Eine Forschung über die schöpferische Kraft und psychedelische Rauschgifte

Stanley Krippner

Abstrakt: Uber die Jahre hin haben sich sehr wenige Forscher mit dem Einfluss des psychedelischen Rauschgifterlebens auf die verschiedensten Aspekte des schöpferischen Vorgangs befasst. Obwohl keine endgültigen Behauptungen gemacht werden können, scheint es doch möglich zu sein, dass diese Substanzen mit der ursprünglichen Gestaltung der Idee und Bildvorstellung verbunden sind, und das betrifft ganz besonders die Künstler. Es gibt kein Beweismaterial, dass LSD-artige Rauschgifte das schöpferische Element in Menschen hervorrufen kann, von denen bekant war, dass sie vor der Rauschgifteinnahme kein Talent besassen. Bei dem schöpferischen Akt wird Phantasie in Realität umgewandelt. Das Studium des psychedelischen Erlebnisses, des hypnotischen Erlebnisses und anderer Veränderungen im Bewusstseinszustand mag dazu verhelfen, diesen Vorgang zu verstehen.

Recherches sur la créativité et les drogues psychédéliques

Stanley Krippner

Résumé: L'influence de l'expérience de drogue psychédélique sur divers aspects du processus créateur a été étudiée par très peu de chercheurs au cours des années. Bien qu'il soit impossible de faire des énoncés concluants, il semble possible que ces substances soient associées avec l'imagerie et l'idéation originale, surtout dans le cas des artistes professionnels. Il n'existe aucune preuve que des drogues de type LSD peuvent susciter la créativité chez des individus qui ne sont pas reconnus comme talentueux avant l'ingestion de drogue. La créativité implique la transformation de la fantaisie en réalité; l'étude de l'expérience psychédélique, de l'expérience hypnotique et d'autres altérations de conscience peut nous aider à comprendre ce processus.

Investigación sobre la creatividad y las drogas psicodélicas

Stanley Krippner

Resumen: La influencia de la experiencia psicodélica sobre diversos aspectos del proceso creativo ha sido estudiada por muy pocos investigadores a lo largo de los años. Aunque no pueden hacerse afirmaciones categóricas, parece posible que las substancias psicodélicas puedan asociarse con la producción de ideas e imágenes originales, sobre todo en el caso de artistas professionales. No hay pruebas de que las drogas del tipo LSD puedan inducir la creatividad en individuos que no hayan dado muestras de talento antes de la ingestón de dichas drogas. La creatividad supone la transformación de la fantasía en realidad; el estudio de las experiencias psicodélica e hipnótica y de otras alteraciones de la conciencia, puede ayudar a comprender dicho proceso.

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THE ROLE OF ATTENTION IN MEDITATION AND HYPNOSIS: A PSYCHOBIOLOGICAL PERSPECTIVE ON TRANSFORMATIONS OF CONSCIOUSNESS[1, 2]

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Abstract: A temporally based scheme for investigation of changes in consciousness, applicable to areas such as meditation and hypnosis, is proposed and is divided into 3 basic epochs: before – predispositional variables that affect response to consciousness altering techniques; during – the state effects of the particular technique; and after – the trait effects of the practice. Research is surveyed which indicates the role of attentional processes during each of these 3 basic epochs in both meditation and hypnosis. Attentional flexibility is a predispositional variable affecting response to both meditation and hypnosis. The state effects of concentrative meditation involve alterations in stimulus set while the state effects of hypnosis may reflect primarily response set. The trait effects elicited by meditation depend critically on the psychobiological systems which are called into play. Evidence is discussed which suggests that concentrative meditation shares with relaxation an autonomic quiescence, but in addition enhances some attentional skills. A mindfulness technique involving the adoption of a particular attentional stance toward all objects of awareness appears to enhance cortical specificity, but a

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concentration technique does not. Some implications of attentional self-regulation are discussed.

In his classic chapter on attention in *Principles of Psychology*, William James (1890) proposed that

> The practical and theoretical life of whole species, as well as of individual beings, results from the selection which the habitual direction of their attention involves. . . . each of us literally *chooses*, by his ways of attending to things, what sort of a universe he shall appear to himself to inhabit [p. 424].

The direct implication of this suggestion is that changing one's habitual ways of attending should change both behavior and experience.

James (1890) was quite emphatic on a related point. He argued that "the brain is the one immediate bodily condition of the mental operations [p. 4]" and that any change in mental events necessarily implies a concomitant neural change. The application of this basic fact of psychobiology to the study of attentional processes has recently led to some significant advances in our understanding of the neural substrates of attention (e.g., Pribram & McGuinnes, 1975).

A growing body of data indicates that humans (as well as lower organisms) can acquire some degree of control over usually autonomous psychobiological processes through a variety of procedures, such as biofeedback. One of the oldest techniques for achieving such self-regulation, particularly of attention, is meditation. From research in this area, a model has emerged which helps us understand some basic principles in the self-regulation of consciousness. Though the present model uses meditation as a reference case, it is applicable to all voluntarily elicited altered states of consciousness.

A General Model of Transformations of Consciousness

The model which has emerged from the present authors' research starts with the three basic temporal epochs present in all changes in consciousness. These three periods may be simply labeled *before, during,* and *after*. *Before* refers to the psychobiological patterns of an individual prior to the experience of a particular altered state of consciousness. It is often referred to under the rubric of predispositional variables and encompasses the study of personality traits and other individual differences that enable one either to be receptive and open to the experience of particular altered states of consciousness or antagonistic and closed to the experience of such states. As such, it includes the genetic history of the individual, the psychobiological encoding of the individual's learning experience (including culturally conditioned learning), as well as the immediate social and interpersonal environment within which the individual experiences the altered state of consciousness. For example, some investigators, in

controlled studies of long-term effects of LSD, have found that persons who emphasized "structure and control" in their cognitive style, respond minimally to the drug, while more intense reactions are seen in *S*s preferring a more unstructured, spontaneous, inward-turning life (e.g., Barr, Langs, Holt, Goldberger, & Klein, 1972; McGlothlin, Cohen, & McGlothlin, 1967).

The next period, *during*, refers to the state effects of a particular vehicle or pathway (such as meditation or drugs). It is upon this period that the vast majority of research in the area of altered states has focused. State effects are a function of the interaction of the vehicle or pathway for altering consciousness with predispositional variables. For example, the state effects of hypnosis appear to be a function of the hypnotic procedures interacting with a broad range of predispositional and situational variables. Thus, we now have evidence that a portion of the variance in hypnotic susceptibility can be attributed to genetic factors (e.g., Morgan, 1973; Morgan, Hilgard, & Davert, 1970), which interact significantly with early history of the individual (see, J. R. Hilgard, 1972; Morgan, 1973), and with a variety of situational factors as well as specific aspects of the hypnotic induction which all have important influences on hypnotic responsiveness (e.g., Barber, 1969, 1970; Orne, 1959). More specifically, the effects of hypnotic suggestion differ between high and low susceptible *S*s: many psychological and biological changes induced by hypnotic suggestion occur only in high susceptible *S*s. These include analgesia, time distortion, and the self-regulation of some autonomic nervous system functions (Engstrom, 1975; Garrett, 1975; E. R. Hilgard, 1969). In sum, an altered state is an interactive product of what came before and the pathway or vehicle employed for consciousness alteration. That is, the before is a potent determinant of the during; predispositon shapes state effects.

It is this latter variable – the pathway or vehicle – which is suggested as a critical determinant of the third major temporal epoch in the present model: the *after*, or trait effects of the particular practice. As a person develops the requisite skills for entering particular states on command, the experiential and biological consequences of such control may become more persistent and enduring through learned control. If we assume that the patterning and structure of neural events reflect an organism's state of consciousness (see John, 1976), a tonic change in key psychobiological processes will result in a shift in information-processing mode and, consequently, can be termed an altered trait of consciousness. Whether such trait effects do in fact arise is hypothesized to be a function of the vehicle or pathway adopted, not of the state effects elicited. For example, an individual may have had a particularly profound experience following the inges-

tion of a psychedelic chemical. The available evidence, however, is inconclusive with regard to long-term carry over from psychedelic altered states (e.g., Barber, 1970; McGlothlin et al., 1967).

Finally, the remaining element in the present model is the feedback effects of trait changes on predispositional variables. For example, high anxiety is a predispositional variable which appears not to be conducive to the practice of meditation (Otis, 1973). One of the most reliable trait effects of meditation is a reduction of anxiety (e.g., Linden, 1973). And, we suggest, lowered anxiety further increases an individual's receptivity to meditation. This feedback process can be put simply as: the after is the before for the next during. In other words, the trait effects of a particular vehicle for altering consciousness change the predispositional matrix, which will in turn affect the state changes elicited by a subsequent utilization of the vehicle. However, this feedback process is hypothesized to occur only when a core biocognitive process such as attention is changed as a function of the learning which ensues upon practice of the particular vehicle. Thus, while attempts to modify hypnotizability through repeated exposure to hypnotic suggestions have been only partially successful (see review by Diamond, 1974),[5] training in processes closely related to selective attention has consistently been associated with increases in hypnotizability (Gur, 1974; Wickramasekera, 1973).

This temporal model of changes in consciousness organizes data on altered states and leads to specific predictions about the effects of different vehicles for altering consciousness. The remainder of this paper will illustrate the application of the model to meditation and hypnosis.

Before: Biocognitive Preparedness

What sort of person is attracted to and can be benefited by meditation? A number of converging lines of evidence suggest that *S*s who are not highly anxious and who have some capacity to voluntarily self-regulate their attention are likely to experience subjectively positive effects from meditation.[6] Interestingly, facility at attentional

[5] It should be noted, however, that training programs designed to maximize motivational and attitudinal conditions have been associated with significant gains in hypnotizability (e.g., Burns, 1976; Sachs & Anderson, 1967). It may be, as Burns 81976) has suggested, that the change in attitude may have the effect of allowing *S*'s "natural" level of hypnotizability to become expressed.

[6] While it may be tempting to classify the individual differences described here on existing dimensions or continua of arousal (e.g., Fischer, 1971), the underlying mechanisms appear to be much more complex and preclude analysis in terms of general arousal. Moreover, the question of the concept of general arousal has recently been called into question by contemporary research on psychophysiological specificity (e.g., Davidson, 1976; Davidson & Schwartz, 1976).

self-regulation is also associated with superior performance on standard tests of hypnotizability. A principle process indexed by standard tests of susceptibility is the capacity for sustained attentional involvement (e.g., Galbraith, Cooper, & London, 1972; Tellegen & Atkinson, 1974; Van Nuys, 1973). If tests of hypnotizability do in fact reflect attentional competence, then we might expect to find that people who are initially attracted to meditation are more highly susceptible before beginning their practice than a comparable control group. Although the necessary longitudinal data are lacking, preliminary findings support this prediction (Walrath & Hamilton, 1975). Van Nuys (1973) has approached this question from the opposite perspective and has found that those *S*s who are better able to concentrate during meditation (operationally defined as fewer "thought intrusions") are more highly susceptible to hypnosis.

Based upon these initial findings, Davidson, Goleman, & Schwartz (1976) sought to more fully explore the personality patterns associated with the predisposition to meditate. This study emerged partially from a recent theory of the psychobiology of relaxation and related states proposed by Davidson and Schwartz (1976). These latter investigators have suggested that individuals differ with respect to the type and amount of ongoing intrusive or unwanted events, which for lack of a better term, has acquired the label "anxiety." Specifically, Davidson and Schwartz have proposed that anxiety occurs in two predominant modes – cognitive and somatic.[7] Cognitive symptoms include phenomena such as difficulty in concentration because of uncontrollable thoughts, excessive worry over something not objectively important, and anxiety over the inability to make decisions. Somatic symptoms, alternatively, include such things as feeling jittery in the body, symptoms of diarrhea, tension in the stomach, and excessive perspiration. Unfortunately, most standard anxiety inventories do not separate these different modes and consequently preclude the assessment of the specificity of particular techniques or vehicles in differentially affecting one versus the other type of anxiety. Davidson and Schwartz have hypothesized that certain configurations of anxiety will benefit by the practice of particular procedures which specifically block unwanted activity in a given mode. For example, these authors propose that a pattern consisting of high cognitive and low somatic anxiety (e.g., excessive rumination in the absence of somatic tension) will be maximally attenuated by a procedure which specifically blocks cognitive anxiety. In this case, it is predicted that activities which maximally engage the cognitive

[7] It should be noted that this distinction is at the most molar level. Somatic may be further subdivided into autonomic and skeletal components (see Borkojec, 1976), while cognitive may be separated into left versus right hemisphere mediated anxiety.

system, such as doing a crossword puzzle or playing chess, would result in the greatest reductions in cognitive anxiety. It is hypothesized that other procedures emphasizing somatic activation would result in greater decrements in somatic relative to cognitive anxiety. Some of these predictions have recently received empirical support (Davidson, Davison, & Freedland, 1977; Schwartz, Davidson, & Goleman, in press).

Davidson and Schwartz (1976) have additionally suggested that meditation will be undertaken by individuals who, on the average, show low cognitive and low somatic anxiety. This suggestion was based upon evidence which indicates that people with elevated levels of anxiety will not, at least initially, be benefited by meditation and will be less likely to persist in their practice. Thus, Otis (1973) has performed a longitudinal study of meditators and found that those initiates who practiced regularly for more than 12 months characterized themselves as less anxious, more calm and peaceful than those who dropped out before 12 months. These self-evaluations were made *before* either group had begun meditation. These data suggest that predispositional differences in global anxiety had significant effects on *S*s' ability to persist in the practice of meditation.

In their study of predispositional variables associated with the practice of meditation, Davidson et al. (1976) found no significant differences in global trait anxiety as assessed by the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) between a group of *S*s ($N = 14$) who had just begun the practice of meditation (who were practicing less than 1 month) and an age and education matched control group ($N = 11$). However, the means indicated that *S*s beginning meditation had less anxiety than controls as assessed by this measure ($\bar{X}$ for beginners = 40.86; $\bar{X}$ for controls = 42.6). An additional anxiety questionnaire (Schwartz et al., in press) designed to separately assess cognitive and somatic components was also administered to these *S*s. This questionnaire consisted of 14 symptoms, half cognitive and half somatic. The *S*s were instructed to circle a number from 1–5 according to the degree to which they generally or typically experienced this symptom *when they are feeling anxious*. This questionnaire is therefore not sensitive to the absolute amount of anxiety experienced but rather reflects the modality in which anxiety is typically experienced when it occurs. The results obtained with this questionnaire indicated that there were no significant differences between controls and beginners in preponderance of cognitive anxiety ($\bar{X}$ for beginners = 20.64; $\bar{X}$ for controls = 19.82) while beginners reported significantly more somatic symptoms than controls ($\bar{X}$ for beginners = 18.9; $\bar{X}$ for controls = 16.2; $t = 2.16$, $d.f. = 23$; $p < .05$).[8] Apparently, when they feel anxious, those *S*s initially attracted to meditation experience more somatic symptoms than controls. The fact that such somatic processes are usually easily discriminable may have been influential in motivating these *S*s to seek a means to greater relaxation. It may be that in the absence of any discriminable anxiety, individuals would not be motivated to begin meditation.

Davidson et al. (1976) have compared beginners to controls on a number of other measures in order to explore the pattern or configuration typically associated with a predisposition toward meditation, and many of these antecedent measures are also associated with hypnotizability. There was a highly significant difference between scores of beginners and of controls on the Tellegen Absorption Scale (Tellegen & Atkinson, 1974), ($\bar{X}$ for beginners = 26.1; $\bar{X}$ for controls = 21.6; $t = 3.02$, $d.f. = 23$; $p < .01$) which measures the capacity for sustained attentional involvement. For example, the following item from the scale, answered true, indicates capacity for absorption: "If I wish, I can imagine . . . some things so vividly that they hold my attention in the way a good movie or story does [p. 270]."

These results suggest that individuals, who are interested enough in meditation to have begun to practice, report more instances of spontaneous, total attentional involvements than a comparable control group. In addition, there is a non-significant trend suggestive of less overall anxiety among the beginners, who at the same time report that they do experience anxiety more in the somatic mode than did the controls. These findings replicate and extend prior work in this area (e.g., Lesh, 1970; Maupin, 1965; Walrath & Hamilton, 1975).

During: Some State Effects of Meditation and Hypnosis

Comparing the state effects of meditation and hypnosis highlights some important differences between these procedures and allows for the development of a model, based partially on signal detection theory (Green & Swets, 1966), for understanding their differential consequences.

It is important to take into account the different forms of meditation when considering their state effects (e.g., Goleman, 1972). The two basic types which have been identified consistently in the classical literature on meditation are *mindfulness* – the maintenance of a particular attentional stance toward all objects of awareness, and *concentration* – the focusing of attention on a single-target percept. These two different forms of meditation have stable, differential,

[8] All statistics employed in this paper are based upon two-tailed tests.

experiential, and psychobiological consequences (see, Goleman, 1972).

One of the frequently reported state effects of *concentrative* meditation is a decreased reactivity to the external environment (e.g., Anand, Chhina, & Singh, 1961; Prabhavananda & Isherwood, 1953). In their classic study of yogi's in *samādhi*, Anand et al., (1961) observed no alpha blocking to a variety of sensory stimuli including strong light and a hot test tube. Banquet (1973) has replicated this effect in practitioners of Transcendental Meditation (also a concentrative practice) during periods of alpha abundance in addition to demonstrating nonresponsiveness of raw EEG during the "deep" stages of meditation associated with fast (20 to 40 Hz.) frequency activity. Although these findings are preliminary and lack the necessary quantitative evaluation, they do suggest that during periods of intense concentration in meditation, sensory information may become attenuated below the level of the cortex.

These state effects differ from those typically observed during hypnosis. One of the most interesting recent developments in evaluating state effects during hypnosis is the resurrection by E. R. Hilgard (1973, 1974, 1976) of a very old and neglected procedure for assessing information at levels below conscious awareness. This procedure involves hypnotically induced automatic writing or its equivalent to gain access to normally unreported information. Hilgard has used this procedure to explore a consistent paradoxical finding in experiments on pain reduction in hypnosis. When cold pressor pain is reduced through hypnotically suggested analgesia, the concomitant cardiovascular changes remain essentially unchanged. When, through "automatic writing" or "automatic talking," the *S* is queried about his experience, he reports the pain just as in the normal nonhypnotic state. The experience of suffering (the affective component) may be reduced but the sensory experience of pain is not significantly different during automatic writing versus the normal state.

These findings are consistent with a growing body of literature suggesting that, in the area of pain reduction, hypnosis as well as placebos function primarily by altering *S*'s criterion for reporting pain (β), but have no significant effects on sensitivity (d') (e.g., Clark, 1969, 1974).[9] This model of hypnotic state effects also applies to situations other than suggested analgesia. For example, when suggestions are given for deafness or blindness, the bulk of the available

[9] There is one report, however, which may be interpreted as indicating that for highly susceptible *S*s, hypnotic analgesia may significantly affect pain sensitivity (McGlashan et al., 1969). However, signal detection methodology was not employed in that report, thus precluding an unambiguous interpretation (see also, Hilgard & Hilgard, 1975).

evidence indicates that the early component of the scalp recorded evoked responses (which primarily reflect the physical characteristics of the stimulus) to stimuli in the relevant modalities are not affected compared with control conditions during which no suggestion was given (e.g., Beck & Barolin, 1965; Beck, Dustman, & Beir, 1966; Halliday & Mason, 1964).[10] Interestingly, other states closely resembling hypnosis – such as hysteria – have also been found, using signal detection and other psychophysical methods, primarily to affect the individual's criterion for reporting various sensations but not the person's sensitivity to these events (e.g., Theodor & Mandelcorn, 1973; Zimmerman & Grosz, 1966). Thus, it appears that procedures based upon suggestion act primarily on the output side of the organism and alter the person's response set while other altered states appear to exert consequential effects on the input or afferent side and alter the person's stimulus set (see Broadbent, 1970). As we have previously seen, advanced stages of concentrative meditation appear to affect the practitioner's stimulus set as do certain pharmacological agents (e.g., Chapman, Murphy, & Butler, 1973). It remains to be determined by future research whether very highly hypnotizable individuals show alterations in stimulus set (sensitivity) during certain types of hypnotic suggestions. It may be that the interaction of certain procedures with *S*s who are highly susceptible would result in the type of attentional change characteristic of concentrative meditation (McGlashan, Evans, & Orne, 1969).

A comparison of the state effects of mindfulness meditation with hypnosis is not yet warranted due to the paucity of relevant data. One unique state effect of such meditation is the lack of habituation to simple, repetitive stimuli (Kasamatsu & Hirai, 1966) as well as the lack of differential responsiveness to affective versus nonaffective stimuli (Hirai, 1974). Such a pattern, in contrast to that found for concentrative meditation, is suggestive of sustained cortical responsiveness to sensory events in conjunction with attenuated affective (limbic) influences on perception. While, based upon the available knowledge, there is little reason to believe that hypnosis would elicit similar changes, no systematic studies have been performed to explore these questions.

To briefly summarize, the available evidence suggests that techniques utilizing a strategy which require the sustained focusing of attention on a single-target percept result in state effects of a stimulus set variety. These procedures result in modifications of afferent input which may, in certain instances, take place below the cortical level. The existence of this specific form of neuronal plasticity has

[10] However, Clynes, Kohn, and Lifshitz (1964) found that hypnotic suggestion of blindness did result in a reduced visual evoked response in one of two *S*s studied.

been suggested in evoked potential studies of selective attention in humans (Harter & Salmon, 1972) and is consistent with recent neurophysiological data on modulation of afferent input at sensory-specific thalamic relay stations (Doty, Wilson, Bartlett, & Pecci-Saavedra, 1973; Pribram, 1973; Spinelli & Pribram, 1967).

After: Altered Traits of Consciousness

The after affects or the more enduring consequences of the practice of particular procedures is dependent on the nature of the technique in question. This basic principle is illustrated in a recent study performed by Schwartz et al. (in press) on the differential effects of meditation and exercise in the reduction of cognitive and somatic anxiety. In this study, individuals who had been regularly attending a weekly class in physical exercise as well as practicing by themselves daily, were compared with a group of meditators on a cognitive-somatic anxiety questionnaire.[11] Since one of the consistent claims made by practitioners of meditation is a reduction of cognitive intrusions (see Goleman, 1972), we specifically hypothesized that long-term practice (for approximately six months) of meditation would lead to significant reductions in cognitive symptoms of anxiety, while long-term training in physical exercise would result in reductions in somatic anxiety. The results indicated that the regular practice of meditation led to a greater reduction in cognitive anxiety than did the regular practice of physical exercise (for the same period of time) while the opposite was true for somatic anxiety. Thus, meditators had less cognitive and more somatic anxiety than exercisers. The latter group, in turn, had less somatic and more cognitive anxiety than meditators. These findings illustrate the need to consider the specificity of effects elicited by different self-regulation techniques and specifically suggest that the systems primarily engaged by a particular vehicle are also those that are most enduringly affected.

The neural concomitants of the specificity of trait effects are illustrated in a recent experiment by Schwartz, Davidson, and Margolin.[12] In this study, the authors were interested in exploring differences in the voluntary control of attention among practitioners of two different forms of meditation. Three groups of 10 *S*s each were employed. Group 1 comprised teachers of Transcendental Meditation—a passive procedure consisting of the subvocal repetition of a phrase and concomitant attentional focusing upon this stimulus. All *S*s in this group were teachers of meditation who had been practicing for at least 2 years.

[11] Copies of the Cognitive-Somatic Anxiety Questionnaire (CSAQ) may be obtained from the senior author.

[12] Schwartz, G. E., Davidson, R. J., & Margolin, R. A. Meditation and the self-regulation of attention: Intrahemispheric EEG changes. (in preparation)

Group 2 (the Sherbourne group) consisted of practitioners of a Gurdjieffian form of meditation who were all trained in a standard 10-month course in Sherbourne, England. The type of meditation practiced by these *S*s was an active form of attentional self-regulation whose object was ongoing proprioceptive or exteroceptive stimuli. These *S*s also practiced a variety of exercises emphasizing the self-regulation of somatic and motoric processes. All persons in this group had been practicing the meditation daily for at least 2 years. A description of one form of meditation regularly practiced by this group was offered by a student of this technique:

> A man lies on his back on the floor. Trying to relax all his muscles, he then concentrates his attention on trying to sense his nose. When he begins to sense his nose the man then transfers his attention and tries to sense his ear; when this is achieved he transfers his attention to the right foot. From the right foot to the left; . . . then to the left ear and back again to the nose, and so on [Ouspensky, 1949; p. 351].

Group 3 was a control group interested in, but not practicing, meditation.

Schwartz et al.[13] predicted that all *S*s would show specificity in cortical activation as a function of the modality of the stimulus to be attended and that the Sherbourne meditators would show greater cortical specificity during such a task than either the Transcendental Meditation or control group. This hypothesis was based upon the specific training in the voluntary control of attention undergone by the Sherbourne group in comparison with the Transcendental Meditation group.

All *S*s were required to attend to either a visual or a kinesthetic stimulus. The visual stimulus was a photograph of a person sitting in the psychophysiology lab; while during kinesthetic conditions, *S*s were required to attend to kinesthetic sensations in their right hand.

In order to assess the cortical concomitants of mode-specific attention, we recorded monopolar EEG from areas known to be actively involved with visual and kinesthetic information-processing: the occipital (01) and the sensory-motor regions (C3). The output of each EEG channel was filtered for alpha and quantified on line. The results revealed that during kinesthetic attention the ratio of occipital to sensory-motor alpha was significantly higher (indicative of relative C3 activation) than during visual attention for each group indicating relatively greater occipital activation during the latter versus the former task. Importantly, the difference in this EEG ratio for kinesthetic versus visual trials was significantly greater for the

[13] See footnote 12.

Sherbourne group than for the Transcendental Meditation or the control group.

One limitation of this study should be recognized and must necessarily temper the conclusions which are drawn. Since the study was entirely between groups, the contributions of self-selection and predispositional influences could not be assessed (see Smith, 1975). Recent research (Davidson, Schwartz, & Rothman, 1976) on *S*s scoring in the upper and lower extremes of the distribution on the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) indicates that the groups differ significantly on EEG concomitants of mode-specific selective attention in a task similar to that employed by Schwartz et al.[14]

These findings, however, highlight an important principle of the present model; the vehicle or technique for altering consciousness is a critical determinant of the trait effects elicited. Specifically, different meditation techniques may lead to the cultivation of different attentional skills which are reflected in a particular patterning of neural processes. The *S*s in the Sherbourne group all had been trained in the active, voluntary control of attention to a restricted range of somatic and other stimuli. The findings of greater cortical specificity in the Sherbourne *S*s compared to the Transcendental Meditation and control *S*s seems consistent with the techniques practiced by the former group.

While different meditation techniques lead to differential task-specific cortical patterning, they do share a number of common components among themselves and with other relaxation techniques, including hynotically suggested relaxation (see Davidson & Schwartz, 1976; Walrath & Hamilton, 1975). At the core of these commonalities is a reduction in self-reported anxiety. Both training in relaxation and meditation have been found to result in decrements in self-reported anxiety (Davidson, Goleman, & Schwartz, 1976; Davidson & Schwartz, 1976; Hjelle, 1974). In addition, Goleman and Schwartz (1976) have found that, compared to nonmeditating control *S*s, meditators show improved recovery on autonomic variables (SCR and HR) following arousal by a stressful stimulus. Others have found that hypnotic suggestions of relaxation as well as other relaxation procedures lead to decrements in a variety of autonomic measures (e.g., Damaser, Shor, & Orne, 1963; Luthe, 1970; Walrath & Hamilton, 1975) and preliminary data exists suggesting that such changes may be more persistent and enduring in *S*s practicing meditation (e.g., Goleman & Schwartz, 1976) though the veracity of this claim must await further research.

[14] See footnote 12.

The consideration of the feedback effects of learned trait changes raises the issue of whether repeated practice of a particular technique results simply in a subsequent decreased latency to induce the particular altered state of consciousness or whether, in fact, the depth of the state is enhanced. Unfortunately, this distinction has not been systematically addressed in the existing literature. However, the available evidence does tentatively suggest that if a particular vehicle results in a change in a core biocognitive process (i.e., the mechanisms of attention) then one consequence of the learned (trait) effects will be an enhanced "depth" of experience upon subsequent utilization of the vehicle. Hirai (1974) has reported a positive correlation between length and quality (assessed by teacher ratings) of meditation practice and electrophysiological parameters reflecting depth of state (percent-time theta, responsiveness of the EEG to external stimuli). Whether the analogous situation applies to experience with hypnosis must await further research.

In summary, a temporal-developmental scheme was outlined and employed to organize data on changes in consciousness arising from the practice of meditation and the induction of hypnosis. The first epoch, before, refers to predispositional variables that influence *S*'s response to a particular technique. It was here suggested that both meditation and hypnosis share a number of common variables associated with a positive response to the experience. These parameters have to do with attentional flexibility and the capacity to engage sustained attention. In addition, low anxiety was identified as being associated with the inclination to persist in the practice of meditation. The relevance of the anxiety dimension to hypnosis is less clear (e.g., Orne, 1974).

Some state effects of meditation and hypnosis were reviewed in the context of research on selective attention and signal detection theory. The effects of concentrative meditation and hypnotic suggestions of analgesia were compared on measures of responsiveness to painful stimuli. It was suggested that concentrative meditation involves alterations in attention of the stimulus set variety while hypnotic suggestions of analgesia result in shifts in response set, except possibly in highly susceptible *S*s (McGlashan et al., 1969).

The trait effects of particular types of interventions were seen to depend critically on the patterning of underlying processes activated by the technique. This notion was illustrated in the studies comparing the trait effects of different types of meditation and relaxation on both psychometric and psychophysiological, dependent measures. Meditation techniques emphasizing active, attentional self-regulation were found to be associated with enhanced specificity of cortical activation during selective attention tasks, compared with more pas-

sive meditation procedures. In addition, a number of trait effects (learned changes) common to most meditative practices and relaxation procedures, including hypnotically suggested relaxation, were identified. These effects were all concerned with decrements in self-reported anxiety, accompanied by enhanced "limbic quiescence" as indexed by decreases in various autonomic indicators of stress.

While the review of the meditation and hypnosis literature is necessarily selective in such a brief overview, a number of themes have been identified which warrant further study. These issues concern the nature and structure of the attentional mechanisms which influence *S*'s initial response to meditation and hypnosis, the type of attentional change associated with the induction of meditative versus hypnotic altered states and, finally, the learned transformations in attentional competence that are associated with the practice of these techniques.

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Die Rolle der Attention in Meditation und Hypnose: Eine psychobiologische Perspektive über Transformationen des Bewusstseins

Richard J. Davidson und Daniel J. Goleman

Abstrakt: Ein vorläufiges Schema zur Untersuchung von Änderungen im Bewusstsein wird hier vorgeschlagen, das sich auf solche Gebiete wie Meditation und Hypnose bezieht. Es wird in 3 Epochen eingeteilt: zuvor – prädispositionale Variablen, die die Bewusstseinsreaktion auf verändernde Techniken beeinflussen; während – die Effekte des Zustands auf die spezielle Technik, und danach – die Eigenschaften der Effekte des Verfahrens. Es wird ein Überblick über die Forschung gegeben, die die Rolle des Attentionsprozesses während jeder der 3 grundlegenden Epochen in Meditation wie auch in Hypnose behandelt. Die Lenkbarkeit der Attention ist eine predispositionale Variable, die die Reaktion auf Meditation wie auch Hypnose beeinflusst. Die Effekte des Zustands sind bei der konzentrierenden Meditation in Änderungen der Reizempflindlichkeit verwickelt, während die Effekte des Zustands bei Hypnose hauptsächlich angelernte Reaktionen widerspiegeln. Die eigenschaftlichen Effekte, die durch Meditation hervorgebracht werden, hängen in kritischem Masze von den psychobiologischen Systemen ab, die in Gang gesetzt werden. Beweismaterial wird hier erörtert, das darauf hinweist, dass die konzentrierende Meditation eine autonomische Quieszenz mit Entspannung teilt. Jedoch kommt dazu, dass die konzentrierende Meditation einige Attentionsfähigkeiten fördert, während eine berücksichtigende Technik kortikale Spezifität zu fördern scheint, was bei einer Konzentrationstechnik nicht der Fall ist. Die Implikationen bei bedachter Selbstregulierung werden hier diskutiert.

Le rôle de l'attention dans la méditation et l'hypnose: une perspective psychologique sur les transformations de la conscience

Richard J. Davidson et Daniel J. Goleman

Résumé: Un schéma à incidence temporelle pour l'évaluation des changements de conscience applicable à des domaines tels la méditation et l'hypnose est proposé et est divisé en 3 périodes: avant – les variables de prédisposition qui affectent la réponse à des techniques de modification de conscience; durant – les effets sur l'état de la technique particulière, et après – les effets sur les traits de personnalité de la pratique de cette technique. Les recherches qui indiquent le rôle des processus d'attention durant chacune de ces trois périodes de base, à la fois pour la méditation et l'hypnose, sont présentées. La flexibilité de l'attention est une variable de prédisposition qui affecte la réponse à la fois à la méditation et à l'hypnose. Les effects sur l'état de la méditation concentrative impliquent des altérations dans la perception du stimulus, alors que les effets sur l'état de l'hypnose peuvent refléter principalement la perception de la réponse. Les effets sur les traits de personnalité suscités par la méditation dépendent d'une façon critique des systèmes psychobiologiques qui sont mis en jeu. Des faits qui suggèrent que la méditation concentrative permet, comme pour la relaxation, un apaisement du système autonome, sont discutés. En plus, toutefois, la méditation concentrative augmente certaines habiletés de l'attention, alors qu'une technique plus cérébrale semble augmenter la spécificité corticale; ce qui n'est pas le cas pour une technique de concentration. Les implications de l'auto-régulation de l'attention sont discutées.

El papel de la atención en la meditación y en la hipnosis: una perspectiva psicobiológica de las transformaciones de la conciencia

Richard J. Davidson y Daniel J. Goleman

Resumen: Se propone un esquema temporal para la investigación de los cambios a nivel de la conciencia, aplicable a dominios como la meditación y la hipnosis; dicho esquema se divide en 3 momentos básicos: antes (variables de predisposición que influyen en la respuesta a las técnicas de alteración de la conciencia), durante (los efectos relativos al estado inducido por una determinada técnica), y después (los efectos característicos de la práctica). Se controla una investigación destinada a indicar el papel de los procesos de atención en cada uno de estos tres momentos básicos de la meditación y de la hipnosis. Los efectos relativos al estado en la meditación concentrada, comprenden alteraciones a nivel del estímulo, mientras que, en el caso de la hipnosis, dichos efectos pueden reflejar, en primer lugar, la respuesta. Los efectos característicos que la meditación pone de manifiesto, dependen críticamente de los sistemas psicobiológicos puestos en juego. Se discuten los hechos que sugieren la existencia de un estado de reposo común a la meditación concentrada y a le relajación. Además, la meditación concentrada acentua ciertas capacidades ligadas a la atención, mientras que una técnica cuidadosa parece acentuar la especificidad cortical; una técnica de concentración no produce semejante resultado. Se discuten las implicaciones de la auto-regulación por medio de la atención.

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APPLICATIONS OF HYPNOTICALLY ELICITED MYSTICAL STATES TO THE TREATMENT OF PHYSICAL AND EMOTIONAL PAIN[1]

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Abstract: Mystical states by-pass usual sensory perception and logical thinking. They often represent the ultimate goal of long apprenticeships in Eastern or Western monastic practices which stress self-discipline and meditation; or they correlate with sudden religious conversions. While interest has also been revived in mystical experiences stimulated by hallucinogens within the appropriate physical, intellectual, and emotional environment, less attention has been paid to those mystical experiences which appear spontaneously during hypnosis and Transcendental Meditation. The present author facilitates the unleashing of mystical experiences by using hypnotic approaches specifically aimed at altering space and time perceptions. Case presentations illustrate the methodologies for guiding receptive subjects to mystical states with the aim of relieving or correcting organic and functional painful syndromes unresponsive to other interventions. The probable biopsychological processes are discussed.

The use of hypnosis in medicine, clinical psychiatry, and psychology has gradually extended from simple approaches aimed at reducing symptoms through direct or indirect suggestions, to the introduction of hypnoanalytic techniques (e.g., age regression, dreams, etc.), to the application of ego-psychology and of transactional analysis, to the facilitation or reinforcement of behavior modification techniques, and to the utilization of abreaction. Valuable results obtained through these various approaches to hypnotherapy have at least one common denominator: intensified transference and countertransference which almost invariably develop with successful hypnotization and continued hypnotherapy. Few clinicians, however, have utilized

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