Perceptual and Motor Skills, 1983, 56, 627-631.

RELATIONSHIP BETWEEN HYPNOTIC SUSCEPTIBILITY AND THERMAL REGULATION: NEW DIRECTIONS FOR RESEARCH[1]

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Summary.—This study examined the relationship between hypnotic susceptibility and thermal regulation using biofeedback. 30 subjects were given the Stanford Hypnotic Susceptibility Scale, Form C. Immediately after the susceptibility score was determined, all subjects were given instructions to lower the peripheral skin temperature on the right middle finger. Subjects remained under hypnosis while they performed this task. A significant negative correlation (−.38) was found, in that the higher subjects' susceptibility, the better they were able to maintain a lower dermal temperature over trials. A 2 × 6 analysis of variance for low and high susceptibility with repeated measures yielded a significant main effect for subjects and a significant interaction of group × trials; highly susceptible subjects maintained a lower mean temperature over trials than subjects of low susceptibility. Issues for future research concerning the role of susceptibility in research on hypnosis are outlined.

Many researchers have investigated the role of hypnotic susceptibility and hypnosis in the performance of various physiological and psychological tasks (Bowers & Kelly, 1979; Maslach, Marshall, & Zimbardo, 1972; Spanos, Rivers, & Gottlieb, 1978). These studies, and others, have shown that there is a useful relationship between susceptibility and the extent to which subjects successfully perform a task (Mott, 1979). By studying susceptibility, one may delineate factors which both positively influence performance on a task and promote the attainment of an hypnotic state. This study was done to (a) determine if there is a useful relationship between hypnotic susceptibility and thermal regulation and (b) to highlight some important directions research on hypnotic susceptibility might take.

The focus was on ascertaining a possible predictive relationship between hypnotic susceptibility and performance on the feedback task. For example, given an individual with a certain susceptibility score, will that person be more likely to, in this case, lower peripheral temperature than an individual with a different susceptibility score? The existence of such a relationship can be useful in (a) identifying individuals who are more likely to complete a task successfully and (b) indicate individuals with whom the use of an hypnotic state may enhance their performance on a selected task.

The variables were hypnotic susceptibility, as determined by the Stanford Hypnotic Susceptibility Scale, Form C (Weitzenhoffer & Hilgard, 1962), and

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temperature change. It was hypothesized that individuals with high susceptibility will maintain lower mean temperatures over trials than subjects of low susceptibility.

METHOD

Subjects

Subjects were 30 undergraduate students, 19 female and 11 male, all of whom volunteered. They ranged in age from 18 to 23 yr.

Apparatus

The equipment employed was a Narco Bio-Systems Inc. temperature monitor, Model TM 301.

Procedure

Prior to the initiation of the trial, each subject was given approximately 5 min. in which to adjust to the experimental situation. It was during this period that the thermistor was taped to the medial phalange of each subject's right middle finger. The feedback monitor provided two lights, a red one to indicate increases in dermal temperature and a blue one to indicate decreases in temperature.

At this point, subjects were administered the Stanford Hypnotic Susceptibility Scale, Form C. After the eleventh task was scored, the subjects were given instructions to open their eyes and look at a previously designated point on the wall. They were instructed to remain in their state of hypnosis while they did this. The experimenter left the room after explaining to the subjects that an assistant would presently conduct the feedback session. Upon entering, the assistant turned on the temperature monitor and read from a prepared script instruction to lower peripheral skin temperature. All communication during this session was done by the assistant.

After the instructions were read, a baseline temperature was obtained. The subjects were then instructed to turn their eyes from the fixed point on the wall to the red and blue lights on the temperature monitor. The assistant sat in front of the subjects, out of immediate view; the attempt to lower temperature then began. The biofeedback session lasted for 10 min., with six readings being recorded: a baseline followed by five readings taken at 2-min. intervals for a 10-min. period. The subjects were given positive feedback, regardless of performance, after Trials 2, 4, and 5.

After the session, the assistant instructed the subjects to close their eyes and relax. The assistant left the room and the experimenter returned. Subjects were removed from their trances and the final test for hypnotic susceptibility (post-hypnotic amnesia) was given and scored. Subjects were then debriefed.

RESULTS

A Pearson product-moment correlation between susceptibility scores attained on the Stanford scale, Form C and temperature deviation scores (Tx). The latter were derived by finding the difference between each subject's final and baseline temperature. A negative deviation indicated a decrease in temperature over the baseline, while a positive one denoted an increase over the baseline temperature. The correlation was —.381 between hypnotic susceptibility scores and temperature ($z = 2.07$, $p < .05$). The higher subjects' susceptibility scores, the lower their final temperatures compared to baseline values.

Data were also analyzed by a 2 × 6 analysis of variance with repeated measures. The two groups were comprised of high (7—12) and low (1—6) susceptibility scores. There was a significant effect for subjects ($F_{28/140} = 667.33$, $p < .01$, $MS = 286.0$). Regardless of susceptibility and over the six measurement trials, there were reliable individual differences in subjects' temperatures. There was also a significant interaction of group × trials ($F_{5/140} = 2.33$, $p < .05$, $MS = 1.0$), which indicates a significant difference in the regression of temperature over trials for the two susceptibility groups. As can be seen from the means presented in Table 1, subjects of high susceptibility maintained lower mean temperatures over trials than did subjects of low susceptibility.

TABLE 1
STATISTICS FOR LOW- AND HIGH-SUSCEPTIBILITY GROUPS' TEMPERATURE OVER TRIALS

Trial	Group	*N*	*M*	*SD*	Susceptibility
B	1	17	91.07	6.46	
1	1	17	91.11	6.73	
2	1	17	91.20	6.73	
3	1	17	91.00	6.70	
4	1	17	90.81	6.70	
5	1	17	90.83	6.86	High, 7-12
B	2	13	92.52	7.27	
1	2	13	92.35	7.24	
2	2	13	92.62	7.31	
3	2	13	92.72	7.33	
4	2	13	92.86	7.17	
5	2	13	92.69	7.06	Low, 1-6

DISCUSSION

The one main result was that, although there were significant differences in performance among subjects, those with higher susceptibility tended to maintain lower mean temperatures over trials than those subjects low in sus-

ceptibility. This result supports the contention that hypnotic susceptibility plays an important role in successful performance on this task. The significant correlation between susceptibility and change in finger temperature further suggests that there is an important relationship between susceptibility and this performance. This relationship can be useful to researchers in selecting potential subjects for high performance on a task. Hypnotic susceptibility can serve as a criterion by which an individual's performance can indicate the likelihood of successful performance on an experimental task. However, this important relationship suggested between susceptibility and performance necessitates that researchers re-examine not only the role of hypnosis as a task facilitator but also our conceptualizations of both hypnosis and susceptibility.

Throughout the literature on hypnosis, when susceptibility is a variable, as in this study, those highly susceptible subjects perform more in the desired direction on a task than those of low susceptibility (Bowers & Kelly, 1979; Roberts, Schuler, Zimmerman, & Patterson, 1975; Spanos, Radtke-Bodorik, Ferguson, & Jones, 1979). Yet, in some studies where hypnosis is introduced as a possible facilitator of performance, the results are not always as clear cut. Often, hypnosis does little or nothing to aid subjects in facilitating their performance on a selected task (Barber & Glass, 1962; Roberts, Kewman, & MacDonald, 1973; Spanos, *et al.*, 1979). It may be possible significant influence of hypnosis on performance is the result of a large number of highly susceptible subjects receiving the hypnotic treatment (Maslach, Marshall, & Zimbardo, 1972).

The above research illustrates the important influence susceptibility exerts in research dealing with hypnosis. This influence may be based on the strong relationship susceptibility has with certain personal dispositions, such as absorption, creativity, imagery, and cognitive activity (Barber & Glass, 1962; Hilgard, 1970; Spanos, *et al.*, 1979). An hypnotic state, on the other hand, may be more influenced by transient situational or organismic variables, such as subjects' attitudes toward hypnosis, motivation, and relationship with the experimenter, than by individuals' underlying susceptibility. Since hypnosis may be easily influenced by superficial factors, use of hypnosis in certain situations may be counterproductive to the goals of a study.

Hypnotic susceptibility deserves closer attention by researchers. Investigation should address issues regarding (a) more clearly outlining those personal dispositions characteristic of highly susceptible individuals, (b) the possibility that a highly susceptible person may perform, under hypnosis, in a manner characteristic of an individual of low susceptibility, (c) the degree to which hypnosis does facilitate the performance of highly susceptible individuals, (d) uncovering whether improvement of one's ability to engage in absorbed, creative tasks results in an increase in one's susceptibility, (e) more

clearly differentiating between susceptibility and hypnosis; does one have to be susceptible to hypnosis to experience an hypnotic state or is susceptibility a type of internal organization conducive to an hypnotic state? Answers to these questions can have implications which may change the way we conceptualize hypnosis and provide the groundwork for deeper investigation of intrapsychic processes.

REFERENCES

BARBER, T. X., & GLASS, L. B. Significant factors in hypnotic behavior. *Journal of Abnormal and Social Psychology*, 1962, 64, 222-228.

BOWERS, K. S., & KELLY, P. Stress, disease, psychotherapy, and hypnosis. *Journal of Abnormal Psychology*, 1979, 5, 490-505.

HILGARD, J. R. *Personality and hypnosis: a study of imaginative involvement.* Chicago: Univer. of Chicago Press, 1970.

MASLACH, C., MARSHALL, G., & ZIMBARDO, P. Hypnotic control of peripheral skin temperature: a case report. *Journal of Abnormal Psychology*, 1972, 9, 163-168.

MOTT, T. The clinical importance of hypnotizability. *American Journal of Clinical Hypnosis*, 1979, 4, 263-269.

ROBERTS, A., KEWMAN, D., & MACDONALD, H. Hypnotic control of skin temperature: unilateral changes using hypnosis and feedback. *Journal of Abnormal Psychology*, 1973, 82, 163-168.

ROBERTS, A., SCHULER, J., BACON, J., ZIMMERMAN, R., & PATTERSON, R. Individual differences and autonomic control: absorption and the unilateral control of skin temperature. *Journal of Abnormal Psychology*, 1975, 84, 272-279.

SPANOS, N. P., RADTKE-BODORIK, L., FERGUSON, J. D., & JONES, B. The effects of hypnotic susceptibility, suggestion for analgesia, and the utilization of cognitive strategies on the reduction of pain. *Journal of Abnormal Psychology*, 1979, 5, 282-292.

SPANOS, N. P., RIVERS, S. M., & GOTTLIEB, J. Hypnotic responsivity, meditation, and laterality of eye movements. *Journal of Abnormal Psychology*, 1978, 3, 566-569.

WEITZENHOFFER, A. M., & HILGARD, E. R. *Stanford Hypnotic Susceptibility Scale, Form C.* Palo Alto, CA: Consulting Psychologists Press, 1962.

Accepted February 23, 1983.