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The neurophenomenology of neutral hypnosis

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ABSTRACT

Introduction: After a hypnotic induction, medium and highly hypnotizable individuals often report spontaneous alterations in various dimensions of consciousness. Few studies investigating these experiences have controlled for the inherent demands of specific hypnotic suggestions and fewer still have considered their dynamic properties and neural correlates.

Methods: We adopted a neurophenomenological approach to investigate neutral hypnosis, which involves no specific suggestion other than to go into hypnosis, with 37 individuals of high, medium, and low hypnotizability (Highs, Mediums, and Lows). Their reports of depth and spontaneous experience at baseline, following a hypnotic induction, and then after multiple rest periods were analyzed and related to EEG frequency band power and global functional connectivity.

Results: Hypnotizability was marginally associated with lower global functional connectivity during hypnosis. Perceived hypnotic depth increased substantially after the induction especially among Highs and then Mediums, but remained almost unchanged among Lows. In the sample as a whole, depth correlated moderately to strongly with power and/or power heterogeneity for the fast EEG frequencies of beta2, beta3, and gamma, but independently only among Highs. The spontaneous phenomenology of Lows referred primarily to the ongoing experiment and everyday concerns, those of Mediums to vestibular and other bodily experiences, and those of Highs to imagery and positive affect/exceptional experiences. The latter two phenomena were associated with lower global functional connectivity during hypnosis. Imagery correlated positively with gamma power heterogeneity and negatively with alpha1 power heterogeneity. Generally, the pattern of correlations for the Highs was the opposite of that for the Lows.

Conclusions: Experienced hypnotic depth and spontaneous phenomena following a neutral hypnotic induction vary as a function of hypnotizability and are related to global functional connectivity and EEG band wave activity.

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1. Introduction

Alterations of consciousness have been associated with animal magnetism and hypnosis throughout their history (Cardeña and Alvarado, 2011; Ellenberger, 1970). Conversely, hypnotizability (the ability to respond to hypnotic suggestions) has been related to the propensity to experience anomalous phenomena, although most of these findings have been correlational in nature (Cardeña et al., 2000). There is also considerable evidence that during a hypnotic procedure highly hypnotizable individuals ("Highs") differ in a number of behavioral and experiential ways from medium ("Mediums") and low ("Lows") hypnotizables (McConkey and Barnier, 2004). Some studies have considered the impact of hypnotizability on spontaneous experiences, but few have controlled for possible confounds (e.g., specific suggestions) while measuring simultaneously different variables (e.g., physiological, behavioral, and experiential) during hypnosis (Orne, 1959; see also Weitzenhoffer, 1980). Another hurdle has been the failure to consider phenomenal experience as a dynamic process rather than a static state (Cardeña, 2011; Tart, 1975). For instance, the concept of depth, used to characterize hypnotic experience, is a metaphor that implies varying changes in experience within the same state, and the validity of this characterization is supported by studies showing a positive correlation between reports of greater depth and suggested and spontaneous behavioral and experiential changes (Kahn et al., 1989; Laurence and Nadon, 1986; Tart, 1970a).

Earlier studies found spontaneous experiences related to hypnosis including changes in body image and sensations, a fading of the sense of external reality and other changes in the sense of reality (Gill and Brenman, 1959; Ludwig, 1965). Hilgard (1968) interviewed 159 participants after a hypnotic procedure and they mentioned experiencing a spontaneous disinclination to speak, move or think, feelings of compulsion in response to suggestions, changes in body image and body sensations, and a perceived similarity to sleep; the latter perhaps an artifact of inductions that included mentions of sleep. In a series of studies, Pekala and Kumar (2007), using a standardized questionnaire, found that among Highs a hypnotic induction produced changes in body image and sensations, time sense, perception, meaning, affect, and imagery, and a general sense of being in an altered state of consciousness. The studies mentioned employed someone else as a provider of hypnotic inductions and suggestions (i.e., hetero-hypnosis). Research on self-hypnosis (the hypnotist and hypnotized person are one and the same) shows that both procedures involve a fading of generalized reality orientation but self-hypnosis involves greater imagery, free-floating attention, and receptivity to internal stimuli (Fromm et al., 1981), probably because the individual attends to internally generated experiences rather than to an external hypnotist.

Although it is known that individuals commonly experience different self-perceived levels of hypnosis (i.e., hypnotic depth), few studies have examined spontaneous experiences across different self-perceived levels of hypnotic depth. Erickson (1952) described loss of contact with the body during *plenary* (very deep) hypnosis and explained it as a pattern of retarded psychological and physiological functioning with lack of spontaneity. He described various induction techniques to achieve "deep hypnosis" including utilization of the person's responses, indirect suggestion, and specific techniques such as using confusing communications. In a collaborative project with Erickson, the author Aldous Huxley described the beginning of hypnosis (after a variety of induction techniques that were not specifically described) as a withdrawal from outer reality concerns followed by changes in body sensations and then synesthesia, a sense of loss of personal identity, and lack of mental content (Erickson, 1965).

One of the problems with much of the literature is that the putative effect of a hypnotic procedure has not been disentangled from that of specific suggestions during an induction, such as those for relaxation and focus of attention, or even for specific post-induction suggestions (e.g., Lipari et al., 2012; cf. Cardeña, in press). Thus, results from this literature could be due to a general induction procedure, socio-cognitive variables such as expectancies, or the specific suggestions provided. A procedure to reduce the confounds of induction and post-induction suggestions on phenomenology has been the rarely-used approach of *neutral hypnosis* in which no explicit suggestions are administered during or after an induction other than to become hypnotized (Kihlstrom and Edmonston, 1971). Clearly there is no such thing as a completely "neutral" hypnosis because even the mention of the word *hypnosis* increases suggestibility more than the same procedure labeled as relaxation (Gandhi and Oakley, 2005). However, this method still avoids artifacts associated with specific suggestions that are typically included in inductions (e.g., relaxation) and later suggestions. It represents a more rigorous way of investigating the neurophenomenology of hypnosis and is similar in spirit to Sheehan and McConkey's (1982, p. 85) attempt to provide few cues on the nature of the hypnotic phenomena investigated.

Along these lines, Tart (1970b) asked a very highly hypnotizable individual to go as deeply as possible into hypnosis without other overt suggestions or instructions, although in the numerical scale he used there are references to, for instance, a certain level of depth being required to experience body sensations or dreams. The volunteer described his experience as involving loss of body and breathing awareness, absolute blackness, sense of potentiality, time alterations, loss of spontaneous mental activity, and a sense of being one with the universe. Tart's case study was subsequently replicated in within-subject designs. Sherman (1971) found similar reports from Highs including intense brightness in deep hypnosis, emotional experiences, simple images, and body sensations during medium hypnosis, and ideas, worries and "normal verbal thinking" during light hypnosis. He used a depth scale similar to Tart's but without landmarks other than stating that a certain numerical depth would be required for people to follow the most difficult suggestions. He let every volunteer use self-hypnosis or counted from 1 to 20 to those who preferred it. Feldman (1976) used a similar scale (but without the mention about the litmus for difficult suggestions) and a counting induction, and replicated Sherman's findings as did, more informally, Hilgard (1986, pp. 169–170), who did not report the induction he used. Regrettably, a recent review of the experience of Highs (McConkey and Barnier, 2004) did not discuss any of this material.