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Higher theta and alpha1 coherence when listening to Vedic recitation compared to coherence during Transcendental Meditation practice

Frederick Travis *, Niyazi Parim, Amrita Shrivastava

Center for Brain, Consciousness and Cognition, Maharishi University of Management, 1000 North 4th Street, Fairfield, IA 52557, United States

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ABSTRACT

This study compared subjective experiences and EEG patterns in 37 subjects when listening to live Vedic recitation and when practicing Transcendental Meditation (TM).

Content analysis of experiences when listening to Vedic recitation yielded three higher-order code. Experiences during Vedic recitation were: (1) deeper than during TM practice; (2) experienced as an inner process; and (3) characterized by lively silence. EEG patterns support these higher-order codes. Theta2 and alpha1 frontal, parietal, and frontal-parietal coherence were significantly higher when listening to Vedic recitation, than during TM practice. Theta2 coherence is seen when attending to internal mental processes. Higher theta2 coherence supports subjects' descriptions that the Vedic recitations were "not external sounds but internal vibrations." Alpha1 coherence is reported during pure consciousness experiences during TM practice. Higher alpha1 coherence supports subjects' descriptions that they "experienced a depth of experience, rarely experienced even during deep TM practice." These data support the utility of listening to Vedic recitation to culture deep inner experiences.

1. Introduction

Research has described two features of consciousness: the *level* of consciousness (tonic wakefulness) and the *contents* of consciousness (specific thoughts, feelings, and perceptions of outer objects and experiences) (Koch & Tsuchiya, 2007). These two features of consciousness are intertwined during ordinary waking experiences. Consequently, most scientists, beginning with William James, have concluded that consciousness cannot exist without an object (James, 1890/1951; Natsoulas, 1997). These two features of consciousness can be disentangled, however, during meditation practices, which are techniques to explore the relation between the levels and contents of consciousness.

Meditation techniques involve different procedures to investigate conscious experiences and so fall into different categories (Travis & Shear, 2010). Meditation practices in the *Focused Attention* and *Open Monitoring* categories keep individual awareness engaged in experiencing objects—such as focusing on breath in the first category or passively observing ongoing experiences in the second category. Meditation practices in the *Automatic Self-Transcending* category, such as Transcendental Meditation, transcend mental activity to reveal a state of silent self-awareness underlying thinking (Travis & Shear, 2010). This is a state of *being* rather than a state of thinking or doing. This state experienced during Transcendental Meditation practice is called "pure consciousness" (Maharishi Mahesh Yogi, 1969; Travis & Pearson, 2000). Pure consciousness is "pure" in that it is a state

* Corresponding author at: Center for Brain, Consciousness and Cognition, 1000 North 4th Street, FM 683, Fairfield, IA 52557, United States.
E-mail address: ftravis@mum.edu (F. Travis).

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of consciousness—self-awareness—free from changing mental content. It is defined as the simplest form of human awareness or the ground state of consciousness, the basis of all thoughts, feelings, and actions (Maharishi Mahesh Yogi, 1986).

Physiologically, experiences of pure consciousness during TM practice have been characterized by higher frontal alpha1 coherence (Dillbeck & Bronson, 1981; Travis & Arenander, 2006; Travis et al., 2010), higher frontal and lower brainstem blood flow (Ludwig, Gevirtz, Hubbard, & Travis, 2011), MEG source localization in medial prefrontal and anterior cingulate cortices (Yamamoto, Kitamura, Yamada, Nakashima, & Kuroda, 2006), and higher eLORETA source localization in midline frontal and parietal cortices that are part of the default mode network (Travis et al., 2010). In a meta-analysis, TM subjects had lower sympathetic activation than eyes-closed rest, as indicated by lower breath rate, lower skin conductance levels, and lower plasma lactate (Dillbeck & Orme-Johnson, 1987).

Phenomenologically, a content analysis of descriptions of pure consciousness during TM practice yielded three themes: absence of time, absence of space, and absence of body sense (Travis & Pearson, 2000). Time, space, and body sense are the framework that give meaning to waking experience. Note that pure consciousness was not described in terms of distorted content—strong emotions, vivid sensations, or distorted sense-of-self. Rather, it was described as the state that is experienced when the customary framework that defines everyday waking experiences is transcended.

The experience of pure consciousness is fundamentally different from ordinary waking experiences. In ordinary waking experiences, changing thoughts and perceptions define the experience. Changing mental content move through awareness, forming a "stream of consciousness" (James, 1890/1951). In contrast, the experience of pure consciousness is "bigger" than the individual. Pure consciousness is defined as being outside the boundaries of time, space and body sense and outside of individual characteristics, such as age, height, gender, and style of thinking. The individual "experiences" pure consciousness by transcending active thinking levels—experiencing more subtle levels of a thought and then transcending even the most subtle level of thinking (Maharishi Mahesh Yogi, 1969). Then the mind is silent and awake with nothing to experience. It is like a wave settling down to the ocean, and becoming the ocean.

This discussion admittedly takes us outside of the modern scientific paradigm. We ask readers to view this argument as a conceptual framework to understand the study hypothesis and to interpret effects of listening to recitation of the Vedic literature.

There is a similarity between individual consciousness and pure consciousness. Individuals are conscious of changing experiences—indeed, the ability to report ongoing experience is the criterion used in research to establish that one is conscious. Maharishi Mahesh Yogi who brought Transcendental Meditation to the West explains that pure consciousness is also, by its nature, conscious. Yet, there is no content in pure consciousness. So, pure consciousness is awake to itself and interacts with itself. This creates as if waves or sequences of transformations—reverberations—within pure consciousness. These reverberations have been experienced as phonetic sequences by individuals with very clear awareness (Maharishi Mahesh Yogi, 1994; Nader, 2000). These sequences were passed down through an oral tradition and have been recorded as the Vedic literature of India. Thus, in this understanding, the Vedic literature are not texts on defense, grammar or architecture, but rather they are the sequences of transformation within pure consciousness.

1.1. Hypothesis

If the sounds of the Vedic literature reflect processes going on in the deepest aspect of silent pure consciousness, then listening to traditional Vedic recitation would enliven these sequences within the consciousness of the listener. This hypothesis will be tested by comparing EEG patterns recorded when listening to Vedic recitation and when practicing Transcendental Meditation. A semi-structured interview will also probe inner experiences when listening to Vedic recitation. TM practice was used as the benchmark in this study since extensive research has documented qualitative and quantitative characteristics of the experiences of pure consciousness during TM practice (Dillbeck & Orme-Johnson, 1987; Farrow & Hebert, 1982; Travis & Arenander, 2006; Travis & Pearson, 2000; Travis et al., 2010; Yamamoto et al., 2006).

2. Material and method

2.1. Subjects

Thirty-seven subjects volunteered for this study, 20 women and 17 men. They were an average age of 57.6 ± 9.3 years, and had been practicing the TM technique for 34.0 ± 11.4 years. They had also been practicing an advanced program, the TM-Sidhi program for 28.6 ± 9.3 years. None of the subjects were fluent in Sanskrit or were able to translate Sanskrit into English. Subjects signed consent forms before beginning the study, which had been approved by the University Institution Review Board.

2.2. Procedure

Each subject came in for EEG measurement in the early afternoon. Thirty-two sensors were applied to the scalp according to the 10/10 system. Sensors were also applied to the left and right ear lobes for later re-referencing before analysis. Impedances were below 10 kΩ at all sensors.