Results with Individual Subjects

In the following tables, reaction times differing from the initial (presumed normal) reaction time at a level of significance of not less than 0·01 is marked by ++ and of not less than 0·05 by +. Many differences were significant at considerably beyond the 0·01 level. In these tables, day 0 indicates the day on which the relevant experimental post-hypnotic suggestion (rel. p.h.s.) was given. The entry "after non-rel. p.h.s." indicates that the subject was tested immediately after waking from a deep trance in which he was given only some simple direct verbal post-hypnotic suggestion, such as undoing a shoe-lace on waking.

1. *Miss T., aet. 19, normal subject*

Showing Considerable Post-hypnotic Effect Remaining After a Year

Day	Test	Reaction Time (seconds)	P (RT>0·2)
	Presumed normal ..	0·2	
0	After rel. p.h.s. ..	4·41	++
1		3·51	++
6		3·65	++
21		3·47	++
100		2·60	++
405		2·52	++

In this first experiment, direct verbal suggestion and a light signal were used, rather than recorded suggestion and a buzzer signal: results should not, therefore, be considered as necessarily comparable with those in the other 9 subjects. This subject exhibited considerable post-hypnotic effect after 1 year.

2. *Miss C.G., aet. 21, normal subject*

Decay of Post-hypnotic Effect Within 9 Days

Day	Test	Reaction Time (seconds)	P (RT>0·13)
0	(*a*) before hypnosis ..	·13	
	(*b*) after rel. p.h.s. ..	·27	++
1	Testing	·22	++
2		·20	++
3		·21	++
8		·15	+
9		·11	

Post-hypnotic effect showed a complete decay within 9 days.

3. *Miss A., aet. 22, normal subject*

Decay After 23 Days

Day	Test	Reaction Time (seconds)	P (RT>0·20)
−3	(*a*) Before hypnosis ..	·22	
	(*b*) After non-rel. p.h.s.	·25	
0	(*a*) Before hypnosis ..	·20	
	(*b*) After rel. p.h.s. ..	·89	++
1	Testing	·90	++
2		·85	++
3		·76	++
4		·91	++
7		·83	++
8		·80	++
9		·52	++
10		·37	++
22		·27	++
23		·25	++
24		·21	

A fairly well maintained effect showed a tendency to decay after 8 days. There was no testing between the 10th and the 22nd day: a small but significant effect on the 22nd and 23rd days had decayed by the 24th day.

4. *Miss G., aet. 29, normal subject*

Decay of Post-hypnotic Effect Within 2 Days

Day	Test	Reaction Time (seconds)	P (RT>0·13)
−5	(*a*) Before hypnosis ..	·12	
	(*b*) After non-rel. p.h.s.	·14	
0	(*a*) Before hypnosis ..	·13	
	(*b*) After rel. p.h.s. ..	·25	++
1	Testing	·16	++
2		·11	

Post-hypnotic effect decayed completely within 2 days.

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5. *Dr. T., aet. 26, registrar*

Effect Present After a Week but Decayed After 2 Weeks

Day	Test	Reaction Time (seconds)	P (RT>0·14)
0	(*a*) Before hypnosis ..	·14	
	(*b*) After rel. p.h.s. ..	·75	++
7	Testing	·30	++
14		·14	

An effect was present after a week but had decayed after 2 weeks.

6. *Mrs. B., aet. 24, normal subject*

A Tendency is Shown to Phasic Fluctuation With a Long-term Increase rather than Decrease in Post-hypnotic Effect

Day	Test	Reaction Time (seconds)	P (RT>0·12)
−3	(*a*) Before hypnosis ..	·14	
	(*b*) After non-rel. p.h.s.	·13	
0	(*a*) Before hypnosis ..	·12	
	(*b*) After rel. p.h.s. ..	·40	++
1	Testing	·34	++
2		·31	++
3		·30	++
4		·40	++
7		·42	++
8		·43	++
9		·45	++
10		·47	++
14		·50	++
15		·43	++
17		·40	++
18		·39	++
36		·37	++
37		·50	++
42		·52	++
43		·45	++
44		·50	++
63		·48	++
64		·47	++
65		·49	++
77		·52	++
79		·44	++
91		·58	++
92		·53	++
93		·55	++

Post-hypnotic effect tested at intervals over 93 days showed phasic variation, but rather than showing any continuous tendency to decay, it actually increased over this period.

7. *Mr. C., aet. 47, alcoholic*

Initial Decay Followed by Stabilization

Day	Test	Reaction Time (seconds)	P (RT>0·08)
0	(*a*) Before hypnosis ..	·08	
	(*b*) After rel. p.h.s. ..	·54	
1	Testing	·41	++
2		·35	++
3		·36	++
4		·36	++
5		·37	++
6		·3	++
7		·40	++
8		·42	++
9		·42	++
10		·39	++
11		·45	++
12		·43	++
13		·40	++
14		·40	++

This subject showed no significant decay between the first and the fourteenth days.

8. *Mr. H., aet. 53, alcoholic*

Results Show a Rapid Decay

Day	Test	Reaction Time (seconds)	P (RT>0·13)
−4	(*a*) Before hypnosis ..	·14	
	(*b*) After non-rel. p.h.s.	·18	
−1	(*a*) Before hypnosis ..	·13	
	(*b*) After non-rel. p.h.s.	·18	
0	(*a*) Before hypnosis ..	·13	
	(*b*) After rel p.h.s. ..	·44	
1	Testing	·15	

In contrast to the previous subject, an initially large effect decayed completely within a day.

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9. *Miss L., aet. 26, normal subject*

Decay Within 7 Days

Day	Test	Reaction Time (seconds)	P (RT>0·15)
−2	(*a*) Before hypnosis ..	·21	
	(*b*) After non-rel. p.h.s.	·15	
0	(*a*) Before hypnosis ..	·15	
	(*b*) After rel. p.h.s. ..	1·33	++
1	Testing	·89	++
5		·27	++
7		·14	

10. *Mr. M., aet. 26, normal subject*

Rapid Decay Despite Large Initial Response

Day	Test	Reaction Time (seconds)	P (RT>0·14)
−4	(*a*) Before hypnosis ..	·20	
	(*b*) After non-rel. p.h.s.	·16	
0	(*a*) Before hypnosis ..	·14	
	(*b*) After rel. p.h.s. ..	1·03	++
1	Testing	·14	

A large initial response decayed within 1 day.

Personality Variables

In Table A, the size of the initial post-hypnotic effect, rate of decay and the N (neuroticism) and E (extraversion) scores on the M.P.I. are tabulated. Subjects showing a longer decay time are placed at the top of the table. For the 5 longer decay subjects, the average E and N scores were 19·2 and 22·6 respectively, and for the 5 shorter decay subjects 25 and 31·6. Similarly, if the E and N scores for the 5 subjects showing the bigger initial post-hypnotic responses are calculated, an average is found of E=25·6 and N=31·2, whereas for the 5 subjects showing smaller initial response E=18·6 and N=23.

These correlations do not reach a level of significance.

TABLE A

Initial Post-hypnotic Response, Rate of Decay and Personality Factors Measured on M.P.I.

Subject	Initial P.H.R. (seconds)	Days to Complete Decay	E	N
1 ..	4·41	405	25	23
6 ..	·40	93	30	24
7 ..	·54	14	23	4
3 ..	·89	24	8	39
2 ..	·27	9	10	23
5 ..	·75	7–14	20	38
9 ..	1·33	7	40	12
4 ..	·25	2	10	29
8 ..	·44	1	20	35
10 ..	1·03	1	35	44

DISCUSSION

The Literature

Knowledge of the quantitative aspects of post-hypnotic suggestion comes partly from the case reports of the 19th century and partly from laboratory experiments done at a time when clinical interest in hypnosis had waned. There is remarkable agreement between some of the fundamental observations from these two very different eras of investigation.

A synthesis of the views of the investigators of the golden age of 19th century hypnosis was given in Moll's monograph, published in 1889. That investigators of that era described individual case reports rather than any planned series of experiments should not make us discount the value of their often brilliant research. In summary, Moll's views were these:

1. *Subject variability:* Post-hypnotic effect shows considerable subject variability.

2. *Duration of effect:* A post-hypnotic effect without intervening testing may last for a long time—certainly at least four months.

3. *Influence of intervening testing:* He believed that testing of a post-hypnotic effect would prolong its duration. The clinical situation was equivalent to experiments with "intervening testing"—for example, a patient with fear of thunderstorms treated by hypnosis would have the post-hypnotic (therapeutic) effect "tested" every time there was a thunderstorm.

Few further studies were done on this particular aspect of hypnosis until the publication of Kellogg's paper in 1929 and Patten's in 1930. These papers both employed ingenious quantifiable experimental techniques: Kellogg used the

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post-hypnotic suggestion of change in respiratory rate in response to page number while reading aloud from a book of sonnets, and Patten gave the suggestion that the subject would depress a key (movement measured in mm.) in response to certain words being exposed on a revolving drum. These papers showed an enormous advance in methodology compared with previous experiments, but the interpretations the authors gave to their results seem, on scrutiny of the data, to have been to some extent out of accord with their actual findings. Their work may be summarized under the same headings as have been used above.

1. *Subject variability:* The work of Kellogg and Patten (who tried to use a population of uniformly deep trance subjects) very clearly serves to support Moll's view of the existence of considerable subject variability.

2. *Duration of effect:* These results do not support the thesis that post-hypnotic effect shows a decay curve similar to learning phenomena. The effect may, in certain circumstances with trained subjects, last for 8 months.

3. *Influence of intervening testing:* They believed that their data supported Moll's speculations. However, Kellogg's published results show that there are certainly instances of subjects manifesting no decay over long periods without testing, while some subjects with more frequent testing showed greater decay.

A fuller critique of Kellogg's and Patten's work (Edwards, 1962) must take account of limitations in experimental design and their lack of statistical method.

Wells (1940) criticized the work done by Kellogg and Patten. He felt that the laboratory experiments had under-estimated the efficacy of post-hypnotic effects: he stressed the importance of technique and subject selection. His own experiments showed post-hypnotic amnesia (with widely spaced testing) effective for at least a year.

It is against this background that the results reported in the present paper must be discussed.

The Decay Effect

The most obvious property, both as revealed by a review of the literature and as shown in the present experiments, of post-hypnotic effect is its capricious tendency to decay. Around the understanding of the *decay effect* revolves the greater part of the problem of applying post-hypnotic suggestion to therapy. If experimentally fast decay could be changed to slow decay or no decay, then by the application of the same principles one might hope to convert an ephemeral therapeutic effect to one which was more permanent. Fundamentally, the problem is to understand and if possible to manipulate the variables which determine the decay effect.

These variables can be grouped into those which are extrinsic (the conditions of the experiment) and those which are intrinsic (the properties of the central nervous system of the individual).

Frequency of Testing: an Extrinsic Variable

Previous authors have suggested that increased frequency of testing tends to prevent the decay effect. In the experiments reported here, can differences in frequency of testing be used as the whole explanation of inter-subject variability? Clearly this is not so. Table B sets out decay from day 0 to day 1 in 8 subjects, all of whom were tested with the same schedule for days 0 and 1: the table shows that in conditions in which "frequency of testing" does not differ between subjects, very great inter-subject differences in decay effect are observed.

Further to emphasize this point, one may contrast subject 5, who did not show a complete disappearance of effect from day 0 to day 7

TABLE B

Decay of Post-hypnotic Response from Day 0 to Day 1 Showing Inter-subject Variability

Subject	P.H.R. Day 0 (seconds)	P.H.R. Day 1 (seconds)	Decay Day 0–Day 1 (seconds)
2	·27	·22	·05
3	·89	·90	—·01
4	·25	·16	·09
6	·40	·34	·06
7	·54	·41	·13
8	·44	·15	·29
9	1·33	·89	·44
10	1·03	·14	·89

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(despite no testing during that interval), with subject 9, who was tested on day 1 and day 5 as well as day 0 and day 7, and yet showed a complete decay of post-hypnotic effect within a week. An inspection of data where comparison for other time intervals is possible leads to the same conclusion—frequency of testing is not a complete explanation of inter-subject variability.

What cannot, of course, be logically argued from these results is that *testing effects* would, under all conditions, be unimportant. If an experiment were conducted in which all other variables were held constant, e.g. re-hypnosis experiments with a subject showing complete decay, then the effect of varying the frequency of testing could be studied.

The Explanation of Inter-Subject Variability

The data obtained in these experiments suggest a variability in decay effect which is not simply explained by extrinsic factors. What other explanations are there of different subjects behaving so differently? Several explanations deserve examination.

1. Response might be related to objective personality variables. The data in Table A do not establish a significant correlation between decay and Eysenck's dimensions of personality, although the results perhaps suggest that with a larger series of subjects a correlation might be found.

Measurement of the subject's conditionability and suggestibility rather than inventory measurements might give findings of interest.

2. The individual's particular pattern of post-hypnotic response might be related to his idiosyncratic concept of what happens to a person who receives a post-hypnotic suggestion—pre-hypnotic experience (and prestige suggestibility) might influence post-hypnotic behaviour. This hypothesis supposes that hetero-suggestion is moulded by auto-suggestion. Such an interpretation of inter-subject variability would be an extension of the role-taking concept of hypnosis developed by Sarbin (1950). To have information prior to an experiment on the subject's expectations of the results of the experiment would be of interest.

3. Response might be related to drive, and in particular to the subject's wish to please the hypnotist.

Most probably, further experiments will show that each of these three hypotheses can contribute to an explanation of the decay effect. Simple underlying patterns of reaction (dictated by simple laws analogous to those found in conditioning phenomena) are perhaps developed, maintained, or decayed by the action of complex variables such as the individual's personality, sets, and drives.

Further Investigation

The method of studying post-hypnotic suggestion used in these experiments readily lends itself to further exploitation. Re-hypnotization, variation in suggestion given, effect of frequent testing, stimulus specificity, effect of drive (electric shock) are being investigated. It is hoped also to study the effect of drugs on post-hypnotic effect. An attempt is being made to apply concepts gained from these experiments to clinical investigations.

Summary and Conclusions

1. A study is described of the duration of post-hypnotic effect and in this experiment, extrinsic variables (conditions of the experiment) were, as far as possible, held constant.

2. Ten deep trance subjects (8 normals, 2 alcoholics) were used. Suggestion, given by tape recorder, was of slowing of reaction time.

3. Very wide differences were seen between different subjects in duration of post-hypnotic effect.

4. It is suggested that many variables may contribute to this variation in *decay effect*, and that if these variables can be understood and manipulated, there is greater expectation of a rational application of hypnosis to therapy.

5. Some further investigations are outlined.

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