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## **The Neurobiology of Trance and Mediumship in Brazil**

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Throughout most of the 19th and 20th centuries, trance and mediumistic experiences were regarded as a manifestation of severe mental disorders by most members of the Western scientific community (Almeida, 2007; Moreira-Almeida, Almeida, & Lotufo, 2005) and were usually described as rich in dissociative behavior, hallucinations, feelings of being controlled by an external power, depersonalization, personality shifts, and alleged post-trance amnesia. These phenomena were the subjects of numerous scientific studies around the turn of the 20th century, but scientific interest subsequently declined. However, there has been renewed interest in dissociative and hallucinatory experiences in non-pathological samples, as there is evidence that these experiences often involve people not suffering from mental disorders (Cardeña et al., 1996; Krippner, 1997b; Martinez-Taboas, 1995; Moreira-Almeida, Lotufo, & Greysen, 2007; Moreira-Almeida et al., 2008).

These experiences have been widespread in most societies throughout history, and are part of the Greek, Roman, and Judeo-Christian roots of Western society, passed down through oracles, prophets, and shamans (Hastings, 1991). It is often difficult to differentiate the terms "medium" and "channeler" since both claim to refer to receiving information that supposedly does not originate from consensual reality (e.g., from living persons, media, their own memory). Mediums purportedly obtain this information from deceased persons, whereas channelers claim to obtain information from other spiritual entities (e.g., deities, nature spirits, inhabitants of other dimensions; e.g., Hastings, 1991; Klimo, 1998).

Although there are several possible definitional approaches to trance and mediumship, for the purposes of the present chapter we define trance as did Wulff (2000): "a state of profound absorption or lack of mental content during which the individual is experientially cut off from the outside world; it is frequently accompanied by vocal and motor automatisms, lack of responsive awareness, and amnesia" (p. 399). Mediumship is defined as an experience in which an individual (the medium) purports to be in communication with, or under the control of, the personality of a deceased person or other nonmaterial being (Moreira-Almeida, Lotufo, & Cardeña, 2008). Frequently, mediumship takes place while the medium is in what Bourguignon (1976) refers to as a "possession trance" in which an alleged incorporeal agency takes possession of a medium's volition, speech, and bodily movements.

An interesting fact is that most of the world's population believes in life after death, including the possibility that trance and mediumship can bridge the two, reflecting certain basic assumptions about human nature and cognitive reference points (Peres et al.,

2007a, 2007b). The availability of new neurobiological research tools has now opened doors to studying such topics in more sophisticated ways, which may help further understanding of the nature of human consciousness and its relationship with the brain.

This chapter reviews neurobiological studies on trance and mediumistic experiences with an emphasis on Brazilian samples, where these continue as a vibrant tradition. We also discuss some crucial methodological issues and the implications of current studies for the mind-brain relationship. Moreover, we report data from two parallel strands of our own investigations conducted in Brazil, namely by the team consisting of Joan H. Hageman, Ian Wickramasekera II, and Stanley Krippner (HWK) and the team of Julio F. P. Peres, Alexander Moreira-Almeida, and Leonardo Caixeta (PAC). The PAC team has studied the neurobiology of mediumship using electroencephalography (EEG) in a group of mediums during their trance state (Caixeta et al., *in press*), while the HWK team has reported studies on two trance mediums using various neurobiological tools. Krippner was the only member of this team who participated in on-site investigations, and Hageman and her colleagues (Hageman, Krippner, & Wickramasekera II, 2009) also participated in psychophysiological studies of a channeler in the United States.

### Trance and Mediumistic Investigation

Research on trance and mediumistic experiences has been seminal for understanding mind and its relationship with the body (Almeida & Lotufo, 2004; Kelly et al., 2007). From the perspective of modern neuroscience, all behaviors and experiences have typically been related to the dynamic matrix of chemical and electromagnetic events within the human brain. However, resuming a rigorous, open-minded and comprehensive investigation of trance and mediumship may provide important evidence and many insights capable of advancing an alternative understanding of mind-brain relationships. From this perspective, neurobiological studies hold potential as an important approach, as a point of view helping to solve the puzzle of these challenging human experiences. However, we must avoid an often naïve and over-optimistic approach in terms of the possibilities and interpretations of neurobiological investigations. In an attempt to avoid these problems, before presenting a summary of the available neurobiological findings on trance and mediumship, we shall very briefly point to certain methodological pitfalls that often occur when investigators analyze data from neurobiological studies on such experiences:

1. *Naïve acceptance of materialist monism (mind as a brain product) as an obvious fact, and rejection of a fair consideration of other hypotheses for the mind-brain relationship.* Despite being a reasonable hypothesis, it is important to bear in mind that it is what Popper and Eccles (1977) called a “promissory materialism.” It is a belief, or a wager that science will, in the future, be able to show how brain fully explains mind. Although this hope may be fulfilled, we should not shun alternative explanations, such as those proposed by Henri Bergson, William James, and Frederic Myers, namely that the brain acts as a filter, rather than as the cause of mental manifestations (Chibeni & Moreira-Almeida, 2007; Kelly et al., 2007).

2. *Work based on second-hand descriptions of original findings or writings.* This has led to many distortions that have been accepted as representing the thoughts or findings of important authors. Second-hand descriptions often produce, embellish, or disfigure inferences not supported by the original source. Some notorious examples are the widespread misrepresentation of Cartesian dualism as denying mind-body interaction (Duncan, 2000; Kirkebøen, 2001), imprecision in reports of behavioral changes following the famous case of Phineas

Gage's accident (Macmillan, 2000), and the reduction of spiritual experiences to a temporal lobe epileptic seizure (Kelly et al., 2007).

3. *Focusing only on one side of psychophysiological parallelism, i.e., changes in brain function modify mental states.* If we are to gain a better understanding of the mind-brain relationship, it is important to study the flip side (i.e., changes in the mind produce changes in brain and body; e.g., Beauregard, 2007; Kelly et al., 2007).

4. *Assuming that experiences based on superficial similarities are identical.* This may lead to unwarranted inferences of causes and of physiological substrates. Some examples of this are taking mediumship as a manifestation of dissociative identity disorder (Moreira-Almeida et al., 2008), or assuming that a jet pilot's acceleration-induced hypoxia produces a near-death experience (Greyson, 2007).

5. *Identifying a brain region involved with some spiritual experience and concluding that this region is the ultimate cause of that experience.* Or, similarly, assuming that producing a certain experience by stimulating the brain shows that the brain is the final source of this experience. To be fair and rigorous, these findings do not imply that experience is merely a brain phenomenon, with no external reality. Although certain brain areas have been associated with hearing and even produce auditory experiences through brain stimulation, this obviously does not mean that there is no auditory experience based on an external source.

6. *Ignoring the complexity of the body and refusing to take a holistic perspective.* Our body has limited output pathways, so the same experience can have different etiologies (e.g., tachycardia can have a wide array of causes such as anxiety, heart failure, exercise, cocaine use). Therefore finding the cause of an episode of tachycardia in one particular patient does not mean that we have found the cause of all tachycardia episodes for this patient, or for all human beings. This seems to often be the case for hallucinatory and similar experiences reported by mediums (Moreira-Almeida et al., 2007, 2008).

7. *Problems in theoretical formulations.* One such limitation is the failure to propose a hypothesis that explains the whole range of phenomena involved in a certain kind of spiritual experience, which is to be expected of a good theory (Chibeni & Moreira-Almeida, 2007). Another aspect is that many hypotheses are too speculative, being based on hypothetical brain substances or activation, but lacking empirical support for such claims (Greyson, 2007). Finally, many hypotheses have been posed by authors who have failed to conduct in-depth and direct investigation of the people having the experience to be explained. Direct contact with a large number of research participants who have had the spiritual experience in question provides invaluable information to help formulate a hypothesis that might explain the whole experience and its implications for those experiencing it.

8. *Focusing studies on beginners or participants who have not had a full-blown spiritual experience.* Following William James, it is very important to concentrate our investigations on the most extreme forms of religious and spiritual experiences. The study of extreme cases has provided observations that have fostered scientific revolutions (Moreira-Almeida & Koenig, 2008).

## **Neurobiological Studies on Dissociation, Possession, and Trance**

Having electrically stimulated the live brain to map cortical functions, Penfield (1978) postulated that neural networks alone would be incapable of producing consciousness, and stated that the mind had a distinct existence from the brain, although closely related to it. He added that there was no place in the cerebral cortex where electric stimulation could cause a patient to make a decision. Neurofunctional findings in relation to psychotherapy, hypnosis, and the placebo effect, taken as a whole, can be interpreted to challenge the hypothesis that the mind is a by-product or epiphenomenon of the brain (Beauregard, 2007). Studies of cardiac-arrest survivors found that 11 to 20% of patients reported experiences that can be used to support the hypothesis that the mind can express itself independently of neural functioning.

Current conventional neuroscientific models involving neuronal processing and plasticity cannot account for certain observations related to human consciousness once these studies have demonstrated that, paradoxically, human consciousness may continue to function during cardiac-arrest (Parnia, 2007). In line with these findings, some theories associate the brain with the role of mediating concepts such as "spirits" (i.e., noncorporeal minds or noncorporeal agencies) (Kelly et al., 2007). Thus, we should not be dogmatic in taking an *a priori* monist or dualist approach based on as-yet embryonic neurofunctional research.

For instance, the hasty proposal of "the God spot," which postulated a site in the brain as responsible for experience of the "divine," has been dismissed by recent neuroimaging studies (Beauregard & Paquette, 2006). Moreover, elucidating the neural circuits involved in subjective experiences such as prayer or mystical experience does not diminish or deprecate their significance or value.

Most studies in this field have focused on religious practices and their underlying neural circuitries. Due to the current nascent stage of this line of investigation, there are differences in methodology (measuring brain activity either by topographical EEG, cerebral blood flow, or by tracers of cerebral metabolism) and inconsistencies across studies. Nevertheless, findings tend to suggest higher activity of the frontal and prefrontal cortex during religious experiences (Azari et al., 2001; Beauregard & Pacquette, 2006; Jevning et al., 1996; Newberg et al., 2001, 2003, 2006). Some similarities also include increased activity in the limbic system, and decreased activity in the parietal lobes (Herzog et al., 1990; Lazar et al., 2000; Newberg et al., 2001).

The results indicate that mediumistic and trance experiences as well as intense mystical, religious, and spiritual experiences, are distinct and mediated by several brain regions and systems. For instance, increased activity in the frontal cortex may reflect focused concentration during the altered states of consciousness (ASC) experiences elicited by meditation practices, while the correlation between the dorsolateral prefrontal cortex and the superior parietal lobe may reflect a non-ordinary sense of space or time. Circuitries involved in sustaining reflexive evaluation of thought were found in religious experience (Azari et al., 2001; Beauregard & Pacquette, 2006; Jevning et al., 1996; Newberg et al., 2001, 2003, 2006). The major findings are shown in Table 1.

Table 1: Neuroimaging studies involving trance and similar experiences

<b>Study</b>	<b>Method</b>	<b>Subjects</b>	<b>Paradigm</b>	<b>Decreases (↓) and Increases (↑) in brain activity</b>
Herzog et al., 1990	PET	8 Yoga meditators	Meditative Yoga	↑ Frontal and occipital cortex
Jevning et al., 1996	REG	10 meditators	Transcendental Meditation	↑ Frontal and occipital cortex
Lazar et al., 2000	fMRI	5 Kindling meditators	Meditation	↑ Dorsolateral PFC, parietal cortices, hippocampus, temporal lobe, pregenual ACC and striatum
Newberg et al., 2001	SPECT	8 Tibetan Monks	Buddhist Meditation	↑ ACC, inferior and orbital frontal cortex, DLPFC and thalamus
Azari et al., 2001	PET	6 Fundamentalist Christians	Religious experience	↑ DLPFC, dorsomedial frontal and medial parietal cortex
Newberg et al., 2003	SPECT	8 Franciscan nuns	Prayer	↑ PFC, inferior frontal lobes and inferior parietal lobes
Beauregard & Pacquette, 2006	fMRI	14 Carmelite nuns	Sense of union with God	↑ RL medial orbitofrontal cortex, R middle temporal cortex, RL inferior and superior parietal lobules, RL caudate, L medial PFC, L ACC, L insula, L brainstem, striate visual cortex
Newberg et al., 2006	SPECT	9 Charismatic prayers	Glossolalia	↑ L caudate ↓ DLPFC, L Superior Parietal
Lutz et al., 2008	fMRI	16 long-term Buddhist meditators	Emotional and neutral sounds during the meditation	↑ Insula and ACC

Note: PET = positron emission tomography; REG = rheoencephalography; SPECT = single photon emission computed tomography; fMRI = functional magnetic resonance imaging; ACC = anterior cingulate cortex; PFC = prefrontal cortex; DLPFC = dorsolateral prefrontal cortex; R = right; L = left.

Although spiritual, mystical, and religious experiences may be related to trance and mediumship manifestations, the actions of the main neurotransmitters during these practices remain poorly investigated and understood. Nevertheless, it has been proposed that higher activity of the dopaminergic system (DRD4) and parallel lower activity of the serotonin (5-HT) system may be involved in individuals who showed higher measures of spirituality (Comings et al., 2000; Kjaer et al., 2002; Previc, 2006). The latter postulated that their results might be due to the higher concentration of dopamine D4 receptor in the frontal cortex. However, it has been shown that the dopaminergic system is in part under the regulation of 5-HT projections. For instance, stimulating 5-HT1A or 5-HT2A receptors may elicit dopaminergic release (Diaz-Mataix et al., 2005). Therefore, it is too early to postulate a role for neurotransmitters in trance and religious experiences given the tiny number of studies conducted so far.

From a psychophysiological perspective of trance and dissociation, dissociation involves the disengaging of the cognitive processes from their executive, higher-order, volitional faculties (Winkelman, 2000). Generalized psychophysiological correlates of what might be described as trance with dissociative aspects involve hemispheric lateralization that favors (in right-handed people) the right hemisphere of the brain (more closely associated with intuitive, emotive, non-logical, spatial, imaginative thought and perception) over the ordinarily dominant left hemisphere (associated with linguistic and rational processing).

Winkelman (1986), in his studies of indigenous shamans, suggested that a wide range of culturally-patterned induction techniques lead to generalized parasympathetic dominance in which the frontal cortex exhibits high-voltage, slow-wave, synchronous electroencephalographic (EEG) patterns (e.g., theta rhythms) that originate in the limbic system and proceed to frontal regions via limbic-frontal innervations. Some ASCs, such as some forms of meditation and hypnosis, exhibit small variances in EEG patterning, and similar differences also exist between voluntary and spontaneously induced states.

Winkelman (1986) also indicated that involvement of the limbic system is an important part of the neural architecture of dissociative trance. For instance, it has been implicated in the modulation of a variety of functions including basic survival drives and hypothalamic/pituitary release of neurotransmitter and endogenous opiates. The hypothalamic action, in turn, influences, among other things, dissociation trance-related hallucinations, analgesia, and amnesia. The hypothalamus also controls sympathetic (excitatory) and parasympathetic (inhibitory) nervous systems; the latter being associated with decreased cortical excitation and increased hemispheric synchronization. Evidence shows that parasympathetic dominance can be induced through excessive sympathetic activation; such as through drumming, dancing, and chanting, all of which are common features of ritual practice and in which the homeostatic reciprocal action of the autonomic nervous system collapses.

Lex (1979) suggested that the “*raison d'être* for rituals, often involved in trance, is the readjustment of dysphasic biological and social rhythms by manipulation of neurophysiological action under controlled conditions” (p. 144). Rituals, such as those associated with shamanism and mediumship, therefore, not only provide psychological relief from social and environmental stressors, they are mechanisms that employ driving techniques that “tune” the nervous system through hemispheric lateralization, parasympathetic dominance, and cortical synchronization.

In a field study conducted by Don and Moura (2000), topographic brain mapping at midline scalp locations of healer-mediums revealed increased brain activity when the healer-mediums reported being incorporated by a “spirit,” compared to resting baseline conditions. These results suggest the presence of a hyper-aroused brain state associated

with the possession trance behaviors of the mediums. In contrast, a small sample of psychiatric patients monitored during involuntary possession trance revealed no high frequency brain activity.

Rhythmic brain electrical oscillations as measured by EEG may also have functional implications for the dynamics associated with cortical networks. EEGs reflect changes in attention, sensory processing, and cognitive processes highlighting the different cortical network interactions (Lopes da Silva, 1991). In particular, alpha, theta, and beta wave activities have all been reported to be associated with different processes of alertness, focused attention, and awareness (Fanji et al., 2003). Giesbrecht et al. (2006) reported a correlation with self-reported dissociative experiences and theta power. Additionally, their results indicated a positive relation between dissociation and delta activity, whereas cortical power within the alpha range was inversely related to dissociative symptoms.

Consequently, the combining of neurophysiological and phenomenological assessments in a qualitative investigation of mediumistic experiences is essential to develop a more precise understanding of the neurobiological substrate of its manifestation and disruption of the integrated functions of consciousness.

For example, the evidence for associating dissociative identity disorder (multiple personality) and demonic possession with epilepsy is weak (Caixeta, Caixeta, & Barbosa, in press). There are many examples of prolonged fugue states with behavioral alterations and subsequent amnesia as a sign or even as the only clinical manifestation of psychomotor epilepsy. Furthermore, paroxysmal abnormalities in EEGs have been described in at least one case of multiple personality (Horton & Miller, 1972). Although the clinical descriptions suggest that many additional cases in the earlier literature were also epileptic, this is difficult to demonstrate since EEGs were not obtained and since hysteroepileptic convulsions were considered common in cases of dissociative states.

Convulsions are frequently described in cases of demonic possession, but the relationship between epilepsy and possession is more difficult to surmise. Most of these convulsions may well have been hysterical in origin but, once again, this is difficult to demonstrate since EEGs were not obtained in most cases (Saver & Rabin, 1997). In 1968, Prince pointed out that possession states had not been studied physiologically although the unusual behavior and the ASCs that are associated with possession phenomena suggest an alteration of cerebral physiology. The confounding of involuntary possession and seizure has been seen since biblical times. For instance, in the frequently quoted passage from the New Testament (Mark 9:17-27), the “dumb spirit” who throws a man on the floor and makes him foam at the mouth seems to represent ordinary epilepsy, even though this passage is often quoted as an example of demonic possession and its successful exorcism.

Mesulan (1981) reported 12 cases with a clinical condition reminiscent of dissociative identity disorder and involuntary possession (seven with multiple personality and the other five with delusions of “supernatural intervention”). These patients’ EEGs showed different degrees of abnormality, suggestive of focal electrical disturbance predominantly in the temporal lobes. Thus, Mesulan suggested that some cases of involuntary possession may be ascribed to disturbed electrical activity in regions of the brain related to the limbic system. However, the description of these patients as epileptic may be questioned in accordance with Mesulan’s reporting absence of motor manifestations in this group. Flor-Henry et al. (1990) described two multiple personality cases on EEG analysis that were in a state of relative left hemisphere activation across all cerebral regions.

Many parapsychological-like experiences (sensed presence of another sentient being, out-of-body experiences, distortions in subjective time, religious reveries) have been reported in association with complex partial seizures with foci within the temporal lobes, particularly the hippocampus and amygdala (Gloor et al., 1982). Direct surgical

stimulation of mesiobasal structures within the temporal lobes, particularly in the right hemisphere, evoked comparable experiences (Horowitz & Adams, 1970). Furthermore, individuals who are more prone to parapsychological-like experiences tend to show more prominent alpha rhythms over the temporal lobes (Makarec & Persinger, 1990).

In some traditional cultures, it is widely observed that ordinary, healthy participants in a ritual ceremony enter voluntary possession trance, with or without psychoactive drugs. Based on a survey of 488 human societies world-wide, Bourguignon (1973) reported that 89% had institutionalized ASCs and 57% associated these states with possession trance (which she differentiated from involuntary possession). Therefore biological mechanisms common to all human beings may well underlie possession and trance phenomena. Since trance and mediumship have so rarely been investigated from a neurobiological perspective, these mechanisms are not clear (Oohashi et al., 2002). The HWK and PAC teams therefore conducted the following studies of Brazilian mediums during trance states.

### Studies with Brazilian Mediums

In Brazil, mediumship is a central component within the ritual practice of spiritistic religions of which Candomblé, Kardecismo, and Umbanda are the three major groupings (Hess, 1994). They hold a commonality of belief in the power and efficacy of "spirit agents" and the ability of humans to interact with and embody these agents through ritualized methods of dissociative trance, such as possession.

Mediumship is typically induced during what Westerners consider an ASC. In the case of the African-derived Candomblé and Umbanda practices, their mythologies are permeated with stories about a "Sky God" and his intermediaries, the *orixás* (or *orishas*), who symbolize the primordial forces of nature. The *orixás* are believed to be powerful and terrifying but also "human" in that they can be talked to, pleaded with, and cajoled through special offerings. Group members also believe that the *orixás* have the ability to take hold of the mind and body of a human through acts of spirit "incorporation." Practitioners of these African-based rituals believe that they gain access to supernatural power in three ways: (1) by making offerings to the *orixás*; (2) by "divining" (i.e., foretelling the future with the help of an *orixá*; and (3) by being taken over by an *orixá*, ancestral spirit, or other entity who -- if benevolent -- may warn the community about possible calamities, diagnose illnesses, and prescribe cures. The medium through which these spirits speak, typically performs the task voluntarily and usually claims no remembrance of the experience. The trance required for this is usually brought about by dancing, singing, and drumming, as well as by using mind-altering substances, such as strong tobacco (Villoldo & Krippner, 1987).

Of all the Brazilian spiritist movements, Candomblé most closely resembles the original religions of Africa, retaining the original names and worship of many West African *orixás* (Bastide, 1960). In contrast, Umbanda gives greater emphasis to Brazil's Christian heritage than to the African *orixás*. Kardecismo (a variant of 19th century spiritualism), also called Espiritismo, is not to be confused with the general reference to Afro-Brazilian spiritistic traditions draws heavily from the teachings of Allen Kardec (1861, 1867), a French pedagogue and spiritualist.

Despite the widespread popularity of spiritistic traditions in Brazil, the practice of mediumship has been largely denigrated as psychopathological in Brazil, similar to how these phenomena are largely negatively viewed in Europe and North America (Johnson, 2007). For example, Rodrigues (1896/1935) conducted extensive research on the various types of Afro-Brazilian mediumistic practices, interpreting such practices as hysterical phenomena resulting from profoundly superstitious personalities of its African-descended practitioners. Later, Xavier de Oliveira (1931) claimed that nearly ten percent of patients hospitalized during a 12 year period in the University of Rio de Janeiro suffered psychosis

from spiritistic traditions, while Pacheco e Silva (1936) maintained that existing psychosis tendencies are aggravated by spiritistic traditions. Two historical elements played a key role in these pathologizing viewpoints: the attempt by Brazilian intellectuals to create a modern Eurocentric nation through suppressing spiritistic practices, and the view that spiritism was the enemy of psychiatrists coming from Roman Catholic or materialist perspectives (Moreira-Almeida, Silva de Almeida, & Neto, 2005).

However, later work, such as that of Roger Bastide (1978) concluded psychopathology may explain some cases, but speculated that spiritism can be viewed as more normative based on social dynamics. Psychiatric theory thereafter developed a cultural sensibility also influenced by the development of transcultural psychiatry and ethnopsychiatry (Lewis-Fernandez & Kleinman, 1995). Within this evolving context, mediumship began to be seen by some as a skill that can empower its practitioners (e.g., women subjugated by a patriarchal culture) and provide support for community members suffering from anxiety, depression, and other afflictions (Krippner, 1997b).

Defining some terms related to spiritist traditions, such as "possession" and "dissociation," poses difficulties. For example, Leacock and Leacock (1972) studied the Batuque, an Afro-Brazilian tradition that used the expression "trance-possession," but these juxtaposed terms were not synonymous in that possession was viewed as "the presence in the human body of a supernatural being" and trance was viewed as "an altered psychological state" (p. 217). Bourguignon and her associates (1964, 1976, 1977), investigated the practice of "spirit possession," and differentiated it from possession and trance. In possession, a spirit has produced the changes in an individual's behavior, health, or disposition without an accompanying shift in awareness, but in possession trance, an individual loses conscious awareness while the invading spirit's own behavior, speech patterns, and body movements take over and can be observed by outsiders. However, trance was an ASC that includes the loss of conscious awareness but not the presence of a spirit or other outside entity.

In addition, the term "incorporation" is also used by the spiritistic groups in Brazil to describe situations in which practitioners allow themselves to be taken over by a spirit entity, exemplified by mediums that voluntarily allow the incorporation of an *orixá*. The term possession, in contrast, is often used to define the experience of an involuntary takeover, typically perceived as distressful, unwelcome, and possibly long-lasting (Negro, Palladino-Negro, & Louza, 2002, p. 65). Possession can also occur with or without the ASC known as dissociation (a separation of awareness that may impede memory). Possession frequently requires the intervention of a religious specialist who can exorcise the offending agent, but, in possession trance, the intrusive spirit may be benevolent, bringing new insights to the possessed individual by means of automatic writing, channeling, or mediumship. Sometimes the spirit even plays the role of a trickster, teaching the individual life lessons through embarrassment or humor. The results differ from cases where an invading entity takes over a victim's body as the result of a sorcerer's curse or to gratify the spirit entity's earthbound impulses and desires. These types of trance are extremely dissociative when the individual manifests experiences and behaviors that appear to be disconnected from the mainstream flow of conscious awareness, behavioral repertoire, and/or self-identity (Krippner, 1997).

## Study One

The HWK team reported a study with two purported mediums from the Brazilian spiritistic traditions of Candomblé, Umbanda, and Kardecismo. Findings were interpreted by employing the high risk model (Wickramasekera, 1991) as a theoretical framework for understanding incongruities between mind and body systems in individuals with mediumistic-like experiences. This study was completed with mediums who were held by

their communities as capable of incorporating discarnate entities, as well as with a local tour guide not associated with any of the local spiritistic movements who served as an age-matched "control participant" from a similar culture. This strategy was selected since, when working with individuals with special abilities, it is useful to make intra-cultural comparisons (Murphy, 1969). Data were collected in a quiet, comfortable hotel room during a parapsychological conference in Recife in 1999. The two research participants received no money for their mediumistic activity or for taking part in this study.

One medium tested was Pai Ely (born in 1932 as Manoel Rabelo Pereira), a *pai-de-santo* in Recife, Brazil. Krippner had visited his *terreiro* or temple, The Lar de Ita Center (in 1990, 1991, 1993, 1995, 1997, and 1998), making observations and conducting interviews with him and members of his congregation. Pai Ely conducts both Candomblé and Umbanda services in the Center and is well versed in both traditions (Krippner, 1998/1999). Formerly, Pai Ely was a bank executive. In his early 40s, he began to see and hear spirits and *orixás*. He was uncomfortable and fought the presence of the entities, especially when they told him he was being "called" to become a healer. As a result of such incidents, Pai Ely transformed his social identity from bank executive to *pai-de-santo*.

Pai Ely reported that his teacher, Master Oascati, in his 70s at the time of our visit, lived in Benin, Africa. Master Oascati once told Pai Ely that he must constantly work on himself to obtain clearer, purer information from the *orixás*. He explained that it is easy for one's own biases, experiences, and fantasies to contaminate the spiritual message. In Pai Ely's words, "The *orixá* paints only one small part of the picture; the medium must paint the rest." As a result, the client receives no "pure" information. According to Pai Ely, it is unusual for more than 25% of the *orixá*'s message to get through. Furthermore, many of the messages are from lesser entities that are not "illuminated beings" and may unknowingly distort information or deliberately play tricks on the mediums and their clients. To prepare to receive the spirit, Pai Ely usually engaged in prayerful meditation or group prayer (Krippner, 1998/1999).

The other medium tested was José Jacques Andrade, born in 1945, is a medium active in the Kardecismo movement. During a 1998 visit to his center, the Leonardo da Vinci Salon of Mediumistic Art, Krippner observed a ceremony that culminated in Andrade's incorporating several famous artists (e.g., Monet, da Vinci) and a few unknown to anyone including Andrade. In preparation, Andrade and his group sang hymns and prayed. Andrade, virtually deaf, did little singing as he prepared himself, through prayer, for the incorporation of his colleagues "on the other side." Once the spirits had been "called," Andrade dipped both of his hands into jars of paint and, with two canvasses in front of him, swiftly began to execute remarkably attractive landscapes, still-life, and portraits, two at a time, which he claimed were produced as "mediumistic art." For example, with one hand, he produced a landscape signed "Monet," and with the other, a still-life signed "Cezanne." The other artists under whose influence he claimed to paint that evening included Van Gogh, Manet, Picasso, da Vinci, Degas, Portinari, and Toulouse-Lautrec. Andrade produced these works at an extraordinary speed, each work taking no more than ten minutes. Each painting bore at least a passing resemblance to the style of the artist being incorporated, some more than others.

Lima (1998) collected 107 paintings by Andrade during an approximate one year period between 1994 and 1995, looking for similarities in the process itself, in the product, and in the signatures of the purported artists. Nearly 300 different artists were represented in this collection, the most frequent being Miro (3.7% of the total), Van Gogh (3.2%), and Dali (2.3%). Lima reported that before beginning to paint, Andrade hesitated for about 20 or 30 seconds; the average time spent on a painting was 6 minutes, 28 seconds. Other patterns Lima mentioned included Andrade's preference for using his right hand, although he would frequently use both hands, producing two paintings at the same time.

The control participant was E.O.S. (born in 1945), a tour guide and schoolteacher. He assisted Krippner as a translator in 1993 and 1995 and was familiar with the spiritistic religions of the area. He was included as a control participant to explore if cultural constraints or environmental demand characteristics existed that could account, at least in part, for the results obtained from the two mediums. All research participants denied being on any form of medication before or during the testing.

Two psychological measures were used in the study: the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986), and a Portuguese translation of the Tellegen Absorption Scale (TAS; McIntyre, Klein, & Gonçalves, 2001). These were administered by Brazilian colleagues and scored by Krippner. The DES is used as a screening tool for both clinical and nonclinical populations to assess the frequency and intensity of dissociation in one's daily life. The higher the DES score, the more likely that the respondent has dissociative identity disorder; however, only 17% of those who score above 30 on the DES are diagnosed with the disorder (Carlson & Putnam, 1993). The TAS is used to measure an individual's capacity for experiences that involve both narrowing and broadening of attentional focus, which are characterized by marked restructuring of one's phenomenal self and the world (Tellegen, 1977; Tellegen & Atkinson, 1974).

Because data can be distorted by bodily movement, and imagery has been found to be efficacious in both performance enhancement and rehabilitation (e.g., Appel, 1992), the two mediums were instructed to imagine incorporating a spirit (rather than to engage in direct incorporation). Previous research, primarily in the field of sports psychology, has suggested that imagery rehearsal activates the same brain centers involved in actual performance (e.g., Feltz & Landers, 1983) and guided this methodological choice. The duration of the psychophysiological testing sessions were four minutes each and all were measured under two baseline resting conditions (eyes open, eyes closed). The two mediums were measured while imagining an incorporation from the "spirit world," and last, during the return to baseline conditions (eyes open; eyes closed), referred to as recovery. The following briefly describes the results of the study.

### ***Psychological measures***

On the TAS absorption measure, only Pai Ely tested high. The Brazilian participants all claimed to be moved by songs that they enjoyed, to get caught up in the action while watching a movie, and liked to watch clouds take various shapes in the sky. However, only the medium Pai Ely claimed to anticipate statements from other people when discussion allegedly supernatural experiences, to feel imaginary matters with such intensity that they seemed real, and for music to evoke colorful pictures in his imagination. He also claimed to think in visual images, to be able to imagine his body becoming so heavy it would not move, and to occasionally feel "suspended in air" while listening to a band or orchestra. Pai Ely's imagination was very vivid, and he moved his hands and arms frequently when he was, from his perspective, actually incorporating discarnate entities. In this respect, Pai Ely's behavior is consistent with his high score on the TAS.

It is not unusual for Brazilians to use such idioms as "I got caught up in the music," or "I was flying during that performance." In addition, the role of a medium may influence responses to tests of this nature. For example, when Pai Ely gave a positive response to the item regarding being "suspended in air" he may have simply been making a declaration concerning his abilities and what was expected of him as a *pai-de-santo*.

From a broader lens, individuals who make high scores on the TAS tend to report becoming fully absorbed while they are watching a movie, television program, or theatrical performance. They also tend to be able to suspend disbelief and to become empathic (Wickramasekera & Szlyk, 2003), especially when their companion (or, at times, a complete stranger) is undergoing stress. Those scoring high on absorption have many traits in common with highly hypnotizable people, deriving meaning from body language

and personal mannerisms (Fernandez, 2001). This description is especially applicable to Pai Ely who deals daily with people under stress. There are members of his congregation, as well as many outsiders, who come to him for relief of some real or imagined misfortune, interpersonal conflict, or health problem. A frequent method of treatment involves incorporating entities from the spirit world, sometimes requesting that they give advice and aid, while at other times intervening to stop their purported malevolent actions against Pai Ely's clients. Of course, his test scores may be influenced by his culture and role expectations.

Andrade did not score as high on the TAS as Pai Ely, but he also does not deal as extensively or intimately with clients. In other words, the high score on the TAS might be related to the frequency with which the two practitioners engage in spirit incorporation. When Andrade incorporates his artistic colleagues from the spirit world, he often becomes so absorbed with the task that he claims not to recall the details when the discarnate entities leave the scene.

On the DES dissociative measure, both Brazilian mediums and their control tested as "severely dissociative." The term "severely dissociative" could be reframed as "intensively imaginative" when culture-bound beliefs and practices are taken into account. For example, all three Brazilian participants reported that they often "have the experience of sometimes remembering a past event so vividly that [it feels] as they were reliving that event," and reported that they often "have the experience of feeling that their body does not seem to belong to them." Pai Ely and Andrade have practiced mediumship for several decades and scored as "severely dissociative;" however, the fact that E.O.S. also received a high DES score supports the likelihood that idioms of expression influenced the results obtained on his dissociation measure as well. This highlights some caution in using a strict interpretation of high absorption and high dissociation as risk factors for somatization (e.g., psychosomatic illnesses) for multicultural research.

Another study with Kardec mediums in São Paulo, Brazil by Negro, Palladino-Negro, and Louza (2002) reported that their mediums also attained high scores on dissociation (as assessed by the DES), and that there was a positive association between mediumship training and the control of the dissociated experiences. Hence, the capacity for dissociative self-experiences may play an important role in the ability to practice as a medium through differentiating and dissociating their normal identity states during their hypnotic-like procedures (Krippner, 2005).

Sociocognitive theorists of dissociation and hypnosis would probably suggest that the phenomenological experiences during mediumship are created in accordance with the previous expectancies and beliefs about the role of being a medium, and other contextual variables (Lynn, Pintar, & Rhue, 1997). The sociocognitive view on dissociation thus seems to be illustrated by Pai Ely's belief that as much as 75% of his experience during mediumship may be the result of his own biases, experiences, and fantasies. Pai Ely's description of his process of discernment of "pure" from "contaminated" information does seem to capture the sociocognitive explanation of how a person might construct a role and personal narrative about dissociative trance experiences as a kind of "believed-in imaging" (Sarbin, 1998).

Neo-dissociation theorists of hypnosis and dissociation might look at the importance of the hypnotic-like procedure (Krippner, 2005) itself in allowing access to the self-experience of the channeled identity state (Hilgard, 1994). A neo-dissociative or ego states explanation of mediumship would probably highlight the normal polypsychic nature of human identity (Frederick, 2005) so that it probably should not be too surprising that individuals might be able to encounter another ego state within them during a hypnotic-like procedure. Our experience of this normally inactive ego state may thus be activated by the hypnotic-like procedures of mediumship whether or not that ego state actually represents the presence of a spirit or deity. These theorists might then speculate that a simpler

explanation of mediumship could be derived through focusing on the origin of the channeled identity as stemming from ego states or cognitive subsystems that are not properly integrated within the mediums normal experience of identity.

Probably everyone has some trickster-like phenomena hidden away within their self experience that they may not normally elicit but which mediums seem to develop as part of their training (Krippner, 2005). This polypsychic aspect of human identity may significantly contribute along with sociocognitive factors to the difficulty Pai Ely described in the attempt to discern pure from contaminated information. However, our data merely illustrate the sociocognitive and neo-dissociative perspectives on mediumship while a host of many other factors (including actual spirit incorporation) may play a role as well if science were to accept the possibility of actual spirit incorporation.

It is important to be cautious about interpreting psychological measures used in research across cultures, since culture-bound beliefs and practices (e.g., idioms of expression) may influence how individuals from differing cultures score on dissociation and absorption measures. For example, a tendency toward hyperbole may be more common among Latin Americans than among Europeans, Canadians, and individuals from the United States, a proposition congruent with Krippner and Weinhold's (2001) finding that Brazilian dream reports contain high levels of emotional content and Krippner and Faith's (2001) finding that twice as many "exotic" dream reports characterize Brazilian dream reports as those obtained from participants in the United States. Dissociation must also be understood through a cultural lens because certain life experiences may be adaptive to life events that are culturally related (Calof, 2002; Krippner, 1997a).

### ***Psychophysiological measures***

A variety of interesting psychophysiological measures were obtained. For example, Andrade had approximately a 5 degree Fahrenheit discrepancy between his left hand and right hand temperature during the baseline "eyes open" condition. When Andrade was asked to close his eyes and relax, there was at least a 1 degree drop in temperature in both hands, while the discrepancy between each hand decreased to about 4 degrees. During the fantasy of incorporating an artist session, his left hand dropped an additional degree, but his right hand temperature barely changed. When he relaxed after imagining an incorporation, his bilateral hand temperatures continued to drop an additional degree in both the recovery conditions. A 4 degree discrepancy existed between both hand temperatures compared to the imagining session. Thus, Andrade tested with right hand temperature higher than left hand under all conditions.

Similarly, Andrade's electromyographic (EMG) baseline readings were about 5 microvolts higher than the optimal (3.1 microvolts). When instructed to close his eyes and relax, his EMG increased almost a microvolt; contrary to expectations. When instructed to imagine incorporating an artist, his EMG increased an additional 4 microvolts. During the eyes open recovery session, his EMG dropped over 6 microvolts, but his EMG increased over 2 microvolts during the eyes closed recovery. Again, this result is paradoxical.

In addition, Andrade's heart rate increased modestly in the baseline eyes closed condition, and in particular during the imagining of incorporation. His heart rate dropped during both recovery sessions with little difference between the eyes open and eyes closed conditions. In general, his heart rate (59–63 BPM) under all conditions was low for a person of his age although he increased his heart rate modestly in the eyes closed conditions.

Similarly in a paradoxical fashion, Andrade's mean skin conductance (SCL) dropped across the entire session independent of other conditions and instructions. Generally, there was a greater sympathetic activation in his left hand than in his right hand.

Pai Ely reported that he had imagined incorporating a "gentle" *preto velho*. During baseline conditions before the imagination session, Pai Ely's EMG, EEG, and SCL

measures were quite normal, but his heart rate was high (90–92 BPM). His bilateral hand temperatures were discrepant during the baseline, eyes open condition with the right hand about 2 degrees higher than the left. When Pai Ely was asked to close his eyes and relax, the results were similar. Hence, even before initiating the imagination task, there were notable incongruities in Pai Ely: his bilateral hand temperatures and an unusual heart rate.

The first collection of data during the imagination session was confounded by motor artifacts and could not be used because he moved his hands and arms frequently. When Pai Ely was asked to restrain himself while imagining that he was incorporating a discarnate entity, his left hand and right hand temperature remained stable. His EMG, SCL, and heart rate increased during the imagination condition, and generally remained elevated relative to the baseline data.

For the Brazilian control, there were fewer discrepancies among the EEG, EMG, hand temperature, SCL, and heart rate. All of E.O.S.'s scores were in the normal range and were essentially congruent.

A variety of EEG measures also were obtained. Andrade's EEG showed an increase in the percentage of theta brain waves from the eyes open to the eyes closed baseline conditions, but a drop in alpha percentage. During the imagination exercise, there was an increase in the percentage of alpha comparable to the eyes open condition. Paradoxically, the increase in the percentage of alpha was also associated with a sustained increase in beta percentage, even during recovery conditions. Pai Ely's percentage of theta brain waves increased in both the left and right cortical hemispheres. E.O.S. showed a large increase in EEG alpha wave percentage in both eyes closed conditions.

For the EMG measures, both mediums increased muscle tension from the baseline eyes open condition to the baseline eyes closed condition. During the imagining of incorporation, all increased muscle tension with the exception of Pai Ely who decreased in muscle tension. During the recovery eyes open session, all decreased muscle tension. Pai Ely's muscle tension remained about the same for both recovery sessions, but E.O.S. and Andrade increased muscle tension in the recovery eyes closed session and each one returned almost to baseline (eyes open) in the recovery eyes closed condition.

Although each of the three decreased their left hand temperature during the imagination session, E.O.S.'s right hand temperature also decreased during the imagination session whereas both mediums increased temperature in their right hand. For recovery in the eyes open condition, only Pai Ely increased temperature in the left hand but both mediums increased temperature in their right hand. For the recovery eyes closed condition, both mediums increased bilateral hand temperatures. For the heart rate session, Andrade increased heart rate from the baseline eyes open condition to the baseline eyes closed condition, whereas Pai Ely and E.O.S. decreased their heart rate. Each of the three increased their heart rate during the imagining of incorporation, with the exception of E.O.S., whose heart rate remained almost exactly the same from the baseline eyes closed condition to both recovery conditions. Pai Ely increased heart rate substantially for the imagining session. However, Pai Ely, and Andrade decreased their heart rate from the imagination to the recovery eyes open condition. In addition, Pai Ely, and Andrade increased their heart rate from the recovery eyes open condition to the recovery eyes closed condition.

In general, the psychophysiological data obtained from Andrade reveals several incongruent findings. First of all, there was a general reduction in SCL across conditions. Since SCL is a measure of sympathetic activation or withdrawal, it is paradoxical to find it associated with peripheral vasoconstriction and increased EMG during the imagination task. Both sets of data suggest increased sympathetic activation in these response systems. Secondly, the increase in muscle tension during the eyes closed imagination condition and the associated increase in the percentage of alpha activity during

imagination are also paradoxical; EMG and EEG are typically negatively correlated, not positively correlated. Andrade's increase in frontal EMG while imagining incorporation is consistent with a hypothesis of increased muscle tension that is possibly driven by intrusive cognitions and/or affect. Andrade's heart rate data are also consistent with the hypothesis of intrusive events occurring in the eyes closed conditions.

Pai Ely also showed incongruities between major physiological response systems, particularly during the imagination condition. Although sympathetic activation was observed in the autonomic nervous system (ANS), relaxation was noted in the central nervous system (CNS), which both typically function in a more integrated manner.

E.O.S.'s large increase in EEG alpha wave percentage in both the eyes closed conditions is consistent with his moderate score on the TAS, which was exactly the same as Andrade. The EEG data are probably consistent with E.O.S.'s hypnotic ability, although this was not tested. However, studies of the association of absorption with measured response to hypnosis demonstrate only a moderate relationship (Spiegel, 1990, p. 125).

There were markedly specific incongruities in the peripheral and central physiological response systems. In other words, there were deviations during Andrade's imagination condition that were discrepant from what is typically seen during an eyes closed imagination condition. This supports a previous finding that physiological incongruities are frequent outcomes of testing sessions with people claiming mediumistic abilities (Wickramasekera, 1991). Not only are there incongruities between the mediums' verbal reports and behavioral observations but between their psychophysiological response systems as well.

People with incongruities between CNS and autonomic nervous system (ANS) responses have been described by Wickramasekera (1986a) as living episodically in two worlds, one in which they are critical, rational, and practical, and another into which their fantasy and emotional reactivity expands and deepens. As such they often are "at risk" for somatization. Both sets of descriptors apply to Pai Ely, the *pai-de-santo* in our investigation who attained a high absorption score on the TAS. Not only does Pai Ely incorporate discarnate entities, he manages a large and successful enterprise, the Lar de Ita Center.

Wickramasekera's (1991) descriptors apply to some extent to the other psychic claimant, Andrade, who also displayed CNS/ANS incongruence. Andrade's duties at the Kardec temple are not as demanding as those of Pai Ely, nor does he spend the amount of time incorporating entities, as does the *pai-de-santo*. When we visited the Kardec temple, we observed a few dozen people in attendance; in contrast, Pai Ely's Candomblé/Umbanda temple was filled with several hundred people during each of our visits. In addition, we observed that Pai Ely has a team of mediums and trained assistants at his disposal at the temple. However, Wickramasekera's (1991) descriptors do not particularly apply to E.O.S. who showed no noticeable CNS/ANS incongruence. According to Wickramasekera (1986b, 1991), incongruence between CNS and ANS response systems are not unusual among spiritual practitioners. It is taken for granted that some practitioners, especially self-styled mediums and channelers, will demonstrate incongruence between their behavioral observations and verbal reports.

In addition, the incidence of individual response specificity among the Brazilian mediums and their control was noticeable. An example of this is that each predominately exhibited stress in their right hand temperatures, but Andrade exhibited SCL stress predominately with his left hand. Mediums and channelers both purport to be able to receive information that supposedly do not originate from consensual reality. Though they might appear calm and composed, while speaking of calamitous events from their clients' "past lives," from the lives of their clients' deceased relatives, or from scenarios of their clients' purported futures, physiological tests often indicate that they are under tension. The individual response specificity (Andreassi, 2000) may help clarify such incongruence

and Stern and Sison's findings (1990) offer some insight, as those individuals who report a high degree of autonomic response typically also show a greater autonomic reactivity than those with a lower awareness of their autonomic response. Moreover, there is the tendency for the more aware individual to exaggerate their degree of reactivity, while the lesser aware individuals tend to underestimate their reactivity.

Wickramasekera's (e.g., 1989, 1993, 1995, 1998) findings support the proposition that spiritual practitioners often are at risk for stress-related symptoms, in particular, when there are incongruities between verbal reports of low negative affect while ANS data indicate otherwise; profound temperature differences between the right and the left sides of the body (e.g., individual response specificity), and "flip-flops" between a repressive cognitive style and easy access to cognitive processing (Wickramasekera, Krippner, & Wickramasekera, 2001). Negro, Palladino-Negro, and Louza's (2002) study of Kardec mediums found that research participants characterized by extensive training attained favorable scores on measures of socialization and adaptation. However, pathological signs were detected among the group of younger mediums with less training; in addition, they evidenced poorer social support. Although stress for mediums may be modified by social support systems, other programs involving voluntary control of internal states (e.g., biofeedback, meditation) and regimens for healthy living (e.g., Krippner, Wickramasekera, & Tartz, 2002, pp. 59-60) may be utilized. There is some evidence that, at least in the United States, self-styled mediums and channelers may be at greater risk than healers and intuitives.

## **Study Two**

The PAC team studied nine mediums (three males, six females; all with normal social functionality and no adjunct mental disorder) linked to the Brazilian Spiritist Federation of the State of Goiás. None of them were taking psychotropic medication or using ritual substances, so the EEG abnormalities in these cases could not conceivably be attributed to the effect of mind-altering substances. They had no psychiatric or neurological antecedents or history of using ritual substances or medical psychotropics and did not receive any money for their participation.

Two showed mediumship behavior related to "psychography" (an alleged spirit's manifestation using the writing of a medium), and one to "psychography" and "psychophony" (from the Greek *psyche* or soul, and the words "graph" and "phone," i.e., sound or voice), the names given by Kardec Spiritism (Kardecismo) and some other spiritualist traditions to the phenomena where, a spirit uses the voice of a medium. The remaining six only manifested psychophony. All were fitted with an 8-channel EEG recording device, and two periods of 90-second continuous baseline resting and probing EEG were recorded (see Table 2 for partial results).

Table 2. EEG findings, type of mediumship and gender of mediums

Mediums Sex		Type of Mediumship	EEG findings (pre-trance)	EEG findings (during trance)
Case 1	F	Psychophony	Normal	Slowing of right temporal delta and theta
Case 2	M	Psychophony	Normal	General slowing of right frontal temporal occipital theta and left frontal temporal theta
Case 3	M	Psychophony	Normal	Slowing of right frontal theta
Case 4	F	Psychography	Normal	Slowing of left temporal theta
Case 5	F	Psychography	Normal	Slowing of left temporal theta

Case 6	F	Psychophony	Normal	Normal
Case 7	F	Psychophony	Normal	Slowing of right occipital theta and left frontal theta
Case 8	F	Psychophony	Normal	Normal
Case 9	M	Psychography and Psychophony	Normal	Normal

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This study was designed to rule out epilepsy as a cause of most mediumship experience, since none of the cases had an EEG suggestive of either epileptic discharge during mediumship activity nor a clinical history of seizure disorder or alterations of ongoing EEG background activity.

EEG findings did not show a consistent pattern among the mediums, but ranged from absolutely normal electrical activity to some degree of EEG slowing. Oohashi et al. (2002) also reported an individual case during an episode of involuntary possession in which the EEG of the possessed subject did not show any pathological findings or epileptic discharges, but indicated enhanced power (increase) in the theta and alpha frequency bands during the trance. Hughes and Melville (1990), in another EEG study with 10 trance channelers, suggested that the trance channeling state is characterized by large, statistically significant increases in amount and percentage of beta, alpha and theta brainwave activity. These authors concluded that there appear to be definite neurophysiological correlates to the trance channeling state, and furthermore that there is some evidence that these correlates may be patterned, in contrast with our results.

None of our cases presented with electrical disturbance that resembled those found in Mesulan's cases (Mesulan, 1981), and it must be emphasized that none had a history of seizure disorders. In the face of these findings, it would be overly hasty to conclude that abnormal electrical activity was the cause of this phenomenon, or even an epiphénomène since it may be a consequence. Mesulan also argued that the high incidence of these otherwise rare conditions at his behavior neurology unit and their association with abnormal EEGs raises the possibility that dissociative identity disorder and involuntary possession may be a behavioral manifestation of abnormal electrical activity in the temporal lobes. We disagree with this statement in the sense that these phenomena are not uncommon in certain cultures (particularly in Brazil, as well as in India and many other Southeast Asian countries) and are not significantly associated with any psychosocial dysfunction (Moreira-Almeida et al., 2008) or with epileptic disorders.

Although the present sample was not large enough to produce interactions of sufficient statistical power, the current results support the notion of an electrophysiological repercussion during mediumship activity in most of the mediums we studied. The current results should be interpreted cautiously, pending replication and extension to other samples.

## Conclusion

Both of the studies presented in this chapter open more questions than they resolve, but they also point to the possible importance of using neurobiological data to explore extraordinary experiences, such as of those who claim to be mediums. The complicated patterns found undoubtedly require much additional research to clarify their fuller meanings.

However, there is a growing consensus that a respect for spiritual belief systems is an ethical duty for physicians and other health care providers and most modern health systems in general take no account of the belief in life after death held by most of the world's population (Peres et al., 2007a). The interest and pertinence of scientific

investigations relating to mediumship, trance states, and spiritual experience are justified, given the importance of their impact on people's quality of life. For example, health and disease are cardinal concepts in all areas that deal with human suffering and conceptual inaccuracies about the myriad of elements that constitute human nature may lead to partial diagnosis and even erroneous therapeutic conduct.

Human nature awaits further elucidation, so scientific research must continue to examine this complex field involving spirit communication and life after death. What we have reported is simply a beginning. However, the preliminary results argue for its continuation and expansion.

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