

Hypnosis: a twilight zone of the top-down variety

Few have never heard of hypnosis but most know little about the potential of this mind–body regulation technique for advancing science

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An early form of psychotherapy, hypnosis has been tarnished by a checkered history: stage shows, movies and cartoons that perpetuate specious myths; and individuals who unabashedly write ‘hypnotist’ on their business cards. Hypnosis is in the twilight zone alongside a few other mind–body exemplars. Although scientists are still unraveling how hypnosis works, little is mystical about this powerful top-down process, which is an important tool in the armamentarium of the cognitive scientist seeking to unlock topical conundrums.

When I was a young magician I thought it would be a good idea to diversify my repertoire by branching into hypnosis. My colleagues were giving hypnosis shows and I wanted to learn more about this new trick. And yet, although their highly choreographed routines were largely successful, when I queried these seasoned entertainers about the ‘how’ and ‘why’ of their acts, even my most rudimentary inquiries often elicited shoulder shrugs and eye-rolls. ‘It works,’ many said when pressed, ‘just use the patter.’ Since that time I have learned a great deal about what hypnosis can and cannot do. I and a growing group of researchers have together elucidated some of the cognitive processes and neural correlates that often typify hypnosis as well as specific hypnotic experiences. We are still busy at work.

Hypnosis is confusing. Type hypnosis into your favorite search engine and you too may confound lay entertainment with clinical intervention, hypnosis with hypnotherapy, and fact with fad. On the one hand, many individuals approach hypnosis with skepticism – regarding it as an arcane and questionable phenomenon – bewilderment, and even fear. On the other hand, as a psychological technique which elicits profound alterations in consciousness after only a few words of suggestion, hypnosis can make certain individuals undergo remarkable experiences: see things that are not there, fail to see things that are there, lose control over voluntary motor functions, and feel as if they were young children. Following hypnosis, moreover, some people can execute responses to previously arranged cues without really knowing what they are doing or why they are doing it. And, given appropriate suggestions, they can forget all they did or experienced while hypnotized until

the suggestions are terminated and the relevant memories come flooding back [1].

Reliable measurement of hypnotic response is an elementary prerequisite to any scientific examination of hypnosis. Only by quantifying hypnotic behaviors under standard conditions can scientists obtain a meaningful measure of hypnotizability. Since the introduction of a number of standardized measures, with good psychometric characteristics, hypnosis research has markedly increased in both quality and quantity. Although other measures are sometimes acceptable, the gold standard in modern hypnosis research consists of having individuals go through both the Harvard Group Scale of Hypnotic Susceptibility, Form A [2] and the Stanford Hypnotic Susceptibility Scale, Form C [3]. Together, these 12-point scales permit researchers to rigorously identify individuals as highly hypnotizable or less hypnotizable with good test-retest reliability, validity and even international norms (e.g. American, Australian, Canadian, German and Spanish).

The popularity and appeal of hypnosis probably draws on its associated ‘romantic’ – dramatic, even epic – qualities as they bring into focus fundamental and fascinating questions about the nature of agency, volition, identity and consciousness. Myths about hypnosis persist, however, with most largely attributable to theatrical presentations (e.g. pendulums and spirals in the hands of charismatic performers armed with a penetrating gaze under a bushy supercilium) and downright folklore (Box 1).

The twilight zone

People, including many a cognitive scientist, frequently blur the distinction between stage hypnosis for entertainment and medical–psychological forms of hypnosis for clinical purposes. Multiple parameters contribute to this confusion. Although assorted hypnosis credentials are available from multiple professional-sounding guilds, for example, most of these certifications are meaningless and further obfuscate the distinction between registered clinicians (e.g. physicians and psychologists) and other practitioners. In the hands of performers, popular depictions of hypnosis often bleed into the clinical realm because, with few exceptions, hypnosis for entertainment is legal. I once heard a Las Vegas stage hypnotist promote his innovative

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Box 1. Common myths related to hypnosis

- **'Under' hypnosis, people are asleep.**
Hypnosis has nothing to do with sleep.
- **The 'hypnotist' hypnotizes the individual.**
Hypnosis is, ultimately, self-hypnosis.
- **Upon 'waking up', people hardly remember the hypnotic experience.**
Although spontaneous posthypnotic amnesia may occur, such instances are rare. Most people, instead, would remember everything that transpired while hypnotized. Nonetheless, hypnosis can have a substantial effect on memory. Suggestions for posthypnotic amnesia, for example, can lead individuals to forget certain things that occurred before or during hypnosis. Such effects, however, are typically focal and fleeting.
- **Hypnosis will refresh memory of a witnessed crime.**
Hypnotically recovered memories are notoriously unreliable. Whereas hypnosis can enhance memory, the popular media have largely exaggerated such effects. Hypnosis hardly leads to dramatic memory enhancement or accuracy; however, it may plant false or distorted memories.
- **Hypnotic age-regression...**
...is hardly a veridical exercise in reverse chronology. In one study, for example, experimenters hypnotized college students and gave them a suggestion that they would age-regress [14]. The students acted like children and drew pictures, which the researchers saved and later compared with pictures each had drawn when they really were children. Comparison of the actual- and

age-regressed images revealed little, if any, similarities suggesting that it was unlikely that the college students were accessing childhood memories as much as they were imagining being a child from the perspective of an adult.

- **Hypnosis supports Freud's repression hypothesis (i.e. magnitude of forgetting would be much more pronounced for individuals who are highly motivated to shunt traumatic material out of awareness).**
It has been inordinately difficult to support Freud's 'repression' hypothesis and multiple studies actually support the contrary (i.e. that even individuals who should be extremely motivated to forget their traumas are largely unable to do so) [12]. In addition, experiments instructing participants to discount, disregard or generally push unwanted thoughts out of awareness often result in a boomerang effect, thereby increasing the prominence and accessibility of these thoughts [12].
- **You can be hypnotized against your will.**
Hypnosis requires voluntary participation.
- **The hypnotic operator has complete control.**
Although people may feel a different sense of authorship under hypnosis, a hypnotic operator could propel individuals to perform only actions congruent with their internal values or morals.
- **Hypnosis can turn you into an athlete, a concert pianist and so on.**
Although hypnosis can be used to enhance performance, it cannot make people athletic or musical beyond their existing capabilities.

procedure for hypnotic bosom enlargement. The audience acquiesced to his preposterous claims without the slightest exsibilation and a throng of eager women lined up at the end of the show. Thus, some 'hypnotists' – perhaps a bit more so than other practitioners – have a reputation for being neither judicious nor circumspect. An unprotected practice in most countries, clinical hypnosis is largely unregulated. Clinical hypnosis on its own, however, is hardly a form of treatment but rather an adjunct to therapy. Whereas a patient undergoing hypnosis may experience reduced tension and other benefits, additional goal-related interventions such as suggestions about pain relief or cessation of smoking are necessary to make it hypnotherapy. Stage hypnosis and clinical hypnosis are different, therefore, as are hypnosis and hypnotherapy; beware those who present themselves as hypnotists, regard them as magicians, believe nothing that you hear and only half of what you see.

Hypnosis and cognitive science

Results from experiments involving hypnosis are occasionally towering, albeit little known. Although hypnosis research could benefit from a measure of rigor and many scientists are unsure what they can and cannot 'believe' about hypnosis, hardcore scientists rarely believe or suppose; instead, they examine data. Consider, for example, hypnotic agnosia: loss or diminution of the ability to recognize familiar objects or stimuli following a hypnotic suggestion rather than as a consequence of brain damage. Although hardly a novel result, hypnotic agnosia has been sparsely studied since Frederick J. Evans and Maribeth Miller reported interesting effects on the performance of simple arithmetic calculations after suggesting to participants that the digit '6' would have no meaning to them (Posthypnotic amnesia and the temporary disruption of retrieval processes, in *Annual Meeting of the American Psychological Association*, APA, 1972). A decade later,

Nicholas P. Spanos and his colleagues reported on the elimination of semantic priming after administering hypnotic suggestions to prevent participants from thinking of certain words [4]. If confirmed by further independent replications, these intriguing effects would probably have striking repercussions. Investigators with specific interests in number processing and language, however, have scarcely pursued these leads. And this example is but one of many in the literature on hypnosis: a corpus of reports, which collectively affords a unique perspective on neuropsychology and higher brain functions but one which cognitive scientists seldom consider in furthering their research prospects.

Using neuroimaging and other methods, my colleagues and I have demonstrated that for highly hypnotizable individuals a specific hypnotic suggestion, for example to view the presented letter strings as gibberish written in an unknown foreign language, resulted in a reduction or elimination of Stroop interference (i.e. when the word for a color is incongruent with its ink color, people take longer and are more prone to errors reporting the ink color compared with congruent trials) [5] even without hypnosis [6]. These effects are important because efforts to eliminate Stroop interference with hypnotic suggestions for color-blindness were largely unsuccessful [7] although suggested color-blindness can have profound effects on both the experience of color and changes in blood flow in the lingual and fusiform gyri [8]. Beyond hypnosis, however, the Stroop findings generalize to a more overarching cognitive ability to exert substantial control over what has been widely perceived as a largely automatic process. Although the question of whether it is possible to regain control over an automatic process is mostly unasked, mounting evidence suggests that deautomatization is conceivable. This unringing-of-the-bell holds far-reaching implications for clinical as well as cognitive science [9].

Hypnosis provides a vehicle to examine the influence of top-down over bottom-up processes. It has been documented to effectively regulate pain, anxiety and multiple somatic functions, even in the invasive clinical procedures accompanying interventional radiology and oncological surgery. Hypnotic alterations of perception, moreover, seem to reduce specific brainwave signatures, including early (e.g. P100, N200) and late (e.g. P300) components of event-related potentials [5]. In addition, hypnotic suggestion can even induce neuropsychological symptoms (e.g. hemispatial neglect, a neuropsychological condition featuring a deficit in attention to, and awareness of, one side of space after damage to one hemisphere of the brain, or synesthesia, an unusual neurological condition characterized by anomalous correspondences between and within sensory modalities) in healthy participants, and may therefore provide a unique lens to elucidate pathology [10].

Social and cultural effects

Some modern scholars advocate for a bowdlerized version of hypnosis devoid of social nuances [11]. Hypnosis, however, involves cognitive changes that take place in particular interpersonal contexts: it draws on both cognitive and social parameters [12]. Changing social expectations have shaped our mental and physiological experiences of hypnosis. In the 18th century the patients of Anton Mesmer, for example, felt animal magnetism racing through their bodies, whereas patients of Amand-Marie-Jacques de Chastenet of the same era replaced these symptoms with access to heightened, even supernatural, mental abilities [13]. By the second half of the 19th century, moreover, these occult-like characteristics faded and, instead, hypnosis became a quasi-pathological phenomenon, with specific physiological profiles such as catalepsy, lethargy and somnambulism. The collective construction of our mental processes, therefore, seems to shape our understanding of hypnosis. Specifically, any one interpretation of a specific hypnotic suggestion is crucial to the ensuing response. We must therefore appreciate experiments from the vantage point of the participants and heed their understandings of the testing context.

After nearly three decades of tinkering with hypnosis, placebos and other mind-body interactions, my scalp is considerably more glabrous than when I started out. However, I am as excited today as I was in my unshorn days about the research prospect of top-down regulation. Today we know a bit more about how specific parameters, including suggestion and expectation, can override bottom-up processes and about the potential contribution such factors could impart to unraveling fundamental questions within cognitive and clinical science. However, hypnosis is hardly a panacea. Although I am enthusiastic about open inquiry into hypnotic behavior and the mechanisms of top-down processes, I hold my breath for neither hypnosis nor placebos to restore those hair follicles of yore.

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