

AN INVESTIGATION
INTO
THE NATURE OF SUGGESTIBILITY
AND
HYPNOSIS

A thesis presented by
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I N T R O D U C T I O N .

With this investigation the writer has intended to shed some more light upon the nature of that personality characteristic, known as suggestibility, and on the relation of hypnosis to this characteristic.

The main object was to ascertain whether suggestibility, as it manifests itself in apparently different fields of behaviour, is in reality one general factor of the personality, or whether it is to be regarded as descriptive of a number of unrelated qualities considered collectively. In other words, is "Suggestibility" a general factor, or a number of specific factors?

Hull (1) points out that this uncertainty is one of the greatest obstacles in the development of a consistent science of hypnotism, namely, the difficulty of defining suggestion in a significant manner. He adds however, that the question at issue is capable of very direct experimental solution.

Following the advice of Hull, the writer has attempted to arrive at such a solution by experimentally measuring a number of different manifestations of suggestibility in a group of people. The experiments were selected to estimate the trait, or traits, in question in most of the main forms in which it is exhibited. The data thus obtained were examined and certain correlations found.

A Centroid Factorial Analysis was then carried out, and four factors were isolated. To make these psychologically significant, the axes were rotated.

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-

PART I

CHAPTER I

PREVIOUS INVESTIGATIONS

Before proceeding with an account of the present study, it is desirable to review briefly the opinions and findings of previous investigators.

In 1921 Aveling and Hargreaves (1) postulated the existence of a general factor of suggestibility, combined with group factors common to two or more tests. Two years later Otis (2) expressed his belief in the existence of a general trait of "ability to resist suggestion", a belief based on experimental evidence. In his pioneer studies, Brown (3) had found little evidence of such generality, and in 1929 Estabrooks (4) also reported that most of the correlations found by him were around zero. Allport (5) does not believe suggestibility to be a "unitary" trait, but admits that it may characterize a few people consistently. Britt (6) also expresses scepticism with regard to such generality.

Many schemes of typological division have been based on the belief that different types of suggestibility exist. Thus Hull (7) distinguishes between prestige and non-prestige suggestion. He identifies the first with that found in his Body-Sway test, and the latter with the Binet (8) Progressive Weights and Progressive Lines Tests. Murphy et al. (9) discuss three common psychological principles underlying many "suggestion" tests. Bird (10) speaks of direct and indirect suggestibility.

Aveling and Hargreaves have previously obtained a correlation of + .55 between the hand-rigidity and the hand-levitation tests. Correlations of + .23, -.06 and +.52 were found to exist between the postural sway tests and hypnotic suggestibility by Barry, Mackinnon and Murray (11), working with seventy-three subjects in three modif-

ications of the experiment. White (12), working with twenty-two subjects, reported a correlation of $+ .75$ between a modified form of the postural suggestion test and susceptibility to hypnosis. Correlating suggested arm movement and hypnotizability, Jenness (13) found correlations of $+ .63$ and $+ .33$, according to the conditions of the experiment. Since he used only eight subjects, these findings do not make the correlation coefficients decisive.

In a factorial study of eight tests of suggestibility, Eysenck (14) found no evidence of a general factor running through all the tests, and showed that two orthogonal factors were sufficient to account for all the correlations within the limits of probable error. The two types of suggestibility he called primary and secondary; primary suggestibility being of the ideo-motor kind, exemplified by the Body-Sway test, while secondary suggestibility was of the "indirection" kind, as described by Young (15) and exemplified by the Binet tests.

Eysenck and Furneaux (16) then carried out further experiments and found average intercorrelations of $+ .50$ between the tests of primary, and $+ .02$ between the tests of secondary suggestibility.

From the above it will be obvious that so far no one completely satisfactory answer to the problem has been produced, and it is the writer's sincerest hope that the present investigation may prove to be of some help in overcoming this obstacle to the development of the science of psychology.

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P A R T II (i)

CHAPTER II

- TESTS: 1. Size-weight Illusion;
2. Progressive Weights.

In all the tests, forty subjects were used. These consisted of University students belonging to different age groups, and a variety of faculties. The ages ranged from sixteen to thirty-five years, the average age being nineteen years and six months. Fig. 1 shows how these ages were distributed. The group included thirteen Science, thirteen Arts, five medical, four Law, three Commerce, and two Social Science students. The sexes were approximately equally represented. There were twenty-two female and eighteen male subjects.

All the Subjects were kept unfamiliar with the true purpose of the tests.

The conditions under which the tests were carried out were standardised as much as possible. The same laboratory and apparatus were used throughout the period of four months during which the experimental work was continued, and the writer has seriously attempted to keep the entire procedure, from the moment a Subject was first approached, until all the tests were completed, as rigid as was practicable.

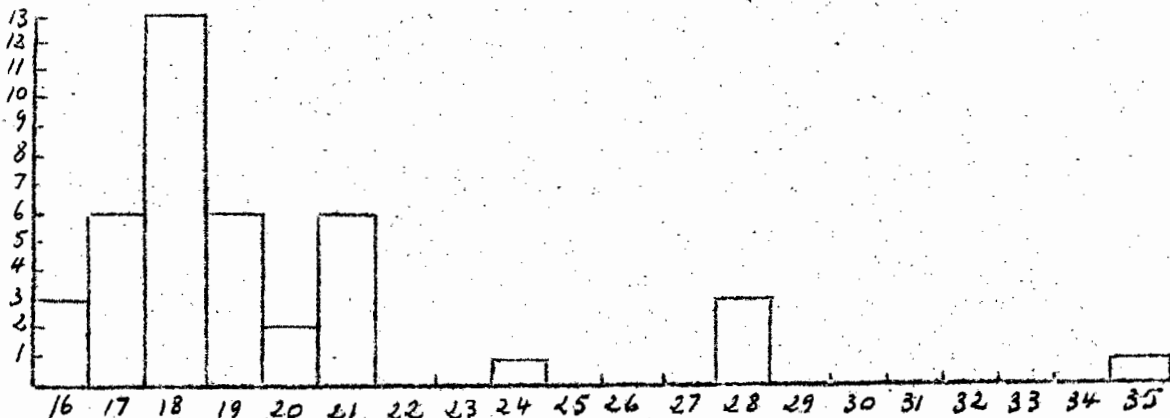


FIG. I.: HISTOGRAM SHOWING AGE DISTRIBUTION OF SUBJECTS.

(1) Tests 1 to 6 are modifications of those described by Whipple (1)

1. SIZE-WEIGHT ILLUSION:

The apparatus for this test consists of a set of Suggestion Blocks as described by Whipple (1). In this case the modified Gilbert blocks were used, i.e. two standard blocks of 50 grams each, block A being 28 mm. thick and having a diameter of 82 mm. Standard block B measured 28 mm. in thickness and 22 mm. in diameter. In addition to these, twenty blocks of equal dimensions, (28 mm. thickness and 35 mm. diameter) whose weights ranged from 5 grams to 100 grams, were used. The difference in weight between any two consecutive blocks was thus 5 grams. All the blocks were black and were labelled clearly A, B, and 1 to 20 respectively.

The subject was seated at a certain distance from the table, so that his arm was parallel to the floor when he lifted a weight. The blocks were arranged in linear series, and increasing in weight, from left to right on the table which was covered with a sheet of thick white paper.

The subject was then instructed to find a block, which had the same weight as (a) the "heavier" standard block (A), and (b) the "lighter" standard block (B), by progressively trying all the blocks in the series, each time comparing with the standard block. At no time was the Subject allowed to lift the two blocks simultaneously. The Subject was asked to keep his eyes fixed on the blocks.

If a Subject selected the block which had the same weight as the standard block, that is; if he judged block 10 to be equal in weight to both standard blocks A and B, his suggestibility score for this test was taken as zero. For every block below 10 judged to be the same weight as standard block A, 5 points were scored. Similarly, if the Subject decided that block 11 weighed the same as

standard block B, his score was 5 points. This system of scoring allowed a maximum of 95 to be obtained in this test.

2. PROGRESSIVE WEIGHTS:

Fifteen weights of identical size and appearance were used for this test. The weights which were black and cylindrical were labelled conspicuously from 1 to 15. Numbers 1 to 4 weighed 20, 40, 60 and 80 grams respectively, while the remaining weights were 100 grams each.

The Subject was seated as in the previous test, and the weights were arranged numerically from left to right upon the thick paper which covered the table. The purpose of the paper was to deaden the sound of the weights being replaced, so that the Subject could not use this as a guide in judging the weights.

Instructions to the Subject were that he should lift the weights, one after the other, starting with number 1, and using the same hand throughout the series. The Subject was required to state whether the weight he was holding was heavier, lighter, or the same weight as the one lifted just before.

For every "heavier" judgement made in the series from number 5 to number 15, the Subject was scored one point. Thus the maximum score possible for this test was 10.

Although both tests (1) and (2) involved the use of weights, it can be seen that certain different indirect factors were involved in producing the suggestions. Association between visual perception and hinaesthetic sensation was operating in test (1). As a result of such association, which was not established by the test itself, the Subjects expected the larger weight to be the heavier. When this was not found to be the case, Subjects almost invariably tended towards the other extreme. In test (2) the association between weight and position in the series was only reinforced by the first four weights and tended to be extinguished more rapidly than the more deeply rooted association of test (1).

The suggestion in both instances was ultimately produced by anticipation to which Subjects reacted negatively in test (1), and mostly positively in test (2).

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-

CHAPTER III

- TESTS: 3. Progressive Lines;
4. Directive Suggestion.

3. PROGRESSIVE LINES:

The apparatus consisted of a kymograph drum which revolved freely around a horizontal axis, behind a screen. Twenty parallel lines of equal thickness, and 2 cms. apart were drawn on white paper which was placed on the drum. Lines 1 to 4 measured 12, 24, 36 and 48 mms. respectively, while lines 5 to 20 were each 60 mms. long. A horizontal slit measuring 1 x 12 cms. in the screen, allowed each line to be exposed separately by rotating the drum.

The Subject was seated at a table, approximately 50 cms. from the screen, and was provided with a pencil and graph paper, ruled in millimetre squares and a margin 3 cms. from the left. The Subject was then instructed to take one look at the line which would appear in the slit, and so reproduce its length as accurately as possible by drawing a cross on the graph paper, at a distance from the margin, so that the distance between the margin and the cross would represent the length of the line seen.

As soon as the Subject turned his attention from line 1, the drum was moved to a blank space, so that no comparison was possible. When the cross had been drawn, the next line was exposed, and so on until all twenty lines had been shown.

Fig. 2 illustrates how the scoring of this test was effected. All the lengths which were greater than that of line 5, as the Subject reproduced them, were considered to be manifestations of suggestibility. The total length in excess of the length of line 5,

S 30

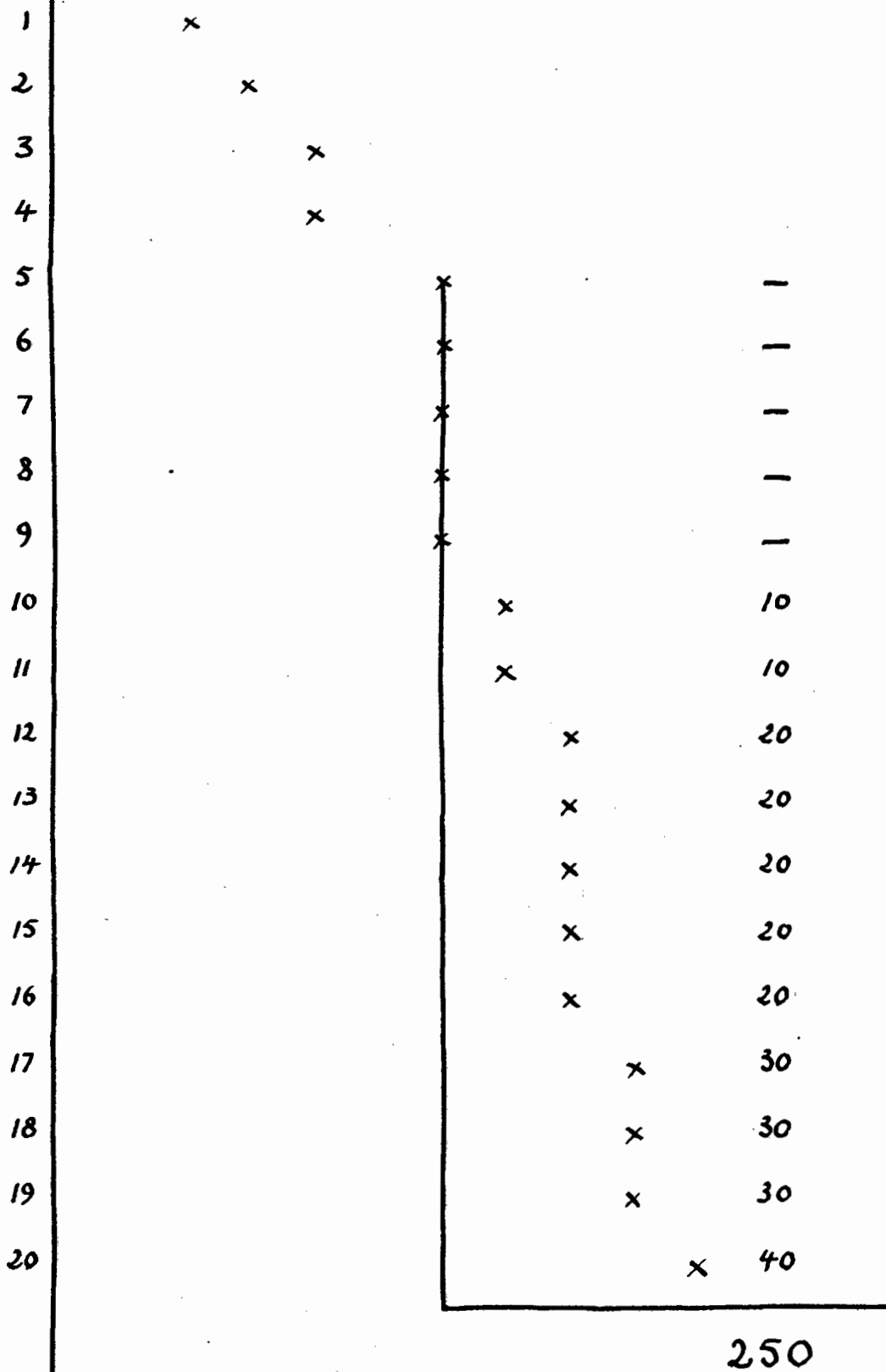


FIG. 2.

RECORD OF TEST 3, ILLUSTRATING THE METHOD OF SCORING.

measured in millimeters was taken as the Subject's score.

4. DIRECTIVE SUGGESTION.

The apparatus used in this test was the same as that used in test III.

The procedure was similar to that of test III, except that lines 1 to 4 were omitted. When the 6th. line was presented, the Subject was told that it was longer than line 5. Similarly, on exposing line 7, this was stated to be shorter than the previous one. Alternating suggestions were continued throughout fifteen lines, so that fourteen suggestions were made altogether (7 long, 7 short).

Fig. 3 illustrates how the test was scored. The amounts by which each line was represented either as longer or shorter than the previous line, was regarded as a measure of the Subject's suggestibility. The total difference between all fifteen lengths was then measured in millimetres and taken as the score. If a Subject reacted negatively to a suggestion, by drawing a line shorter when it had been described as being longer than the previous one, or vice versa, the amount by which he reacted in this way, indicating contra-suggestibility, was subtracted from his total score. In no case was contra-suggestibility found to be in excess of suggestibility.

The different nature of the conditions leading to the eventual manifestation of suggestibility in the "Progressive Lines" and the "Directive Suggestion" tests is evident.

The phenomenon, as it appears in the "Progressive Lines" test, can be explained along lines, similar to those in test II (Progressive Weights). Association between position in the series and the length of a line, is built up, but is not further reinforced beyond line 5.

The exhibition of suggestibility in this test is again ultimately induced by anticipation.

In the case of the "Directive Suggestion" test, hetero-suggestion is a distinctive feature. Here we see "the imitative assumption of a mental attitude, under the illusion of assuming it spontaneously", as it is defined by Stern (1). Prestige probably plays an important part in making the suggestions effective. The Subject anticipated seeing a longer or a shorter line, and this anticipation once again produces suggestion.

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CHAPTER IV.

- TESTS: 5. Illusion of Warmth;
6. Odour Suggestion.

ILLUSION OF WARMTH.

For this test a piece of apparatus, consisting of an electric hot-iron with its flat surface uppermost, a globe and screen, and two switches, was assembled. The circuit was arranged so that one switch, conspicuously situated on top of the apparatus, could be turned on to allow a current of 220 Volts to warm the hot-iron and light the globe. A silent switch, placed so that it could not be seen by the Subject, enabled the Experimenter to exclude the hot-iron from the circuit, so that only the light showed. A small cardboard screen was placed between the globe and the hot iron, to prevent heat rays emitted by the globe from reaching the warming surface. The entire apparatus was mounted on a black cardboard box.

The Subject was seated at a comfortable distance from the table upon which the apparatus rested, and was told that his ability to perceive warmth was to be tested. The circuit of the apparatus was briefly explained, without any mention being made of the secret switch. The Subject was then instructed to place his right hand upon the warming plate, so that a maximum amount of contact between the palm of the hand and the plate was obtained. The first and slightest perception of warmth was to be reported immediately by the word "now".

After a warning word had been given, the main switch was then turned on rather ostentatiously and simultaneously a stop-watch was started to record the time the Subject took to react. The secret

switch remained closed so that no current passed through the hot-iron and only the globe was lit. The Experimenter then remained in an expectant attitude awaiting the reaction. As soon as the Subject reported warmth, the stop-watch was stopped and the time recorded. In this way the test was repeated five times, with each hand alternately.

If the Subject, at any trial, failed to get the illusion of warmth within 30 seconds, the hot-iron switch was opened without attracting the Subject's attention, but the trial was recorded as one "resistance".

The number of seconds elapsing between the time when the light-switch was turned on, and the moment a Subject reported a sensation of warmth, was subtracted from 30. Such a score was found for each of the five separate trials. The total of these scores was taken to give a measure of the Subject's suggestibility.

6. ODOUR SUGGESTION.

For the purpose of this test six identical glass stoppered bottles were used. Three of these contained extracts of Oil of Cloves, Peppermint and Spearmint respectively, and were labelled accordingly. The remaining three bottles contained only water with odourless colouring matter, and were labelled "Orange", "Pine-apple" and "Lemon" respectively.

The Subject was told that his sense of smell was to be tested. The six bottles in the above mentioned order were placed before him, with the labels clearly visible. It was then explained that each bottle would in turn be brought slowly up to the Subject's nose from a distance, and that he was to report as soon as he detected the appropriate smell.

The stopper was then removed from the first bottle when it was two feet from the Subject's nose, this distance being decreased slowly, until the Subject reported the smell, or until the bottle touched his nose. This procedure was repeated with each bottle in turn, the Subject being told each time what odour to expect.

Every claim to detect smell from any one of the last three bottles was scored +1.

In the "Warmth Illusion" test, an association exists between the turning on of a switch, the burning of a globe and the warming of the hot-iron, provided that the Subject understands the circuit. The fact that female Subjects on the whole are less likely to grasp the full significance of the circuit as explained to them, together with their greater experience of judging the temperature of hot-irons by touch, might account for their lower mean suggestibility score in this test (i).

The association is to a slight extent reinforced by the preliminary explanation of the circuit, and where a Subject fails to perceive warmth within 30 seconds the objectively experienced warmth also tends to reinforce the association.

In the "Odour Suggestion" test, the association between the label on the bottle and the corresponding odour is built up by the test itself, and is further strengthened by the spoken word of the Experimenter and the colour of the water. Thus with the first three bottles the Subject is presented with two visual stimuli (label and colour), the verbal stimulus, and the odour. When, in the last three bottles, the odour is omitted, the Subject tends to fill this gap by a purely subjectively experienced odour.

(i) Mean score of female Subjects: 18.9;
Mean score of male Subjects : 29.3.

CHAPTER V.

TESTS: 7, 8, and 9: BODY-SWAY. (1).

The apparatus used for the three tests described in this chapter, consisted of a small hook which could be attached to the Subject's collar. A cotton thread passed from this hook, through a large upright screen concealing the rest of the apparatus, over a pulley, and was joined onto one end of a light lever. A recording needle attached to the other end of this lever traced all forward and backward movements of the Subject, onto a smoked paper which was mounted on a kymograph drum.

Vertical lines were drawn automatically by a wire joining two electro-magnetic recorders. These recorders were connected up with an electric chronoscope pendulum, so that the lines were drawn at 2 second intervals. Simultaneously a comb-like device traced fifteen horizontal lines, spaced at 1 cm. intervals on the record. These lines were afterwards numbered +7 to -7, the former being uppermost.

An additional electro-magnetic recording needle, connected to a silent tap-key, enabled the Experimenter to record instructions on the smoked paper without moving away from the Subject (ii).

7. UNCONSCIOUS MOVEMENT AND IMAGINATION:

(NORMAL AMOUNT OF BODY-SWAY WAS ALSO MEASURED BY THIS TEST)

The Subject was told that his ability to stand still was to be measured. The Subject stood with his back to the screen, and when the hook had been placed in position he was told to close his eyes and to stand perfectly still. The recording apparatus was then started.

Thus a record of the Subject's normal amount of Body-Sway

(1) These tests are modifications from those described by Hull (1)
(ii) For this purpose use was made of the Morse Code.

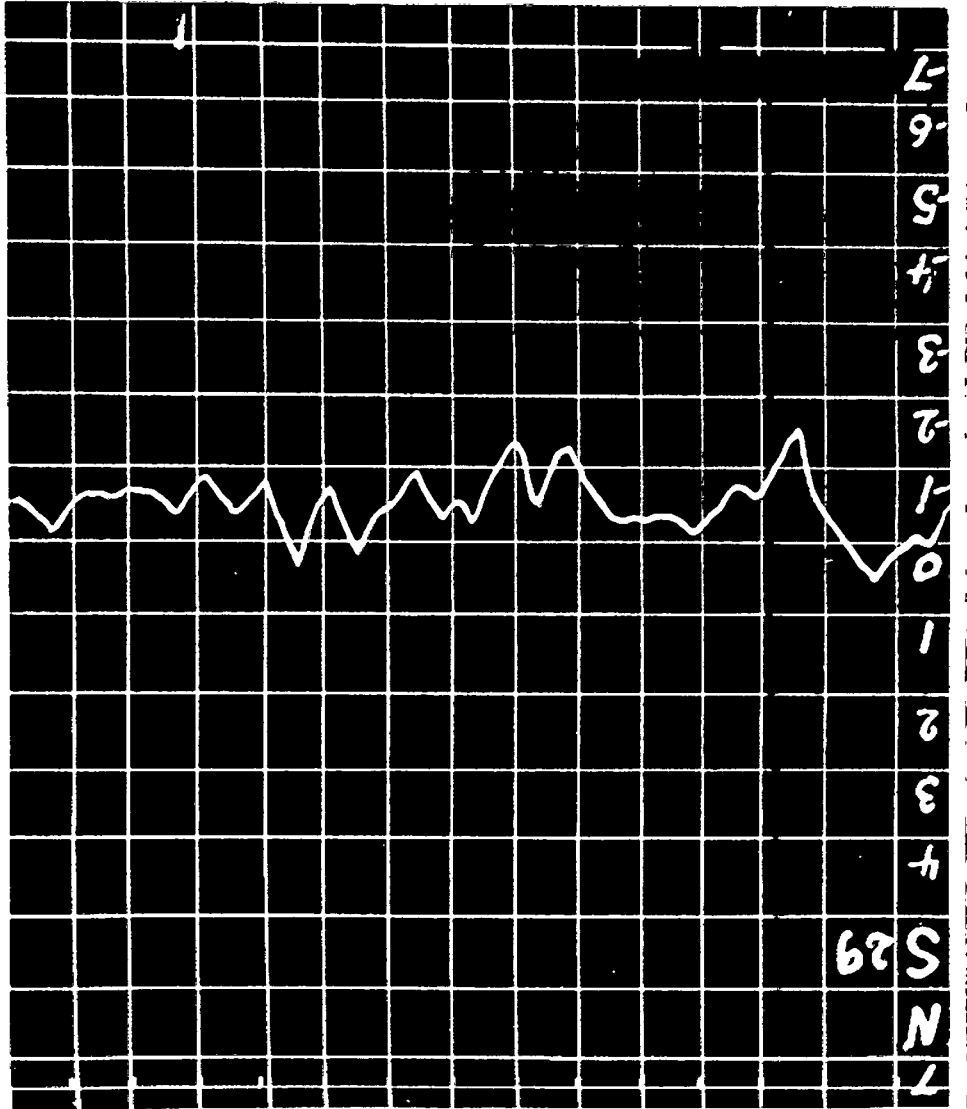
was obtained. This record was taken over a period of 30 seconds. Fig. 4 (page 19) and Table I represent a typical record obtained, and the method of scoring respectively. Readings were taken at 2 second intervals, and the average of the 15 readings was found. The total amount of deviation from this average, as shown by the 2 second intervals readings, was expressed in centimetres, and this quantity of Normal Body-Sway was called "Variable 11"

TABLE I.

Method of calculating Normal Amount of Body Sway, from record shown in Fig. 4.

| SECS. | READINGS ON RECORD. | AMOUNTS ABOVE AVERAGE. (Backward Sway) | AMOUNTS BELOW AVERAGE. (Forward Sway). |
|-------|----------------------------|---|---|
| 2 | + .2 | . 8 | |
| 4 | - .4 | . 2 | |
| 6 | - .6 | | |
| 8 | - .2 | . 4 | |
| 10 | - .3 | . 3 | |
| 12 | -1.0 | | .4 |
| 14 | -1.3 | | .7 |
| 16 | - .5 | . 1 | |
| 18 | - .5 | . 1 | |
| 20 | - .6 | | |
| 22 | - .7 | | .1 |
| 24 | - .8 | | .2 |
| 26 | - .7 | | .1 |
| 28 | - .5 | . 1 | |
| 30 | - .5 | . 1 | |
| | TOTAL:-8.4 | TOTAL Amount of Backward Sway: 2.1 | TOTAL Amount of Forward Sway: 1.5 |
| | AVERAGE:-8.4= 15 -.6 | TOTAL AMOUNT OF NORMAL BODY SWAY= 3.6 | |

FIG. 4 : RECORD OF THE NORMAL AMOUNT OF BODY SWAY OF SUBJECT 29, MEASURED OVER A PERIOD OF THIRTY SECONDS. (LEFT YI).



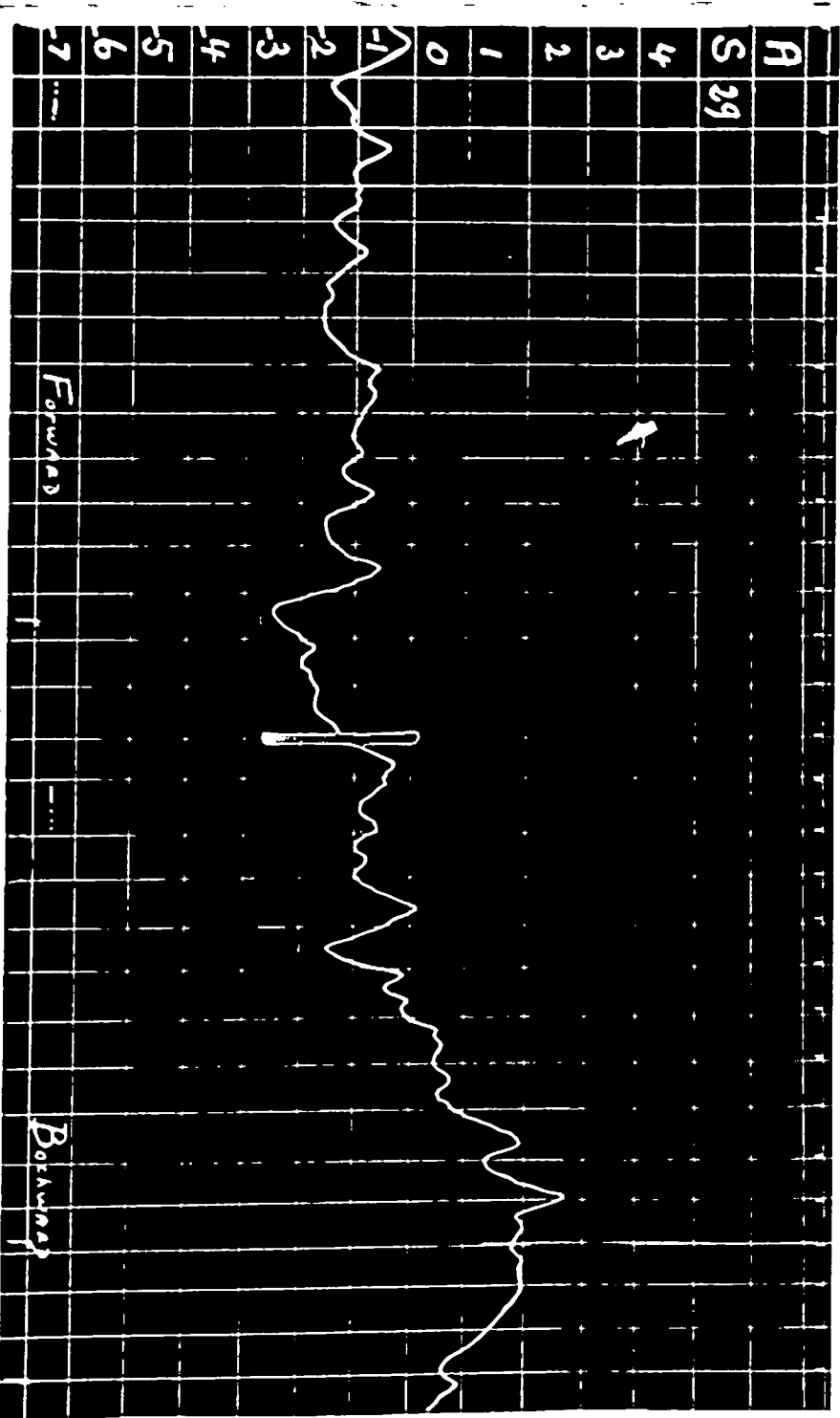
The Subject was then instructed to imagine as vividly as possible that he was leaning forward, but that he was not to perform the movements imagined. This was continued for 30 seconds, and then a similar instruction was given; this time, that the Subject was to imagine himself leaning backwards, again without performing such a movement. This was also continued for 30 seconds, when the recording apparatus was stopped and the Subject was allowed to open his eyes.

Fig.5 (page 21) shows a typical record obtained in this test. The method of scoring is illustrated by Table 2. Averages were calculated for the position of the body during forward, and during backward suggestion. The difference between these two averages, expressed in centimetres, was taken as the Subject's score in this test.

TABLE 2.

| SECS | READINGS DURING FORWARD SUGGESTION. | READINGS DURING BACKWARD SUGGESTION. |
|-------------------------------------|-------------------------------------|--------------------------------------|
| 2 | -1.3 | - .5 |
| 4 | -1.0 | - .7 |
| 6 | -1.0 | -1.0 |
| 8 | -1.4 | - .5 |
| 10 | -1.4 | - .6 |
| 12 | -1.6 | 0 |
| 14 | - .7 | + .5 |
| 16 | - .8 | + .8 |
| 18 | -1.0 | +1.4 |
| 20 | -1.0 | +2.6 |
| 22 | -1.4 | +1.8 |
| 24 | -1.7 | +2.0 |
| 26 | -2.0 | +1.4 |
| 28 | -1.7 | + .7 |
| 30 | -1.2 | + .5 |
| TOTALS | -19.2 | +8.4 |
| AVERAGES | - 1.3 | + .6 |
| DIFFERENCE (BACKWARD - FORWARD)+1.9 | | |

Method of Scoring Test VII, from record shown in Fig. 5.



11. S : RECORD OF THE AMOUNT OF BODY-SWAY INDUCED BY THE SUBJECT'S
 FLUCTUATION RESULTING IN UNCONSCIOUS MOVEMENT MEASURED
 OVER A PERIOD OF THIRTY SECONDS FORWARD, AND THIRTY SECONDS
 BACKWARD, SUCCESSIVELY. (TEST VII).

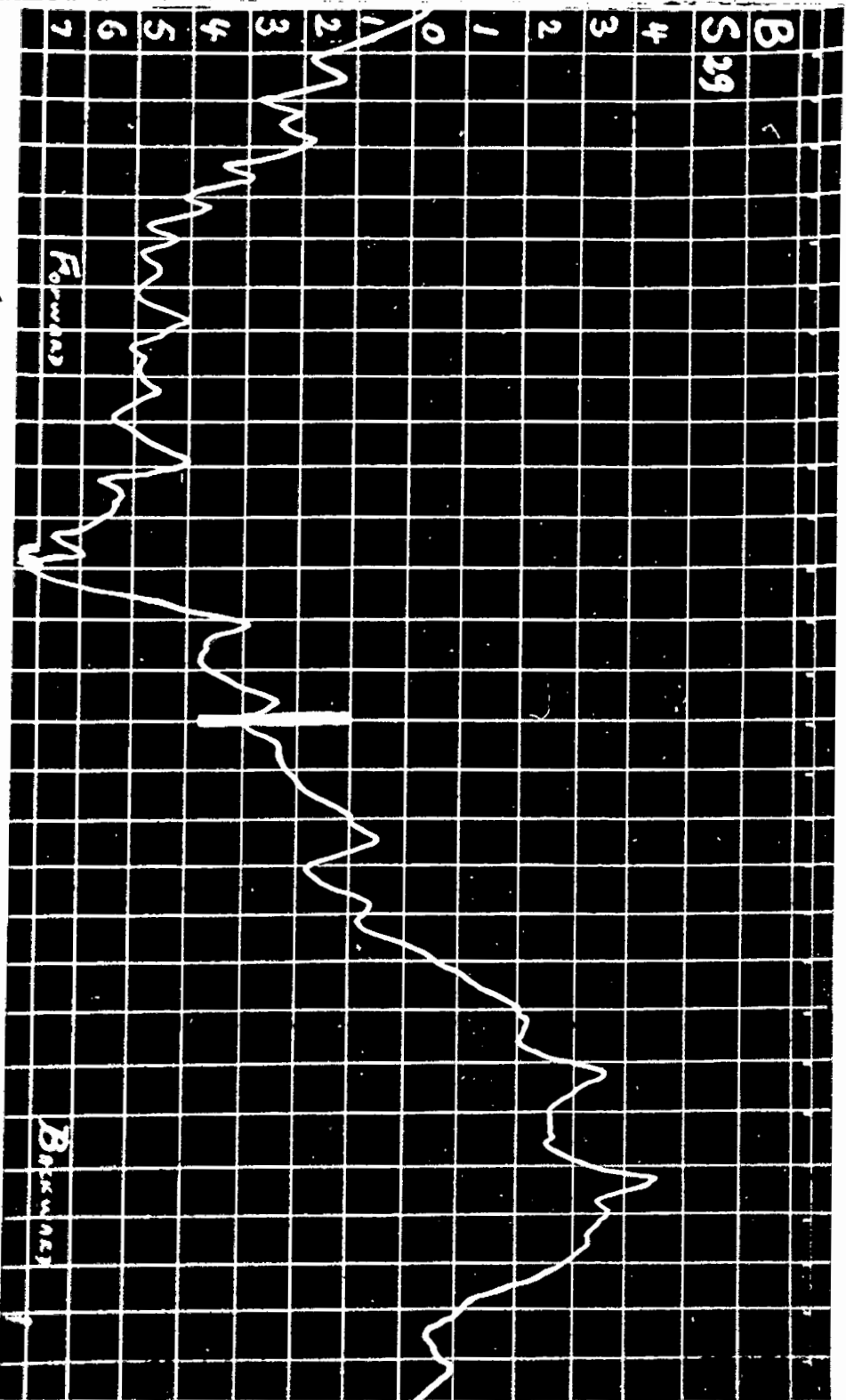
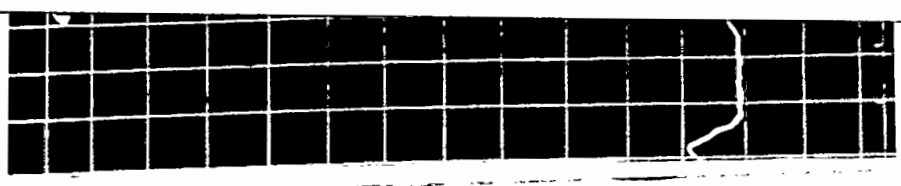


Fig. 6 : (a) Waveform of a signal at the output of a diode detector. The signal is a 100 kHz sine wave with a peak-to-peak amplitude of 10 V. The diode is a 1N4148. The load resistor is 1 kΩ. The time scale is 1 μs/div. The vertical scale is 1 V/div.



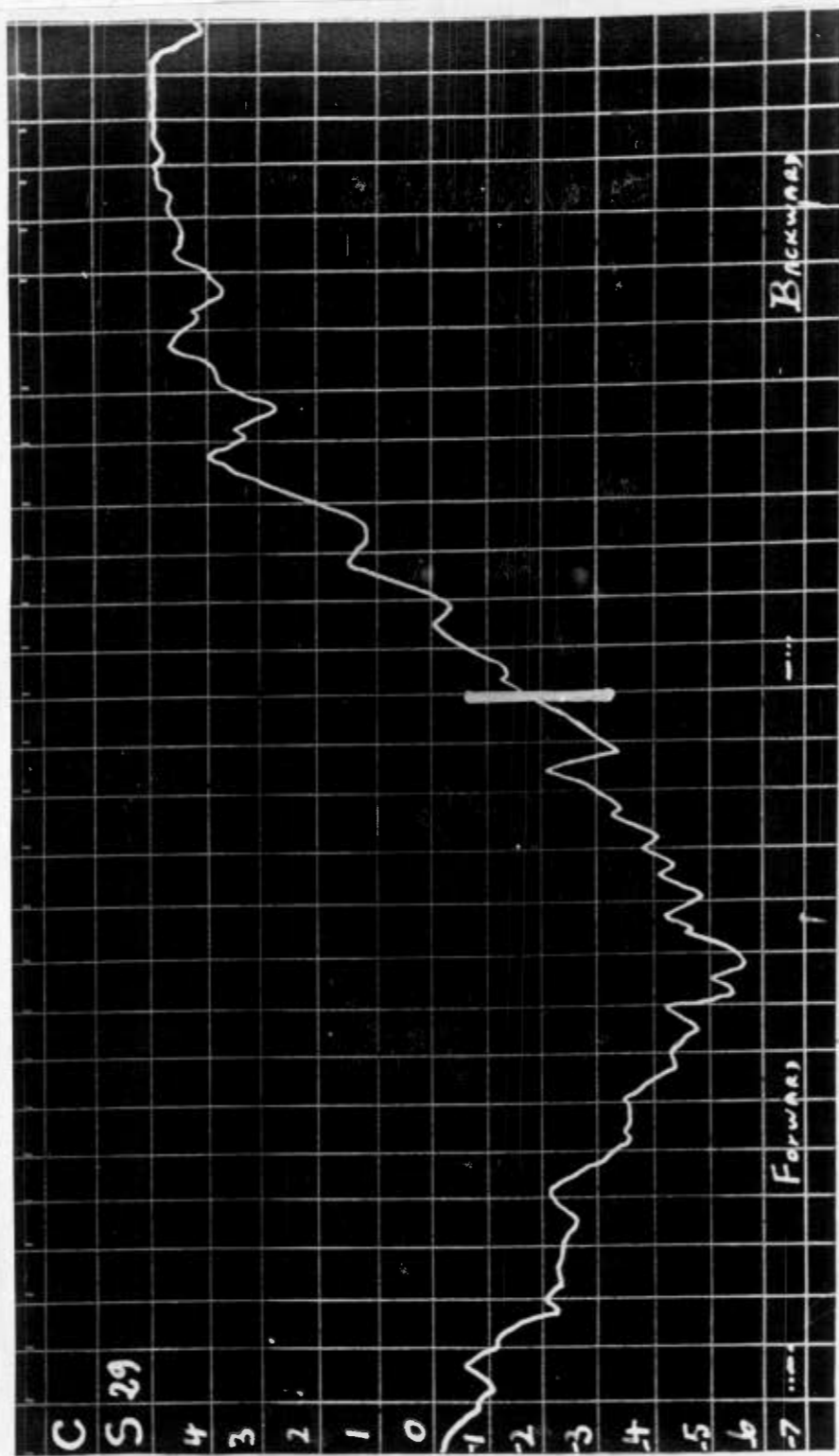


FIG. 7 : RECORD OF THE AMOUNT OF BODY-SWAY WHICH RESULTED FROM VEREAL HETERO SUGGESTION, MEASURED OVER A PERIOD OF THIRTY SECONDS FORWARD, AND THIRTY SECONDS BACKWARD SUGGESTION. (TEST IX).

In all the three tests, association does seem to be a factor. One does not normally think or say that one is falling forward, unless this is actually happening. Thus the Subject, when presented with an incomplete situation, tends to supply the missing event. Since the Subject is normally unaware of the swaying movements he performs, the test does not reinforce this association.

Anticipation does not appear to play a very important part in inducing the movement, since the Subject was instructed to stand perfectly still, and was not told that he would sway despite his efforts to carry out this instruction.

The measurement of the normal amount of body-sway was included, because the writer believes that the individual who is normally less steady when standing erect, is affected by a lack of muscle control, or by a less efficient sense of equilibrium. In both cases a physical factor is involved. When an idea is brought to the mind of such a Subject, either by autosuggestion or by heterosuggestion, the resulting action will tend to be less controlled than it will be in the individual who is normally more steady.

Since every test used in the present investigation measures a physical manifestation of suggestibility (1), this physical^{ad} factor probably affects the results to some extent in every instance. The "normal amount" of Body-Sway test was considered to measure the factor in question most clearly.

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- (2) Baudouin, C., "Suggestion and Autosuggestion", George Allen and Unwin Ltd., London, 1920, p. 26.

(1) This physical manifestation is a sensory perception in Tests 1,2,3,4,5 and 6; motor behaviour in Tests 7,8 and 9, and a combination of both in the hypnosis (Test 10).

CHAPTER VI.

TEST X : HYPNOSIS.

None of the Subjects used in these tests had ever been hypnotized before, and in every instance, this test was carried out with the consent of the Subject.

The Subject was told that he was to be hypnotized, but that he need have no fear whatsoever (1). In a half-darkened room the Subject was seated comfortably and was instructed to fix his gaze on a small point of light, about six feet in front of him and slightly above the height of his eyes. The Experimenter was seated to the left and somewhat behind the Subject.

The Subject was then instructed to make himself perfectly comfortable, to relax completely while gazing steadfastly at the point of light.

After four minutes, the Subject was told that his eyelids would soon begin to feel heavy, and that his eyes would feel tired. "Very soon you will want to close your eyes and you will no longer be able to keep them open". When the Experimenter noticed that the eyelids began to flutter, he stated that the Subject's eyes were closing, and that as soon as they were closed completely, he would go into a deep sleep.

Suggestions, aimed at inducing sleep were then made continually, the Experimenter spacing his short phrases rhythmically, arranging them so that the emphasis on sleep was made simultaneously with the exhalation of the Subject. The words "tired", "weary", "drowsy", "sleepy", "relaxed" etc. were used extravagantly.

The Subject was then told that everything was becoming vaguer, dimmer and further away; that he felt as though he was going backward into a long, dark tunnel and was being engulfed completely by huge black wave of irresistible sleep. This verbose

(1) The Subject was reassured that no personal questions would be asked, and that no foolish or embarrassing acts would be induced.

suggestion proved to be very efficient.

As soon as the Experimenter was satisfied that the suggestions had taken effect, it was emphasized that nothing, save the Experimenter's voice, could wake the Subject. Further suggestions to bring about deeper sleep were continued, until thirty minutes had elapsed since the start of the test. The Subject was then told that he was now completely and deeply asleep, unaware of his surroundings, with the exception of the Experimenter's voice. This voice he would hear all the time, and he would obey it's instructions automatically. It was stressed that the Subject had no control over himself, but that all control was exercised by the Experimenter. Thus no amount of effort would enable the Subject to awaken without the Experimenter's command being given.

The Experimenter then suggested that the Subject's left arm was becoming lighter and that it was beginning to rise. This suggestion was continued until the hand was eventually pointing at the ceiling.

Assuming for the purpose of the description of this test that every suggestion was carried out, rigidity of the arm was then induced, and the arm was kept pointing upward for 5 minutes.

It was then suggested that the face was completely anaesthetised. This part of the Subject was then stroked gently with a fine brush.

Suggestions, aimed at inducing hypersensitivity of the right hand were then made. The Subject was told that his hand would hurt very much when touched, and that the pain would be so intense as to cause him to withdraw that hand. The Experimenter then touched the Subject's right hand with the blunt point of a pencil, and noted whether withdrawal followed.

Then the Subject was instructed to open his eyes, but it

was stressed that this would not cause him to awaken. The gold cap of a fountain pen was exhibited to the Subject, with the information that he was looking at a cigarette. It was suggested that the Subject would remember having seen the "cigarette" after he would wake up, although everything else would be forgotten.

The Experimenter then gave instructions for the Subject to follow him. He was led out of the darkened room, up a flight of stairs, and into the brightly lit laboratory, where the Subject was once again seated.

It was then suggested that the Subject was in turn twelve, ten, eight and six years old. (1). To test the influence of this suggestion the Subject was asked to write his name and to make some drawings. (Fig. 8). A verbal description of the drawing was also asked for, and this was usually given in the form of a single word.

After bringing the Subject back to his actual age, a post-hypnotic suggestion to the effect that he would immediately relapse into sleep when the experimenter placed his finger between the Subject's eyes and said "Sleep", was made.

A simpler post-hypnotic suggestion was also made. This consisted of telling the Subject that he would ask the Experimenter to open the window, exactly 5 minutes after awakening.

After impressing upon the Subject that he would be completely unable to remember anything, except having seen a cigarette, from the moment he went under hypnosis, until he would wake up, the Subject was aroused from his hypnotic state. This was done by slowly counting to ten, after informing the Subject he would wake up when the Experimenter said "ten" (11)

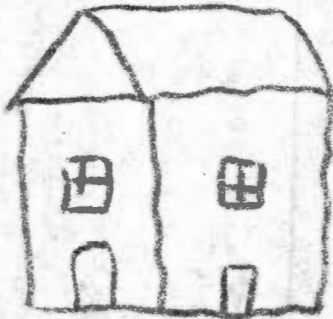
- (1) In the case of Subjects who were apparently less deeply hypnotized, the younger ages (eight and ten years) were omitted.
- (11) It was also emphasized that the Subject would feel very fresh and not tired after awakening.



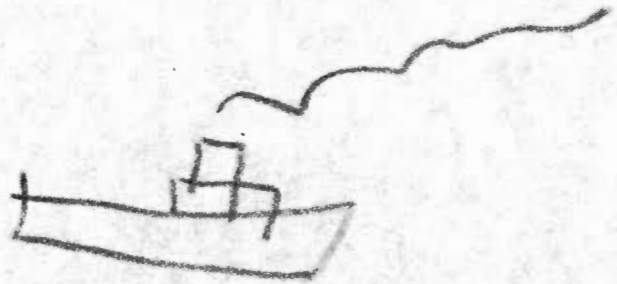
"LADY" (8 years).



"MAN" (8 years).



"HOUSE" (6 years).



"SHIP" (8 years).

Fig. 8:

Some typical drawings produced by Subjects under Hypnosis, when different ages were suggested to them.

After a few minutes the Subject was asked to give an account of what had happened to him. The Experimenter noted either complete amnesia, partial amnesia, or no amnesia. Visual hallucination of the "cigarette" if reported, was also noted. Slight prompting was done in certain cases where it seemed as though a Subject had no amnesia and yet omitted a stage of the procedure. This prompting however, was never direct, but in such cases, the Subject was asked whether he was quite certain that he had left nothing out of his account.

It was also noted whether the simple post-hypnotic suggestion was carried out. After a period of 10 minutes, the Experimenter attempted to re-hypnotize the Subject by the suggested method of placing his finger between the Subject's eyes and saying "Sleep". While the Subject was thus again in a hypnotic state he was asked to relate his experiences once again, and it was noted whether the anaesthesia, hypersensitivity and hallucinatory suggestions had been effective. The Subject was then re-awakened by the method described above.

For the scoring of this test, a table (Table 3) enumerating the various events suggested during the hypnosis, was drawn up. This table was based on a scoring system developed by Davis and Husband (1). By giving one point for each suggestion carried out, a measure of the degree of hypnosis induced in a standard period of 30 mins. was obtained.

REFERENCE.

- (1). Davis, L.W., and Husband R.W., "A Study of Hypnotic Suggestibility in relation to Personal Traits". Journal of Abnormal and Social Psychology, 1931, 26: 175-182.
-

HYPNOSIS

Scoring System.

TABLE 3.

- A {
1. Relaxation
 2. Fluttering of eyelids
 3. Closing of eyes
 4. No re-opening of eyes within 30 minutes after start of session
- B {
5. S appears to be asleep (head droops etc.)
 - 6 Hand moves slightly
 7. Arm moves up completely
 8. Arm catalepsy for 5 minutes
 9. Anaesthesia of hand
 10. Hyperaesthesia of other hand- withdrawal
- C {
11. Opening of eyes without affecting trance
 12. Somnambulism - S follows E.
 13. No awakening outside darkened room.
 14. S. writes name and draws at different age levels.
 15. S. describes drawings.
 16. Visual hallucination (cigarette).
 17. Partial p.h: amnesia.
 18. Complete p.h. amnesia.
 19. Simple p.h. suggestion carried out.
 20. Rehypnotisation by method suggested.

P A R T I I I

RESULTS AND TREATMENT OF DATA.

CHAPTER VII

RESULTS AND CORRELATIONS.

The results obtained were tabulated. (Table 4).

A certain degree of contra-suggestibility was exhibited by four Subjects in Test 4, (Directive Suggestion). These Subjects reacted negatively to the information that a line was either longer or shorter, in one, seven, six and two of the fourteen lines resp. In this test, all the contra-suggestible Subjects were male.

In the "Unconscious Movement and Imagination" test (test 7), five Subjects were found to show contra-suggestibility. Of these, two were female with a mean score of $-.65$, and three were male, with a mean score of -1.0 .

The "Verbal Autosuggestion" test, (test 8) revealed only one contra-suggestible Subject; a female who scored $-.4$.

Six female Subjects, with a mean score of $-.6$, and six male Subjects with a mean score of $-.9$, were found in the "Verbal Hetero-suggestion" test, (test 9).

Two Subjects showed contra-suggestibility in both tests 4 & 9. Only one Subject scored negatively in both Tests 7 and 9, and similarly only one Subject exhibited contra-suggestibility in both tests 8 and 9. Table 5 shows the distribution of contra-suggestibility, as found in tests 4, 7, 8, and 9.

See Table 5 (page 33).

T E S T S.

| SUBJECTS | 4 | 7 | 8 | 9 |
|----------|---|---|---|---|
| 1 | | | | C |
| 2 | C | | | C |
| 4 | | | | C |
| 9 | | | | C |
| 10 | | C | | |
| 15 | | | | C |
| 18 | | | C | C |
| 20 | C | | | C |
| 22 | | C | | C |
| 26 | | | | C |
| 27 | | C | | |
| 28 | C | | | |
| 29 | C | | | |
| 33 | | C | | |
| 34 | | | | C |
| 36 | | | | C |
| 39 | | | | C |
| 40 | | C | | |

TABLE 5

Distribution of Contrsuggestibility in Tests 4, 7, 8, and 9.

The mean Scores and Standard Deviations were also calculated for each test. (Table 6).

| No. of TEST. | NAME OF TEST | MEAN | STANDARD DEVIATION. |
|--------------|--------------------------------------|------|---------------------|
| 1 | Size-Weight Illusion | 7.2 | 1.104 |
| 2 | Progressive Weights | 4.8 | 1.077 |
| 3 | Progressive Lines | 64.2 | 1.130 |
| 4 | Directive Suggestion | 84.8 | .919 |
| 5 | Illusion of Warmth | 23.6 | 1.173 |
| 6 | Odour Illusion | 2.4 | 1.274 |
| 7 | Unconscious Movement and Imagination | 1.9 | .877 |
| 8 | Verbal Autosuggestion | 3.1 | 1.223 |
| 9 | Verbal Heterosuggestion | 2.0 | .731 |
| 10 | Hypnosis | 12.9 | 1.527 |
| 11 | Normal Body Sway | 5.8 | .967 |

TABLE 6: MEAN SCORES AND STANDARD DEVIATIONS.

Using the Product-Moment method, correlations between the eleven tests were then calculated. Thus Table 7 was drawn up. (See p. 35).

For the purpose of comparison of these correlations with those found by Brown (1) (1), and later by Eysenck and Furneaux (3) the correlations of similar tests were tabulated (Tables 7, 8 and 9)

| | Odour | Heat | Weights | Lines. |
|---------|-------|-------|---------|--------|
| Odour | — | | | |
| Heat | + .17 | — | | |
| Weights | + .17 | - .03 | — | |
| Lines | + .27 | + .11 | + .17 | — |

TABLE 7(a)

Correlations found by Brown.

| | Odour | Heat | Weights | Body Sway | Hypnosis |
|-----------|-------|------|---------|-----------|----------|
| Odour | - | | | | |
| Heat | .18 | - | | | |
| Weights | .24 | .05 | - | | |
| Body Sway | .18 | -.16 | .05 | - | |
| Hypnosis | .12 | .51 | -.17 | .73 | - |

TABLE 8.

Correlations found by Eysenck and Furneaux, (using the Tetrachoric Correlating Method.)

| | Odour | Heat | Weights | Body Sway | Hypnosis | Lines |
|-----------|-------|------|---------|-----------|----------|-------|
| Odour | - | | | | | |
| Heat | .12 | - | | | | |
| Weights | .14 | -.06 | - | | | |
| Body Sway | .21 | -.12 | 0 | - | | |
| Hypnosis | -.02 | .12 | -.30 | .73 | - | |
| Lines | -.14 | .10 | -.06 | -.11 | .01 | - |

TABLE 9

Correlations found in the present investigation.

Following Eysenck and Furneaux, the tests were classified into two groups. Average intercorrelations between tests of "ideomotor suggestibility, (Primary Suggestibility)", and tests of "indirection suggestibility (Secondary Suggestibility)", were calculated.

Tests of Primary Suggestibility.

7. Unconscious Movement and Imagination.
8. Verbal Autosuggestion.
9. Verbal Heterosuggestion.
10. Hypnosis.

Tests of Secondary Suggestibility.

1. Size-Weight Illusion.
2. Progressive Weights.
3. Progressive Lines.
4. Directive Suggestion.
5. Illusion of Warmth.
6. Odour Illusion.

Table 10 shows a comparison between the findings in the present investigation, with those of Eysenck and Furneaux.

| Findings in Present Investigation. | | Findings of Eysenck and Furneaux. |
|---|-----|-----------------------------------|
| Average intercorrelation between tests of Primary Suggestibility. | .37 | .50 |
| Average Intercorrelation between tests of Secondary Suggestibility. | .11 | .15 |
| Correlation between tests of Primary Suggestibility with tests of Secondary Suggestibility. | .15 | 1.02 |

Table 10.

REFERENCES.

1. Brown, W., "Individual and Sex Differences in Suggestibility",
University of California Publication in Psychology,
1916, 2, 291-430. (i) QUOTED BY HULL (2)
2. Hull, C.L. "Hypnosis and Suggestibility", Appleton-Century,
1933, 369.
3. Eysenck, H.J., and Furneaux, W.D., "Primary and Secondary
Suggestibility", Journal of Experimental Psychology, 1945,
35, 485-503.

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CHAPTER VIII.

FACTORIAL ANALYSIS.

In this Factorial Analysis, the Centroid method was used.
(Tables 11, 12, 13, 14, 15, 16, 17, 18) See Below:

| | -1 | 2 | -3 | 4 | 5 | 6 | 7 | 8 | 9-10 | 11 |
|-----|----|---|----|---|---|---|---|---|------|----|
| -1 | | | | | | | | | | |
| 2 | + | | | | | | | | | |
| -3 | - | + | | | | | | | | |
| 4 | + | - | + | | | | | | | |
| 5 | + | - | - | | | | | | | |
| 6 | - | | + | | | | | | | |
| 7 | - | | + | | | | | | | |
| 8 | + | | + | | | | | | | |
| 9 | + | | + | | - | | - | | | |
| -10 | + | + | + | + | - | + | + | + | - | |
| 11 | - | - | + | - | - | - | - | | | + |

TABLE 11
Reflections of Variables 1, 3 and 10
for extracting
Factor I

| | -1 | 2 | -3 | 4 | 5 | 6 | 7 | 8 | 9 | -10 | 11 | |
|-----|---|------------|------------|-------------|------------|-------------|-------------|-------------|-------------|------------|------------|----------|
| -1 | 431 .141 290 | | | | | | | | | | | 1.411 |
| 2 | .244 .090 154 304 057 247 | | | | | | | | | | | .900 |
| -3 | .101 094 195.058 060 002 303 063 240 | | | | | | | | | | | .944 |
| 4 | 086 130 044 131 083 214 158 087 071 327 119 208 | | | | | | | | | | | 1.296 |
| 5 | 059 061 002 055 039 094 096 041 137 080 056 024 291 026 265 | | | | | | | | | | | .606 |
| 6 | 018 120 138 142 077 065 138 081 057 158 111 047 115 052 063 2 07 102 105 | | | | | | | | | | | 1.203 |
| 7 | 004 2 12 216 116 135 019 052 .142 090 327 194 133 291 091 200 091 181 090 553 318 235 | | | | | | | | | | | 2.116 |
| 8 | 431 294 137 182 187 005 005 196 191 200 270 070 245 126 119 176 250 074 553 440 113 553 610 057 | | | | | | | | | | | 2.934 |
| 9 | 244 129 115 0 082 082 113 086 027 089 118 02 9 108 055 163 207 110 097 072 193 265 .402 267 135 731 117 614 | | | | | | | | | | | 1.285 |
| -10 | 224 095 129 304 060 244 011 063 053 041 087 046 122 041 163 023 081 058 301 142 159 152 197 045 731 086 817 731 063 668 | | | | | | | | | | | .945 |
| 11 | 185 046 231 264 029 293 303 031 272 039 042 081 094 020 114 036 039 075 092 069 161 035 095 060 410 042 368 011 031 020 410 015 395 | | | | | | | | | | | .459 |
| | 1.411 .3757 | .900 .2397 | .944 .2514 | 1.296 .3451 | .606 .1614 | 1.203 .3204 | 2.116 .5635 | 2.934 .7813 | 1.285 .3422 | .945 .2517 | .459 .1222 | t=14.099 |

TABLE 12. Correlation Matrix, Cross-Multiplication Matrix, and Table of Residuals, for Factor I.

| | -1 | -2 | 3 | 4 | 5 | -6 | 7 | 8 | 9 | 10 | -11 |
|-----|----|----|---|---|---|----|---|---|---|----|-----|
| -1 | | | | | | | | | | | |
| -2 | - | | | | | | | | | | |
| 3 | + | - | | | | | | | | | |
| 4 | - | + | - | | | | | | | | |
| 5 | - | + | + | | | | | | | | |
| -6 | + | + | + | - | - | | | | | | |
| 7 | - | + | + | | | + | | | | | |
| 8 | | + | + | - | | + | | | | | |
| 9 | | + | - | | - | - | - | | | | |
| 10 | - | + | - | + | + | - | - | + | + | | |
| -11 | + | - | + | + | + | - | + | + | - | - | |

TABLE 13

Reflections of Variables 2, 3, 6, 10 and 11 for extracting Factor 11

| | -1 | 2 | 3 | -4 | 5 | -6 | 7 | 8 | -9 | -10 | -11 |
|-----|----|---|---|----|---|----|---|---|----|-----|-----|
| -1 | | | | | | | | | | | |
| 2 | + | | | | | | | | | | |
| 3 | + | + | | | | | | | | | |
| -4 | + | + | + | | | | | | | | |
| 5 | - | - | | + | | | | | | | |
| -6 | + | - | | + | - | | | | | | |
| 7 | - | + | | - | | | | | | | |
| 8 | + | + | | + | | | | | | | |
| -9 | - | + | + | - | + | + | + | - | | | |
| -10 | + | + | + | - | + | + | + | + | + | | |
| -11 | + | + | | - | | - | | - | + | + | |

TABLE 15

Reflections of Variables 2, 4, 9 and 10 for extracting Factor III

| | 1 | -2 | 3 | 4 | 5 | -6 | 7 | 8 | 9 | 10 | -11 | |
|-----|--------------|-------------|--------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|---------|
| 1 | 231 031 2 00 | | | | | | | | | | | .502 |
| -2 | 154 034 188 | 293 039 254 | | | | | | | | | | .567 |
| 3 | 195 064 131 | 002 072 074 | 2 72 135 137 | | | | | | | | | 1.061 |
| 4 | 044 027 071 | 214 031 183 | 071 057 128 | 214 024 190 | | | | | | | | 1.061 |
| 5 | 002 050 052 | 094 056 038 | 137 105 032 | 024 045 021 | 200 082 118 | | | | | | | .827 |
| -6 | 138 013 125 | 065 015 050 | 057 028 029 | 047 012 059 | 063 022 085 | 138 006 132 | | | | | | .222 |
| 7 | 216 026 242 | 019 029 010 | 090 055 035 | 133 023 110 | 200 043 157 | 090 011 079 | 2 65 022 243 | | | | | .431 |
| 8 | 137 061 076 | 005 068 063 | 191 127 064 | 070 054 124 | 119 099 020 | 074 027 047 | 113 052 061 | 191 120 071 | | | | 1.000 |
| 9 | 115 062 053 | 082 069 013 | 027 130 157 | 029 055 084 | 163 101 264 | 097 027 124 | 265 053 318 | 135 122 013 | 817 124 693 | | | 1.017 |
| 10 | 129 104 233 | 244 117 127 | 053 213 271 | 046 093 047 | 163 170 007 | 058 046 104 | 159 089 248 | 045 206 161 | 817 209 608 | 817 382 465 | | 1.713 |
| -11 | 231 032 199 | 293 036 329 | 2 72 068 204 | 081 029 052 | 114 053 061 | 075 014 089 | 161 027 134 | 060 064 004 | 868 068 433 | 020 109 129 | 368 034 334 | .521 |
| | .502 | .567 | 1.061 | .451 | .827 | .222 | .431 | 1.000 | 1.017 | 1.713 | .521 | 6-8.324 |
| | .1754 | .1965 | .3677 | .1563 | .2856 | .0769 | .1494 | .3466 | .3525 | .5937 | .1840 | |

TABLE 14.
Correlation Matrix, Cross-Multiplication Matrix, and Table of Residuals, for Factor II.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | |
|----|-------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| 1 | 242 062 180 | | | | | | | | | | | .918 |
| 2 | 188 183 105 | 329 112 217 | | | | | | | | | | 1.228 |
| 3 | 131 095 036 | 074 127 053 | 271 144 127 | | | | | | | | | 1.396 |
| 4 | 071 032 039 | 183 043 140 | 128 049 079 | 183 017 166 | | | | | | | | .476 |
| 5 | 052 044 096 | 038 059 097 | 032 067 035 | 021 023 002 | 2 64 031 233 | | | | | | | .651 |
| 6 | 125 032 093 | 050 043 093 | 029 048 019 | 059 016 043 | 085 023 108 | 125 016 109 | | | | | | .468 |
| 7 | 242 069 311 | 010 092 082 | 035 104 069 | 110 036 146 | 157 049 108 | 079 035 044 | 318 075 243 | | | | | 1.008 |
| 8 | 076 052 024 | 063 069 006 | 064 079 015 | 124 027 097 | 020 037 017 | 047 026 021 | 061 057 004 | 161 048 118 | | | | .760 |
| 9 | 053 161 214 | 013 216 203 | 157 245 088 | 084 084 168 | 264 114 150 | 124 082 042 | 318 177 141 | 013 134 147 | 608 418 190 | | | 2.375 |
| 10 | 233 166 067 | 127 223 096 | 271 253 018 | 047 086 133 | 007 118 111 | 104 085 019 | 248 183 065 | 161 138 023 | 608 431 177 | 608 444 164 | | 2.449 |
| 11 | 199 121 078 | 329 162 167 | 204 184 020 | 052 063 118 | 061 086 025 | 089 062 151 | 134 133 001 | 004 100 104 | 433 312 121 | 129 322 193 | 433 234 199 | 1.777 |
| | .918 | 001 1.228 | 001 1.396 | 001 .476 | 000 .651 | 000 .468 | 000 1.008 | 002 .760 | 002 2.375 | 001 2.449 | 000 1.777 | 002 6.13.506 |
| | .2498 | .3341 | .3799 | .1295 | .1771 | .1273 | .2743 | .2068 | .6462 | .6664 | .4835 | |

TABLE 16.

Correlation Matrix, Cross-Multiplication Matrix, and Table of Residuals, for Factor III.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-----|---|---|---|---|---|---|---|---|---|----|----|
| 1 | | | | | | | | | | | |
| -2 | + | | | | | | | | | | |
| -3 | + | - | | | | | | | | | |
| -4 | + | + | + | | | | | | | | |
| -5 | + | + | + | + | | | | | | | |
| -6 | - | + | + | - | - | | | | | | |
| 7 | + | + | + | + | | | | | | | |
| -8 | + | - | - | + | + | - | - | | | | |
| -9 | + | + | + | + | | | | + | | | |
| -10 | - | + | - | + | - | | | - | | | |
| 11 | + | + | + | - | + | + | - | - | - | + | |

TABLE 17
Reflections of Variables 1, 2, 3, 4, 8 and 11 for extracting Factor IV.

The mean Correlation Coefficient of all the variables was found to be +.1622, with a Probable Error of .1039. Since the Mean Residual after extraction of Factor IV was only .0585, the analysis was not continued beyond this point.

Table 19 shows the Factors, Factor Loads and Mean Residuals obtained:

| | | FACTOR I | FACTOR II | FACTOR III | FACTOR IV | |
|----------------------------------|----|----------|-----------|------------|-----------|-------|
| t | | 14.099 | 8.326 | 13.506 | 8.155 | |
| \sqrt{t} | | 3.755 | 2.885 | 3.675 | 2.856 | |
| $\frac{1}{\sqrt{t}}$ | | .2663 | .3466 | .2721 | .3502 | |
| Mean Residual | | .1284 | .1239 | .0876 | .0585 | |
| | | | | | | h^2 |
| Factor Loads on Variables. | 1 | -.3757 | .1754 | .2498 | -.3691 | .3706 |
| | 2 | .2397 | -.1965 | .3341 | -.3947 | .3635 |
| | 3 | -.2514 | .3677 | .3799 | -.1219 | .3576 |
| | 4 | .3451 | .1563 | -.1295 | .2851 | .2416 |
| | 5 | .1614 | .2866 | .1771 | .1614 | .1655 |
| | 6 | .3204 | -.0769 | .1273 | .0890 | .1327 |
| | 7 | .5635 | .1494 | .2743 | .4455 | .6135 |
| | 8 | .7813 | .3466 | .2068 | -.0907 | .7815 |
| | 9 | .3422 | .3525 | .6462 | .4983 | .9073 |
| | 10 | -.2517 | .5937 | -.6664 | .2301 | .9129 |
| | 11 | .1222 | -.1840 | .4835 | -.1702 | .3116 |

TABLE 19.
FACTORS, FACTOR LOADS AND MEAN RESIDUALS.

CHAPTER IX.

Rotation of the Axes.

In order to impart a psychological significance to the factors that were found, the axes were rotated.

Variable 11 (Normal Amount of Body Sway), was considered to be the clearest and most meaningful entity in the battery. Thus, for the first three rotations, the main axis was plotted through variable 11. Variables 9 and 4 both seemed to indicate heterosuggestibility. Therefore the axis was passed between these two variables for the next rotations. For the last rotation, the axis was plotted through Variable 8, which was intended to measure autosuggestibility.

The order of rotation was therefore as follows:

Main axis passed through variable 11 $\left\{ \begin{array}{l} I_0 \text{ and } II_0 = I_1 \text{ and } II_1 \\ I_1 \text{ and } III_0 = I_2 \text{ and } III_1 \\ I_2 \text{ and } IV_0 = I_3 \text{ and } IV_1 \end{array} \right.$

Main Axis passed between Variables 4 and 9. $\left\{ \begin{array}{l} II_1, \text{ and } III_1 = II_2 \text{ and } III_2 \\ II_2 \text{ and } IV_1 = II_3 \text{ and } IV_2 \end{array} \right.$

Main Axis passed through variable 8 $\left\{ \begin{array}{l} IV_2 \text{ and } III_2 = IV_3 \text{ and } III_3 \end{array} \right.$

Figures 9, 10, 11, 12, 13, and 14 show how this graphic rotation was carried out, while the Factor Loads obtained are tabulated in Table 20.

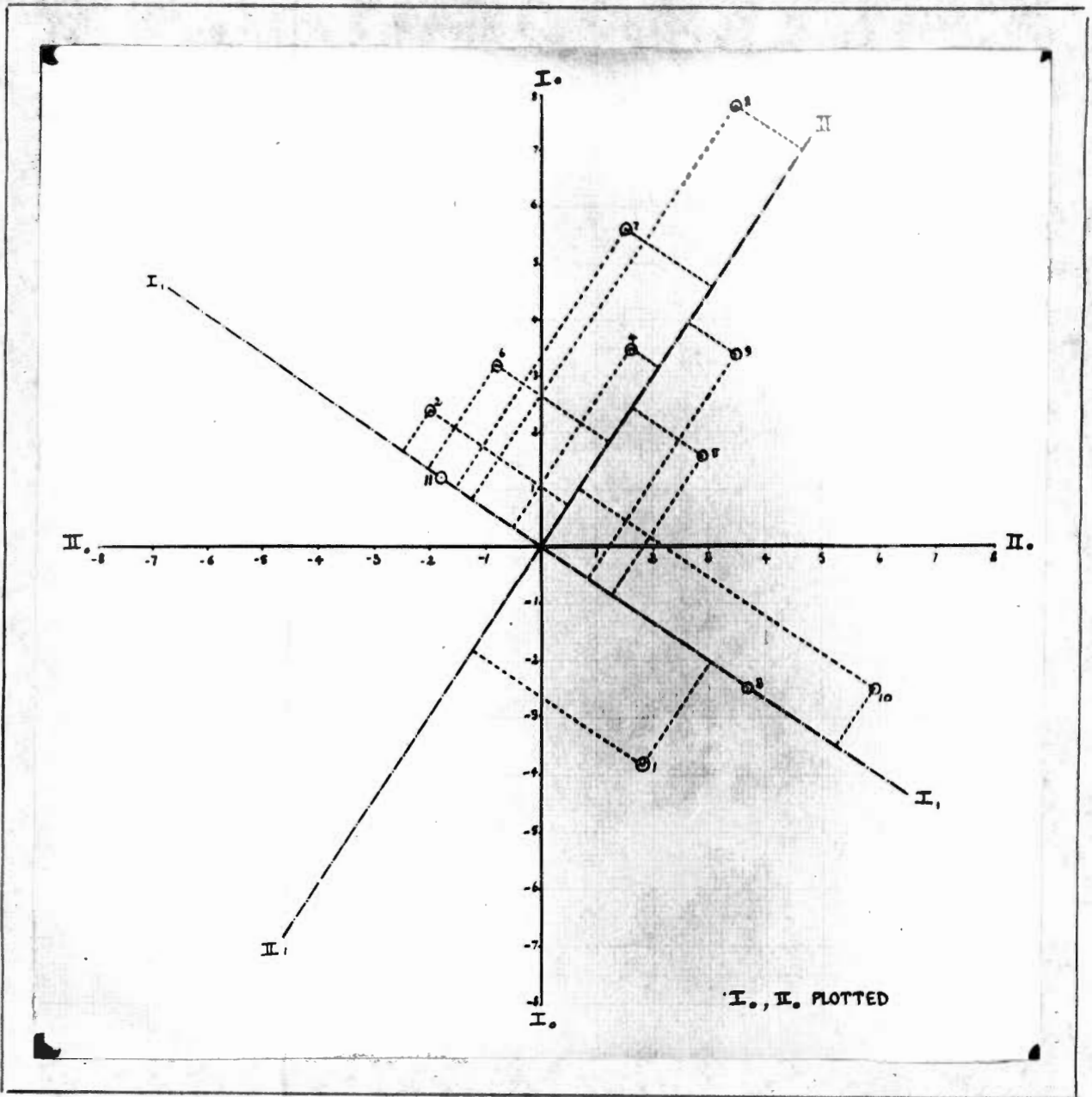


FIG. 9 : ROTATION WITH AXES I_0 AND II_0 PLOTTED.

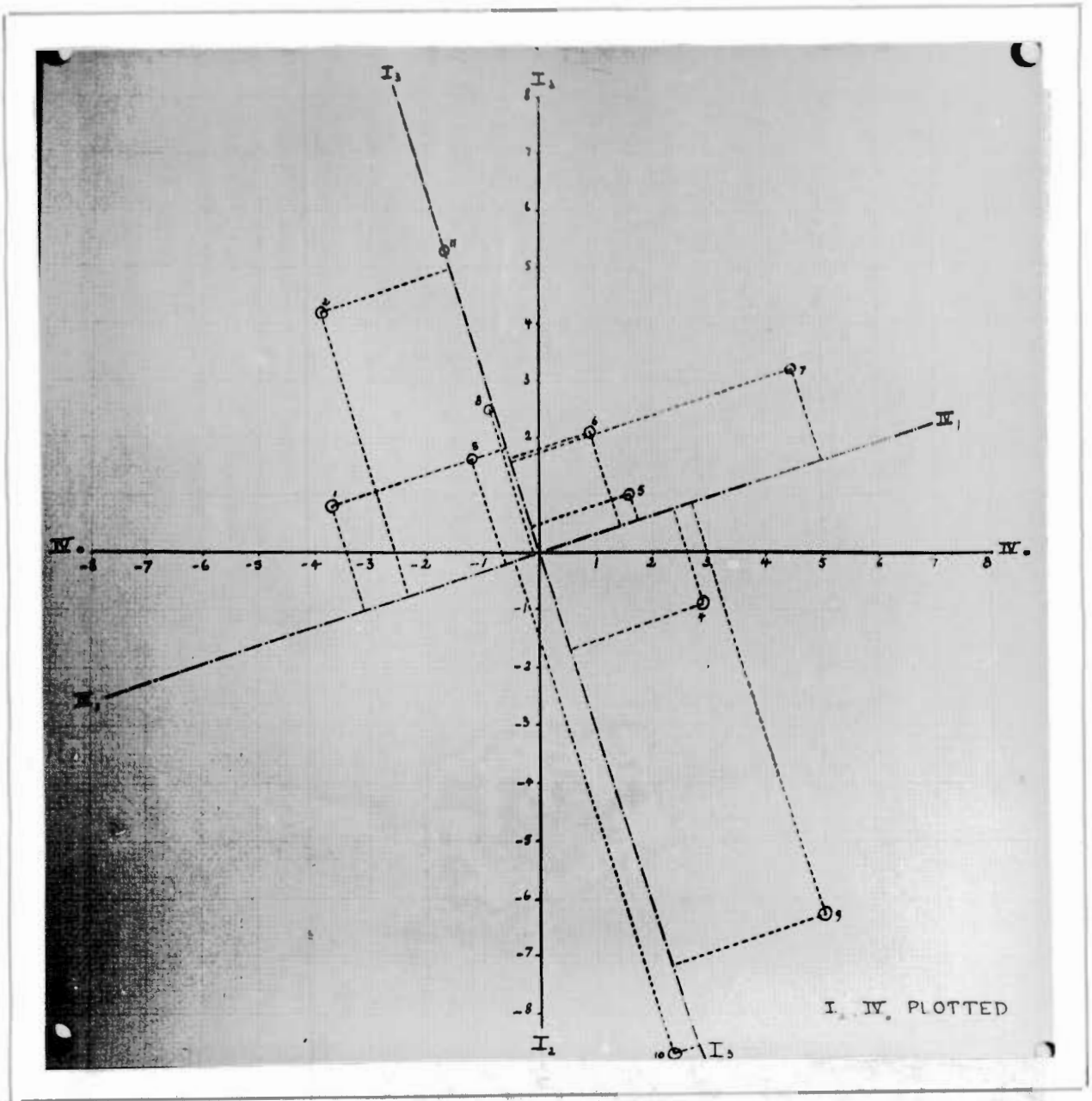


FIG. II : ROTATION WITH AXES I_2 AND IV_0 PLOTTED.

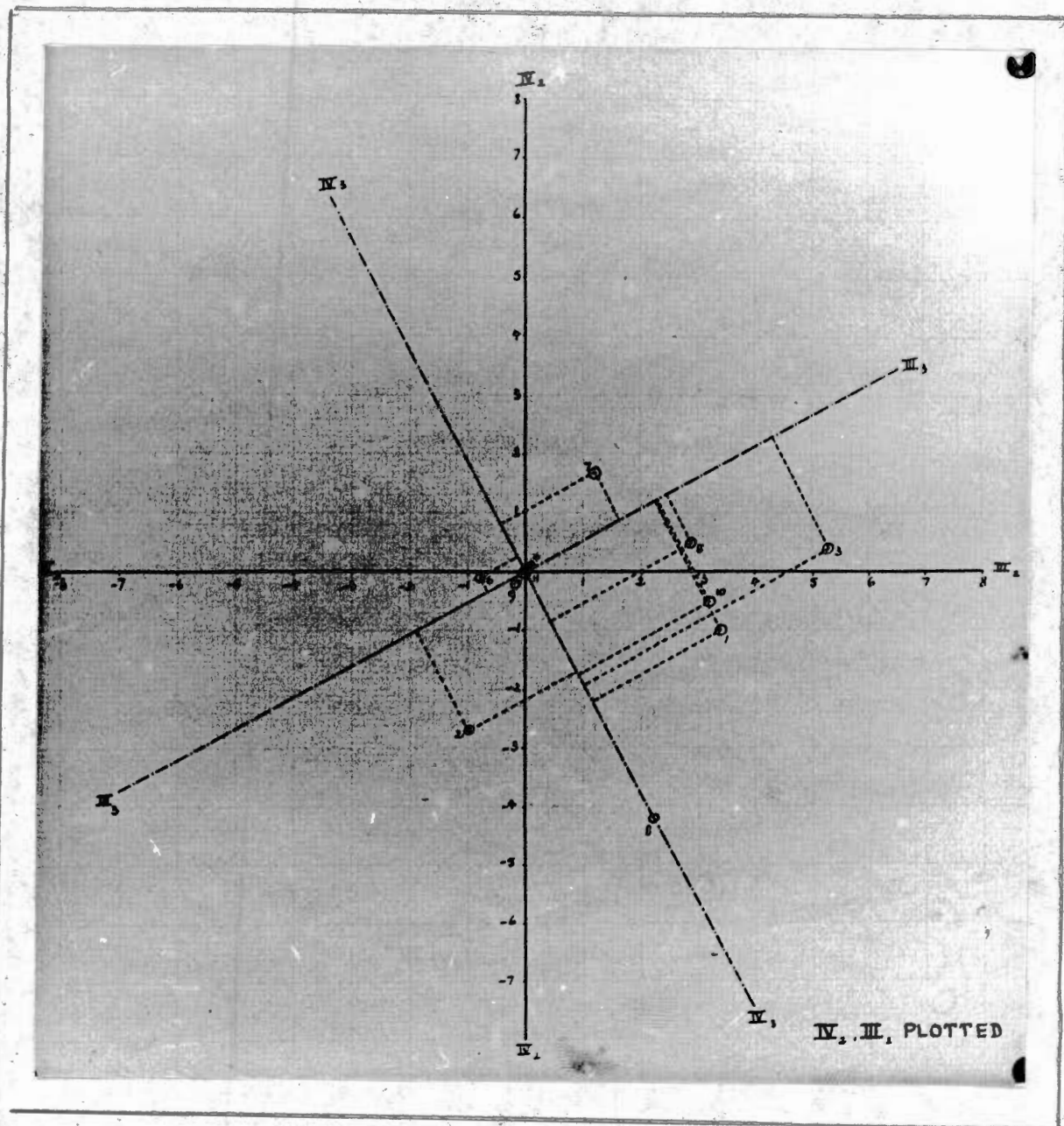


FIG. 14 : ROTATION WITH AXES IV₂ AND III₂ PLOTTED.

| | I ₀ | II ₀ | III ₀ | IV ₀ | I ₁ | II ₁ | III ₁ | IV ₁ | I ₂ | II ₂ | III ₂ | IV ₂ | I ₃ | II ₃ | III ₃ | IV ₃ |
|-----|----------------|-----------------|------------------|-----------------|----------------|-----------------|------------------|-----------------|----------------|-----------------|------------------|-----------------|----------------|-----------------|------------------|-----------------|
| a1 | -38 | 18 | 25 | -37 | -36 | -22 | +43 | -33 | +.08 | -34 | 34 | -10 | 19 | -46 | 25 | -25 |
| b2 | 24 | -20 | 33 | -39 | +30 | 09 | -13 | -24 | .42 | .13 | -10 | -27 | 52 | -01 | -21 | -19 |
| c3 | -25 | 37 | 38 | -12 | -44 | 0 | 56 | -06 | .16 | -18 | +53 | 04 | 19 | -18 | 49 | -21 |
| d4 | 35 | 16 | -13 | 29 | +06 | 38 | -11 | 25 | -09 | .39 | 01 | 01 | -17 | 46 | 01 | 0 |
| e5 | 16 | 29 | 18 | 16 | -15 | 29 | 21 | 18 | 10 | 21 | 29 | 05 | 05 | 27 | 28 | -09 |
| f6 | 32 | -08 | 13 | 09 | +24 | 22 | -16 | 15 | 21 | 26 | -08 | -01 | 17 | 30 | -08 | 03 |
| g7 | 56 | 15 | 27 | 45 | +19 | 55 | -06 | 52 | 32 | 54 | 12 | 17 | 17 | 73 | 18 | 09 |
| h8 | 78 | 35 | 21 | -09 | +14 | 84 | -04 | -01 | 25 | 81 | 22 | -42 | 26 | 69 | 0 | -48 |
| i9 | 34 | 35 | -65 | 50 | -10 | 48 | -18 | 28 | -63 | 51 | -02 | -02 | -76 | 58 | -02 | -01 |
| j10 | -25 | 59 | -67 | 23 | -63 | 12 | 30 | -05 | -87 | 02 | 32 | -05 | -90 | -01 | 26 | -19 |
| k11 | 12 | -18 | 48 | -17 | +22 | 0 | 0 | 0 | 53 | 0 | 0 | 0 | 56 | 0 | 0 | 0 |

TABLE 20

Factor Loads undergoing Graphic Rotation.

The angle through which the axis was rotated in each case was measured and a transformation was carried out to check and increase the accuracy of the results of the graphic rotation.

$$T_1 = \begin{array}{cc|c} \cos \theta & -\sin \theta & I_1 \\ \sin \theta & \cos \theta & II_2 \end{array} \quad (\theta = 56^\circ 30')$$

$$T_2 = \begin{array}{cc|c} \cos \theta & \sin \theta & I_2 \\ -\sin \theta & \cos \theta & III_1 \end{array} \quad (\theta = 65^\circ 30')$$

$$T_3 = \begin{array}{cc|c} \cos \theta & -\sin \theta & I_3 \\ \sin \theta & \cos \theta & IV_1 \end{array} \quad (\theta = 18^\circ)$$

$$T_4 = \begin{array}{cc|c} \cos \theta & -\sin \theta & II_2 \\ \sin \theta & \cos \theta & III_2 \end{array} \quad (\theta = 18^\circ)$$

$$T_5 = \begin{array}{cc|c} \cos \theta & \sin \theta & II_3 \\ -\sin \theta & \cos \theta & IV_2 \end{array} \quad (\theta = 31^\circ)$$

$$T_6 = \begin{array}{cc|c} \cos \theta & \sin \theta & III_3 \\ -\sin \theta & \cos \theta & IV_3 \end{array} \quad (\theta = 28^\circ)$$

The Factor Loads obtained by this method are presented in Table 21. (See Page 53)

| | I ₁ | II ₁ | III ₁ | IV ₁ | I ₂ | II ₂ | III ₂ | IV ₂ | I ₃ | II ₃ | III ₃ | IV ₃ | h ² |
|----|----------------|-----------------|------------------|-----------------|----------------|-----------------|------------------|-----------------|----------------|-----------------|------------------|-----------------|----------------|
| 1 | 3535 | 2164 | 4253 | 3271 | 0807 | 3372 | 3375 | 1066 | 1902 | 4576 | 2480 | 2525 | .3708 |
| 2 | 2962 | 0914 | 1310 | 2435 | 4268 | 1274 | 0958 | 2743 | 5279 | 0162 | 2134 | 1972 | .3633 |
| 3 | 4453 | 0070 | 5627 | 0662 | 1609 | 1806 | 5329 | 0448 | 1907 | 1838 | 4914 | 2105 | .3560 |
| 4 | 0601 | 3740 | 1084 | 2424 | 0930 | 3892 | 0124 | 0074 | 1766 | 4584 | 0144 | 0007 | .2416 |
| 5 | 1499 | 2928 | 2098 | 1841 | 0990 | 2137 | 2900 | 0477 | 0443 | 2780 | 2785 | 0940 | .1667 |
| 6 | 2400 | 2247 | 1654 | 1512 | 2154 | 2648 | 0879 | 0067 | 1773 | 3049 | 0808 | 0354 | .1310 |
| 7 | 1865 | 5524 | 0559 | 5247 | 3270 | 5426 | 1175 | 1703 | 1733 | 7353 | 1837 | 0950 | .6134 |
| 8 | 1422 | 8430 | 0436 | 0099 | 2472 | 8152 | 2190 | 4287 | 2632 | 6937 | 0079 | 4812 | .7822 |
| 9 | 1050 | 4799 | 1728 | 2789 | 6314 | 5896 | 0157 | 0233 | 7545 | 5804 | 0248 | 0132 | .9070 |
| 10 | 6341 | 1178 | 3007 | 0497 | 8693 | 0201 | 3224 | 0530 | 8977 | 0083 | 2597 | 1982 | .9127 |
| 11 | 2209 | 0003 | 0005 | 0025 | 5314 | 0004 | 0006 | 0083 | 5580 | 0016 | 0044 | 0021 | .3114 |

TABLE 21.

Factor Loads rotated by Transformation Matrix.

CHAPTER X

INTERPRETATION AND CONCLUSION.

Correlations of more than $\pm .2$, between the Factors and the Variables, were considered as being significant. These are set out in Table 22.

| | I | II | III | IV |
|---|-------|-------|-------|-------|
| 1. Size-Weight Illusion | | -4576 | -2480 | -2525 |
| 2. Progressive Weights | 5279 | | -2134 | |
| 3. Progressive Lines | | | 4914 | -2105 |
| 4. Directive Suggestion | | 4584 | | |
| 5. Illusion of Warmth | | 2780 | 2785 | |
| 6. Odour Illusion | | 3049 | | |
| 7. Unconscious Movement and Imagination | | 7353 | | |
| 8. Verbal Autosuggestion | 2632 | 6937 | | -4812 |
| 9. Verbal Heterosuggestion | -7545 | 5804 | | |
| 10. Hypnosis | -8977 | | 2597 | |
| 11. Normal Body Sway | 5580 | | | |

TABLE 22.

Significant Correlations of Factors with Variables.

FACTOR I : This factor has high positive loads on Progressive Weights and Normal Amount of Body Sway. A lower correlation exists with Verbal Heterosuggestion. There are high negative loads on Verbal Heterosuggestion and Hypnosis. The factor therefore seems to imply a poor kinaesthetic sense (shown by loads on Variables 2 and 11), and a certain inability to relax, making heterosuggestion less effective (Variables 9 and 10).

FACTOR II : This correlates highly and positively with

ective Suggestion, Unconscious Movement and Imagination, Verbal Autosuggestion, and Verbal Heterosuggestion. The Factor Loads are smaller on the Illusion of Warmth and the Odour Illusion tests. There is a fairly high negative correlation with the Size-Weight Illusion test. There are positive loads on all the tests involving the personal influence of the Experimenter on the Subject, except in the test of Hypnotizability. This exception is understandable when we consider the great variety of visual, auditory and sensory elements involved in Hypnosis which might well overshadow the personal influence of the Experimenter. The tests in which no personal element is present, Progressive Weights and Progressive Lines, do not correlate significantly with this factor.

FACTOR III : This factor has a fairly high positive load on Progressive Lines, and smaller loads on Size-Weight Illusion, Illusion of Warmth and Hypnosis. There is a small negative load on Progressive Weights test. The factor thus seems to involve the visual and dermal senses, (Loads on Variables 1, 3 and 5). The fact that both these senses play an important part in Hypnosis could account for the positive load on this variable.

FACTOR IV: The correlation of this factor with Verbal Autosuggestion is fairly highly negative. Smaller negative loads exist on the Size-Weight Illusion and Progressive Lines tests. The three variables which correlate with this factor do not involve the influence of the Experimenter and could therefore be called autosuggestion tests. To recover the negative quality of the correlations seems to point to a contra-suggestion element involved.

From the above findings it is clear that Suggestibility is not one simple or "unitary" trait. A number of physical or physiological elements such as kinaesthetic sense and ability to relax are involved. Psychologically, autosuggestibility and heterosuggestibility appear to be distinct, while contra-suggestibility can be exhibited independently by certain individuals. Broadly speaking then, the specific factors, which this investigation has revealed, and which contribute to produce phenomena of suggestibility are physical instability, personal influence of the Experimenter, visual and sensory acuteness, and contra-autosuggestibility.
