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States of Consciousness

Experimental Insights into Meditation, Waking, Sleep and Dreams

Springer

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ISSN 1612-3018
ISBN 978-3-642-18046-0 e-ISBN 978-3-642-18047-7
DOI 10.1007/978-3-642-18047-7
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2011931470

Cover design: eStudio Calamar S.L.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Chapter 10
States of Consciousness Beyond Waking, Dreaming and Sleeping: Perspectives from Research on Meditation Experiences

Frederick Travis

Abstract Three categories of meditation practices have been proposed: *focused attention* meditations, which involve voluntary and sustained attention on a chosen object; *open monitoring* meditations, which involve non-reactive monitoring of moment-to-moment content of experience; and *automatic self-transcending* meditations, which are designed to transcend their own activity. While *focused attention* and *open monitoring* meditations explore the nature of individual cognitive, affective, and perceptual processes and experiences, *automatic self-transcending* meditations explore the state when conscious processing and experiences are transcended, a state called pure consciousness. This paper reports unique phenomenological and physiological patterns during the state of pure consciousness, as experienced during Transcendental Meditation (TM) practice, a meditation in the *automatic self-transcending* category. These data support the description of pure consciousness as a fourth state of consciousness with unique phenomenological and physiological correlates. This paper also discusses the Junction Point Model that integrates meditation experiences with the three ordinary states of waking, sleeping, and dreaming. The Junction Point Model is supported by EEG data and provides a structure to integrate ordinary experience during waking, sleeping, and dreaming with meditation experiences and so can serve as a foundation for investigating the full range of human consciousness.

10.1 Introduction

Traditional meditation techniques are part of a subjective approach to gaining knowledge that parallels and complements the objective approach of gaining knowledge in the natural sciences. The objective approach in western science has

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D. Cvetkovic and I. Cosic (eds.), *States of Consciousness*, The Frontiers Collection,
DOI 10.1007/978-3-642-18047-7_10,

used instruments to objectively measure phenomena to identify the principles and laws that explain material and social interactions. Similarly, the subjective approaches in eastern traditions have used meditation techniques to directly experience and so understand the full range of human experience. Some meditation techniques are designed to explore the range of waking processes and experiences; others are designed to explore the nature of consciousness at the source of thought when mental processes and content are transcended. In this time when East meets West, scientists can objectively evaluate growth of subjectivity through meditation practice. Thus, meditation techniques can serve as scientific probes to fathom the range of human experience.

Lutz has divided meditation practices into two categories: *focused attention* meditations, which involve voluntary and sustained attention on a chosen object, and *open monitoring* meditations, which involve non-reactive monitoring of the moment-to-moment content of experience (Lutz et al. 2008). In *focused attention* meditations, attention is focused on a given object and regulative skills are developed to monitor the movement of attention – detecting distraction, disengaging attention from the source of distraction, and redirecting and refocusing on the object (Lutz et al. 2008). *Open monitoring* or mindfulness-based meditations refer to an alert and open mode of perceiving and monitoring mental content from moment to moment, including perception, sensation, cognition, and affect (Kabat-Zinn 2003). These meditation practices involve the non-reactive, dispassionate monitoring of the content of ongoing experience to become reflectively aware of the nature of emotional and cognitive processes.

Meditation techniques in these two categories explore the nature of waking processes and experiences. Waking experiences are characterized by subject/object duality. A subject, agent or experiencer observes and reflects on affective, cognitive, or sensory objects of perception that are separate from himself or herself – I am here observing the experience out there. Focusing attention on a specific object of experience or maintaining an orientation to monitor changing objects of experience uses and maintains the subject/object duality. One keeps the attention involved with the procedures of the technique.

A third meditation category has been proposed, *automatic self-transcending*, which includes meditation techniques designed to transcend their own activity (Travis and Shear 2010a). Meditation techniques in this category do not attempt to control the movement of attention or to monitor ongoing experience; rather they are designed to transcend their own activity – to allow a state of consciousness to emerge when mental activity and cognitive control has been transcended. Techniques in this third category necessary must be automatic, because any intention to control the attention would keep the mind active and not allow mental activity to settle to silence.

Meditation techniques in the *automatic self-transcending* category provide insight into the state of consciousness when thoughts have ceased, revealing a ground state of human consciousness. This paper explores the nature of this state, and then presents a model that integrates this state during meditation with those during waking, dreaming, and sleeping.

Note that these three categories are not necessarily mutually exclusive within a single session or over the course of a life-time of meditation practice. *Focused attention* and *open monitoring* are combined in Zen, Vipassana, and Tibetan Buddhism meditation traditions (Austin 2006; Gyatso and Jinpa 1995; Lutz et al. 2008). Also, with diligent practice over many years, *focused attention* meditations may lead to reduced cognitive control and could result in effortless concentration (Lutz et al. 2008; Wallace 1999).

A meditation technique within the *automatic self-transcending* category is the Transcendental Meditation® (TM®) technique. During TM practice, one appreciates a mantra at finer levels in which the mantra becomes secondary in experience and self-awareness becomes primary (Maharishi 1969; Travis and Pearson 2000). Ultimately, the mantra disappears and the subject-object relation that defines customary experiences is transcended. The subject, or the experiencer, finds him/herself awake to his/her own existence – called pure consciousness or a ground state of consciousness (Maharishi 1997). Pure consciousness is pure in the sense that it is free from the processes and contents of knowing. It is a state of consciousness in that self-awareness is maintained. Pure consciousness is a non-dual state of awareness – the self is both the subject and object of awareness. This would contrast with the end state of some Buddhist meditations that seek to lose the self in the object, such as during the practice of loving, kindness, and compassion (Lutz et al. 2008). While this is also a non-dual state, it is a state of object referral – the object alone is (see Travis and Shear 2010b).

The non-dual state of pure consciousness differs from the duality of conscious awareness or conscious experience. Conscious experience has a three-part structure – the experiencer, the object of experience, and the process of experience. These three components exist as separate even at the same time as they are unified in the conscious experience. In pure consciousness, the three-part structure of experiencer, object of experience, and process linking the two has been transcended. Now, the experiencer or subject is the both the subject and object of experience – it is described as a purely self-referral experience.

Table 10.1 presents a schematic of the qualitative shift of inner experience from sleeping to pure consciousness. This table presents a 2 × 2 grid with the presence or absence of affective, cognitive, or perceptual content as one axis, and presence or absence of sense of self as the other. As presented in this table, the waking state is characterized by the inner experience of a sense of self, the experiencer or doer and the experience of outer objects in the mind or in the environment. There is a clear separation between my inner reality and my outer experience.

Table 10.1 Phenomenological characteristics that differentiate waking, dreaming, sleeping and pure consciousness

		Sense of self is present	
		Yes	No
Inner and/or outer perception is present	Yes	Waking	Dreaming
	No	Pure consciousness	Sleeping

The sleep state is characterized by no sense of self and no awareness of any content. "Sleeping like a log" is a saying for having a good night's sleep. During deep sleep, there is no awareness of self or ongoing cognitive or perceptual experiences for large blocks of time.

Dreaming is arguably characterized by no sense of self and vivid dream images. This describes most dream experiences. Lucid dreaming, we argue, is meta-cognition within the dream state. A careful analyze of lucid dream content reveals that the dream ego and dream intellect make decisions that the waking ego and waking intellect would not make (see Travis 1994).

The fourth box in this 2 × 2 table is a sense of self without mental content. Before reading this paper, you along with the vast majority of today's scientists might say that state does not exist. The empty cell is simply an artifact of setting up a 2 × 2 grid. How can there be a sense of self without an object; without a sense of the body or the thinker or the thinking? William James, in his *Principles of Psychology*, observed:

> . . . it is difficult for me to detect in the activity any purely spiritual element at all. Whenever my introspection glance succeeds in turning round quickly enough to catch one of those manifestations of spontaneity in the act, all it can ever feel distinctly is some bodily process, for the most part taking place within the head (James 1950/1890, p. 300).

This conclusion is a valid conclusion if the experience of consciousness has been limited to waking experience, which includes sense-of-self (inner) and outer experiences. In waking consciousness, the self is never found without an object. However, the proposal put forth in this paper, is that meditation techniques uncover that state of pure consciousness and so make this seemingly anamolous state available for discussion and experimentation.

10.2 Phenomenological and Physiological Investigations of Pure Consciousness

Fifty-two college students who practiced the TM technique for a few months to over 8 years were asked to describe their deepest experiences during TM practice. They were asked to use their own words to describe their experiences, as though they were describing it to someone who did not meditate. A content analysis of these descriptions yielded three themes that were common to all reports – absence of time, absence of space, and absence of body sense (Travis and Pearson 2000). Time, space, and body sense are the framework that give meaning to waking experience. During deepest TM experiences, both the fundamental framework and the content of waking experience were reported to be absent. This suggests that the experience of pure consciousness may not be an "altered" state of waking. It is not described in terms of distorted content – strong emotions, strong visual, auditory or tactile sensations, or distorted sense of self. Rather, pure consciousness was described by the absence of the customary framework and characteristics that

define waking experience. Phenomenologically, pure consciousness is distinct from experiences that characterize waking, dreaming, and sleeping.

Physiological, pure consciousness is also distinct from waking, dreaming, and sleeping. During pure consciousness, research reports higher EEG alpha coherence, and apneustic breathing – slow, extended inhalation from 10 to 20 s – with skin conductance orienting and a heart rate preparatory response at the onset of breath changes (Badawi et al. 1984; Travis and Pearson 2000; Travis and Wallace 1997). Apneustic breathing is not reported in normal populations (outside of meditation practices), and has never been reported in the literature with durations longer than 4–6 s (Plum and Posner 1980). The respiratory drive centers responsible for apneustic breathing (the parabrachialis medialis nuclei) are quiet during waking, dreaming, and sleeping, but become active during pure consciousness periods (Kesterson and Clinch 1989). Changes in the brainstem nuclei driving breathing, in autonomic functioning and brain state, with distinct phenomenological reports, supports the description of pure consciousness as a fourth major state of consciousness fundamentally different from waking, dreaming, or sleeping (Maharishi 1997).

10.3 Self-Referral Default Mode Network: Pure Consciousness Experiences Activate the Intrinsic Default State of the Brain

During TM practice, brain activity is reported to increase in the default mode network (DMN) (Travis et al. 2010). This network was first noted when comparing data from nine different neural imaging studies. Since neural imaging involves subtracting control from experimental images, higher activation in a control condition could lead to perceived "decreases" in the experimental condition. In these nine studies of unrelated and independent tasks, decreases in midline frontal and parietal cortices were consistently reported (Raichle et al. 2001); eyes-closed rest or simple fixation on a point were used as the control conditions. The researchers concluded that a default mode network exists that is an intrinsic, default property of the brain (Fox and Raichle 2007). Activation in this default mode is higher during low cognitive load periods, such as eyes-closed resting control periods, and is lower during goal directed behaviors requiring executive control (Gusnard et al. 2001; Raichle and Snyder 2007).

Further research into DMN activation reported higher activation during (1) self-referential mental activity (Gusnard et al. 2001; Kelley et al. 2002; Vogeley et al. 2001); (2) self-projection tasks; and (3) taking the viewpoint of others (Buckner and Carroll 2007). Activity in the default state is higher during eyes-closed experiences. When one closes the eyes, objects are reduced but sense-of-self remains. The person knows that they are sitting in space; they are there waiting for the next instruction. This is a predominately self-referral experience and DMN activity is reported to be high. When opens the eyes and attention streams through the senses and falls on an object – an object referral experience – DMN activity is reduced.

Relative to eyes-closed rest, DMN activation was higher during TM. This supports the description of pure consciousness during TM practice as being a fuller or higher sense of self-referral than just eyes-closed rest. Self can be written with a small and a capital "S". When "self" is written with a small "s" it denotes the self that thinks, feels, decides, and experiences – the self in a waking state; when "Self" is written with a big "S" it denotes that part of the individual that does not change and is the source of all streams of individual activity (Maharishi 1969). Thus, DMN activation during eyes-closed rest – small self-referral – would rise during the experience of pure consciousness – large self-referral.

10.4 Junction Point Model of Pure Consciousness, Waking, Sleeping, and Dreaming

A proposed Junction Point Model integrates meditation experience with waking, dreaming, and sleeping. This model helps to locate meditation experiences relative to those three states. It also provides a model for discussing higher states of consciousness. The Junction Point Model posits that waking, sleeping, and dreaming are not isolated states that interact, but are sequential expressions of an undifferentiated field – pure consciousness – that underlies them (Maharishi 1972; Travis 1994). This model starts with the observation that waking, sleeping, and dreaming are discrete states. This assumption is supported by unique brain stem activity (Siegel 1987), neurotransmitter balance (Hobson 1988), and EEG, EMG, and eye movement patterns (Niedermeyer 1997) during each state. The model suggests that one state must completely fade away before the next begins, and that between any two, a junction point can be located that will mark the end of one state and the beginning of the next. These junction points are windows into the field of consciousness posited to underlie waking, sleeping, and dreaming.

10.5 Research Testing the Existence of Pure Consciousness Between States of Consciousness

The prediction that pure consciousness can be located between states of consciousness is supported by two lines of research. First, similar EEG patterns have been reported during TM practice, which leads to pure consciousness between thoughts, as during the waking/sleeping transition. For instance, frontal alpha and slowing of peak EEG frequency by 1–2 Hz, reported during TM practice (Wallace 1970), were later independently reported (Santamaria and Chiappa 1987) during the waking/sleeping transition. This relation between EEG patterns during TM program and the waking/sleeping transition has also been experimentally investigated. EEG in 15 experienced TM subjects during TM practice was compared to EEG during the waking/sleeping transition in 15 non-meditating subjects matched for age, gender, and handedness. The raw EEG and the resulting power and coherence spectra were

not significantly different between the TM sessions and the waking/sleeping transition (Travis 1990). However, the duration of these EEG patterns were different. During TM practice, they lasted for the entire 10-min TM session; during the waking/sleeping transition, they lasted for 3–5 min.

Other researchers have reported this similarity of EEG patterns during TM and during the waking/sleeping transition, and the fact that they last longer during TM. They concluded that TM practice balanced awareness between waking and sleeping (Fenwick et al. 1977; Stigsby et al. 1981; Wachsmuth and Dolce 1980), or that TM practice freezes the hypnagogic process (Pagano and Warrenberg 1983; Schuman 1980). The junction point model gives a more comprehensive interpretation of these findings. According to this model, EEG patterns would be similar during the waking/sleeping transition and during TM practice because both states involve a gradual minimizing of mental activity followed by pure consciousness periods between states in the first case, and between thoughts in the second. Also, this model would predict a longer duration of this pattern during TM practice because one continues to give an inward direction to awareness during TM, thereby cycling through pure consciousness many times in each session, in contrast to the natural transition between states of consciousness.

A second line of research directly compared EEG patterns during TM practice to those during the junction points between waking/sleeping, sleeping/dreaming, and dreaming/sleeping. In the subjects' power spectra, activity in each band, except 7–10 Hz, could be explained by known sleep mechanisms (Travis 1994). For instance, the rise and fall of 1–4 Hz power occurred during periods of slow wave sleep marked by high delta density and power; 13–16 Hz power was highest during Stage 2 sleep, reflecting sleep-spindle activity. In contrast, the rise and fall of 7–10 Hz activity (alpha1) occurred at the transitions between waking, sleeping, and dreaming in all subjects. Activity in this same band was seen in these subjects during their Transcendental Meditation program. In terms of the Junction Point Model, significant peaks in EEG power during the transitions between waking, sleeping, and dreaming and during TM practice suggests that a similar state might be available between states of consciousness and between thoughts.

10.6 Research Testing the Integration of Pure Consciousness with Waking, Sleeping and Dreaming

If pure consciousness underlies waking, dreaming and sleeping, can it be integrated with the three customary states of consciousness? If pure consciousness represents a fourth state of consciousness, then the integration of pure consciousness with waking, dreaming and sleeping will be a fifth state. This is the first stabilized state of enlightenment described in the Vedic tradition, called *turiyatit chetana* (Maharishi 1997). Since subjective experiences and states of consciousness have defining physiological characteristics, this proposed fifth state of consciousness should also have distinct physiological markers.

10.7 Research Testing the Integration of Pure Consciousness with Sleeping

Two research papers report EEG data that support the description of the experience of pure consciousness along with the body sleeping. Banquet and Sailhan (1974) recorded EEG during sleep in advanced TM subjects, and reported that alpha1 activity, seen during the TM practice, was superimposed over delta activity, seen during deep sleep. Although they used experienced TM subjects, they did not correlate this EEG pattern with self-reports of the integration of pure consciousness with sleep.

Mason tested this hypothesis more directly (Mason et al. 1997). She compared sleep EEG in 11 subjects reporting the integration of pure consciousness with sleep, to sleep EEG in 11 short-term TM subjects, who did not report this experience, and 11 non-meditating controls. Subjects reporting the integration of pure consciousness with sleep had simultaneous alpha1 and delta in their sleep records, which supports their subjective experience of self-awareness while the body rested deeply. Simultaneous alpha and delta during sleep, called alpha/delta sleep, has also been reported in clinical cases of subjects in pain (Moldofsky et al. 1983). However, these clinical subjects only reached Stages 2 and 3 during sleep. In contrast, the TM subjects did not complain of pain, discomfort, or problems during sleeping, and they had the same amount of Stage 4 sleep as normal subjects.

10.8 Research Testing the Integration of Pure Consciousness with Waking

A second line of research has investigated the integration of pure consciousness with waking tasks. EEG was recorded during simple and choice paired reaction time tasks in 17 long-term TM subjects, reporting the integration of pure consciousness with waking and sleeping, and compared to EEG patterns in 17 short-term TM subjects who did not report this experience, and 17 non-meditating controls. In individuals reporting the integration of pure consciousness with waking and sleeping, brain preparatory responses during the paired reaction time tasks were higher in simple but lower in choice trials, and alpha relative power and broadband frontal EEG coherence were higher during the challenging tasks (Travis et al. 2002). Increased alpha amplitude and coherence, characteristic of TM practice, appeared to become a stable EEG trait during challenging tasks in these subjects.

These individuals were also given a battery of personality and psychological tests including inner/outer orientation, moral reasoning, anxiety, and personality. Scores on these tests were factor analyzed. The first unrotated PCA component of the test scores yielded a "consciousness factor," analogous to the intelligence *g* factor. The individuals reporting the integration of pure consciousness with waking and sleeping had significantly higher consciousness factor scores – more

inner directed, higher levels of moral reasoning, higher emotional stability, and lower anxiety. These same individuals had higher scores on the Brain Integration Scale (BIS) (Travis et al. 2004).

We can use a movie metaphor to give a sense of the growth of consciousness. Watching a movie, most individuals are "lost" in the movie. The movie is real. Emotions and thoughts are dictated by the ever-changing sequence of the film. This is a predominantly object-referral state that characterizes the waking state. The meditative experience of transcending – the repeated experience of pure, self-referral consciousness – alters this common movie-going experience. Subjectively, the individual begins to "wake up" to his/her own inner status. Although continuing to enjoy the movie, he/she gradually becomes aware that they exist independently of the movie. They experience a value of witnessing the activity around them. To these individuals, the ever-changing movie frames are a secondary part of experience because these frames are always changing. The most salient part of their every experience is pure self-awareness. What is "real" shifts with time from the movie to self-awareness, from the thoughts, feelings, and actions to the Self, from object-referral to self-referral awareness (Travis et al. 2004).

10.9 Other Research on the Brain Integration Scale

The Brain Integration Scale (BIS) was constructed from cross-sectional data of individuals reporting more frequent experiences of pure consciousness. A 3-month random assignment longitudinal study with college students supports the finding that TM practice leads to higher scores on this scale. After 3 months of TM practice, college students increased on brain integration scores and decreased in sympathetic reactivity (Travis et al. 2009). They also decreased in negative personality traits, such as total mood disturbance, anxiety, and depression, and increased in positive personality traits such as vigor, emotional intelligence, and behavioral and emotional coping (Nidich et al. 2009). Thus, the experience of pure consciousness during TM could to be a causal mechanism for increasing levels of brain integration over time.

In addition, BIS scores were explored in two groups of athletes: professional athletes who placed in the top ten in the Olympics, world games, or national games for 3 consecutive years, or control athletes who did not consistently place. The professional athletes who excelled had higher BIS scores, faster skin conductance habituation to loud tones, and higher moral reasoning and ego development than the controls (Harung et al. in press). The athletes were not practicing a meditation technique. Their level of brain integration reflects the sum of their lifestyle and life experiences to that point. However, this finding suggests greater success in life with those markers that could index higher consciousness.

10.10 Conclusion

Meditation techniques can serve as probes to investigate states of consciousness. Investigating the Transcendental Meditation technique, a technique designed to transcend its own activity, has led to phenomenological and physiological descriptions of a state called pure consciousness, a proposed fourth state of consciousness, and has generated a model, the Junction Point Model, which integrates waking, sleeping, and dreaming with meditation experiences. This model is supported by similar EEG patterns during the transitions between waking, sleeping, and dreaming and during TM practice. This model also suggests that the underlying field of pure consciousness can coexist with ordinary waking, sleeping and dreaming. This would be a fifth state of consciousness. Individuals reporting this experience were distinguished during slow wave sleep by the coexistence of alpha EEG, observed during TM, and delta EEG, observed during sleep, and during waking tasks by higher scores on the Brain Integration Scale and higher consciousness factor scores. The Junction Point Model could provide a structure to integrate ordinary experience with meditation experiences to help model and research the full range of human consciousness.

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