appears. Do not draw a line through the circle." Demonstration. "The direction of the line does not matter. You will be told when to start and when to stop. Are you ready? Begin."

The subjects were tested at six different speeds for periods of twenty seconds each; a stop-watch was used to time each performance. The speeds were chosen so that everyone obtained

one hundred per cent. correct in the first test, and no one scored one hundred per cent. in the last test. The speeds used were:

Test 1	-	60	dots	per	minute
2	-	108	"	"	"
3	-	138	"	"	"
4	-	165	"	"	"
5	-	180	"	"	"
6	-	195	"	"	"

The time twenty seconds was chosen as it was considered short enough to exclude the possibility of fatigue, especially in conjunction with the short pauses in between the tests while the speed was being adjusted.

Marking. It was found necessary to neglect a number of dots at the beginning of each test, due to the fact that the dotting machine required to run for a short time before attaining the particular speed set. The number of dots actually marked for each test was:

Test 1	-	15	dots
2	-	30	"
3	-	40	"
4	-	50	"
5	-	50	"
6	-	50	"

A response was considered to be correct if the pencil line started either within or on the perimeter of the circle. A wrong response was one in which the pencil line did not touch the circle or fall within it. The number of correct responses, the number of wrong responses and the number of omissions were recorded for each subject in each of the six tests. The detailed results will be found on pages iii, iv and v of the Appendix.

The direction of the pencil line was also noted, as well as remarks, giggles, biting of the lip and any other reaction of the subject. In particular, as the subjects were unaware that the speed would be increased from test to test, careful watch was kept for any sign of speed shock at the beginning of the second test.

It was thought advisable to attempt to derive a composite measure of dotting performance. After consideration it appeared that two such measures would possibly be of use, the one being a standard of correct performance, the other a measure based on the number of dots omitted. The former was arrived at by assigning a score to each subject, this score being the number of the highest test in which at least seventy-five per cent. of the dots were correctly marked. Similarly the latter measure was the number of the highest test in which not more than six per cent. of the dots were omitted. These percentages were chosen after an examination of the data had shown that they would give a reasonable spread of scores. The scores yielded by these two measures will be found on page vi of the Appendix.

Results. The means and standard deviations in respect of each of the six tests were calculated separately for each of the three sets of marks, number right, number wrong and number omitted. The results are given separately for the European group and the Non-European group, as well as in total.

In the tables below all the figures are expressed as percen-

tages in order to facilitate comparisons.

Test Number	European Group	Non-European Group	Total
%age right - Arithmetic Means			
1	100.00	100.00	100.00
2	89.80	87.00	88.40
3	72.60	69.40	71.00
4	51.76	50.00	50.88
5	47.04	43.80	45.42
6	40.56	33.84	37.20
- Standard Deviations			
1	0.00	0.00	0.00
2	16.02	17.35	16.76
3	20.81	23.26	22.12
4	21.85	23.70	22.81
5	22.48	22.66	22.63
6	20.96	20.45	20.98
%age wrong - Arithmetic Means			
1	0.00	0.00	0.00
2	3.20	5.53	4.37
3	15.00	12.85	13.92
4	26.00	18.28	22.14
5	28.92	21.08	25.00
6	27.20	23.80	25.50
- Standard Deviations			
1	0.00	0.00	0.00
2	6.04	11.50	9.26
3	13.88	14.58	14.28
4	17.89	15.95	17.39
5	18.25	17.54	18.32
6	16.30	18.14	17.33

Test Number	European Group	Non-European Group	Total
%age omitted - Arithmetic Means			
1	0.00	0.00	0.00
2	7.00	7.47	7.23
3	12.40	17.75	15.08
4	22.24	31.72	26.98
5	24.04	35.12	29.58
6	32.24	42.36	37.30
- Standard Deviations			
1	0.00	0.00	0.00
2	14.55	12.99	13.79
3	18.98	19.04	19.20
4	22.91	22.13	23.02
5	21.14	22.01	22.28
6	23.98	22.53	23.81

The following table shows the results of the composite dotting scores:

Test Description	European Group	Non-European Group	Total
Arithmetic Means			
75% Right	2.80	2.64	2.72
6% Omitted	3.54	2.66	3.10
Standard Deviations			
75% Right	1.34	1.35	1.35
6% Omitted	1.84	1.60	1.78

It will be seen from the above tables that, as might have been expected, the correctness of dotting diminishes with an increase in speed; on the other hand the number of dots incorrectly marked as well as the number omitted increase as speed

increases.

Examining the results from the point of view of a comparison between the European group and the Non-European group, it will be seen that the average number of dots correctly marked is consistently higher for the former group. Further, it will be observed that in tests 3, 4, 5 and 6 the European group also has a higher average of wrongly marked dots. The higher figures for Non-Europeans in the number of dots omitted, therefore, may be interpreted as meaning that this group attempted less dots than the other, which fact should be borne in mind when examining the differences in the number right and number wrong. These tendencies are supported by the results of the composite dotting tests.

As was done in the treatment of the measures of personality, the significance of the difference between the European and the Non-European groups was examined in the light of critical ratios.

Test No.	Right		Wrong		Omitted	
	Critical Ratio	Probability %	Critical Ratio	Probability %	Critical Ratio	Probability %
1	-	-	-	-	-	-
2	.84	40.10	1.27	20.42	.17	86.50
3	.73	46.55	.76	44.74	1.41	15.86
4	.39	69.66	2.28	2.26	2.10	3.57
5	.72	47.17	2.19	2.86	2.57	1.02
6	1.62	10.53	.99	32.23	2.17	3.01

Test Description	Critical Ratio	Probability %
75% Right	.59	55.53
6% Omitted	2.56	1.05

The columns headed "Probability %" in the above tables show the number of times that differences at least as large as those observed would be expected to occur in one hundred cases, were the occurrences due to chance.

Reliability of the Dotting Test. The reliability of the test was calculated by the split halves method. As the odd-even method of scoring introduces a bias on the odd results, the 1st, 4th, 5th, 8th, 9th, etc. dots were chosen to constitute one half of each test, the other half consisting of the 2nd, 3rd, 6th, 7th, etc. dots. The number right, number wrong and number omitted were recorded for both halves in each test, without however distinguishing between the European and Non-European groups, the product-moment correlation coefficient being calculated for corresponding halves in every case. The split-half scores will be found on pages vii to xiii of the Appendix.

The following table gives the correlation coefficients as a measure of reliability:

Test Number	Number Right	Number Wrong	Number Omitted
1	1.00	1.00	1.00
2	.91	.81	.90
3	.84	.81	.94
4	.91	.89	.93
5	.91	.88	.93
6	.92	.84	.93

The Spearman-Brown correction for length, $\frac{2r}{1+r}$, where r is the correlation coefficient as given above, was applied, giving the following amended figures for reliability:

Test Number	Number Right	Number Wrong	Number Omitted
1	1.00	1.00	1.00
2	.96	.90	.95
3	.92	.90	.97
4	.96	.94	.96
5	.95	.93	.96
6	.96	.91	.96

These results indicate a high degree of reliability attaching to the dotting test.

- PART II - CORRELATION BETWEEN PERSONALITY AND DOTTING -

The product-moment coefficient of correlation was calculated between each personality factor and each aspect of dotting tests 3 to 6 inclusive, as well as the composite measures of dotting. The following table shows the correlation coefficients, the figures in brackets being the probable errors thereof.

Test	Tension	Flexibility	Nervousness	Persistence
3 - Right	-.19 (.07)	.01 (.07)	.02 (.07)	.06 (.07)
Wrong	-.03 (.07)	-.05 (.07)	-.13 (.07)	.03 (.07)
Omitted	.23 (.06)	.02 (.07)	.09 (.07)	-.09 (.07)
4 - Right	-.07 (.07)	.06 (.07)	.04 (.07)	.08 (.07)
Wrong	-.15 (.07)	-.16 (.07)	-.10 (.07)	.01 (.07)
Omitted	.16 (.07)	.04 (.07)	.06 (.07)	-.05 (.07)
5 - Right	-.09 (.07)	.02 (.07)	.00 (.07)	.09 (.07)
Wrong	-.15 (.07)	-.08 (.07)	.00 (.07)	-.01 (.07)
Omitted	.19 (.07)	.05 (.07)	.08 (.07)	-.10 (.07)
6 - Right	.00 (.07)	.03 (.07)	.06 (.07)	.07 (.07)
Wrong	-.18 (.07)	-.06 (.07)	-.07 (.07)	-.02 (.07)
Omitted	.12 (.07)	.01 (.07)	.03 (.07)	-.04 (.07)
75% Right	-.11 (.07)	.07 (.07)	-.01 (.07)	.03 (.07)
6% Omitted	-.25 (.06)	-.05 (.07)	-.08 (.07)	.17 (.07)

It will be seen that no correlation coefficient in the above table is such as to justify any dogmatic assertion as to the existence of a particular relationship. In spite of this, however, certain features do call for some attention.

It will be observed that there is a consistent positive correlation between Tension and the number of dots omitted in the various tests, which does not exceed $.23 \pm .06$. The tendency

suggested by this feature is supported by the correlation of $-.25 \pm .06$ between Tension and the second composite dotting test. It will be remembered that the test described above as "6% Omitted" assigned to each subject the number of the highest dotting test in which not more than 6% of the dots were omitted; a correlation of low scores in this test, therefore, with high scores for the personality factor Tension indicates that a person having the qualities associated with that factor has a tendency to omit more dots.

It will also be seen that there is a correlation of $.17 \pm .07$ between Persistence and the composite score "6% Omitted." This indicates that the persistent person makes more attempts at dotting, which fact is supported in the correlation table by the suggestion of a negative tendency to omit dots in tests 3 to 6.

As regards Nervousness and Flexibility, no significant correlations occur, although a suggestion of negative correlation may be seen between Flexibility and the number wrong in tests 3 to 6.

It may be mentioned that all the above tendencies are indicated by the correlations only to a very small extent. Undue weight should not be attached to these features, which are noticeable only in the absence of any more significant results in the table.

It should perhaps be pointed out that the probable error of $.07$ encountered in almost all the values in the above table

represents the maximum value of the probable error of the coefficient of correlation, to the number of significant figures employed, where the number of cases is one hundred.

Conclusion. The correlations do not admit of any conclusions being drawn concerning Flexibility, Nervousness or Persistence.

It is felt that the length of the test has an important bearing on the results, particularly those of Persistence, and that the factor of length has contributed to the lack of correlation between Persistence and dotting. It is suggested that the test was not long enough to allow the factor to influence dotting performance, for after a time the non-persistent person, in accordance with the definition of persistence, will want to change to another task, whereas the persistent person will persevere with the task in hand. At this point the difference between the persistent and non-persistent subject would become apparent. The writer is of the opinion that this stage was not reached, for at the end of the test most of the subjects would willingly have continued, showing that the task still held an interest for them.

A possible line of future investigation in connection with this might be to test each subject in relation to his capacity at a uniform speed. It would first be necessary to determine the highest speed at which each subject omitted not more than 6% of dots (as given in the table on page vi of the Appendix). Having determined this, each subject would be tested at his own particular speed until a break-down (at least five successive dots omitted) occurred. The standard of difficulty for all subjects having been

equated, the quality of Persistence might appear.

In so far as Nervousness is concerned, it will be recalled that the experimenter noted nervous signs such as giggling, biting of the lip and trembling, displayed by the subjects during the dotting performance. Arbitrary scores were assigned to these subjective evaluations of Nervousness, and were correlated with the two composite dotting scores. In the case of the "75% Right" score, a correlation coefficient of $.27 \pm .05$ was obtained, and in the case of the "6% Omitted" score, a correlation of $.20 \pm .07$. The possibility should be envisaged, therefore, that the personality questionnaires were not quite adequate in so far as this factor is concerned, possibly because the results are dependent on self-evaluation. Consequently the lack of correlation between dotting and Nervousness as measured by the personality questionnaires should not be taken as conclusive evidence that some sort of relationship does not exist, and the dotting machine should not be hastily discarded as an indicator of this trait. It is of interest to observe that May Smith's results mentioned on page 15 above confirm the positive correlation between Nervousness and dotting performance.

Turning now to Flexibility, there does not appear to be any reason why a significant relationship should exist between this factor and dotting. A flexible person would be expected to excel when faced with a situation involving continual reorientation of behaviour. The dotting test is not such a situation, and it is doubtful whether it could be varied so as to provide the necessary

conditions.

The dotting test may therefore be regarded tentatively as an indicator of Tension. If this conclusion is substantiated by further investigation, the dotting test may prove to be of practical value in a battery of selection tests in industry; a high proportion of dots attempted in the test (indicating a person lacking in Tension) would be a guide to the subject's ability to do a large amount of work in a short time without unnecessary wastage or misdirection of energy. As an industrial test, the dotting test has a number of advantages. Firstly, it is objective; secondly, it is reliable; thirdly, it takes a short time to administer; and fourthly, it captures the interest of the subject.

The writer feels, however, that before any practical benefits can be derived from the dotting machine, physical attributes such as dexterity and reaction time must be carefully and exhaustively studied, together with sex and age. Allowances for these factors will have to be made before the dotting machine can be included in the test equipment of the industrial psychologist.

Although no conclusive evidence regarding a relationship between dotting and personality has been obtained from this investigation, there are sufficient indications to encourage future work along the lines suggested.

- REFERENCES -

- Louis P. Thorpe: "Psychological Foundations of Personality." (1938)
- Gordon W. Allport: "Personality - A Psychological Interpretation" (1937)
- H. A. Reyburn and J. G. Taylor: "Some Factors of Temperament: A Re-examination." Psychometrika, Volume 8, page 91, (1943)
- J. P. Guilford and R. B. Guilford: "Personality Factors D, R, T and A." Journal of Abnormal and Social Psychology, Volume 34, page 21. (1939)
- J. P. Guilford and R. B. Guilford: "Personality Factors N and GD." Journal of Abnormal and Social Psychology, Volume 34, page 239. (1939)
- J. P. Guilford and R. C. Hall: "The Patellar Reflex and Personality." Journal of Abnormal and Social Psychology, Volume 32. (1937)
- H. A. Reyburn and J. G. Taylor: "On the Interpretation of Common Factors: A Criticism and a Statement." Psychometrika, Volume 8, page 53. (1943)
- Cyril Burt: "Experimental Tests of General Intelligence." British Journal of Psychology, Volume 3, page 153. (1909-10)
- W. McDougall: "On a New Method for the Study of Concurrent Mental Operations and of Mental Fatigue." British Journal of Psychology, Volume 1, Part 4. (1904-5)
- May Smith: "A Contribution to the Study of Fatigue." British Journal of Psychology, Volume 8. (1916)
- May Smith: "The Nervous Temperament. Its Definition and History: Its Expression in Industry and Importance from the Point of View of Health and Efficiency." British Journal of Psychology - Medical Section, Volume 10, page 99. (1930)

- - - - -

- A P P E N D I X -

PERSONALITY RATINGS FOR EUROPEAN GROUP.

T - Tension
 F - Flexibility
 N - Nervousness
 P - Persistence

Subject Number:	T	F	N	P	Subject Number:	T	F	N	P
1	3	3	-2	4	26	-2	-1	0	3
2	-2	-8	-1	2	27	-2	-8	0	10
3	-3	4	-2	5	28	-4	-1	-2	4
4	1	-11	-4	3	29	-3	-2	-3	9
5	-2	3	2	-2	30	-3	-5	0	7
6	0	0	-2	2	31	-1	5	3	-2
7	0	5	-3	5	32	3	0	-2	-5
8	1	1	1	-9	33	-1	-5	2	6
9	0	3	1	-7	34	-3	-5	-2	6
10	1	-2	1	3	35	1	0	2	3
11	1	-2	2	-4	36	-2	-11	0	0
12	1	-2	0	-2	37	-2	-7	0	7
13	-2	-3	-4	3	38	-1	-5	0	8
14	-1	4	4	5	39	-3	-8	-1	0
15	-1	1	0	0	40	-3	-1	1	1
16	-1	-1	1	-5	41	0	0	0	4
17	-1	1	-1	-5	42	0	1	4	-10
18	0	-4	0	-5	43	-2	-7	0	6
19	1	2	0	-6	44	1	-3	2	0
20	1	-8	1	-3	45	2	2	3	-9
21	0	2	0	4	46	0	-7	3	-7
22	2	-1	0	-4	47	2	-7	1	0
23	-1	-4	1	6	48	-2	-1	3	-6
24	-2	-4	2	9	49	-3	-5	-1	-3
25	-2	-3	-1	8	50	-1	-2	4	-6

PERSONALITY RATINGS FOR NON-EUROPEAN GROUP.

T - Tension
 F - Flexibility
 N - Nervousness
 P - Persistence

Subject Number:	T	F	N	P	Subject Number:	T	F	N	P
1	-1	4	-3	-3	26	-1	0	2	-7
2	-1	-1	-1	-4	27	-1	-3	1	-4
3	0	-10	-1	-6	28	3	-4	1	-10
4	1	-2	-1	-3	29	-4	-4	-1	5
5	-4	-7	-1	5	30	0	0	-2	1
6	0	-10	0	5	31	-1	-1	-2	8
7	1	0	-1	-2	32	-2	1	3	-6
8	-2	-3	-1	8	33	2	-11	1	1
9	-1	0	0	-10	34	-3	4	-1	3
10	1	5	-1	3	35	-1	4	0	-5
11	-2	2	2	9	36	-2	2	-1	-1
12	-1	-2	-1	-2	37	2	-3	2	-5
13	-1	-5	-4	6	38	-1	7	0	-6
14	-1	3	-2	6	39	-2	-4	1	-4
15	-4	-6	-2	-5	40	-3	-5	-4	-3
16	-3	-4	-1	3	41	-4	-10	1	10
17	0	0	1	-1	42	-4	-1	3	-2
18	-2	-4	-3	3	43	-2	2	1	1
19	-2	0	1	8	44	0	-9	0	0
20	-1	2	0	6	45	-4	2	-4	11
21	-3	4	0	9	46	-4	-4	-4	8
22	-3	-3	-2	0	47	-4	-2	-2	8
23	-4	1	0	6	48	-2	-1	0	1
24	0	-10	-2	-3	49	1	-3	0	2
25	-3	3	1	-2	50	0	-7	-2	-4

DOTTING SCORES FOR EUROPEAN GROUP.

R - Number right
 W - Number wrong
 O - Number omitted

Subject Number:	Test 1			Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
1	15	0	0	30	0	0	37	3	0	37	8	5	37	4	9	31	9	10
2	15	0	0	30	0	0	39	1	0	34	12	4	29	11	10	18	11	21
3	15	0	0	30	0	0	28	12	0	28	16	6	8	26	16	8	14	28
4	15	0	0	28	2	0	29	10	1	29	16	5	29	19	2	37	10	3
5	15	0	0	27	3	0	22	17	1	33	10	7	11	36	3	17	20	13
6	15	0	0	30	0	0	32	2	6	38	8	4	39	8	3	27	14	9
7	15	0	0	13	4	13	15	1	24	8	8	34	12	4	34	11	6	33
8	15	0	0	12	1	17	9	5	26	14	2	34	14	3	33	7	3	40
9	15	0	0	30	0	0	33	6	1	25	21	4	28	16	6	16	30	4
10	15	0	0	20	1	9	21	1	18	25	2	23	24	2	24	17	2	31
11	15	0	0	28	2	0	25	15	0	30	19	1	25	24	1	20	30	0
12	15	0	0	27	3	0	27	0	13	20	4	26	14	24	12	21	21	8
13	15	0	0	25	0	5	23	4	13	20	3	27	19	4	27	13	8	29
14	15	0	0	14	0	16	16	0	24	14	1	35	18	1	31	17	0	33
15	15	0	0	30	0	0	32	5	3	17	14	19	32	3	15	26	6	18
16	15	0	0	26	4	0	30	10	0	36	14	0	12	26	12	9	15	26
17	15	0	0	19	0	11	24	1	15	20	1	29	21	4	25	14	6	30
18	15	0	0	30	0	0	12	21	7	14	30	6	8	27	15	18	18	14
19	15	0	0	30	0	0	35	5	0	34	15	1	42	8	0	42	5	3
20	15	0	0	30	0	0	26	10	4	17	23	10	15	21	14	6	23	21
21	15	0	0	24	5	1	12	22	6	6	22	22	6	23	21	6	19	25
22	15	0	0	30	0	0	29	8	3	14	29	7	21	24	5	12	29	9
23	15	0	0	21	1	8	18	7	15	11	14	25	9	16	25	10	13	27
24	15	0	0	30	0	0	36	4	0	43	7	0	39	11	0	37	12	1
25	15	0	0	28	2	0	29	11	0	8	12	30	14	15	21	9	16	25
26	15	0	0	30	0	0	36	3	1	21	18	11	15	25	10	20	17	13
27	15	0	0	28	2	0	24	15	1	14	33	3	15	28	7	12	19	19
28	15	0	0	29	1	0	34	6	0	14	35	1	18	29	3	18	31	1
29	15	0	0	30	0	0	39	1	0	33	14	3	35	10	5	15	22	13
30	15	0	0	30	0	0	38	1	1	34	8	8	12	27	11	12	16	22
31	15	0	0	30	0	0	40	0	0	50	0	0	45	5	0	44	5	1
32	15	0	0	30	0	0	36	4	0	40	10	0	22	21	7	29	9	12
33	15	0	0	28	0	2	27	13	0	16	32	2	8	25	17	7	18	25
34	15	0	0	30	0	0	27	11	2	22	24	4	28	15	7	34	13	3
35	15	0	0	30	0	0	40	0	0	43	7	0	35	12	3	22	24	4

Subject Number:	Test 1			Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
36	15	0	0	30	0	0	33	7	0	32	18	0	34	11	5	15	14	21
37	15	0	0	30	0	0	38	2	0	44	5	1	45	5	0	34	15	1
38	15	0	0	28	2	0	34	6	0	43	7	0	33	17	0	31	19	0
39	15	0	0	24	3	3	32	5	3	21	9	20	26	14	10	29	0	21
40	15	0	0	30	0	0	34	6	0	30	20	0	25	24	1	28	20	2
41	15	0	0	19	10	1	17	16	7	11	14	25	15	14	21	14	2	34
42	15	0	0	30	0	0	38	2	0	30	19	1	39	11	0	47	3	0
43	15	0	0	30	0	0	40	0	0	25	20	5	35	12	3	27	12	11
44	15	0	0	29	1	0	37	3	0	42	8	0	49	1	0	34	16	0
45	15	0	0	30	0	0	30	3	7	29	2	19	17	4	29	12	4	34
46	15	0	0	23	0	7	19	1	20	21	0	29	16	3	31	14	5	31
47	15	0	0	19	1	10	16	2	22	21	5	24	14	4	32	12	5	33
48	15	0	0	28	0	2	35	5	0	27	9	14	18	11	21	15	13	22
49	15	0	0	30	0	0	35	5	0	36	13	1	30	19	1	24	26	0
50	15	0	0	30	0	0	34	2	4	20	9	21	21	16	13	16	12	22

DOTTING SCORES FOR NON-EUROPEAN GROUP.

1	15	0	0	26	1	3	35	4	1	31	13	6	18	16	16	15	12	23
2	15	0	0	29	1	0	31	2	7	26	1	23	24	4	22	25	3	22
3	15	0	0	30	0	0	40	0	0	45	3	2	32	12	6	20	13	17
4	15	0	0	26	2	2	15	11	14	12	13	22	7	21	22	5	21	24
5	15	0	0	10	20	0	20	20	0	6	39	5	7	34	9	4	30	16
6	15	0	0	19	5	6	14	10	16	13	13	24	11	10	29	7	16	27
7	15	0	0	23	7	0	15	21	4	5	22	23	6	24	20	4	23	23
8	15	0	0	30	0	0	33	2	5	26	4	20	22	4	24	21	5	24
9	15	0	0	26	0	4	22	2	16	19	7	24	21	8	21	11	9	30
10	15	0	0	25	2	3	36	3	1	48	2	0	25	18	7	5	22	23
11	15	0	0	27	3	0	29	10	1	26	10	14	22	9	19	11	15	24
12	15	0	0	30	0	0	23	5	12	17	8	25	10	12	28	5	14	31
13	15	0	0	22	8	0	10	18	12	10	14	26	5	17	28	8	9	33
14	15	0	0	20	3	7	15	9	16	17	9	24	15	6	29	8	12	30
15	15	0	0	26	4	0	31	9	0	23	27	0	21	29	0	12	38	0
16	15	0	0	30	0	0	36	4	0	38	11	1	25	23	2	17	31	2
17	15	0	0	30	0	0	33	5	2	24	10	16	17	11	22	19	8	23
18	15	0	0	29	1	0	37	3	0	45	4	1	35	9	6	38	7	5
19	15	0	0	30	0	0	40	0	0	48	2	0	49	1	0	46	4	0
20	15	0	0	24	0	6	24	2	14	18	9	23	19	4	27	12	9	29
21	15	0	0	26	0	4	23	3	14	27	6	17	24	10	16	11	14	25
22	15	0	0	30	0	0	40	0	0	33	17	0	26	19	5	20	20	10
23	15	0	0	30	0	0	34	6	0	16	12	22	13	12	25	18	4	28
24	15	0	0	30	0	0	28	9	3	20	14	16	10	19	21	14	12	24
25	15	0	0	22	8	0	19	21	0	22	25	3	10	33	7	9	37	4

Subject Number:	Test 1			Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
26	15	0	0	30	0	0	30	1	9	28	4	18	22	7	21	24	4	22
27	15	0	0	30	0	0	27	6	7	18	10	22	21	7	22	13	8	29
28	15	0	0	30	0	0	40	0	0	35	10	5	38	4	8	21	18	11
29	15	0	0	30	0	0	39	0	1	42	6	2	44	4	2	29	14	7
30	15	0	0	30	0	0	40	0	0	49	1	0	49	1	0	47	3	0
31	15	0	0	30	0	0	40	0	0	35	4	11	33	7	10	37	8	5
32	15	0	0	27	0	3	29	0	11	25	2	23	31	8	11	30	12	8
33	15	0	0	21	7	2	26	5	9	18	10	22	15	16	19	17	6	27
34	15	0	0	29	1	0	29	7	4	25	18	7	26	11	13	19	13	18
35	15	0	0	24	3	3	27	9	4	17	13	20	14	12	24	12	13	25
36	15	0	0	30	0	0	27	13	0	29	18	3	16	30	4	13	26	11
37	15	0	0	25	0	5	23	0	17	23	2	25	18	2	30	19	0	31
38	15	0	0	29	0	1	21	0	19	14	0	36	10	1	39	16	0	34
39	15	0	0	30	0	0	37	0	3	10	15	25	20	7	23	12	13	25
40	15	0	0	24	0	6	13	14	13	13	16	21	18	13	19	12	10	28
41	15	0	0	16	0	14	14	1	25	17	0	33	16	0	34	12	0	38
42	15	0	0	30	0	0	40	0	0	50	0	0	36	6	8	30	10	10
43	15	0	0	26	1	3	20	4	16	20	8	22	18	9	23	14	7	29
44	15	0	0	27	0	3	23	0	17	22	0	28	16	0	34	18	0	32
45	15	0	0	25	0	5	39	0	1	36	2	12	50	0	0	25	5	20
46	15	0	0	30	0	0	36	4	0	39	11	0	40	9	1	28	19	3
47	15	0	0	30	0	0	40	0	0	24	1	25	28	1	21	16	3	31
48	15	0	0	30	0	0	20	6	14	21	0	29	16	3	31	8	6	36
49	15	0	0	13	1	16	15	0	25	19	0	31	15	0	35	5	2	43
50	15	0	0	9	5	16	10	8	22	3	11	36	11	4	35	4	7	39

- - - - -

COMPOSITE DOTTING SCORES.

- R - Highest test number in which at least 75% of dots were marked correctly.
- O - Highest test number in which not more than 6% of dots were omitted.

EUROPEAN GROUP						NON-EUROPEAN GROUP					
Subject Number:	R	O	Subject Number:	R	O	Subject Number:	R	O	Subject Number:	R	O
1	3	3	26	3	3	1	3	3	26	3	2
2	3	3	27	2	4	2	3	2	27	2	2
3	2	3	28	3	6	3	4	4	28	3	3
4	2	6	29	3	4	4	2	2	29	5	5
5	2	5	30	3	3	5	1	3	30	6	6
6	5	5	31	6	6	6	1	1	31	3	3
7	1	1	32	4	4	7	2	2	32	2	1
8	1	1	33	2	4	8	3	2	33	1	1
9	3	3	34	2	6	9	2	1	34	2	2
10	1	1	35	4	5	10	4	4	35	2	1
11	3	6	36	3	4	11	2	3	36	2	4
12	2	2	37	5	6	12	1	2	37	2	1
13	2	1	38	4	6	13	2	2	38	2	2
14	1	1	39	3	3	14	1	1	39	3	2
15	3	3	40	3	6	15	3	6	40	2	1
16	3	4	41	1	2	16	4	6	41	1	1
17	1	1	42	6	6	17	3	3	42	4	4
18	2	2	43	3	5	18	6	4	43	2	1
19	6	6	44	5	6	19	6	6	44	2	1
20	2	2	45	3	2	20	2	1	45	5	5
21	2	2	46	2	1	21	2	1	46	5	6
22	2	2	47	1	1	22	3	4	47	3	3
23	1	1	48	3	3	23	3	3	48	2	2
24	5	6	49	3	6	24	2	2	49	1	1
25	2	3	50	3	2	25	1	4	50	1	1

- - - - -

SPLIT HALF DOTTING SCORES FOR EUROPEAN GROUP.

R - Number right
 W - Number wrong
 O - Number omitted

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
1	15	0	0	18	2	0	20	3	2	19	3	3	16	6	3
	15	0	0	19	1	0	17	5	3	18	1	6	15	3	7
2	15	0	0	20	0	0	18	4	3	15	4	6	8	6	11
	15	0	0	19	1	0	16	8	1	14	7	4	10	5	10
3	15	0	0	14	6	0	14	8	3	5	13	7	6	7	12
	15	0	0	14	6	0	14	8	3	3	13	9	2	7	16
4	14	1	0	14	6	0	14	7	4	14	11	0	22	2	1
	14	1	0	15	4	1	15	9	1	15	8	2	15	8	2
5	13	2	0	9	10	1	15	7	3	5	19	1	7	10	8
	14	1	0	13	7	0	18	3	4	6	17	2	10	10	5
6	15	0	0	16	1	3	20	2	3	19	4	2	14	9	2
	15	0	0	16	1	3	18	6	1	20	4	1	13	5	7
7	7	2	6	6	1	13	3	4	18	7	0	18	6	4	15
	6	2	7	9	0	11	5	4	16	5	4	16	5	2	18
8	7	0	8	5	2	13	7	1	17	7	1	17	4	1	20
	5	1	9	4	3	13	7	1	17	7	2	16	3	2	20
9	15	0	0	18	2	0	13	9	3	14	7	4	10	15	0
	15	0	0	15	4	1	12	12	1	14	9	2	6	15	4
10	9	1	5	11	0	9	11	1	13	13	2	10	8	2	15
	11	0	4	10	1	9	14	1	10	11	0	14	9	0	16
11	14	1	0	12	8	0	16	9	0	13	11	1	10	15	0
	14	1	0	13	7	0	14	10	1	12	13	0	10	15	0
12	13	2	0	12	8	0	9	3	13	7	12	6	11	11	3
	14	1	0	15	5	0	11	1	13	7	12	6	10	10	5
13	12	0	3	12	2	6	8	3	14	9	2	14	7	2	16
	13	0	2	11	2	7	12	0	13	10	2	13	6	6	13
14	7	0	8	8	0	12	7	1	17	10	1	14	10	0	15
	7	0	8	8	0	12	7	0	18	8	0	17	7	0	18

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
44	14	0	1	12	0	8	11	0	14	6	0	19	9	0	16
	13	0	2	11	0	9	11	0	14	10	0	15	9	0	16
45	13	0	2	19	0	1	19	1	5	25	0	0	12	3	10
	12	0	3	20	0	0	17	1	7	25	0	0	13	2	10
46	15	0	0	19	1	0	20	5	0	21	3	1	14	11	0
	15	0	0	17	3	0	19	6	0	19	6	0	14	8	3
47	15	0	0	20	0	0	12	1	12	14	1	10	8	0	17
	15	0	0	20	0	0	12	0	13	14	0	11	8	3	14
48	15	0	0	9	4	7	10	0	15	8	1	16	5	3	17
	15	0	0	11	2	7	11	0	14	8	2	15	3	3	19
49	7	0	8	7	0	13	10	0	15	9	0	16	4	1	20
	6	1	8	8	0	12	9	0	16	6	0	19	1	1	23
50	4	3	8	4	4	12	2	7	16	6	2	17	2	2	21
	5	2	8	6	4	10	1	4	20	5	2	18	2	5	18

It will be noticed that split half scores are not given for Test 1. As each subject obtained one hundred per cent. correct in this test, it was not necessary to apply the split halves method.

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	0	R	W	0	R	W	0	R	W	0	R	W	0
15	15	0	0	15	3	2	8	5	12	16	1	8	14	3	8
	15	0	0	17	2	1	9	9	7	16	2	7	12	3	10
16	12	3	0	15	5	0	16	9	0	8	13	4	6	7	12
	14	1	0	15	5	0	20	5	0	4	13	8	3	8	14
17	8	0	7	11	1	8	10	1	14	10	3	12	6	3	16
	11	0	4	13	0	7	10	0	15	11	1	13	8	3	14
18	15	0	0	5	12	3	8	15	2	4	12	9	9	9	7
	15	0	0	7	9	4	6	15	4	4	14	6	9	9	7
19	15	0	0	18	2	0	17	7	1	21	4	0	20	3	2
	15	0	0	17	3	0	17	8	0	21	4	0	22	2	1
20	15	0	0	14	5	1	7	13	5	7	10	8	1	14	10
	15	0	0	12	5	3	10	10	5	8	11	6	5	9	11
21	11	3	1	5	13	2	2	10	13	3	11	11	4	10	11
	13	2	0	7	9	4	4	12	9	3	12	10	2	9	14
22	15	0	0	16	3	1	8	13	4	10	12	3	6	14	5
	15	0	0	13	5	2	6	16	3	11	12	2	6	15	4
23	11	1	3	9	4	7	5	6	14	3	10	12	7	5	13
	10	0	5	9	3	8	6	8	11	6	6	13	3	8	14
24	15	0	0	18	2	0	21	4	0	19	6	0	19	5	1
	15	0	0	18	2	0	22	3	0	20	5	0	18	7	0
25	15	0	0	17	3	0	3	5	17	5	10	10	5	8	12
	13	2	0	12	8	0	5	7	13	9	5	11	4	8	13
26	15	0	0	19	1	0	12	9	4	8	14	3	10	9	6
	15	0	0	17	2	1	9	9	7	7	11	7	10	8	7
27	13	2	0	11	8	1	8	15	2	7	13	5	6	11	8
	15	0	0	13	7	0	6	18	1	8	15	2	6	8	11
28	15	0	0	16	4	0	8	16	1	9	15	1	9	16	0
	14	1	0	18	2	0	6	19	0	9	14	2	9	15	1
29	15	0	0	20	0	0	16	7	2	16	6	3	9	10	6
	15	0	0	19	1	0	17	7	1	19	4	2	6	12	7
30	15	0	0	19	1	0	18	3	4	5	14	6	6	10	9
	15	0	0	19	0	1	16	5	4	7	13	5	6	6	13

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
31	15	0	0	20	0	0	25	0	0	22	3	0	23	2	0
	15	0	0	20	0	0	25	0	0	23	2	0	21	3	1
32	15	0	0	17	3	0	21	4	0	10	12	3	14	3	8
	15	0	0	19	1	0	19	6	0	12	9	4	15	6	4
33	14	0	1	14	6	0	7	17	1	2	15	8	4	9	12
	14	0	1	13	7	0	9	15	1	6	10	9	3	9	13
34	15	0	0	15	4	1	11	13	1	16	5	4	18	6	1
	15	0	0	12	7	1	11	11	3	12	10	3	16	7	2
35	15	0	0	20	0	0	22	3	0	16	8	1	10	13	2
	15	0	0	20	0	0	21	4	0	19	4	2	12	11	2
36	15	0	0	18	2	0	18	7	0	15	7	3	10	6	9
	15	0	0	15	5	0	14	11	0	19	4	2	5	8	12
37	15	0	0	18	2	0	22	3	0	22	3	0	20	5	0
	15	0	0	20	0	0	22	2	1	23	2	0	14	10	1
38	15	0	0	17	3	0	21	4	0	17	8	0	14	11	0
	13	2	0	17	3	0	22	3	0	16	9	0	17	8	0
39	11	3	1	15	4	1	13	4	8	14	6	5	15	0	10
	13	0	2	17	1	2	8	5	12	12	8	5	14	0	11
40	15	0	0	16	4	0	15	10	0	13	11	1	16	9	0
	15	0	0	18	2	0	15	10	0	12	13	0	12	11	2
41	10	5	0	9	8	3	5	5	15	7	9	9	6	1	18
	9	5	1	8	8	4	6	9	10	8	5	12	8	1	16
42	15	0	0	18	2	0	14	11	0	21	4	0	24	1	0
	15	0	0	20	0	0	16	8	1	18	7	0	23	2	0
43	15	0	0	20	0	0	11	12	2	18	5	2	14	8	3
	15	0	0	20	0	0	14	8	3	17	7	1	13	4	8
44	15	0	0	18	2	0	21	4	0	25	0	0	18	7	0
	14	1	0	19	1	0	21	4	0	24	1	0	16	9	0
45	15	0	0	15	2	3	13	1	11	8	2	15	6	2	17
	15	0	0	15	1	4	16	1	8	9	2	14	6	2	17
46	13	0	2	10	0	10	11	0	14	6	2	17	7	3	15
	10	0	5	9	1	10	10	0	15	10	1	14	7	2	16

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
47	8	0	7	8	1	11	11	3	11	6	2	17	6	2	17
	11	1	3	8	1	11	10	2	13	8	2	15	6	3	16
48	15	0	0	16	4	0	16	4	5	10	4	11	7	8	10
	13	0	2	19	1	0	11	5	9	8	7	10	8	5	12
49	15	0	0	16	4	0	19	6	0	13	11	1	13	12	0
	15	0	0	19	1	0	17	7	1	17	8	0	11	14	0
50	15	0	0	18	1	1	9	3	13	14	7	4	8	4	13
	15	0	0	16	1	3	11	6	8	7	9	9	8	8	9

SPLIT HALF DOTTING SCORES FOR NON-EUROPEAN GROUP.

1	13	1	1	17	2	1	17	6	2	9	8	8	7	8	10
	13	0	2	18	2	0	14	7	4	9	8	8	8	4	13
2	14	1	0	17	0	3	12	1	12	11	1	13	14	1	10
	15	0	0	14	2	4	14	0	11	13	3	9	11	2	12
3	15	0	0	20	0	0	22	1	2	17	6	2	11	6	8
	15	0	0	20	0	0	23	2	0	15	6	4	9	7	9
4	13	0	2	6	7	7	7	5	13	4	11	10	2	14	9
	13	2	0	9	4	7	8	8	9	3	10	12	3	7	15
5	5	10	0	9	11	0	4	18	3	2	18	5	3	12	10
	5	10	0	11	9	0	2	21	2	5	16	4	1	18	6
6	11	2	2	7	5	8	7	6	12	5	4	16	5	8	12
	8	3	4	7	5	8	6	7	12	6	6	13	2	8	15
7	13	2	0	9	9	2	3	12	10	3	14	8	2	11	12
	10	5	0	6	12	2	2	10	13	3	10	12	2	12	11
8	15	0	0	15	1	4	13	2	10	8	3	14	11	2	12
	15	0	0	18	1	1	13	2	10	14	1	10	10	3	12
9	12	0	3	12	1	7	10	5	10	11	6	8	7	3	15
	14	0	1	10	1	9	9	2	14	10	2	13	4	6	15
10	13	0	2	18	2	0	24	1	0	11	10	4	2	10	13
	12	2	1	18	1	1	24	1	0	14	8	3	3	12	10
11	13	2	0	14	5	1	11	6	8	14	4	7	5	9	11
	14	1	0	15	5	0	15	4	6	8	5	12	6	6	13

Subject Number:	Test 2			Test 3			Test 4			Test 5			Test 6		
	R	W	O	R	W	O	R	W	O	R	W	O	R	W	O
12	15	0	0	12	4	4	7	5	13	6	4	15	3	8	14
	15	0	0	11	1	8	10	3	12	4	8	13	2	6	17
13	10	5	0	4	9	7	7	8	10	3	6	16	4	4	17
	12	3	0	6	9	5	3	6	16	2	11	12	4	5	16
14	10	1	4	9	3	8	9	3	13	6	4	15	3	7	15
	10	2	3	6	6	8	8	6	11	9	2	14	5	5	15
15	14	1	0	16	4	0	10	15	0	10	15	0	5	20	0
	12	3	0	15	5	0	13	12	0	11	14	0	7	18	0
16	15	0	0	16	4	0	19	6	0	14	11	0	9	14	2
	15	0	0	20	0	0	19	5	1	11	12	2	8	17	0
17	15	0	0	17	2	1	13	5	7	9	7	9	10	4	11
	15	0	0	16	3	1	11	5	9	8	4	13	9	4	12
18	15	0	0	18	2	0	21	3	1	19	4	2	18	3	4
	14	1	0	19	1	0	24	1	0	16	5	4	20	4	1
19	15	0	0	20	0	0	24	1	0	25	0	0	23	2	0
	15	0	0	20	0	0	24	1	0	24	1	0	23	2	0
20	11	0	4	13	1	6	11	4	10	8	3	14	6	6	13
	13	0	2	11	1	8	7	5	13	11	1	13	6	3	16
21	13	0	2	10	1	9	13	2	10	9	7	9	4	8	13
	13	0	2	13	2	5	14	4	7	15	3	7	7	6	12
22	15	0	0	20	0	0	16	9	0	15	8	2	10	11	4
	15	0	0	20	0	0	17	8	0	11	11	3	10	9	6
23	15	0	0	17	3	0	8	6	11	5	7	13	9	3	13
	15	0	0	17	3	0	8	6	11	8	5	12	9	1	15
24	15	0	0	12	6	2	7	9	9	4	10	11	7	8	10
	15	0	0	16	3	1	13	5	7	6	9	10	7	4	14
25	11	4	0	10	10	0	12	10	3	5	15	5	3	20	2
	11	4	0	9	11	0	10	15	0	5	18	2	6	17	2
26	15	0	0	16	0	4	13	2	10	10	2	13	12	3	10
	15	0	0	14	1	5	15	2	8	12	5	8	12	1	12
27	15	0	0	15	3	2	10	4	11	10	4	11	6	3	16
	15	0	0	12	3	5	8	6	11	11	3	11	7	5	13