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Altered States of Consciousness

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Before discussing altered states of consciousness, we need to consider what it is that is being altered. The terms "consciousness" and "mind" are often used interchangeably but cognitive psychologists generally use "mind" to refer to a broader entity that includes both conscious and unconscious processes. By "consciousness" they mean the state of being aware of something. In higher species, this normally includes a sort of meta-awareness, essentially the awareness of being aware. Some theorists prefer to call this system "executive" or "reflective" consciousness to distinguish it from the simpler awareness we share with all other sentient species. By contrast, nonconscious mental events are those stimuli, memories, emotions, and desires operating outside of subjective awareness but which might still affect behavior or the ongoing stream of thought.

From both introspection and research we know that the scope of what we can be aware of at any moment is limited. To compensate for this bottleneck, consciousness can shift focus rapidly, either voluntarily or involuntarily. This roving spotlight that selects what we are presently aware of is called "selective attention." Just how meta-awareness deploys selective attention has much to do with the experiences known as "altered states of consciousness" (ASCs). The term ASC was coined by the parapsychologist Charles Tart (1969) to refer to any of a number of radical departures from one's normal waking state.

The Plurality of Mind.

Because meta-awareness is ordinarily conscious of only one self and can attend to only one thing at a time, it is customary to think of mind as a unitary process, but there is much to suggest that this is not the case. Ernest Hilgard (1977) has provided theoretical and empirical support for the claim that within us all there is a "multiplicity of functional systems that are hierarchically organized but can become dissociated from one another." Dissociation refers to the appearance of transient barriers to communication between meta-awareness and other mental compartments. An understanding of the ways dissociative states can come about is also important to understanding ASCs.

Meta-awareness maintains the continuity of the self through contact with a bundle of interrelated memories, aptitudes, and dispositions I shall call the self model. It also produces our sense of personal agency—i.e., the

feeling that it is this self-aware entity that wills and directs our actions. In some dissociated states the self model becomes temporarily unavailable while other, previously hidden caches take its place. While such an interlude lasted, you would literally not be yourself.

The brain's perceptual and motor systems are organized so that well-practiced actions become automated and thereafter require little conscious monitoring. Thus even complex operations like driving an automobile come to be handled safely and effectively outside of awareness. In this everyday kind of dissociation, executive consciousness is free to solve abstract problems or pursue flights of fancy while unattended subsystems operate autonomously. Meta-awareness often becomes aware of actions already initiated by one of these unattended systems and must concoct, retroactively, a story that makes it feel as if the action had been consciously willed.

In extreme (usually traumatic or intoxicated) instances, meta-awareness itself is overwhelmed and behaviors that outwardly appear to be consciously directed unfold instead in a robot-like fashion. Because the law requires criminal intent (and by extension, self-awareness) before handing down a conviction, some defendants have escaped punishment by convincing the court that they acted in a dissociated state (P. Fenwick, Automatism, medicine and the law, *Psychological Medicine*, Supplement 17, 1990, Cambridge University Press).

Because meta-awareness sits atop the cognitive hierarchy, it is rare for it to be completely suppressed this side of deep sleep, trance, or coma. In all but the most profound psychotic breaks, automatisms, or drug states, some vestige of self-awareness remains. Sometimes, however, even this last shred of the self model disappears and it is only after returning to the normal waking state that we infer that we have been in an ASC. Remembering a dream, a period of delirium, or a particularly vivid hallucination would be examples of when meta-awareness has been temporarily overwhelmed by the raw feelings of an ASC. To complicate matters, it is also possible to come out of some dissociated states and have no memory of them.

There is nothing necessarily paranormal about slipping away from the task-oriented, sense-dominated representation of reality into one of these mental sidestreams. Although parapsychologists have claimed that supernatural abilities are associated with ASCs, the dominant scientific opinion disputes this. Psychologists do agree, however, that mind contains parallel systems that can handle tasks simultaneously, each with its own feelings and intentions (J. F. Kihlstrom, The cognitive unconscious, *Science,* 1987, v. 237: 1445-1452). Much of interest goes on outside the shell of self-awareness, but executive consciousness generally only becomes aware of the products of these unconscious deliberations, not the processes themselves. If need be, it can shift attention to *some* of these parallel operations, bringing them temporarily into awareness.

Anything that disrupts the brain mechanisms responsible for meta-awareness, or access to its informational base, will make us feel quite unusual—the hallmark of an ASC. The average person would probably find the notion of altered states less eerie if it were more widely known that mind is a community of parallel brain systems, most working outside of awareness most of the time. If selective attention should temporarily lock onto one of these

byways, the experience may seem other-worldly, despite its prosaic origins.

The Contents of Consciousness.

The exact nature of consciousness continues to be a subject of debate but most theorists would accept the working definition offered by Farthing (1992): [Consciousness is] "the subjective state of being currently aware of something, either within oneself or outside of oneself." Consciousness is populated by a varying mix of external sensory data and internally generated body sensations, thoughts, images, memories, feelings, intentions, etc. Language and imagery facilitate this inner dialog whereby we assess situations, mull over relevant knowledge, and try out tentative courses of action "in our mind's eye."

The momentary ratio of external to internal items in consciousness shifts, depending on factors such as the predictability and safety of the immediate environment, individual differences in the salience of particular stimuli, and level of arousal. Deprivation, for instance, raises the attractiveness of things "out there" that could satisfy the perceived need. Arousal is jointly influenced by those need states and position on two biological rhythms—the 24-hour circadian cycle and the 90-minute epicycles of alertness called the Basic Rest Activity Cycle (BRAC). Mistakes on vigilance tasks and the amount of daydreaming vary with the BRAC and the time of day. Fatigue and sleep deprivation also have detrimental effects on alertness and performance.

Evolution of the brain and mind.

Farthing defined mind as "the functioning of the brain to process information and control action in a flexible and adaptive manner." According to this view, consciousness emerged as the requisite brain structures evolved. These higher-level representational systems combine raw sense data with memory, emotion, and inference to form a comprehensive sense of an external world and our place in it. Natural selection favored this ability to construct an inner model of the world and the self because it allows behavior to adapt more efficiently and creatively. It means that we can engage in thought experiments rather than relying exclusively on trial and error.

As we evolved mechanisms for constructing these inner representations and reflecting on our own existence, we also gained the ability to envision situations that do not exist in the here and now, and even ones that could never occur in the physical world. Thus we can step aside from the model built from current sense data and create hypothetical scenarios wherein objects and actions can be linked when they would otherwise be separated in time and space. Along with the ability of the human brain to conjure up imaginary worlds comes the potential to create varieties of conscious experience quite different from our ordinary representations of our surroundings. We call the vivid ones that "grab our attention" ASCs.

As a corollary of equating mind with neural activity, mental experience is also seen to be private and inseparable from individual, functioning brains. Elsewhere, I have summarized the evidence in favor of brain-mind

identity and argued that its strong scientific support undermines the widely held belief that ASCs entail separations of mind from body (Beyerstein, 1987). For materialists like myself, ASCs are altered states of the brain's representational systems. The job of the biological psychologist is to understand what physical and psychological conditions bring about the transient changes in neural activity that modify subjective awareness. It is now possible to detect some of them with imaging technologies such as the electroencephalogram (EEG), magnetoencphalogram (MEG), and Positron Emission Tomography (PET). Later, I shall describe a system in the brain that seems to be involved in most dramatic alterations of consciousness, whether they be due to pathological, attentional, behavioral, or chemical causes.

The Background State of Consciousness.

If consciousness evolved because it enhances survivability, it would seem reasonable that there would be a common background state, a sort of "default mode" best adapted to handle most basic demands in the everyday world. Ordinary consciousness is constrained by the need to scan the environment for possible dangers and life's necessities, to plan strategies, and to track the results. Thus, to be useful, it has to remain tolerably faithful to the present environment. Though this mental facsimile seems natural and effortless, it is, in fact, a carefully-assembled cognitive construct. Realizing that our ordinary sense of reality is an artifact makes it easier to accept that it could occasionally be replaced by other models the brain might construct from its own resources. Dreams are but one example.

In section XXX ("Hallucinations and Visions"), I argue that the brain assigns the feeling of "realness" to the most stable and predictive internal representation among those that may be vying for ascendancy at any moment. If, during one of its periodic "reality checks," meta-awareness notes a discrepancy between current experience and recalled versions of the normal flow of thoughts and feelings, it infers that we are in an ASC. Such an inference is likely to triggered by any combination of instability of the perceptual world, difficulty in accessing memories, strange body sensations, altered time sense, or anomalies of emotion or the sense of will. To qualify as an ASC, it is not sufficient merely for the contents of consciousness to change. The overall pattern of mental functioning must have altered sufficiently to create a fundamental break with the normal sense of reality.

Arousal, Attention, and ASCs.

The duties of background consciousness are carried out most efficiently when the brain is moderately aroused. Shifts in either direction from the mid-range of the physiological arousal continuum affect attention and are thus conducive to ASCs. Both sensory overload and understimulation exert such effects, as do frenetic exertion and deep relaxation. Fatigue, fever, intoxication, dizziness, and extreme emotional distress also influence attention and arousal. Meditative and hypnotic techniques are intentional means of manipulating both of these systems. Similarly, gifted artists, scientists, and athletes often report that they become so absorbed in their pursuits that they temporarily experience an altered awareness of self and the world around them. Extreme sexual passion can do the same for others and some cultures use isolation, starvation, and self-mutilation to effect such

changes. They are used in spiritual rites of passage because of the altered sense of reality they produce.

In situations such as these, the normally seamless meshwork of sense data, memories, emotions, and personal agency that creates the feeling of a self dwelling in a body in the physical world, can fractionate. When the habitual reality model breaks down, it may seem as though the self is disengaging from the body or is being manipulated by unseen forces (see "Out-of-body Experiences" and "Possession and Exorcism").

The diversity of the subjective experiences in different dissociated states is due in part to the fact that there are numerous ways in which the brain's attentional and arousal systems can interact. In addition, just as the same drug can produce dissimilar effects when it is taken in different physical or psychological settings, the nature of non-drug ASCs can vary for similar reasons. When conspicuous shifts in arousal and attention occur in different contexts, the raw experience is likely to be interpreted differently by the meta-awareness system. Situational demands and the personal beliefs, desires, and expectations will trigger unique memories and emotions. They will color the experience in unique ways.

Lowered arousal and ASCs.

If basic needs are met, dangers seem remote, and the tasks at hand can be handled by habits so well practiced that they no longer require conscious oversight, vigilance can be relaxed. Thus satisfied and protected, we have the luxury of diverting attention to self-generated images, plans, and fantasies. When, by accident or design, we become sufficiently engrossed in one of these mental tableaux, it may suddenly become apparent that, compared to our ordinary waking state, the world looks and feels quite different—a sign that we have slipped into an ASC. Some variants are merely drowsy, dream-like reveries but others can be permeated with a sense of estrangement that creates a temporary break with ordinary awareness.

Monotony, fatigue, sensory deprivation, and boredom tend to decrease arousal and awareness of the outside world. At such times the brain begins to shift from word-based thinking to imagistic thinking. The resulting rush of images, feelings, and fantasies may reflect an alternation from left to right cerebral dominance associated with the BRAC. We call this sort of wish-fulfilling as opposed to task-oriented thinking, daydreaming (J. L. Singer, Navigating the Stream of Consciousness, *American Psychologist*, July, 1975: 727-738). Sleep-deprived sentries, polar explorers, and long-distance pilots and sailors have reported that solitary, monotonous environments can produce vivid altered states. And so-called "highway hypnosis" claims many accident victims each year. Immersion tanks that reproduce these unchanging, pattern-less conditions, have escaped the laboratory to become businesses catering to consumers hungry for ASCs.

Either narrowing or diffusing attention in ways that preclude mundane concerns can make the sense of ordinary reality recede. Body sensations change and familiar objects can take on a new clarity and vividness. Practitioners of such mental exercises call it meditating. The teachings of competing systems differ but most attempt to arrest the normal stream of

thought — or, as devotees put it, to experience pure consciousness, devoid of contents. Achieving this is considered an enlightened state, known in meditative lore as satori, samadhi, nirvana, etc. While some psychological or health benefits may result from regularly lowering arousal in this way, claims that any particular kind of meditation produces superior dividends have been oversold—simple relaxation of any kind seems to be equally beneficial.

A related path to ASCs involves the reciprocal adoption of certain culturally shared, but usually unstated, social roles. This entails an agreement that one member of a pair will relax and focus his or her attention on the speech of the other. The passive member also tacitly agrees to visualize the referents of those utterances and not to inhibit the tendency to act out his or her imaginings. Our culture calls the altered states resulting from such suggestions hypnosis.

In all of the foregoing states the sense of self becomes vulnerable. Fading awareness of the self model creates an estrangement from the ordinary world and one's body that fuels the mystical belief that the ego has merged with a higher power. Achieving this feeling of "one-ness with the universe" is the goal of many occult doctrines. According to cognitive scientists, these seekers are experiencing a temporary breakdown of the brain's sense-dominated model of the self and the world.

It has become fashionable in pop-psychology circles to refer to all pleasant moments of lowered arousal and attention as "alpha states" because they are allegedly caused by the presence of alpha waves on the electroencephalogram (EEG). As I have shown elsewhere (B. L. Beyerstein, The myth of Alpha Consciousness, *The Skeptical Inquirer,* 1985, 10(1): 42-59), there is no scientific basis for advertisers' claims that times of EEG alpha production are necessarily enjoyable or beneficial. Alpha waves are an index of visual processing in the brain and can also appear during states that are neither pleasant nor relaxing.

Hyperarousal and ASCs.

Turning to the high end of the arousal continuum, I have described elsewhere in this volume ("Hallucinations and Visions") how stressful, hyper-aroused states can temporarily disturb the brain's model of the self and reality. Frenzied physical and mental exertion have long been used to overstimulate brain activity for mind-altering purposes (Beyerstein, 1988). This includes such time-honored measures as rhythmic chanting, drumming, dancing, and rapid breathing. Passionate oratory is usually mixed with repetitive sensory bombardment to heighten desires, animosities, and anxieties. The psychiatrist William Sargant (1957, 1973) found that these excitatory techniques had been discovered independently throughout the ages by numerous religious and political movements who incorporated them into ceremonies to produce so-called "conversion experiences." Demagogues of various stripes became adept at driving proselytes into these cathartic states to impress them with the power of the accompanying dogmas. Depending on the culture, era, and belief system, these ASCs have been called transcendence, the folk spirit, fana, rapture, cosmic consciousness, Zar possession, snapping, awakening, brain washing, descent of the Holy Ghost, the born-again experience, and much else.

Sargant argued that, despite superficially different induction procedures and widely varying intents and metaphysical stances, the same underlying brain mechanisms are engaged by all who attempt to incite transcendent states. However the mental and emotional exhaustion are produced, the result is a sudden break with ordinary reality and increased manipulability.

Transcendent states.

Andrew Neher (1990) defines transcendent states as sudden, usually unexpected, alterations of consciousness so intense as to be overwhelming. Though they are often thought to have mystical significance, Neher agrees with Sargant that they result from natural neurological and psychological processes. To bolster his case, Neher offers readers simple exercises for experiencing these states themselves.

If a neural substrate for such phenomena exists in the brain, it should, like other neural systems, kick in spontaneously once in a while. Sleep disturbances, metabolic changes, slight fever, or emotional stress could set it off, for instance. Indeed, transcendent ASCs are known to erupt occasionally without ritual exhortation or pharmacological assistance. The psychologist Peter McKellar and the sociologist Andrew Greely both polled large numbers of people and found that a surprising percentage reported having had a spontaneous transcendent experience at some time in their lives. They described it as intensely real and often accompanied by great joy and contentment. There was also a feeling of portentiousness and extreme clarity that seemed to reveal the ultimate meaning and purpose of life—a quality called "noetic" by mystics. But despite feeling privileged to have been afforded a glimpse of a deeper reality, they usually found themselves unable to describe it in words. In the mystical literature, this is known as "ineffability."

Sacred texts call such experiences "revealed truth." They use such expressions as "holiness," "enlightenment," "ecstasy," "rapture," "joy, light, and peace," "lifting out of self," "the collapse of reason," "grasped by a superior power," "born again," "merged with the all that is" and "the peace that passeth all understanding." Many religious figures have felt they received special callings in this way.

Scholarly interpretations of transcendence vary widely, ranging from deranged at one extreme to sacred on the other. Scientific observers avoid both extremes, preferring naturalistic explanations. Until recently, most psychiatrists and neurologists tended to consider such overwhelming transformations of consciousness, when they occurred outside their own religious traditions, as demented and meaningless—i.e., a pathological stress reaction meriting diagnoses such as "depersonalization," "derealization," and "dissolution of ego boundaries." They were seen as unwelcome psychological or neurological disorders requiring treatment. Of course, an *unremitting* break with reality or loss of self *are* symptoms of well-established neuro-psychiatric syndromes. However, research has shown that ASCs may share some of these characteristics *temporarily* without necessarily being pathological. In fact, most mystical doctrines consider these transformations spiritually

uplifting. They are to be actively pursued through discipline, self-denial, and ritual cleansing. Transcendent feelings underlie most traditional religions and they continue to attract converts to modern Pentecostal sects and New Age "experiential" religions.

The present writer agrees with Sargant and Neher that, like consciousness itself, transcendent states are due to natural processes rooted in the brain. They may seem exceptionally real and meaningful to percipient, yet have no supernatural claim to validity. Transcendent experiences are very interesting from a scientific standpoint because studying them can enhance our understanding of the mind-brain relationship. They form an important part of the field known as "Anomalistic Psychology" (see the seminal works in the discipline, by Neher, Reed, Sargant, and Zusne and Jones, listed at the end of this essay).

Categorizing anomalistic states of consciousness.

In trying to understand ASCs, a useful first step is to divide the profusion of experiences into theoretically meaningful categories. One way is to group phenomena according to how they were induced. This could include states that are: (a) spontaneous or neuropathological, (b) brought on by mental exercises, (c) due to social and behavioral manipulations, or (d) precipitated by chemical ingestion. Obviously, some ASCs could fit more than one category.

Spontaneous ASCs. In this group are ASCs due to brain anomalies of varying severity and duration. Some are major neurological disorders, others are merely occasional, self-limiting irregularities in certain brain systems. Among the severe illnesses whose mental symptoms have been mistaken for supernatural phenomena throughout history are schizophrenia and the affective disorders, epilepsy, some varieties of migraine, and Tourette's syndrome (see "Possession and Exorcism").

Old head injuries can be responsible for intermittent cognitive effects that some patients interpret as mystical awareness. E.g., Fenwick and his colleagues (*British J. of Medical Psychology*, 1985, vol. 58: 35-44) found an unusually high incidence of prior head trauma and right temporal lobe dysfunction among a group of "sensitives" from a local psychic college. There are also sporadic defects of the brain systems that control sleep and dreaming which can cause bizarre experiences. Narcolepsy, an abrupt intrusion of the Rapid Eye Movement (REM) stage of sleep into waking consciousness, is accompanied by temporary paralysis and strange mental imagery. (REM periods are associated with vivid dreams during normal sleep.) Other transient disruptions of the sleep/waking cycle associated with grotesque images and emotional turbulence include sleep paralysis and hypnagogic and hypnopompic sleep (ASCs that occur in the margins between sleep and wakefulness). These and related dissociative phenomena such as "fugue states," lucid dreams, night terrors, and somnambulism are described in the suggested readings at the end of this chapter.

Although most brain diseases profoundly alter consciousness, ASCs are not necessarily indicative of chronic neuropathologies. For various reasons, the neural circuitry that generates mental imagery and emotions can be pushed

into aberrant, but reversible, patterns of activity. Some of these patterns temporarily mimic those caused by neurological diseases but, fortunately, they abate. Neuroscientists have suggested that psychological factors such as extreme stress, fear, or shock can instill some of the same neurophysiological changes as certain diseases or mind-altering drugs. This can disrupt the mechanisms that normally restrict vivid dreams to the REM portions of sleep, permitting dream-like images from memory to flood waking consciousness. The fringe psychotherapy called "breathwork" is based upon altering brain function in a similar way. It couples suggestion, relaxation, and rapid, deep breathing to alter brain oxygenation and EEG patterns. This induces ASCs which proponents claim have personal and supernatural benefits. Fasting, a part of many "cleansing" rituals, also affects brain chemistry in ways that can contribute to ASCs.

Discipline-induced transcendent states. These are altered brain states brought about by mental exercises engaged in for self-improvement or mystical purposes. Such manipulations of attentional and arousal systems include meditation, hypnosis, social and sensory isolation, prolonged praying, chanting, or scrying (staring at crystal balls, mirrors, etc.), and self-induced pain. A committee of the U.S. National Research Council (D. Druckman and J. Swets, eds., *Enhancing Human Performance*, Washington, DC: National Academy Press, 1988), looked into commercial claims that inducing ASCs by some of these methods can improve cognitive abilities. It found little empirical support for the promoters' puffery.

Social-behavioral routes to ASCs. In this category we find systematic social applications of the foregoing principles for producing ASCs. They are the stuff of the well-orchestrated revival meeting, cult indoctrination, or totalitarian political rally—i.e., recipes for producing conversion experiences. ASCs are induced by use of the protracted, repetitive behaviors discussed earlier. Deprivation of sleep, food, and water adds to the drained and disoriented condition. Suggestabilty is heightened by incremental social pressures employing rhetoric designed to appeal to deep-seated anxieties and psychological needs. The effectiveness of this social conditioning regimen is enhanced by rigid controls over the flow of information.

Pharmacological transcendence. Virtually every culture has discovered and woven into its social fabric plants with psychoactive properties. Because of their potential for disrupting the social order, these intoxicants are stringently controlled by custom and by law. Consciousness-altering plants continue to be used for ceremonial, magico-religious, performance enhancing, and recreational purposes. These species contain chemicals sufficiently like the brain's neurotransmitters that their ingestion dramatically alters psychological functioning. We now know that the differing psychological effects of various plants are due to the fact that their active ingredients react with specific chemical tracts in the brain. This understanding has permitted chemists to create new "designer" drugs that have tailor-made abilities to alter consciousness.

Indigenous cultures typically attribute the mind-altering effects of hallucinogens to gods who dwell in the plants. Psychopharmacologists have speculated on how accidental discovery of hallucinogenic plants may have contributed to the founding of various supernatural and religious beliefs. Readers who are interested in delving further into this area known as

"ethnopharmacology," should consult the works by Grinspoon and Bakalar (1979) and Seigel (1989) listed at the conclusion of this chapter.

Is there a common physiological mechanism?

William Sargant concluded that the similarities among the transcendent ASCs he observed around the world pointed to a common brain system that was being affected by different culturally-specific manipulations. Since then, neuroscientists have provided support for such a mechanism (Beyerstein, 1988). There is a complex neural circuit found in the middle levels of the mammalian brain, known as the limbic system. It has a variety of emotional, motivational, and memory functions. It is also involved in the attentional and arousal functions discussed above. Electrical stimulation of limbic sites in neurosurgical patients produces intense alterations of consciousness, including all the basic attributes of transcendent or mystical states (M. Persinger, *Neurophysiological Bases of God-Beliefs*, NY: Praeger, 1989). Some types of migraine and epileptic seizures that originate in temporal lobe limbic structures are also capable of producing similar dissociative states. The idea that transcendent experiences are due to hyperactivation of the normal emotional and imagery functions of this circuit is reinforced by research in neuropharmacology showing that psychedelic drugs exert many of their effects by altering activity in the limbic system. And finally, psychopathologies that are associated with profound emotional disruptions and hallucinations are also known to involve limbic abnormalities.

The neuropsychiatrist Arnold Mandell (1980) assembled research on psychedelic drugs, neuropathologies and various behavioral techniques for altering consciousness and compared their effects with those described in the mystical tradition. He showed how all of these manipulations are capable of affecting neural activity in the limbic system. Mandell implicated particular interactions among the septum, hippocampus, and amygdala as critical for the occurrence of transcendent experiences. This circuit can be affected by various pathological states as well as prolonged rhythmic stimulation, sensory deprivation, and the three major classes of hallucinogenic drugs (those that affect the neurotransmitters serotonin, acetylcholine, and the catecholamines).

Summary.

This chapter has argued that altered states of consciousness are altered states of certain brain systems. Specifically, these are the representational systems that encode external and internal events, the emotional systems that produce their affective tone, and the systems that regulate arousal and attention. Various processes were described that temporarily modify interactions among these systems. The result is a dissociation between self-aware executive consciousness and its usual sources of sensations, memories, and emotions. When these neural systems are affected by disease, repetitive stimulation, mental manipulations, or chemical ingestion, our perception of ourselves and the world can be profoundly altered. For the duration, reality seems fundamentally changed. Although these dramatic interludes have often been taken to be supernatural, it is more likely that, in the words of the psychiatrist William Sargant, it is "... the brain of man and not his soul

which is affected by mystical techniques."

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