vation. There are persistent and perplexing questions still to be answered. For example, what socialization experiences stimulate moral integrity and hypocrisy, respectively? To what degree do parents preach the former but teach the latter? How might one structure social environments so that even those individuals motivated by moral hypocrisy or vulnerable to overpowered integrity might be led to act morally? Answers to such intriguing—and challenging—questions may help society avoid the atrocities of the past century in the next.

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Imaginative Suggestibility and Hypnotizability

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Abstract

More than a half-century of research aimed at identifying the predictors of hypnotic responding has been described as investigations of "hypnotizability." Most of that research, however, has disregarded the well-established findings that (a) people respond to suggestion without being hypnotized almost as much as they do following a hypnotic induction, and (b) nonhypnotic and hypnotic suggestibility are highly correlated. More recent studies have provided the first empirical data on predictors of individual differences in response to the induction of hypnosis. These studies indicate that individual differences in hypnotic suggestibility can be accounted for completely by nonhypnotic suggestibility, expectancy, motivation, and reaction time. Because the amount of variance accounted for is as great as the reliability of the hypnotic-suggestibility scale, and because nonhypnotic suggestibility has been controlled, no additional variables are necessary to account for hypnotic suggestibility.

Keywords

hypnosis; suggestibility; hypnotizability

Highly suggestible hypnotized subjects display and report automatic movements, partial paralyses, selective amnesia, insensitivity to painful stimulation, and hallucinations in all sensory modalities. These responses seem so astonishing that they have evoked two contrasting reactions. One is to doubt their veracity; the second is to assume that they must be due to a very unusual altered state, generally referred to as a hypnotic "trance." But research indicates that neither of these conclusions is justified.

Hypnotized subjects are not merely putting on an act to impress

an observer. Unlike unsuggestible people who have been instructed to fake high levels of responding, highly suggestible people display hypnotic responses even when they think that they are alone (Perugini et al., 1998). The veracity of the experiential reports of hypnotized subjects has also been substantiated by brain-imaging studies. Rainville, Duncan, Price, Carrier, and Bushnell (1997), for example, reported that suggestions used to alter the unpleasantness of painful stimuli produced changes in brain activity that were consistent with those suggestions.

Although the experiences and behaviors reported and observed in hypnosis are real, data indicate that they are not due to a trance. Instead, hypnotic responses reveal an astounding capacity that some people have to alter their experience in profound ways. Hypnosis is only one of the ways in which this capacity is revealed. It can also be evoked—and almost to the same extent—without inducing hypnosis at all. These data and their implications are the subjects of this article.

HYPNOTIC AND NONHYPNOTIC SUGGESTIBILITY

One of the most salient aspects of hypnotic responding is its variability between people. Some people respond to almost all suggestions; others respond to none; most show moderate levels of response. Although responsiveness can be altered by changing people's expectations about how they will respond (e.g., Vickery & Kirsch, 1991) and by training (Gorassini & Spanos, 1999), in the absence of interventions of this sort, it is remarkably stable. This has led to the development of highly reliable standardized scales that measure individual differences in responding (e.g., Weitzenhoffer & Hilgard, 1962).

Because the behaviors measured by these scales were presumed to be due to the induction of an altered state of consciousness, the construct they measure was labeled "hypnotizability" or "hypnotic susceptibility." The presumption was that the observed behaviors were due to the induction of hypnosis, but the data tell a very different story. They reveal that hypnotizability is an inaccurate and misleading name for a very important trait, ability, or propensity that has little to do with the induction of hypnosis.

Hypnotic-suggestibility scales consist of two parts: a hypnotic-induction ritual and a series of test suggestions. A typical induction ritual consists of instructions for muscular and mental relaxation (similar to those given in relaxation training) with mention of the word "hypnosis." The test suggestions are of four types: motor productions (involuntary movements), motor inhibitions (paralyses), cognitive productions (hallucinations), and cognitive inhibitions (sensory inhibition, amnesia).

Because the induction rituals are separate from the test suggestions, it is possible to administer the suggestions with and without inducing hypnosis or following any other procedure aimed at increasing responsiveness to suggestion. This has been done in six studies (Barber & Glass, 1962; Braffman & Kirsch, 1999a, 1999b; Hilgard & Tart, 1966; Hull, 1933; Weitzenhoffer & Sjoberg, 1961), and the results reported in all of these studies are consistent. They reveal that the effect of hypnosis is relatively small—"probably far less than the classical hypnotists would have supposed had the question ever occurred to them," wrote Clark Hull in 1933 (p. 298)—and the correlation between hypnotic and nonhypnotic responding is very high. These data alone should lay to rest the altered-state hypothesis in its strongest form. Because responses to imaginative suggestions are almost as readily observed outside of hypnosis as in it, they cannot be ascribed to the presence of a hypnotic trance.[2]

Because of the small effect of hypnosis and the high correlation between hypnotic and nonhypnotic responding, the term hypnotizability is inaccurate and misleading as a label for the individual difference variable measured by so-called hypnosis scales. These scales do not measure differences in the effects of hypnosis. Instead, they measure differences in responses to a particular type of suggestion, more or less independent of the induction of hypnosis.

One might consider using the term "suggestibility" to denote the construct measured by these scales. But without further qualification, this term is too broad. There are diverse types of suggestibility that differ from each other in the nature of the suggestions given, and these different types of suggestibility are not highly correlated with each other. Most types of suggestion are deceptive. They are aimed at convincing the person that the world is (or was) different from the way it actually is (or was). For example, placebos are inert, but are presented as substances that contain active medications (Kirsch, 1997). Similarly, leading questions provide false information about past events (Mazzoni, in press). In contrast, the suggestions that are administered in hypnotic susceptibility scales are not deceptive. They are not aimed at convincing the person that the world outside his or her experience has changed or is different from the way it actually is. Instead, hypnotized subjects are asked to engage in fantasies, leading to subjective experiences that are at variance with what they know to be objectively true. Often,

they are explicitly instructed to imagine the suggested state of affairs (e.g., "imagine a force acting on your hands to push them apart," Weitzenhoffer & Hilgard, 1962, p. 18). For this reason, we have termed this type of suggestibility *imaginative suggestibility*.

Imaginative suggestions are requests to experience an imaginary state of affairs as if it were real. These suggestions can be given in or out of hypnosis. Imaginative suggestibility is the degree to which the person succeeds in having the suggested experiences. It can be assessed in or out of hypnosis. Responsiveness to other types of suggestions can also be assessed with and without hypnosis, but the suggestions contained in the so-called hypnosis scales are imaginative suggestions, and it is the responsiveness to these suggestions that has been mislabeled hypnotizability. When we use the terms hypnotic suggestibility and nonhypnotic suggestibility, we are referring to imaginative suggestibility, assessed in and out of hypnosis, respectively.

THE IMPORTANCE OF LANGUAGE

Referring to hypnotic suggestibility as hypnotizability is not just inaccurate, it is also very misleading. Just how misleading it is can most clearly be appreciated by considering analogous situations. Imagine, for example, that a group of researchers wishes to determine the correlates of successful weight loss. In study after study, they put people on diets and then correlate their postdiet weight with potential predictor variables, without controlling for differences in prediet weight. They find that postdiet weight is correlated with height, waist size, gender, and weight of parents. They then conclude that short, thin women with thin parents have a natural ability to lose weight.

We suspect that the fallacy of this conclusion would be recognized immediately by virtually all members of the scientific community studying weight loss and that the manuscripts of these researchers would never find their way into print. A similar fate should await hypnosis researchers who commit the error of confusing hypnotic suggestibility with hypnotizability. Just as weight loss is the change in weight after a diet, hypnotizability is the change in suggestibility after hypnosis has been induced. Measuring suggestibility after a hypnotic induction and calling it hypnotizability is like assessing weight after a diet and calling it weight loss. Neither approach makes any sense unless the pretreatment data (i.e., nonhypnotic suggestibility and prediet weight, respectively) are taken into account. Because hypnotizability refers to the change in suggestibility that is produced by hypnosis, it can be measured as hypnotic suggestibility with nonhypnotic suggestibility statistically controlled.

THE CORRELATES OF HYPNOTIC SUGGESTIBILITY AND HYPNOTIZABILITY

Accounting for individual differences in hypnotic suggestibility (generally mislabeled hypnotizability or hypnotic susceptibility) has been an enigma that has eluded the best efforts of hypnosis researchers for the better part of a century. Excepting nonhypnotic suggestibility, only four variables have been shown to be reliably correlated with hypnotic suggestibility (e.g., Kirsch, Silva, Comey, & Reed, 1995). In descending order of the magnitude of association, these variables are response expectancy (i.e., the participant's prediction about the degree to which he or she will respond to suggestions), attitudes toward hypnosis, fantasy proneness, and absorption (i.e., the tendency to become absorbed in commonplace imaginative experiences). Until recently, however, studies of correlates of hypnotic suggestibility left out the most powerful one: nonhypnotic imaginative suggestibility.

We recently reported the first study in which nonhypnotic imaginative suggestibility was examined in conjunction with other correlates of hypnotic suggestibility (Braffman & Kirsch, 1999a). These data revealed significant correlations of hypnotic suggestibility with nonhypnotic imaginative suggestibility, response expectancy, the motivation to respond to suggestion, and fantasy proneness. The correlation between hypnotic suggestibility and absorption was not significant. This study also was the first attempt to find correlates of individual differences in hypnotizability, defined as the effect of hypnosis on response to suggestion. We did this via a series of regression analyses in which we analyzed the associations between hypnotic suggestibility and other variables after statistically controlling for individuals' nonhypnotic suggestibility. Thus, hypnotizability was defined operationally as hypnotic suggestibility with nonhypnotic suggestibility controlled. In these analyses, hypnotizability was significantly associated only with individual differences in expectancy and motivation to respond to suggestion.

A final analysis revealed that hypnotic suggestibility was predicted uniquely by nonhypnotic suggestibility, expectancy, and motivation. In other words, each of these variables was significantly associated with hypnotic suggestibility even with all other variables statistically controlled. It is conventionally assumed that the degree of variance that can be accounted for

by predictor variables is limited to the reliability of the criterion variable (in this case, hypnotic suggestibility). All that is left after that is variance due to measurement error. However, the variance accounted for in this analysis exceeded the reliability of the suggestibility scale. This suggested to us that there was little left to learn about the immediate determinants of hypnotic suggestibility. They had been established. All that remained, we maintained, was to find more of the factors influencing individual differences in nonhypnotic imaginative suggestibility.

But we were wrong. In addition to replicating the results of our first study, our next study (Braffman & Kirsch, 1999b) revealed two more determinants of hypnotic suggestibility and hypnotizability (i.e., hypnotic suggestibility with nonhypnotic suggestibility statistically controlled). These were two of the first individual difference variables ever studied: simple and go/no-go reaction times (Donders, 1868).[3] With all other variables controlled, including nonhypnotic suggestibility, hypnotic suggestibility (and therefore hypnotizability) was associated positively with simple reaction time and negatively with go/no-go reaction time. With the addition of these two reaction time variables, the analysis accounted for even more of the individual differences in hypnotic suggestibility and hypnotizability than the analysis in our previous study did. Also, as before, the large proportion of individual differences accounted for indicated that there were no more predictors to find. At the risk of making the same mistake twice, we will climb out on the perilous limb of pertinacity and claim, once again, that the immediate determinants of hypnotic suggestibility have now been established. These are nonhypnotic suggestibility, expectancy, motivation for responding, and reaction time. Hypnotic suggestibility is simply nonhypnotic suggestibility augmented by a readiness to respond and modified by the changes in expectancy and motivation produced by the hypnotic context.

WHERE RESEARCH SHOULD GO FROM HERE

The immediate determinants of hypnotic suggestibility and hypnotizability have been empirically established, and there are apparently no additional determinants left to uncover. In contrast, there is much left to discover about their most powerful correlate, nonhypnotic imaginative suggestibility. We have established that nonhypnotic imaginative suggestibility is influenced by expectancy, motivation, absorption, and fantasy proneness (Braffman & Kirsch, 1999a). However, these variables account for only a small part of the variability in nonhypnotic suggestibility. Learning more about imaginative suggestibility will require additional studies in which it is assessed without the potentially confounding effects of a hypnotic induction. This should be done in correlational studies, brain-imaging studies, and studies using the wide variety of experimental paradigms that have been developed in hypnosis research.

Nonhypnotic imaginative suggestibility is an egregiously ignored construct, and understanding it is an exceptionally important task. Imaginative suggestibility is the ability or trait underlying the automatic movements, partial paralyses, selective amnesias, pain reduction, and hallucinations that are most commonly observed in the context of hypnosis. These behaviors mimic the symptoms of dissociative and conversion disorders, which until recent years were collectively known as "hysteria." One of the prominent symptoms of dissociative identity disorder (formerly termed multiple personality disorder), for example, is amnesia for behaviors supposedly carried out by an alternate personality. Similarly, conversion disorders are defined by psychologically produced physical symptoms, such as automatic movements and paralyses. Thus, it seems likely that the behaviors by which imaginative suggestibility is measured share some common underlying mechanisms with those disorders. But all of these responses and experiences can be elicited without hypnosis, and some of them can be produced easily by the vast majority of people. This indicates that the ability to respond to imaginative suggestions is a normal human characteristic, and its substantial effect in such important clinical areas as pain management indicates that it is a characteristic of great importance. Understanding this widely neglected phenomenon will require the combined efforts of cognitive, neuropsychological, social, and clinical psychologists.

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2. In an attempt to save the altered-state hypothesis, some psychologists

have advanced the idea that people might slip into trance spontaneously, so that responses to suggestion can be taken as evidence that the person is in a hypnotic state. The circularity of this position has long been argued. People are hypothesized to be responding to suggestion because they have slipped into a trance, but the only reason for claiming they are in this trance is that they are responding to suggestion. Also, the ease and frequency with which people display responses to nonhypnotic suggestion render this hypothesis implausible. Almost 80% of the participants in our first study (Braffman & Kirsch, 1999a) responded to suggestions during the nonhypnotic trial. Thus, the altered-state hypothesis requires supposing that the vast majority of people spontaneously slip into a hypnotic trance in response to simple requests to imagine experiences like one's arms moving apart. If slipping into trance is that common a phenomenon, then perhaps we are all in a hypnotic state much of the time, and much psychological research has been unwittingly conducted on inadvertently hypnotized participants.

3. Simple reaction time measures the speed with which a person can respond (e.g., by pressing a key) to a stimulus. In go/no-go reaction time tasks, two different stimuli are presented in random order. The participant is instructed to respond to one of the two stimuli and not to respond to the other stimulus. Simple reaction time is facilitated when the person gets set to respond as soon as any stimulus is detected, thereby allowing the response to be activated automatically, much as are the routine behaviors associated with well-learned habits (e.g., typing or driving a car). However, the adoption of this response set is precluded by the instructions for go/no-go reaction time tasks.

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Synesthesia: Strong and Weak

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Abstract

In this review, we distinguish strong and weak forms of synesthesia. Strong synesthesia is characterized by a vivid image in one sensory modality in response to stimulation in another one. Weak synesthesia is characterized by cross-sensory correspondences expressed through language, perceptual similarity, and perceptual interactions during information processing. Despite important phenomenological dissimilarities between strong and weak synesthesia, we maintain that the two forms draw on similar underlying mechanisms. The study of strong and weak synesthetic phenomena provides an opportunity to enrich scientists' understanding of basic mechanisms involved in perceptual coding and cross-modal information processing.

Keywords

synesthesia; cross-modal perception; selective attention

Color is central to Carol's life. As a professional artist, she uses color to create visual impressions in her paintings. Yet unlike most people, Carol also uses color to diagnose her health. She is able to accomplish this by consulting the colored images she sees in connection with pain. For example, a couple of years ago, Carol fell and damaged her leg badly while climbing on rocks at the beach. She diagnosed the severity of her accident not only by the intensity of her pain, but also by the intensity of the orange color that spread across her mind's eye. She said, "When I saw