

PRIMARY AND SECONDARY SUGGESTIBILITY: AN EXPERIMENTAL AND STATISTICAL STUDY

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Introduction.—The concept of ‘suggestibility’ is of obvious importance to social as well as to abnormal psychology; it has long been used as an explanatory concept in both these spheres. Yet the evidence regarding the question as to whether or not we have the right to speak of ‘suggestibility’ at all, i.e., whether this term covers a simple, unitary mental trait, or whether it would be more accurate to speak of ‘suggestibilities,’ is very far from complete. The question of generality or specificity is still unsettled.

Averling and Hargreaves, in discussing their experimental findings, “consider that . . . the most probable explanation of [the] results is . . . the existence of a general factor of suggestibility, combined with group factors common to two or more tests” (3, p. 73). Similarly, Otis (24) believes in the existence of a general trait of ‘ability to resist suggestion,’ a belief also based on experimental evidence.

Brown (9), on the other hand, found little evidence of such generality in his pioneer studies, and Estabrooks (11) also had to report that the majority of correlations found by him were around zero. Allport (1) believes that suggestibility is a trait which may characterize a few people consistently, but that it is not otherwise a ‘unitary’ trait, while Britt (8) also is sceptical with regard to the existence of a general trait of this nature.

Many investigators believe in the existence of different types of suggestibility, and many schemes of such typological division have been worked out by Prideaux (25) and later writers. Thus, Hull distinguishes prestige and non-prestige suggestion, identifying the first-named with that found in his Body-Sway test, and the latter with the Binet Progressive Weights and Progressive Lines tests (19). Murphy *et al.* discuss three common psychological principles underlying many ‘suggestion’ tests (23). Bird (6) speaks of direct and indirect suggestibility.

In a factorial study of eight tests of suggestibility, Eysenck (12) found no evidence of a general factor running through all the tests

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and showed that two orthogonal factors were sufficient to account for all the correlations within the limits of the probable error. He called these two types of suggestibility primary and secondary; primary suggestibility was of the ideo-motor kind exemplified in such tests as the Body-Sway test, the Chevreul Pendulum test, and the Arm Levitation test, while secondary suggestibility was of the 'indirection' kind (29) exemplified by the Binet tests (5). It was further shown that the presence or absence of 'prestige' did not distinguish these two types of suggestibility. The possibility that further unrelated kinds of suggestibility might exist was left open.

Certain weaknesses in this experiment made it desirable to repeat it with some modifications. The number of different tests of suggestibility used was too small to give any definitive results; the tests of secondary suggestibility were too similar to make this concept very meaningful; no effort was made to include hypnosis among the variables, in spite of the acknowledged close relation between hypnosis and suggestibility.

An attempt was made to remedy these faults in the present study. The number of tests used was 12, including a fairly representative battery of tests of secondary suggestibility, and every S was rated on a scale of 'hypnotizability' similar to that developed by Davis and Husband (10). In addition to thus confirming and extending the previous findings, experiments were undertaken with a view to obtaining evidence regarding (1) the distribution of primary suggestibility, and (2) the nature of primary suggestibility. Superficially, scores on tests of primary suggestibility tend to be distributed in the form of a U-curve; an attempt was made here to investigate the actual distribution of the underlying trait. As regards the nature of primary suggestibility, it seemed worth while to test a theory relating primary suggestibility to ideo-motor action (13).

The experiment.—The experimental population used in this research consisted of 60 patients of the Mill Hill Emergency Hospital for Nervous Disorders, all of whom were in the Army at that time, and who were entirely unselected except for the fact that they were all of approximately the same intelligence. This was achieved by taking only patients whose scores on the Matrix test of intelligence put them roughly between IQ 90 and 110 (26); the test data may be regarded as comparatively reliable and valid, as previous work on the neurotic population of this hospital had shown their responses to be not very much different from comparative normal groups (14, 15). By this means, intelligence was practically ruled out as a factor in our experiment.

The tests used were almost all adapted from existing tests described in the literature. A novel test was included which had been developed at this hospital in an effort to study the effects of drugs on suggestibility (17). In order of giving, the tests were as follows:

(1) *Picture Report test.*—The patients were shown a painting of a church interior for 30 sec.; then the picture was removed and 14 questions regarding various details in it were asked. Five of these questions contained suggestions that certain details were contained in the picture which actually were not in the picture. The number of these suggestions accepted by the patient constitutes his score on this test.

(2) *Ink-Blot Suggestion test.*—One of the Rorschach ink blots was shown to the patient, and he was told that some people thought it looked like [here followed two common responses to the

blot]. Then he was given four quite inapplicable responses and asked if he could see something resembling these in the ink blot. The number of suggestions accepted constituted his score.

(3) *Chevreul Pendulum test.*—The patient was shown a small pendulum made of a bob suspended by a thread. He was told that if he held the pendulum over a ruler, and looked fixedly at the bob he would quickly notice that the bob started to swing along the ruler, even though he himself remained quite passive, and was careful not to produce a movement deliberately. E demonstrated how the pendulum started swinging, then handed it to the patient with the instruction to hold it steady and look fixedly at the bob. Continuous strong suggestion was then given to the effect that the bob was beginning to swing, that the swing was increasing, etc. The actual swing of the pendulum in inches constituted the score on this test.

(4) *Odour Suggestion test.*—The patient was told that his sense of smell was to be tested. Six dark green bottles were placed before him, labelled, in order: Pineapple, Banana, Vanilla, Rose, Jasmine, and Coffee. He was told that the cork would be removed from each bottle in turn, and that the bottle would then be brought slowly up to his nose from a distance. He was to report as soon as he could detect the smell. The cork was then removed from the first bottle (pineapple essence) while it was some two feet from the patient's nose, this distance then being decreased until either the patient reported that he could detect the smell, or the bottle was in contact with his nose. The procedure was repeated with each of the other bottles in turn, the patient being told each time what odour to expect. The last three bottles contained only water, and each claim to detect an odour from these bottles was scored 1 point. The first three odours were selected in such a way that they decreased in strength, pineapple being the strongest, vanilla the weakest.

(5) *Progressive Weights, Impersonal.*—Twelve boxes identical in appearance were placed in front of the patient, who was told that they all differed in weight, and he was to compare box 1 with box 2, 2 with 3, 3 with 4, and so on, saying each time which of the two was heavier. The first five boxes increased in weight by identical amounts, the next seven boxes were identical in weight with the fifth box. The score was the number of identical boxes called 'heavier' minus the number of identical boxes called 'lighter.'

(6) *Progressive Weights, Personal.*—For this test, the raw data from test (5) were used, but the scoring was such that the number of times the identical boxes were called 'heavier' and the number of times they were called 'lighter' were added. The reason for these different methods of scoring has been given elsewhere (12); roughly, it consists in counting in test (6) the effect of the personal suggestion that the weights were all going to be different, and in test (5) the effect of the impersonal suggestion emanating from the arrangement of the material that the weights would continue to get heavier.

(7) *Heat Illusion test.*—A small heating element was applied to the forehead of the patient, the element being connected through a variable resistance, an invisible switch, and a transformer to the electric mains. The patient was shown how the element became hot as he turned a calibrated knob connected with the variable resistance. He was asked to turn the knob slowly until he could just detect the first sign of heat in the element, when he was to remove the element from his forehead immediately and call out the reading on the dial. The patient was then asked to repeat the procedure, and on this occasion the secret switch was silently opened, so that no current passed through the element. As the dial reading approached that at which heat had been reported previously, the patient's attention was drawn to this fact, and he was told: "Be on the alert now, you should soon feel the heat." Those who reported feeling the heat when the switch was open were scored as suggestible.

(8) *Body-Sway test.*—This test consists in the measurement of the effect of verbal suggestions that the patient is falling forward, continued for 2½ min., on the posture of the patient who is trying to stand still and relaxed, with his eyes closed. The amount of sway induced is measured in inches through inspection of a pointer on a scale which is activated through a thread fastened to the patient's clothing. The score on this test is the maximum amount of sway induced, in inches; complete falls are arbitrarily scored as 12 inches.

(9) *Press and (10) Release test.*—This test measures the effect of verbal suggestion that the patient is either releasing his hold on, or is grasping more firmly, a rubber ball. This ball is connected through rubber tubes with a particularly large tambour, which in turn activates a lever which writes on a kymograph, thus making a complete record of the pressure exerted by the patient on the rubber ball. The patient is fully aware that he is expected to keep his pressure steady, just as in the preceding test he knows that he is expected to keep standing still. In the Press test the patient starts by holding the ball so that he exerts just a small amount of pressure

(in order to enable him to give a negative reaction to the suggestion); in the Release test the patient starts by squeezing the ball hard so that he should be able to relax to a considerable extent. (Here also a negative reaction is possible.) Scores are calculated in terms of maximum excursion of the lever.

(11) *Hypnosis*.—An attempt was made to induce hypnosis in the patients by a method combining fixation of a bright object, a constant low sound, and verbal suggestion. A variety of suggestions regarding eye closure, tiredness, rigidity, anaesthesia, catalepsy, positive and negative hallucinations, etc., were given; the complete list of these suggestions will be found in the next section, Table I. These suggestions under hypnosis were given in the same order for each patient; the sequence used is indicated in Table I. Scoring of this test is explained in the next section.

(12) *Post-hypnotic suggestion*.—Three post-hypnotic suggestions were given. (1) On repetition of the Body-Sway test there would be an increase in sway; (2) there would be a definite negative error in a length-comparison test which had been given previous to the hypnosis; (3) the patient would shake and open a box on coming out of the hypnosis. The scoring of this test also is given in the next section.

In addition to these 12 tests, two tests of the effects of autosuggestion were carried out, in an effort to settle certain theoretical points discussed in a later section. In these, the patient was put in the same position as at the beginning of the Body-Sway test, but instead of suggesting to him that he was falling, he was simply requested to imagine that he was falling, and left to himself after that. This autosuggestive test was done for 30 sec. each time.

A further experiment was carried out on a different population from that investigated in the main part of the present research. A group of 70 patients were given the Body-Sway test under conditions of heterosuggestion by means of a gramophone record for 30 sec., their sway in response to the record being noted. Then the experiment was repeated, the time during which the record was being played being increased to 2½ min. Again, maximum response to the suggestion was noted for each patient. This experiment was carried out in order to obtain certain data necessary in our discussion of the distribution of primary suggestibility. It was supplemented by another experiment in which 100 men were given the Body-Sway test in full, and had it repeated immediately on them, again lasting the full term of 2½ min. This was done in order to obtain data on practice effects.

Results.—In Table I are reported the results of the hypnotic experiment. The response to each one of the suggestions made was rated on a three-point scale: if the response was complete, the *S* scored two points for this particular part of the test; if the response was definitely noticeable, but fell short of completeness, it was scored one; if there was no observable response at all, the *S* received a score of zero on this particular item. Total number of points thus gained by the 53 *Ss* who completed this test are given after each item; thus, the fact that the item 'Eyes closing' received 45 points shows that on the average this suggestion was followed much more frequently and whole-heartedly than the suggestion 'Complete catalepsy,' which received only 21 points.

In order to get a total score for each person, the items making up the scale were weighted. The weights are roughly inversely proportional to the number of points scored by each item; thus, the items to which a good many people were suggestible are weighted less than those to which only a few proved suggestible. The weights are also given in Table I.

A special method of scoring was used for the item 'amnesia.' If 10 or fewer items of the hypnotic test were recalled or recognised

TABLE I
RESULTS OF THE HYPNOTIC EXPERIMENT

Items Suggested *	Points	Weights
1. Eyes tired	76	1
4. Complete relaxation	76	1
6. Feels incapable of activity	65	1
8. Arm falls irresistibly	63	1
2. Eyelids heavy	61	1
9. Impossible to raise arm	59	1
7. Feels miles away	54	1
5. Feels pleasant warmth	53	1
12. Glove anaesthesia	46	2
3. Eyes closing	45	2
10. Both arms stiff and rigid	36	2
19. Impossible to raise arm (eyes open)	24	3
17. Illusion of bell-ringing	22	3
11. Complete catalepsy	21	3
18. Cannot hear buzzer	19	4
16. Illusion of leg movement	18	4
13. Increase of Body Sway (post-hypnotic)	18	4
14. Line length suggestibility (post-hypnotic)	16	4
15. Shake and open box (post-hypnotic)	13	4
20. Illusion of electric bulb lighting up	12	4
21. Amnesia (spontaneous)	15	4

* The suggestions are numbered in the order in which they were given. Post-hypnotic suggestions were given as indicated, and the effect tested after the whole scale had been given to the patient. The amnesia observed was spontaneous, as no suggestion to the effect that the patient would forget anything was given.

during interrogation following the test, the S got two points; if from 11 to 20 items were recalled or recognized, he got one point; if more than 20 items were recalled or recognized, he got zero points.

Separate scores were obtained for hypnosis and for post-hypnotic suggestibility, the latter being made up of items number 13, 14 and 15. The distribution of scores on the Hypnosis test is shown in Fig. 1; scores on this test range from 0 to 76. Means and standard deviations on this test are reported in Table II.

Also reported in that table are the means and SD's of the other tests used. The histograms showing frequency of scores on these tests are given in Figs. 1 and 2. It will be seen that roughly speaking the distribution of scores on the tests of primary suggestibility tends towards a U- or a J-shaped curve, while scores on the tests of secondary suggestibility tend towards a normal curve of distribution.

Tetrachoric correlations were worked out between the 12 tests used, and are given in Table III. We preferred the use of tetrachoric coefficients to that of the product-moment formula because of the very far from normal distribution of the scores on many of the tests. Further justification for the use of this formula (which strictly speaking applies only when the underlying variable is normally distributed) is given in a later section, where the distribution of the underlying trait is discussed.

The average intercorrelation of the six tests of primary suggestibility (Nos. 3, 8, 9, 10, 11, 12) is $+0.50$; the average intercorrelation

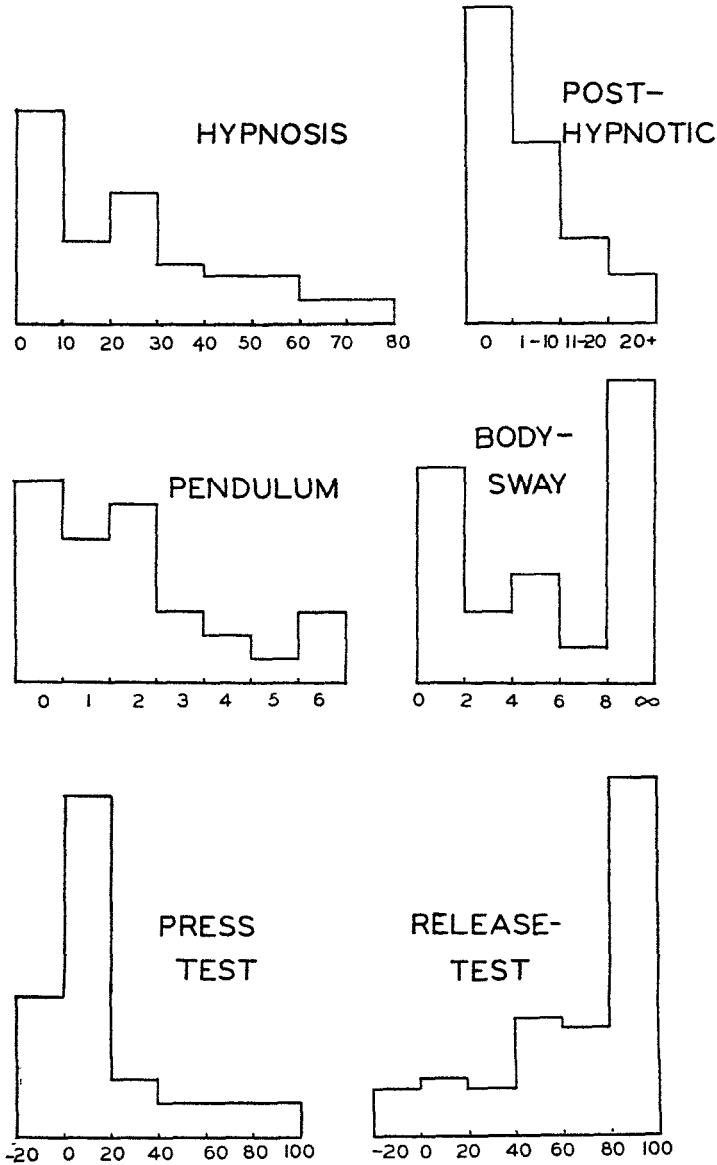


FIG. 1. Distribution of scores on six tests of Primary Suggestibility

of the six tests of secondary suggestibility (Nos. 1, 2, 4, 5, 6, 7) is $+0.15$. The average intercorrelation of the tests of primary suggestibility with those of secondary suggestibility is $+0.02$. As we

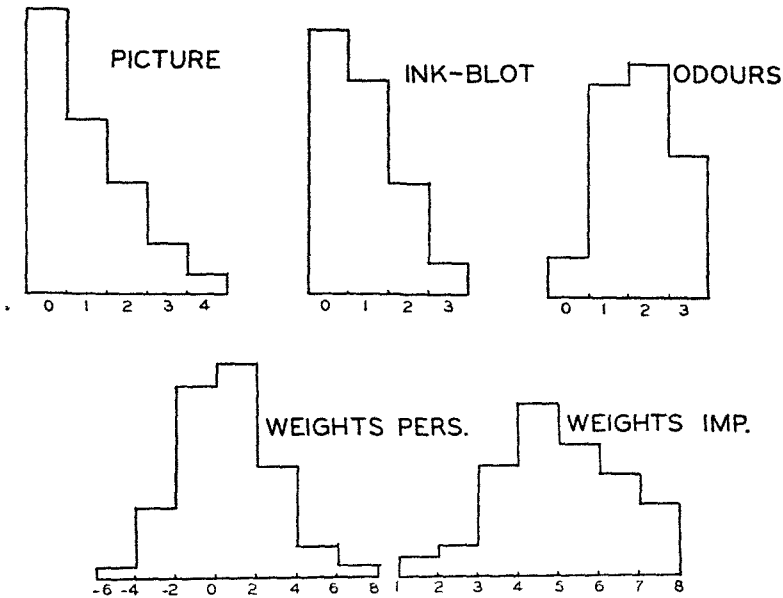


FIG. 2. Distribution of scores on five tests of Secondary Suggestibility

are therefore clearly dealing with two entirely unrelated factors, there would appear to be little point in factor-analysing the table as

TABLE II
MEANS, STANDARD DEVIATIONS, AND FACTOR SATURATIONS OF THE TESTS

	Mean	S.D.	Factor Saturations: Primary Suggestibility
Hypnosis.....	23.0	20.7	.89
Post-hypnotic.....	1.6	1.9	.77
Pendulum.....	2.0	1.9	.64
Body Sway.....	6.5	4.7	.92
Press Test.....	12.2	23.9	.38
Release Test.....	50.7	50.5	.73
			Secondary Suggestibility
Report.....	1.00	1.11	.27
Ink Blot.....	.83	.84	.71
Odour.....	1.60	1.20	.62
Weights, Imp.....	.79	2.39	.06
Weights, Pers.....	4.49	1.41	.43
Heat Illusion.....	-.21	—	.25

a whole; results would merely be vitiated by the chance-correlation of the tests of one group with those of the other.²

² A factor analysis of the whole table was actually carried out; the main findings were very similar to those reported in an earlier paper (12). They are not given or discussed because the practice of analysing a table of this kind as a whole is not beyond criticism.

TABLE III
TETRACHORIC CORRELATIONS AMONG THE 12 TESTS

Test	1	2	3	4	5	6	7	8	9	10	11	12
1. Hypnosis	—	.72	.57	.73	.24	.64	.51	-.10	.13	.12	-.17	-.10
2. Post-hypnotic		—	.54	.57	.24	.54	.29	.06	-.04	-.17	.09	.30
3. Pendulum			—	.75	.00	.38	-.07	-.07	.22	.06	.24	-.04
4. Body Sway				—	.47	.45	-.16	-.21	-.12	.18	.05	-.25
5. Press Test					—	.47	.10	.18	-.22	-.19	.27	-.16
6. Release Test						—	.02	.10	-.18	-.03	-.22	-.23
7. Heat Illusion							—	.31	.22	.18	.05	-.25
8. Picture								—	.31	.07	-.23	.10
9. Ink Blot									—	.24	-.02	.48
10. Odours										—	.24	.38
11. Weights, Imp.											—	.11
12. Weights, Pers.												—

Consequently, the two groups of tests were analysed separately, and the saturations with the one general factor found in each of the two groups of tests are given in Table II. It will be seen that the primary suggestibility factor accounts for 55 percent of the variance, the Body-Sway test having a saturation of .92 for this factor, and Hypnosis having a saturation of .89. It will also be seen that the secondary suggestibility factor accounts for 20 percent of the variance, the Ink-Blot Suggestion test having a saturation of .71 for this factor, and the Odours test having a saturation of .62.

Multiple correlations were calculated in an effort to determine the possibility of predicting success in hypnotizing a patient from a knowledge of the scores on the various tests of suggestibility used. In particular, the Body-Sway, the Pendulum, the Release and the Heat Illusion test were studied in this connection. A special difficulty is raised by the fact that the Heat Illusion test shows a tendency to correlate with the tests of secondary suggestibility, rather than with those of primary suggestibility, and that its only high positive correlation with any test of primary suggestibility is with hypnosis. This fact is discussed in its theoretical bearings in a later section; here we need only note that precisely because of the lack of correlation of this test with the other tests of primary suggestibility does it contribute a considerable share to the multiple correlations with hypnosis.

Various combinations of the tests mentioned, and their multiple correlations with hypnosis, are given below in Table IV. It will be noticed that Body-Sway and Heat Illusion together correlate + 0.96 with Hypnosis; thus, we may say that the factors active in these two tests account for over 90 percent of the factors determining a person's hypnotizability.

The results of our study of the whole battery of tests used may be supplemented by a report of the results of the two supplementary

TABLE IV
MULTIPLE CORRELATIONS OF CERTAIN TESTS WITH HYPNOSIS

Multiple correlation of hypnosis with: Pendulum and Body Sway73
Multiple correlation of hypnosis with: Pendulum and Release73
Multiple correlation of hypnosis with: Pendulum and Heat Ill.....	.79
Multiple correlation of hypnosis with: Body Sway and Release.....	.80
Multiple correlation of hypnosis with: Body Sway and Heat Ill.....	.96
Multiple correlation of hypnosis with: Release and Heat Ill.81

experiments undertaken in order to clarify certain points regarding the Body-Sway. First, the average amount of sway on the Body-Sway test, under conditions of heterosuggestion, and under conditions or autosuggestion (twice repeated), is given in Table V, together with the SD's of the three means.³ Also given in that table are the correlations between the three tests.

TABLE V
MEANS OF BODY-SWAY MEASURES, STANDARD ERRORS OF THESE MEANS AND INTERCORRELATIONS AMONG THE THREE MEASURES

	Mean	σ_{Mean}	
(1) Heterosuggestion.....	6.8	4.8	$r_{12} = .92$
(2) Autosuggestion I	6.2	4.9	$r_{23} = .96$
(3) Autosuggestion II.....	6.4	4.9	$r_{13} = .93$

It will be seen that the means and the SD's are closely similar, and that the three tests correlate so highly that they must be regarded as identical. (The reliability of the Body-Sway test is + 0.91, as established in an earlier investigation, while the reliability of the Autosuggestion test, as shown above, is + 0.96. Consequently, if the two tests measured exactly the same trait, they should correlate to the extent of + 0.93, which corresponds precisely to the observed value.)

In the second experiment, in which 70 Ss were given the Body-Sway test (heterosuggestion by means of a gramophone record) for 30 sec., the test then being repeated for $2\frac{1}{2}$ min., the average amount of sway in inches increased from 4 to 5 inches, and 35 of the patients swayed over an inch *more* the second time, while only one swayed *less* the second time. Twenty fell outright during the 30-sec. run, while an additional six fell when the run was extended to $2\frac{1}{2}$ min. Thirty-nine men swayed less than two inches during the short run; only 15 swayed less than two inches during the long run. There is little doubt that this increase in the effectiveness of the record is due to the fact that it was played for a longer period of time; no practice effects were observed on simply repeating the test in identical form on another sample of 100 men.

Discussion.—The experimental results reported in the preceding

³ These values are not quite identical with those in Table II because a few patients did not do the Autosuggestion test, and are not therefore included in Table V.

section require discussion on three points. These are (1) the question of the generality of the trait of suggestibility, (2) the question of the distribution of the trait of suggestibility, and (3) the question of the nature of suggestibility.

(1) The generality of the trait of suggestibility. The correlations reported among the 12 tests used in this study, as well as the results of the factor analyses carried out, seem to show clearly that we are dealing in these tests with two essentially unrelated traits, which in a previous study were called primary and secondary suggestibility (12). As in that study, primary suggestibility seemed to be of an ideo-motor kind, while secondary suggestibility seemed rather to depend on suggestion by indirection. Possibly a better name for this secondary kind of suggestibility might be 'gullibility.'

It is apparent from the intercorrelations among the various tests that primary suggestibility is a much more definite and marked trait; intercorrelations among tests of secondary suggestibility are all rather small, averaging only .15, as contrasted with an average of .50 for the other group. In addition, as was found in the previous study retest, reliabilities tend to be a good deal higher for tests of primary suggestibility than for tests of secondary suggestibility, the former averaging about .90 in our experience, the latter usually ranging between .30 and .50. Possibly this low reliability of tests of secondary suggestibility accounts for the low intercorrelations between these tests.

One test in our battery seems to create certain difficulties in respect to this differentiation into primary and secondary suggestibility, viz., the Heat Illusion test. This test has a positive correlation of .51 with hypnosis, but correlates negatively or only very slightly positively with Body-Sway and the rest of the tests of primary suggestibility not involving hypnosis. For this reason we have put it with the tests of secondary suggestibility, but clearly this decision is to some extent arbitrary. Our data do not really permit us to say whether this test belongs with the tests of primary or with the tests of secondary suggestibility, and only further research will enable us to answer this question satisfactorily. Possibly both types of suggestibility are involved in this test.

The question as to the proper alignment of this test is of importance because of its correlation with hypnosis. In attempting to forecast a person's hypnotizability from the results of psychological tests, this test contributes a good deal to the total forecasting ability of a battery precisely because of its low correlation with the other tests. As the multiple correlation coefficients given in Table IV show, the addition of the Heat Illusion test to the Body-Sway test raises the forecasting efficiency from 52 percent to 93 percent.

One further point deserves mention. In a previous paper, attention was drawn to the fact that there seemed to be a division within the factor of primary suggestibility between *active* and *passive* suggestibility. This appeared quite clearly in the Arm Levitation test, which was given in two forms: (1) the suggestion was that the arm was getting lighter, and was rising; (2) the suggestion was that the arm was getting heavier, and was falling. It was thought that these two forms of the test were almost identical, just as for instance the two forms of the Body-Sway test used in that experiment [(1) with suggestion to fall forward, (2) with suggestion to fall backward] were almost identical, as indicated by the correlation of .91. The correlation between the two forms of the Arm Levitation test, however, was only .35, thus indicating a much less close correspondence between the two tests than had been anticipated.

From observation it appeared that the Ss tested fell into two classes: (1) the alert, active type, who executed every suggestion rapidly, and (2) the passive, inactive type, who tried to achieve a state of complete restfulness, and who was much keener on carrying out suggestions which led to such a state (e.g., lowering his arm), than on carrying out suggestions which had the opposite effect (e.g., raising his arm). This distinction is one which can also be observed in hypnotic Ss.

In the present experiment, the Press and the Release tests, respectively, seem to divide the Ss into the same two classes, the active responding best to the Press, the passive to the Release test. In both the previous experiment and in the present one also, the test of *passive* reaction has a higher correlation with the other tests, and therefore has a higher factor saturation, than has the test of *active* reaction; the respective values are .37 and .55 in the previous, and .38 and .73 in the present experiment. This suggests that primary suggestibility as measured by our tests is of the passive rather than of the active kind. Similarly, hypnosis seems to go with the passive rather than with the active type of response, the respective correlations with the Release and the Press tests being .64 and .24. These findings suggest that further studies of the active-passive dichotomy may be fruitful in throwing light on the nature of suggestibility.

(2) The distribution of the trait of suggestibility. It has usually been found by investigators (19, 11, 3, 12) that primary suggestibility scores are distributed in the form of a U-curve, rather than of a normal curve. The present study is no exception to this rule, as can be seen from the curves of distribution given in Fig. 1. The question arises whether this mode of distribution represents accurately the distribution of the underlying trait, or whether it is merely a statistical artefact. An attempt will be made here to show that the

latter alternative is the correct one, and that by reference to two psychophysical concepts, viz., that of *threshold* and of the *Weber-Fechner law*, the underlying distribution can be shown to be a normal one.

Let us assume that the trait 'suggestibility' is distributed in the form of a normal curve, as shown in Fig. 3A. Let us also assume

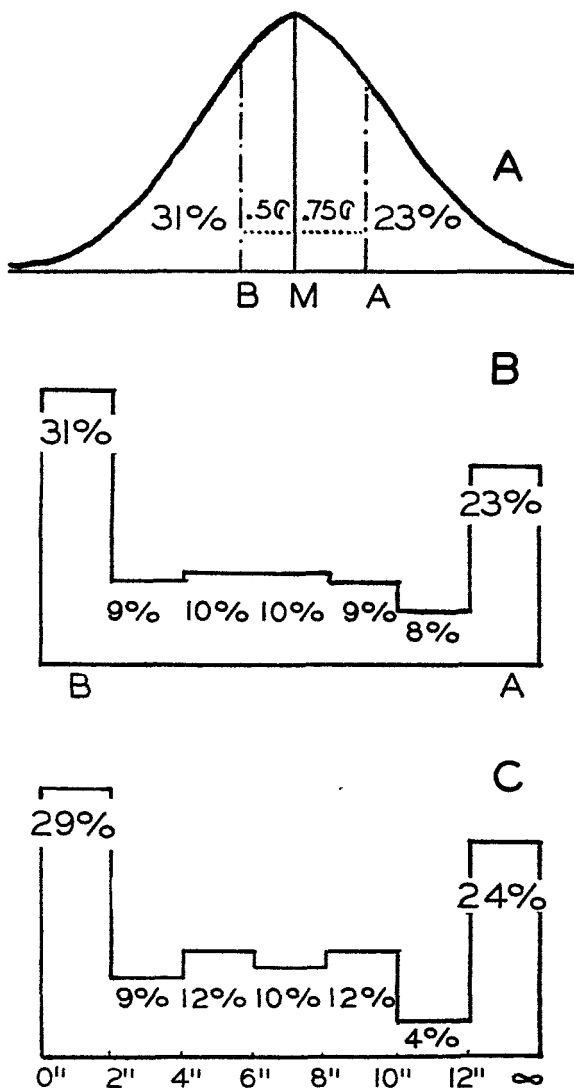


FIG. 3. A. Normal curve of distribution of scores on a suggestibility test, with threshold at point B and ceiling at point A

B. U-shaped curve of distribution of scores such as would be found under conditions shown in (A)

C. Experimentally found curve of distribution of scores on Body-Sway test. (Experimental population: 300 neurotics, both sexes equally represented.)

that the test has a threshold at point *B*, .50 sigma units below the mean, and a ceiling at *A*, .75 sigma units above the mean. In other words the test is discriminative only between *A* and *B*; values beyond those two points are either complete successes or complete failures. If this were so, the 31 percent of values below *B* would all come to lie at *B* in the actual distribution of the test scores, and the 23 percent of values above *A* would come to lie at *A*. This would effectively convert a normal curve into a U-shaped curve, with two modes at *A* and *B* respectively (*cf.* Fig. 3*B*).

Does this argument apply to the tests of primary suggestibility with which we are dealing? Let us restrict ourselves to the Body-Sway test. It is clear that there is an 'upper limit' beyond which the testee cannot go, viz., a complete fall. Similarly, there is a lower limit below which the testee cannot go, viz., no sway at all.⁴ This much is self-evident; the question that remains is the following: Do the *Ss* belonging to either of the two modal categories, i.e., those who fall outright, and those who do not sway at all, form homogeneous groups, i.e., groups containing *Ss* all of exactly the same degree of suggestibility, or do they form heterogeneous groups, i.e., groups containing *Ss* of different degrees of suggestibility? If the former hypothesis were true, it would follow that the U-shaped curve of distribution is the true mirror of the underlying distribution; if the latter hypothesis were true, it would follow that the U-shaped curve would not give a true picture of the underlying distribution. We can prove that the latter hypothesis is true in two ways.

The first method open to us is the one described in the experimental section, in which the same group of patients were given the Body-Sway test, first for 30 sec., then for 2½ min. If the two groups were really homogeneous, then all those who had not swayed at all on the first test should have behaved similarly on the second test, and all those who fell outright on the second test should have behaved similarly on the first test. The figures quoted in the previous section clearly show that this was not so. On the second test, six *Ss* fell who had not fallen on the first test; they were clearly less suggestible than the 20 who had fallen on the first test, yet because of the 'upper limit' the second test failed to distinguish them from the 20 more suggestible ones. Similarly, at the other end, of the 39 who had swayed less than two inches during the short run, over half increased their sway to above two inches during the long run, thus showing that this group of 'non-swayers' also was not homogeneous.

By thus extending the run to several minutes, by increasing the volume of sound coming from the gramophone, by injecting sodium

⁴ In practice, a sway less than two inches is counted as 'no sway at all,' because many *Ss* sway up to two inches even without any suggestion. This fact does not invalidate the argument, however.

amytal intravenously, and by various other changes it is possible, and in fact quite easy, to show that neither the 'non-sway' nor the 'fall outright' groups are in any way homogeneous, but that they are made to appear so because of the limitations of the test, which has a high threshold and a low ceiling, so to speak.

The second method by means of which we can prove the same point is by showing that the Ss who fall into either of our two groups in question do not react similarly to other tests of primary suggestibility. If all the Ss who fall outright, for instance, were equally suggestible, then one would expect them to react in an identical manner to other tests of suggestibility. This, however, is emphatically not the case. This can be shown best, perhaps, by adding the weighted scores of the Ss on all the six tests of primary suggestibility used, thus deriving a composite score for each S; the curve of distribution of these composite scores is shown in Fig. 4*A*. (The formula used for weighing the scores was

$$w_u = \frac{r_{ug}}{(1 - r_{ug}^2)\sigma},$$

in which w_u = the weight ascribed to test U ; r_{ug} = the factor saturation of test U with the general factor of primary suggestibility; and σ the SD of the distribution of scores on test U .) The fact that this curve of distribution has lost the U-shaped appearance characteristic of the individual curves which go to make it up proves that neither the non-suggestible nor the very-suggestible groups in any of the individual tests are really homogeneous.

The question arises whether the resulting curve of distribution gives an accurate picture of the distribution of the underlying trait. We do not believe that it does. We have arbitrarily taken each unit along our base-line as equivalent to each other similar unit; we have taken the difference in body-sway between 0 and 3 inches as equal to the difference between 6 and 9 inches. There is no ground for supposing that such equality actually obtains; quite on the contrary, experiments conducted with neurotic and with normal Ss have shown that while the difference between 0 and 3 inches is of very great significance, that between 6 and 9 inches is of very little importance (26). It seems reasonable to assume that additional increments of sway obey the law of diminishing returns, and consequently that some form of the Weber function seems appropriate here.

Accordingly, scores were converted into logarithmic values, and the resulting curve of distribution is shown in Fig. 4*B*. This curve approaches normality, though it is seriously skewed towards the left. This is understandable. It has been shown elsewhere (16)

that neuroticism is highly correlated with suggestibility; as our experimental population consisted entirely of neurotics, it is only natural that the curve of distribution of scores on suggestibility should be skewed towards the 'less-suggestible' end.

We believe we have shown in this discussion that it is unlikely that suggestibility is distributed in the form of a U-curve; we do not

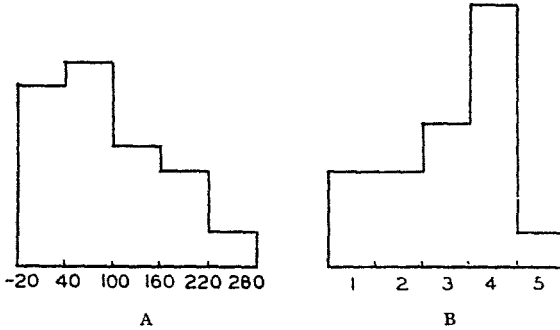


FIG. 4. Weighted combined scores on six tests of Primary Suggestibility. (A) Simple scores, (B) Log. scores.

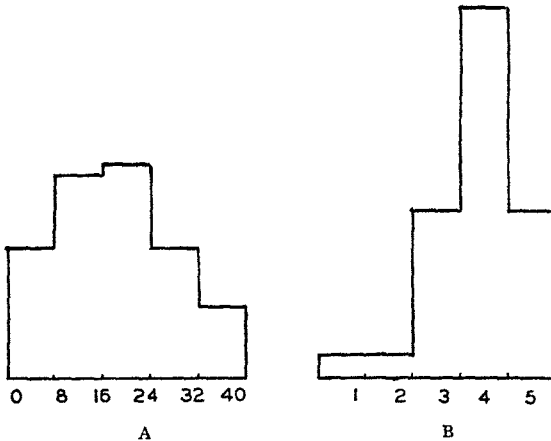


FIG. 5. Weighted combined scores on six tests of Secondary Suggestibility. (A) Simple scores, (B) Log. scores.

believe that our data are sufficient to prove that it is normally distributed, although the argument would certainly seem to tend that way. Proof that the Weber-Fechner law applies to suggestibility scores would certainly be required before accepting our suggestion; we do not claim to have done more than to show that it is not unreasonable to apply this law to our data.

For the sake of interest, we have also calculated the weighted

total scores of the six tests of secondary suggestibility; the distribution is shown in Fig. 5*A*. Here also the Weber-Fechner law may be applied, and the results of transforming the scores into logarithmic values are shown in Fig. 5*B*. This distribution also is unimodal, and approaches the normal.

(3) The nature of primary suggestibility. It has often been suggested that primary suggestibility and hypnosis are explicable in terms of the ideo-motor theory of action (19, 13). This theory has been combined with the view that in primary suggestibility we are dealing with two factors, aptitude and attitude, in such a way that the result of the Body-Sway test, say, is determined (*a*) by the *aptitude* of the testee, i.e., by the presence or absence of the essential ideo-motor neural bonds, and (*b*) by his *attitude*, i.e., by the degree of control or inhibition he is able and willing to exercise over the manifestations of this aptitude. Assuming that the neurotic shows less ability to control or inhibit the activity of these neuro-muscular bonds, it seemed reasonable to assume that neurotics would be more suggestible on tests of this kind than normals, a forecast shown to be correct in another paper (16). Similarly, it seemed reasonable to assume that the injection of such a drug as sodium amytal would not affect the responses of those who had no *aptitude* at all, because although it would weaken their control there was in their case no necessity for such control; that it would increase to a large extent, however, the reactions of those who did show a certain amount of aptitude, by decreasing their control over the manifestations of this aptitude. This forecast also was shown to be correct (17).

A third forecast might be made in terms of this theory, viz., that if the essential factor in such a test as the Body-Sway test is ideo-motor action, it does not matter in what way the idea is implanted in the mind of the S; however the implantation may take place, motor action will be found to follow. This view was tested in the experiment described in the previous section; it was found that when the S was simply asked to imagine that he was falling, his reaction was for all practical purposes identical with that resulting from having the suggestion that he was falling repeated to him for several minutes. In other words, suggestion was not at all necessary in order to procure the desired effects; a simple order ("Imagine that you are falling forward") had precisely the same effect.

A further point relates to the question of whether further types of suggestibility exist in addition to ideo-motor suggestibility and suggestion through indirection. It is possible that prestige suggestibility, of the kind investigated by Sorokin & Boldyreff (27), Arnett (2), Bowden (7), Kulp (20), Moore (22), Barry (4), Marple (21), Wheeler and Jordan (28), and Ferguson (18), may constitute a

tertiary kind of suggestibility, and an experimental clarification of this hypothesis would seem eminently desirable.

A last point which may be worthy of mention is that the amnesia which appeared in many cases after the hypnosis was not suggested, but appeared spontaneously. In fact, the patients never knew that they were being hypnotized; they were told that the purpose of the procedure was to teach them how to relax. This point is worth mentioning because many writers assume that amnesia occurs only when specifically suggested, or when the S knows that he is expected to forget what happened in the hypnotic state (19, p. 131). To the best of our knowledge, no such expectation existed in our patients, so that we would conclude tentatively that amnesia is a natural accompaniment of hypnosis.

Summary and Conclusions.—Sixty neurotic male army patients at Mill Hill Emergency Hospital, all with IQ's between 90 and 110, were given 10 tests of suggestibility, and an attempt was made to hypnotize them, and to make them carry out post-hypnotic suggestions. Also investigated in two subsidiary experiments were (1) the correlation between autosuggestion and hetero-suggestion, and (2) the effect of the length of time during which suggestion was given on the success of the suggestion. A factorial analysis was carried out on the intercorrelations between the suggestibility tests and the hypnotic and post-hypnotic scores. The following conclusions were arrived at:

(1) There are two independent types of 'suggestibility,' which may be called 'primary suggestibility' and 'secondary suggestibility.'

(2) Primary suggestibility is of the *ideo-motor* kind, and correlates highly with hypnotizability. The best single test of this type of suggestibility is the Body-Sway test.

(3) Secondary suggestibility is of the *indirection* kind, and does not correlate with hypnotizability. It can best be measured by the Odour Suggestion and the Ink-Blot Suggestion tests.

(4) A weighted point scale was constructed for the trait 'hypnotizability,' which showed this trait to be distributed continuously, and not dichotomously.

(5) This trait of hypnotizability could be forecast with considerable accuracy from knowledge of a person's scores on two or more of the suggestibility tests; a multiple correlation of .96 indicated that the tests of suggestibility involved account for 92 percent of the factors active in hypnotizability.

(6) It was shown that post-hypnotic amnesia is a natural consequence of hypnosis, and is not dependent on suggestion, either direct or indirect, to that effect.

(7) The distribution of the raw scores on tests of primary suggestibility (and to some extent on tests of secondary suggestibility also) was usually of the U-shaped type found also by earlier investigators. By application of two psycho-physical laws it was possible to convert these distributions into more nearly normal ones, and to show that the U-shaped distribution of raw scores was due to statistical and experimental artefacts.

(8) Heterosuggestion on the Body-Sway test was shown to be so highly correlated with autosuggestion that the two could not be differentiated experimentally.

(9) It was shown that the length of time during which suggestion was continued affected profoundly the effect of the suggestion.

(10) Results of the Press and Release tests of primary suggestibility suggested a subdivision of this type of suggestibility into 'active' and 'passive.' This finding was only suggestive, however.

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