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Motivation and Post-Hypnotic Effect

By GRIFFITH EDWARDS

On first inspection, there may seem to be little difference between a simple experimental post-hypnotic suggestion (p.h.s.) and a simple therapeutic post-hypnotic suggestion. The difference is not so much between the form of the experimental and the form of the therapeutic p.h.s., but between the patterns of behavioural tendencies on which the experimental and the therapeutic post-hypnotic suggestions are respectively superimposed. The experimental p.h.s. is superimposed on the behavioural tendencies dictated by the subject's views of the experiment, and his motives probably often include a wish to "perform well". The experimental subject will seldom have strong motivation to disobey the hypnotist. In the therapeutic setting the situation is entirely different; the therapeutic p.h.s. is frequently superimposed on strong pre-existing conscious or sub-conscious tendencies which run counter to the acceptance of the suggestion.

An experimental study of p.h.s., if it is to have clinical application, must thus include not only an investigation of a p.h.s. which is superimposed upon favourable or non-opposing behavioural tendencies, but should also include studies of a situation in which the p.h.s. is superimposed on tendencies which are opposed to acceptance of the p.h.s. The relevance to hypnotherapy of previous studies on p.h.s. (Edwards, 1963; Edwards, 1965a, 1965b) will be more firmly established if it can be shown that the kind of post-hypnotic effect (p.h.e.) described in those experiments is still seen when the subject's motivation is expected to act against the manifestation of that behaviour.

The contention however can be advanced that even when a subject manifests post-hypnotic behaviour which *appears* to be contrary to normal motivation, this behaviour is indicative simply of the subject's willingness to act in a play. Hypnosis, it has been argued, is a particular example of role-playing behaviour (Sarbin, 1950). If therefore an experiment is conducted on the influence of motivation on p.h.e., firm conclusions can be drawn from the results only if a role-playing control group is studied at the same time.

Subjects: Hypnotic and Control Groups

Outline of the Experiment

A summary of the experimental schedule is given in Table I. From among a group of eighty-eight volunteers, ten deep trance subjects were selected. The criterion for deep trance was that the subject at the screening session obeyed a simple p.h.s. such as opening a window, and showed complete amnesia for having received the suggestion lasting at least 24 hours. A group of ten control subjects matched the hypnotic volunteers for age, sex, occupation, and N and E scores on the Maudsley Personality Inventory (Eysenck, 1959). Matching was considered important as bearing on the subject's knowledge and expectations of hypnosis and on his view of the experimenter's prestige.

For the hypnotic group mean age was $22 \cdot 2 \pm 5 \cdot 2$ years, and for the control group mean age was $24 \cdot 1 \pm 1 \cdot 3$ years. The mean N scores were $18 \cdot 7 \pm 7 \cdot 6$ and $18 \cdot 0 \pm 6 \cdot 0$ years, and mean E scores $24 \cdot 1 \pm 7 \cdot 2$ and $27 \cdot 6 \pm 6 \cdot 8$ years for the hypnotic and control groups respectively. Three of the hypnotic subjects (V, IX, X) had previous experience of the reaction-time apparatus.

Experimental Design: Hypnotic Group

(1) *Measurement of reaction time.* Base line measurement of reaction time (Series A, B) was first made.

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TABLE I

Outline of Experimental Schedule

Procedure	Series (25 trials of RT)
Both groups: baseline recording of normal reaction time	A, B
Hypnotic subjects hypnotized Control subjects instructed to pretend to be hypnotized.	
Hypnotic subjects given PHS of slowing of RT Control subjects put through parallel role-playing procedure	
Hypnotic subjects woken Control subjects given parallel role-playing instruction	
The two groups put through parallel procedures not relevant to the present investigation	
Hypnotic group: PHE measured Control group: acted PHE measured	C, D
Both groups: effect of shocking all slow reactions	E
Both groups: effect of shocking only "very slow" reactions	F
Both groups: effect of stopping shock	G, H

(2) *Trance depth.* An attempt was made to produce "deep trance" in all subjects before giving the experimental p.h.s., and after having given the p.h.s., a suggestion was then also made of amnesia for the complete trance. A simple eye-fixation hypnotic technique was used (Edwards, 1961).

(3) *Post-hypnotic suggestion.* Each subject was played a tape-recorded suggestion of slowing of reaction time (Edwards, 1963).

(4) *Post-hypnotic effect* (Series C and D). Reaction time was measured, the subject being urged to press the key as fast as possible.

(5) *Electric shock punishment.* After the initial post-hypnotic effect (Series C and D) had been recorded, an apparatus for delivering AC electric shocks was demonstrated to the subject. Electrodes were attached to two fingers of the non-dominant hand, and the current was turned up stepwise, 10 points on the dial at a time, with a 1 sec. shock administered at each step. The subject was asked to say at what point he would consider any further increase intolerable, and shock strength was then turned up a further 10 points without his knowledge. Over normal range of resistances, and over a wide range of voltage variations, equal changes of intensity as read off the dial gave equal changes in voltage.

The subject was then told that he would receive a shock in the next experiment if reaction time was slow, and in the next series of recordings (E) an immediate 1 sec. shock—shock strength 10 points above "limit of tolerance"—was administered each time reaction time was slow. The cut-off point for "slow" was such that all recordings of the subject's series B, except the two slowest recordings of that series, would escape shock.

For Series F the subject was given different instructions. He was told that he would receive an electric shock "not if you are slow, but only if you are very slow". The threshold for administration of shock was chosen so that approximately half the recordings in the subject's Series D would have escaped shock. In this way it was hoped that subjects who had failed to escape shock in Series E would now be placed

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in a situation in which they could learn the reward of faster RT.

In Series E and also in Series F, the subject was instructed to press the key "as quickly as you possibly can".

(6) *Series G, H.* These recordings were made to see what would happen to the p.h.e. when punishment was stopped.

Experimental Design: Control Group

(1) *Measurement of base-line reaction time.* Series A, B.

(2) *Instructions analogous to post-hypnotic suggestion.* The subject was asked to lie on a couch, to shut his eyes, and pretend to be hypnotized. He was then played the same tape-recording as had been used with the hypnotic group, and a few minutes after the playing of the recording, he was asked to "wake up again".

(3) *Effect analogous to post-hypnotic effect.* The subject was asked again to sit in the chair facing the key, and he was read the following instruction:

"I am going to test your reaction time again. Sit in the chair just as you were before. I want you to pretend that you have been deeply hypnotized and that you are now wide awake again. I want you in these tests to act exactly as you imagine someone would act who had been deeply hypnotized and played that recording. I want you to play-act that you have been deeply hypnotized, played that recording, and woken up again. I am going to say to you, 'Every time the signal sounds, press the key as quickly as you possibly can', and you must act as you think somebody who had really been hypnotized, and played that recording, would act when woken up again and asked to perform these tests. Now—I say to you in this play—every time the signal sounds, press the key as quickly as you possibly can."

Series C and D were then recorded, as a response analogous to the post-hypnotic effect.

(4) *Electric shock punishment.* The apparatus was explained to the subject, and shock level adjusted, as with the hypnotic group. The following instruction was then read:

"I want you now to go on play-acting. I want you again to act exactly as you imagine someone who had been hypnotized, played that recording, and woken up again and put through the various tests you have done so far, would act in these present circumstances. This time you will receive an electric shock each time you are slow pressing the key, but not if you react with normal speed. Now—I say to you in this play—every time the buzzer sounds, press the key as quickly as you possibly can. Quick as you possibly can."

Series E was then recorded, using the same criterion of "slow" as with the hypnotic group.

Before Series F, another scripted instruction was given: "I want you now to go on play-acting. I want you again to act exactly as you imagine someone who had been hypnotized, played that recording, and woken up again and put through all the tests you have done, would act in the present circumstances. This time you will receive an electric shock not if you are slow but only if you are very slow pressing the key. Now—I say to you in this play—every time the buzzer sounds, press the key as quickly as you possibly can. Quick as you possibly can."

The degree of slowing at which shock was given was as in Series F of the hypnotic group.

(5) *Series G, H.* The following instruction was given. "I want you again to act as you imagine someone would act who had been hypnotized, played that recording, woken up, and put through all these experiments, would act in these present circumstances. Now—I say to you in this play—every time. . . ."

Results

*Inter-subject Variability**

The mean reaction times for each subject of the hypnotic and control groups are presented graphically in Figs. 1a and 1b, respectively. In both groups there is considerable variation in mean R.T. from subject to subject.

(*a*) *Hypnotic group.* Fig 1a shows that subjects V, VII, and X manifested three entirely different patterns of response—Subject V shows the p.h.e. immediately inhibited by electric

* Tables showing precise details of the reaction times of individual subjects may be obtained from the author.

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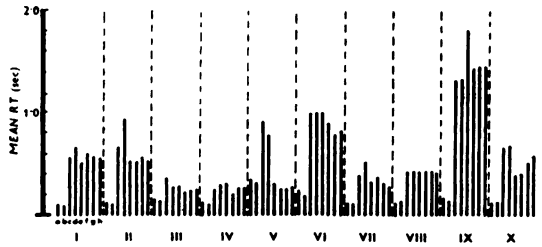


FIG. 1a.—Hypnotic group. Mean reaction times of ten subjects, for each series A to H.

shock and remaining inhibited when shock is stopped; Subject VII shows p.h.e. unaffected by shock, while Subject X shows p.h.e. inhibited by shock but recovering when shock is stopped.

(*b*) *Control group.* Fig. 1b shows Subject I with a pattern of complete inhibition of p.h.e. by shock and with partial recovery when shock was stopped; Subject II shows only a partial inhibition but with no tendency to recovery when shock was stopped, and Subject VII shows an inhibition followed by complete recovery.

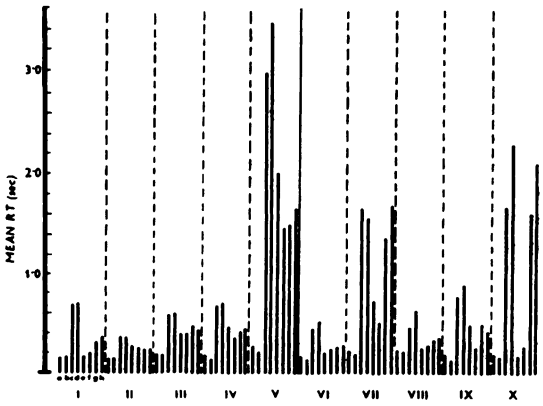


FIG. 1b.—Control group. Mean reaction times of ten subjects, for each series A to H.

Analysis of Variance

There was significant between-subject variability in both groups ($P < 0{\cdot}05$), and significant differences between the mean series reaction times for both groups ($P < 0{\cdot}05$), and there was also evidence of significant inter-reaction between subjects and series ($P < 0{\cdot}05$) greater in the control group. There was no significant differences between trial means, nor any significant inter-reaction between trials and subjects, or between series and trials.

Comparison of Series Means

Table II shows the mean reaction time for each series for the two groups, together with the 95 per cent. confidence limits on the mean. In the series where the 95 per cent. confidence limits do not overlap, the mean series reaction times for the two groups are significantly different. In all series except E, the mean reaction times for the hypnotic group differ significantly ($P < {\cdot}05$) from those of the control group.

(1) *Quantitative comparison of the two groups*

(*a*) Base line (A, B). The reaction time for the hypnotic group was slightly faster than for the control—it should be noted that three of the hypnotic group had previous experience of the apparatus.

(*b*) Initial response (C, D). The acted "p.h.e." of the control group was greater than the p.h.e. of the hypnotic group.

(*c*) Reaction time when shocked (E, F). Series E is not significantly different for the two groups, but Series F gives a just significantly lower mean for the control than for the hypnotic group.

(*d*) Reaction time when shock stopped (G, H). The mean reaction time of the control group is then slower than the hypnotic group.

(2) *Qualitative comparison (comparison of pattern of response) for the two groups.*

(*a*) In the base line recordings the control group shows a slight practice effect of borderline significance.

(*b*) For both groups, the suggestion caused a significant change in behaviour (C, D compared to B).

(*c*) For the hypnotic group, shocking all slow reactions did not cause a fall in p.h.e. (E compared to D), whereas in the control group this procedure caused a significant fall in the acted "p.h.e."

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TABLE II

Hypnotic and Control Groups

Series mean reaction time (secs.) and 95 per cent. confidence limits on the mean

		A	B	C	D	E	F	G	H
Hypnotic Group	Upper 95% C.L.	·16	·15	·71	·75	·67	·58	·58	·59
	M	·15	·14	·66	·70	·59	·54	·54	·54
	Lower 95% C.L.	·14	·13	·62	·65	·51	·50	·50	·49
Role-Playing Group	Upper 95% C.L.	·20	·18	1·08	1·21	·55	·47	·77	·85
	M	·19	·17	·98	1·10	·49	·42	·70	·77
	Lower 95% C.L.	·18	·16	·88	·99	·43	·37	·63	·69

(*d*) For neither group did shocking "very slow" responses produce a result significantly different from shocking all slow responses (F compared to E), but with the hypnotic group reaction time then reached a level significantly lower than D.

(*e*) For the hypnotic group, stopping shock did not result in any recovery in p.h.e., whereas in the control group there is a partial but significant recovery in the acted "p.h.e."

Trial Means

A clear picture of the way in which the two groups differ can be obtained by plotting for each group the mean for ten subjects of each of the 200 trials (trials 1–25 for series A–H). This is done in Fig. 2, which shows the base line for the hypnotic group slightly below the control group. The initial p.h.e. is then seen running along below the acted "p.h.e.", but when shock is given the acted "p.h.e." dips down just below the p.h.e. When shock is stopped, the lines again cross—the acted "p.h.e." swings up above the p.h.e.

Shock Avoidance Scores

In Series E a subject might conclude that to be very slow brought the same punishment as being slightly slow, and might, therefore, have little motivation to go faster unless going faster meant going fast enough to escape shock. To some, but to a lesser extent, the situation pertains also in Series F. Rather than relying only on mean reaction time to assess the effect of shock, a score may be made of the number of times each subject succeeded in each series of twenty-five observations in going fast enough to escape shock.

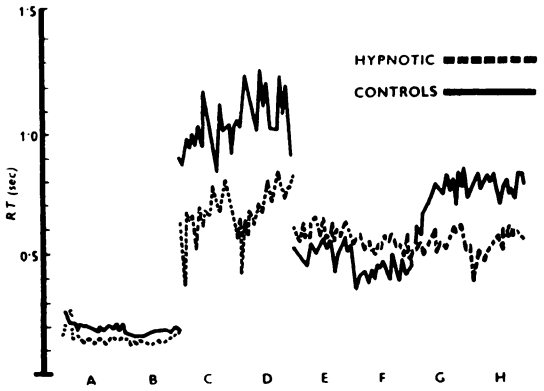


FIG. 2.—Hypnotic and control groups: group mean reaction times for trials 1 to 25 series A to H.

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Tables IIIa and IIIb show that in Series E one hypnotic subject (V) escaped shock almost completely, whereas in the control series, four subjects escaped shock almost completely. Similarly, in the hypnotic group, seven subjects totally failed to escape shock, whereas this applies to only two subjects in the control group. Series F shows a less marked difference between the two groups.

Shock Strength

Exact conversion of readings on the dial is not possible, but the range of shock employed was roughly 15–40 volts. An increase of 10 units on the dial represents an increase of about 2 volts. More important probably than these figures is the fact that all subjects were given a shock which they considered to be extremely unpleasant; this subjective assessment of the shock strength is of greater relevance than its actual voltage.

The average shock strength applied to the hypnotic group was 73·5 on the dial, and to the control group 74. There is no indication (Tables IIIa and IIIb) that shock strength was correlated with degrees of inhibition of response.

Depth of Hypnosis

Only one subject—Subject IV—failed to show complete amnesia for the suggestion, but despite the lack of amnesia, this subject was one of those who was unable to avoid displaying a p.h.e. when shocked (Table IIIa).

There was nothing to suggest that any of the subjects in the control group had been accidentally hypnotized.

Attitude of Hypnotic Subjects to the Experiment

The general attitude expressed was of surprise at not being able to go faster in Series C and D, and incredulity and irritation at not being able to go faster in E and F. Subject IV—the subject who failed to produce any amnesia—said that at first, when getting off the couch, she regarded the suggestion that her reaction time would be slowed as absurd, and she was amazed and frightened when she found that she could not escape from the suggestion. Subject V was the only person in this group to show complete inhibition of the post-hypnotic effect by shock; he was surprised at being slowed in Series C and D, but not surprised at being able to speed up in Series E and F.

Attitude of Control Subjects to the Experiment

The control subjects had no difficulty in expressing their attitudes to Series C, D, and G, H; they were simply acting as they supposed subjects would react to a post-hypnotic suggestion. In series E and F they felt that if they were acting properly they *ought* to be uninfluenced by the shock: whether indeed to receive the shock each subject then decided for himself.

Discussion

(1) *The problem of experimental motivation.* The "motivation" used in previous experiments on the influence of hypnosis on motivation (Barber, 1961; Brenman, 1942; de la Tourette, 1887; Erickson, 1939; Esdaile, 1846; Forel, 1906; Heron, 1952; Liégeois, 1889; Lyon, 1954; Orne, 1962; Rowland, 1939; Schneck, 1947; Watkins, 1947; Wells, 1941; Young, 1956) has always presented difficulties. The motivation pitted against the p.h.s. has usually been the supposed unwillingness of the subject to perform what it was hoped he would believe to be an antisocial act; he could never be allowed to test out the experimenter's assertion that the act was antisocial. In the present experiments the motivation was not the imponderable of a subject's aesthetic and social inclinations, but his wish to escape an electric shock of a strength greater than one which he had considered a very unpleasant experience. Furthermore, in the course of the experiment, he was able to test out the reality of the threatened consequences of his action—there was no intervening safety device.

A considerable literature has accumulated in the last thirty years on the use of electric shock in psychological experiments on human volunteers. Timing of the shock in relation to the behaviour which it is punishing is critically important if an attempt is being made to build up a conditioned response; it seems likely that timing within such narrow limits is not of importance when shock is being used for purposes other than conditioning.

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TABLE IIIa

Hypnotic Group: Shock Avoidance, Shock Strength

Subject	Mean series B	Mean series D	Series E level shocked over	Shock strength (Dial reading)	Number of series E responses unshocked	Mean series E	Series F level shocked over	Number of series F responses unshocked	Mean series F
I	·09	·68	·17	85	0	·50	·52	5	·60
II	·10	·95	·16	95	0	·52	·50	10	·52
III	·14	·28	·21	90	7	·28	·25	20	·22
IV	·11	·31	·16	40	0	·32	·30	25	·20
V	·26	·77	·29	70	24	·31	·50	24	·26
VI	·19	1·02	·26	100	0	1·00	1·02	19	·90
VII	·11	·53	·18	80	6	·31	·36	12	·38
VIII	·14	·44	·20	35	0	·41	·45	10	·42
IX	·14	1·34	·18	65	0	1·82	1·80	21	1·44
X	·11	·69	·13	75	0	·39	·40	12	·41

TABLE IIIb

Control Group: Shock Avoidance, Shock Strength

Subject	Mean series B	Mean series D	Series E level shocked over	Shock strength (Dial reading)	Number of series E responses unshocked	Mean series E	Series F level shocked over	Number of series F responses unshocked	Mean series F
I	·17	·70	·23	55	24	·17	·40	25	·20
II	·15	·37	·21	60	6	·28	·27	20	·25
III	·19	·60	·27	100	7	·39	·45	19	·40
IV	·14	·70	·20	80	0	·46	·45	16	·35
V	·21	3·04	·27	75	0	1·78	·19	23	1·44
VI	·15	·52	·25	90	21	·20	·30	24	·23
VII	·19	1·54	·24	70	4	·71	·65	24	·50
VIII	·21	·64	·28	60	21	·25	·40	24	·29
IX	·14	·89	·20	95	2	·47	·40	24	·25
X	·17	1·95	·22	55	23	·18	1·00	25	·26

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Among the more interesting points which emerge from this literature is Spence's finding (Spence *et al.*, 1954) that threatening shock can be as effective a stimulus as actually delivering shock, and it is worth noting that in the present experiments the abrupt fall in RT at the beginning of Series E usually occurred before the subject received any shock.

(2) *Controls and the role-playing hypothesis.* A difficulty in the interpretation of previous investigations which is now, to some extent, overcome was the objection that the classical experiments were simply charades. In the present investigation the validity of this role-playing interpretation is examined by including a control role-playing group. The control group were not simply asked to act (Lyon, 1954) but were instructed to act *as if hypnotized*. The hypnotic group are, on the role-playing hypothesis, also being asked to "act as if they were being hypnotized": the simplest interpretation of this hypothesis is, therefore, that the behaviour of the two groups will only differ if being hypnotized differs from acting as if hypnotized (Edwards, 1965a, 1965b).

Nevertheless it can be argued that deep trance subjects are a highly selected group and that the difference between the behaviour of the two groups is not due to the different experimental procedures to which they are subjected, but rather due to people with different "role-playing propensities" constituting the two groups. The fact that the average initial acted "p.h.e." significantly exceeded the average p.h.e. (0·88–1·08 sec. compared with 0·62–0·71 sec.) is some evidence against the contention that the hypnotic group were simply role-playing with greater enthusiasm.

A less cogent objection is that the two groups are both role-playing, but are being asked to engage in different role-playing activities–that the request to the control group to "behave like hypnotic subjects" is less pressing than the request to the hypnotic group "to be hypnotic subjects". One group is being asked to act in an unimportant play, while the other group is asked to act in an important play. Such an argument almost denies the possibility of constructing a control group. (See also Dorcus *et al.*, 1941; Barber, 1962).

In the present experiments the two most striking differences between the hypnotic and control group are the immediate response to shock, and the response to the shock being stopped: the differences are not only differences of degree but amount to very different patterns of response.

As is seen in Table II, the RT in the control group after shock comes down to a level which is now that of the parallel behaviour in the hypnotic group; averages for Series E in the two groups do not differ. It may, therefore, at first appear that the difference between the two groups is simply that shock inhibits a labile element in the ebullient role-playing of the control group, bringing the control group behaviour into line with the hypnotic group, rather than there being any true evidence of shock producing greater inhibition in the control than in the hypnotic group. However, even if one discounts the fact that shock causes approximately 62 per cent. inhibition (1·10 sec. to 0·42 sec.) in the average RT of the control group and only 23 per cent. inhibition (0·70 to 0·54 sec.) in the hypnotic group, convincing evidence that the two groups differ in their reaction to shock can be found in Tables IIIa and IIIb.

The role-playing subjects were fully conscious of all the circumstances of the experiment and considered that they could (if they had wished) at any moment have speeded up their reaction time. In contrast, the hypnotic subjects, with one exception (Subject IV) were convinced that despite the shock, they could not go any faster. If the role-playing hypothesis is to contain these facts, then either the hypnotic subjects are lying, or "subconscious role-playing" becomes a postulate of very central importance.

(3) *Clinical relevance.* The most obvious deduction from these experiments is that in deep trance subjects p.h.e. is likely to withstand considerable contrary motivation; even the most conservative interpretation of these results must allow that they at least provide no evidence to confirm the commonly held belief that a therapeutic p.h.e. will be ephemeral in the face of contrary motivation. It is, however, also proper to note the experimental inter-

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subject variability and that the results are based on studies of deep trance subjects only. The investigations of adverse motivation described here are also limited to the short-term effect.

A finding of possible clinical relevance is however that the p.h.e., unlike the role-playing effect, is, under the short-term conditions of the experiment, "permanently damaged" by shock. To explore whether the therapeutic p.h.e. can be similarly "permanently damaged" by an encounter with strong adverse motivation might be a profitable line of enquiry and in this respect comparison of p.h.e. with other forms of psychotherapy would be of interest.

Suggested Improvements in Design

Three immediate suggestions can be made. The control group should consist of subjects with deep trance potentialities, the inter-trial variability is not significant so that ten rather than twenty-five trials would be sufficient in any series, and lastly, more sophisticated apparatus should be employed in which the key pressing to shock interval could be measured and adjusted.

Summary

1. An experiment is reported on the influence of contrary motivation on obedience to post-hypnotic suggestion (p.h.s.). Ten deep trance hypnotic subjects were employed in this experiment, and also a matched control group of ten subjects were studied, in an analogous role-playing situation.

2. Nine out of the ten hypnotic subjects showed post-hypnotic amnesia for the whole trance.

3. Baseline reaction time (Series A, B, each of twenty-five trials) was recorded in both groups. Subjects of the deep trance group were then hypnotized, given the tape-recorded p.h.s., woken up, and the post-hypnotic effect (p.h.e.), of slowing of reaction time measured in Series C, D. Analogous procedures were carried out with the control group.

4. The effect of shocking very slow (Series E) and slow (Series F) responses was next studied in both groups.

5. Finally, unshocked responses were again recorded (Series G, H).

6. In both groups there was significant between-subject variability, significant between-series variability, and significant inter-reaction between subject and series ($P < 0{\cdot}05$ in each instance).

7. Baseline reaction time (A, B) was slightly but significantly faster for hypnotic than for control group. Initial response (C, D) was significantly greater for the control group. Series E was not significantly different between the two groups, but Series F gave a just significantly faster mean reaction time for the control group.

8. For the hypnotic group, the overall pattern of response was a slight inhibition of p.h.e. by shock, with this inhibition still remaining when shock was stopped. In the control group, the pattern was a greater inhibition of response by shock but with a partial recovery when shock was stopped.

9. Difference between the behaviour of the two groups was further confirmed by examining shock avoidance scores.

10. The relevance of the experimental results to psychological theory is seen as being in their providing evidence against the contention that the p.h.e. is simply role-playing behaviour; some necessary reservations in interpreting these experiments are noted.

11. The relevance of the results to hypnotherapy is in their demonstrating that the p.h.e. in deep trance subjects is little influenced by contrary motivation: p.h.e. cannot be regarded as ephemeral. The "permanent damage" done to the p.h.e. by shock may also suggest the pattern of relapse which is to be expected after therapeutic p.h.s. Experimental inter-subject variability must be expected to have its counterpart in hypnotherapeutic results.

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