

The Use of Virtual Reality as a Meditative Neurotechnology (A Pilot Study)

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Abstract

The purpose of this study was to develop a new technological meditative tool, called the virtual reality meditative technique (VRMT) and test its feasibility for further large-scale studies. This VRMT was designed by the 7D Health research team based on principles of mind-body medicine, mental imagery, meditation, and other mystical states of consciousness to promote health-producing effects and optimal well-being. A sacred Hindu virtual reality (VR) environment was created for Hindu participants. EEG equipment was used to detect brainwave changes throughout the virtual reality experience, and self-report measures were administered to gather qualitative data. Although the sample size for this pilot study was too small for statistical data analysis, there were some observed brainwave changes, which suggest that some of the participants were experiencing shifts of consciousness. Additionally, the self-report data revealed that several participants felt calm, peaceful, and compassionate, with some experiencing improved moods. These results demonstrate the need for a further large-scale study to explore the wide range of health possibilities that this new technique could offer as a meditative aid. This VRMT intervention could have potentially therapeutic implications for complementary medicine, improving a person's well-being, as well as for enhancing one's creativity, training compassion, developing a high performance mind, and quickly experiencing higher states of mystical consciousness.

Utilisation de la Réalité Virtuelle pour une Neuro-technologie Méditative (Étude Pilote)

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Résumé

Le but de cette étude était de développer un nouvel outil technologique, appelé la « technique méditative de réalité virtuelle » (VRMT d'après ses initiales en anglais) et de mettre à l'épreuve sa faisabilité afin de pouvoir poursuivre ultérieurement des études à grande échelle. Cette VRMT a été conçue par l'équipe de recherche de santé « 7D » et se base sur les principes de la médecine corps-esprit, l'imagerie mentale, la méditation et d'autres états mystiques de conscience, avec le but de promouvoir des effets générateurs de santé et de bien-être optimal. Un environnement de réalité virtuelle (VR) hindoue sacrée a également été créé à l'attention des participants de nationalité hindoue. Un équipement de EEG (électro-encéphalogramme) a été utilisé afin de détecter des changements dans les ondes cérébrales tout au long de l'expérience de réalité virtuelle, et des tests d'auto-évaluation ont été fournis afin de recueillir des données qualitatives. Bien que la taille d'échantillon de cette étude pilote ait été trop exigüe pour produire une analyse

statistique appropriée, on a pu observer certains changements d'ondes cérébrales, qui donnent à penser que quelques-uns des participants ont éprouvé des changements d'état de conscience. Par ailleurs, les données d'auto-évaluation recueillies ont révélé que plusieurs participants ont bénéficié après coup d'un état de calme, de paix, de compassion et d'une meilleure humeur. Ces résultats démontrent la nécessité d'une plus vaste étude afin d'explorer la vaste gamme de possibilités que cette nouvelle technique pourrait offrir en tant qu'aide à la méditation. Cette intervention de VRMT pourrait avoir des implications potentiellement thérapeutiques pour la médecine alternative, en vue d'améliorer le bien-être de la personne ainsi que la créativité, d'augmenter la compassion, de développer un mental de performances élevées et d'expérimenter rapidement des états supérieurs de conscience mystique.

"El Uso de la Realidad Virtual como Técnica de Meditación Neurotecnológica (Un estudio piloto)"

Ranjie Singh, Ph.D., Paula Rayo, y Nirvana Singh

Abstracto

El propósito de este estudio fue desarrollar una nueva herramienta tecnológica para la meditación, llamada la técnica de meditación de realidad virtual (VRMT) y probar su viabilidad para realizar nuevos estudios a gran escala. Este VRMT fue diseñado por el equipo de investigación 7D Salud basado en los principios de la medicina mente-cuerpo, la imaginación mental, la meditación y otros estados místicos de conciencia para promover los efectos que producen la salud y el bienestar óptimo. Un (VR) entorno de realidad virtual sagrado hindú fue creado para los participantes hindúes. Equipos de EEG fueron utilizados para detectar cambios en las ondas cerebrales durante la experiencia de la realidad y de auto informe virtuales fueron administradas para recopilar datos cualitativos. Aunque el tamaño de este estudio piloto era demasiado pequeño para el análisis estadístico adecuado, hubo algunos cambios cerebrales observados, lo que sugiere que algunos de los participantes estaban experimentando cambios de conciencia. Adicionalmente, los datos de auto-informe revelaron que varios participantes experimentaron tranquilidad, paz, compasión y mejor estado de ánimo. Estos resultados demuestran la necesidad de un nuevo estudio a gran escala para explorar la amplia gama de posibilidades para la salud que esta nueva técnica podría ofrecer como ayuda para la meditación. El uso de este VRMT podría tener implicaciones potencialmente terapéuticas para la medicina complementaria, para mejorar del bienestar de una persona, así como para mejorar de la propia creatividad, crear compasión, el desarrollo de una mente de alto rendimiento, y para experimentar rápidamente los estados superiores de conciencia mística.

O uso da Realidade Virtual como uma Neurotecnologia Meditativa (Um estudo piloto)

Ranjie Singh, Ph.D., Paula Rayo, e Nirvana Singh

Resumo

O objetivo deste estudo foi para desenvolver uma nova ferramenta tecnológica de meditação, chamada Técnica de Meditação em Realidade Virtual (VRMT-Virtual Reality Meditative Technique), e para testar a sua viabilidade para novos estudos de grande escala. Este VRMT foi projetado pela equipe de pesquisa '7D Saúde' com base nos princípios de medicina da mente-corpo, de imagem mental, de meditação e de outros estados místicos de consciência para promover efeitos de boa saúde e bem-estar ideal. Um ambiente sagrado Hindu de Realidade Virtual (VR) foi criado para os participantes hindus. Foi utilizado um equipamento de EEG para detectar alterações de ondas cerebrais durante a experiência de realidade virtual, e também foram administradas medidas de auto-relato para coletar dados qualitativos. Embora este estudo piloto foi muito pequeno para análise estatística adequada, algumas mudanças de ondas cerebrais foram observadas, o que sugere que alguns dos participantes estavam experimentando mudanças de consciência. Além disso, os dados do auto-relatório revelaram que vários participantes sentiram calma, paz, compaixão, e alguns ficaram de melhor humor. Estes resultados demonstram a necessidade de um estudo mais aprofundado, em larga escala, para explorar a vasta gama das possibilidades de saúde que esta nova técnica poderia oferecer como um auxílio de meditação. Esta intervenção do VRMT poderia ter um grande potencial terapêutico para a medicina complementar, melhorar o bem-estar, e também para melhorar a criatividade, praticar compaixão, desenvolver uma mente de alto empenho, e experimentar rapidamente estados superiores de consciência mística.

Der Einsatz der Virtuellen Realität als einer Meditativen Neurotechnologie (Eine Pilotstudie)

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Zusammenfassung

Der Zweck dieser Studie war, ein neues technologisches Werkzeug der Meditation zu entwickeln, die so genannte Virtuelle Realität Meditations-Technik (VRMT), und deren Machbarkeit im Hinblick auf weitere groß angelegte Studien zu testen. Diese VRMT wurde vom 7D Health Research-Team entwickelt, um der Gesundheit förderliche Auswirkungen und optimales Wohlbefinden zu steigern, basierend auf Prinzipien der Geist-Körper-Medizin, mentalen Bildern, Meditation und anderen mystischen Bewusstseinszuständen. Eine Virtuelle Realität (VR) als heilige hinduistische Umgebung wurde für Hindu-Teilnehmer erstellt. Mittels EEG-Geräten wurden Veränderungen der Hirnwellen während der Erfahrung der Virtuellen Realität gemessen, und persönliche Erfahrungsberichte wurden erhoben, um qualitative Daten zu erhalten. Obwohl die Datenmenge dieser Pilotstudie für eine exakte statistische Analyse zu gering war, wurden Änderungen bei den Gehirnwellen festgestellt, die darauf schließen lassen, dass einige der Teilnehmer Veränderungen des Bewusstseins erfahren haben. Darüber hinaus ergaben die bei der Selbsteinschätzung gewonnenen Daten, dass mehrere Teilnehmer sich als ruhig, friedlich und mitfühlend erlebten und eine verbesserte Stimmungslage empfanden. Diese Ergebnisse verdeutlichen die Notwendigkeit einer weiteren groß angelegten Studie, um die breite Palette von gesundsförderlichen Möglichkeiten zu erforschen, die diese neue Technik als

meditative Hilfe anbieten könnte. Der Einsatz der VRMT könnte eine mögliche therapeutische Bedeutung für die Komplementär-Medizin aufweisen, indem dieser das Wohlbefinden und die Kreativität von Anwendern steigert, das Mitgefühl trainiert, die geistige Leistungsfähigkeit verbessert und schnell die Erfahrung höherer mystischer Bewusstseinszustände ermöglicht.

Introduction

Over the past decades, several studies have confirmed the importance of meditation and the experiencing of advanced states of consciousness for optimal health, wellness, longevity, peace and happiness.⁽⁴⁶⁾ Massion et al.⁽⁴³⁾ conducted a study at the University of Massachusetts which revealed that mindfulness meditation is associated with increased physiological levels of melatonin, which have therapeutic implications in the area of breast and prostate cancer. Similarly, Singh⁽⁶²⁾ found that a combined self-healing technique using specialized breathing, vivid imagery, and emotionalized meditative intonations increases melatonin levels due to increased pineal gland activity. Researchers have speculated that the production of melatonin during meditation is due to the activation of the pineal gland.^(43, 62) In 2014, in a study published in the *Canadian Oncology Nursing Journal*, a part of Singh's self-healing techniques was used to help cancer patients improve sleep quality.⁽²⁾

Chopra and colleagues⁽¹⁵⁾ have observed cardiovascular benefits from the mental calm that meditation promotes, including a decrease in blood pressure in a normotensive population. Meditation is also thought to slow down the aging process, which could be due to the lengthening of telomeres and decreased rate of cellular aging.⁽¹⁹⁾ In 2010, a study revealed that people who attended a three-month meditation retreat had significantly higher telomerase activity, helping to delay the aging process.⁽¹⁹⁾ They also observed an increase in mindfulness, decrease in neuroticism, and a better understanding of their life purposes. Furthermore, researchers at the University of California San Francisco found that women who focused on the "Present" (a form of mindfulness meditation) reported longer telomeres compared to women who had wandering minds.⁽¹⁹⁾ In 2013, another study revealed that women who practised loving-kindness meditation had longer telomeres than women who did not practice meditation.⁽¹⁹⁾ Longer telomeres are associated with increased longevity.

Wallace⁽⁶⁷⁾ noted that the Transcendental Meditation (TM) technique allows the nervous system to function in a more refined manner, which positively influences a wide variety of health outcomes; Alexander et al. (as cited in Orme-Johnson)⁽⁴⁶⁾ found that states of higher consciousness are associated with alpha and theta EEG coherence. They assert that higher states of consciousness are states in which the cosmic psyche is identified as the basis of individual psyche. Cosmic psyche is known as "an unrestricted field of intelligence and creativity at the foundation of not only human nature but Nature's functioning as a whole." Furthermore, attaining and experiencing these advanced mystical states of consciousness are the highest stages of human development, wherein one's fullest potential may be expressed. Beaugard and O'Leary⁽¹⁰⁾ also noted that during the mystical experience, in which higher states of consciousness are accessed, there is more theta activity in the right inferior parietal lobule, the superior parietal lobule, and the temporal cortices, as well as in the anterior cingulate cortex and

the medial prefrontal cortex.

As Orme-Johnson⁽⁴⁶⁾ indicates, “Maslow found that the healthiest, most creative and integrated individuals have more frequent ‘peak experiences,’ ‘healthiest moments,’ periods of ‘transcendent ecstasy,’ ‘tremendous intensification of any of the experiences in which there is loss of self or transcendence of it.’ Skip and colleagues argue that the reason that other meditation and relaxation techniques are not as effective as the TM technique in developing self-actualization is because they do not provide the experience of transcendental consciousness. Other meditation techniques tend to increase mental activity by requiring contemplation (thinking about the meaning of something) or concentration (effortful holding of attention on a particular object) rather than allowing the mind to settle to the silent state of transcendental consciousness.... In another study, they found that elderly, long-term practitioners of the TM technique have lower blood levels of lipid peroxides, substances linked to heart disease, compared with elderly people who do not practice TM. In her doctoral dissertation, Mason found that the EEG during sleep of subjects frequently experiencing cosmic consciousness (witnessing) showed an EEG pattern of transcendental consciousness (6-8Hz theta-alpha) superimposed upon the EEG of deep sleep (1-3 Hz delta).” Holz et al.⁽³⁰⁾ have found that EEG slow-wave activity and sleep spindles, also known as sigma activity, are positively correlated with consolidation of declarative and procedural memories.

Benefits of Meditation

There are numerous studies demonstrating the association of meditation with improved mental health, including reduction of anxiety, less substance abuse, PTSD symptomatic relief, and enhanced cognitive functioning.⁽³⁶⁾ Researchers at the University of California San Francisco suggest that the reason meditation works so well is that meditation promotes a positive and healthy mind to maintain well-being and the ability to cope with stress effectively.⁽¹⁹⁾ Some of the biological reactions initiated by meditation include reduction in oxygen consumption, lower secretion of stress hormones, enhanced immunity, and calm brainwave activity.⁽³⁶⁾ Forman⁽²⁵⁾ suggests that mystical experiences during meditation are trophotropic in that physiological parameters such as heart rate, skin temperature, galvanic skin responses, and EEG patterns decrease in activity. Quieting the mind through meditation enables the body to go into a relaxed state, acting as an antidote to the stress response, and enabling a homeostatic state that the body craves. Nader⁽⁴⁵⁾ wrote a treatise discussing the discovery of the external reality of the Ramayan and Vedic literature (a Hindu sacred scripture) in the structure and function of human physiology.

The Importance of Experiencing Higher and Mystical States of Consciousness

A meta-analysis of over 500 studies has found significant associations between higher states of consciousness and improvements in daily life.⁽⁵⁾ For example, researchers have found that higher states of consciousness are correlated with increased self-actualization, creativity, intelligence and cognitive-perceptual abilities, as well as decreased anxiety, aggression, depression, and introversion.⁽⁴⁾ Moreover, higher states of consciousness are known to promote moral sensitivity, faith, courage, personal force, sympathy, affection, and morality while reducing fear, anger and hatred.⁽¹³⁾ Many religious luminaries and scientists have attributed their genius abilities to

exalted inner experiences, which provide inspiration to do their work.⁽⁴⁾ In fact, Einstein stated, “The most beautiful and most profound emotion we can experience is the sensation of the **mystical**. It is the sower of all true science. He to whom this emotion is a stranger, who can no longer wonder and stand rapt in awe, is as good as dead.” In his book *The Conscious Interlude*, Ralph Lewis⁽³⁸⁾ discussed the various dimensions of consciousness and encourages each person to use his or her conscious interlude wisely to experience the Divine, or Cosmic mind, that pervades the universe. The “conscious interlude” that Lewis writes about refers to a person’s existence.

Additionally, several more recent studies strongly suggest a powerful association between advanced mystical states of consciousness and better intuitive “psi” abilities, higher creativity, increased spirituality, psychological and physiological health, self-actualization, higher altruism, compassion, and even genius abilities.⁽³⁵⁾ Kelly⁽³⁵⁾ stated, “...**there are profound and inescapable interconnections, both historical and psychological, between mysticism and genius...the two co-occur to a conspicuous degree....** It is no exaggeration to say with Bucke that mystical consciousness pervades the foundations of all civilization; nevertheless, we predict with confidence (as would Myers) that if one administered standardized instruments for measurement of creativity and mysticism to a sufficiently large sample of subjects, one would find a significant overrepresentation of persons scoring extremely high on both dimensions simultaneously. Central to Patanjali’s practical psychology is a process of progressive intensification of attention, culminating in unwavering absorption in its objects. Three progressively deeper stages are distinguished—concentration, meditation, and absorption. This threefold process, Samyama, represents much more than a movement within the range of ordinary states of consciousness. Indeed, the central thrust of Patanjali’s exposition is to describe how the practice of Samyama, systematically intensified, will lead through a hierarchy of increasingly exalted discrete states to the ultimate mystical objective of pure, undifferentiated limitless consciousness. The emergence of supernormal capacities or siddhis is reported in matter-of-fact fashion as a by-product of this central movement, their value consisting mainly in providing markers on the developmental path. The eight limbs of Yogic practice as outlined by Patanjali can be understood at minimum as a system of progressive psychophysiological noise reduction leading to a state characterized by physical relaxation, isolation from the normal sensory environment, and intensely focused inwardly directed attention. This is strikingly consistent with the self-descriptions of gifted ESP subjects, and it would therefore not be surprising if even modest practice of Yoga and its central techniques of meditation should produce conditions favourable for the occurrence of psi.” Patanjali’s⁽⁴⁸⁾ work as discussed in the book *How to Know God* explains the importance of calming the mind for experiencing God. Furthermore, Andrea⁽⁶⁾ in his elegant work, *The Disciple and Shamballa*, discusses the great importance of using advanced mystical spiritual techniques to experience spiritual revelation and the critical importance of experiencing the Shamballa, the spiritual and esoteric forces accessible to the disciple on the path.

Forman⁽²⁵⁾ suggests that “mysticism seems to offer a procedure for unveiling certain deep truths of human existence. What it offers, in the end, is not a linguistic truth, but rather a way to slough off the onion layers of illusion and self-delusion, and allow the nonlinguistic inner presence of reflexively reveal itself to itself: consciousness showing itself to consciousness. In doing so, this

nonverbal presence has a great deal to teach about the nature of human life and intelligence.” Poole⁽⁵⁰⁾ in his book, *Mysticism—The Ultimate Experience*, discusses the various types of mystical experiences and the universal values of individuals and humanity as a whole. He states, “Mysticism is that discipline which makes it possible for us to reach and understand the source of knowledge that lies beyond the limits of the material universe.” He quotes Cheney⁽⁵⁰⁾ from *Men Who Have Walked With God*: “one of the purposes of mysticism is ‘to illuminate everyday living with the light of Divine understanding.’” Sperry⁽⁶³⁾ stated that a shift from materialism to a holistic science (incorporating neurosciences and consciousness) is important for better changing our human value system and a key for humanity’s quality of survival.

The Importance of Spiritual Practice and Compassion

Hood, Hill and Spilka⁽³¹⁾ emphasize the importance of spirituality and religion for physical, mental, and emotional health. Spiritual practices promote healthy behaviours, positive psychological states, coping mechanisms, and social support from one’s religious groups. There is evidence that suggests an association between religion/spirituality and lower blood pressure, reduced hypertension, better immune functioning, and increased optimal functioning. Additionally, spirituality promotes a sense of meaning and purpose in life, as well as greater self-esteem.

Polls in the U.S.A. have indicated that most people wish to have their spiritual needs considered while receiving health care but often fail to find it.⁽⁵¹⁾ Puchalski⁽⁵¹⁾ found that spiritual care is an important factor to consider for optimal health and must be one of the pillars in complementary medicine. Today, there are 101 medical schools that incorporate patient spirituality in their curriculum.⁽⁵⁸⁾ Levin et al.⁽³⁷⁾ conclude from their study that “...there is potential value of religious assessment for clinicians and behavioural medicine researchers interested in psychopathology, treatment utilization, coping and recovery.”

Religion and spirituality also promote more compassion, which is a marker for improved health. Seppälä⁽⁶⁰⁾ suggests that compassion can be trained and increased in a person. Seppälä⁽⁶⁰⁾ states, “Although compassion appears to be a naturally evolved instinct, it sometimes helps to receive some training. A number of studies have now shown that a variety of compassion and ‘loving-kindness’ meditation practices, mostly derived out of traditional Buddhist practices, may help cultivate compassion. Cultivating compassion does not require years of study and can be elicited quite rapidly. In a 2008 study that the author (R. Singh) conducted with Cendri Hutcherson (California Institute of Technology) and APS Fellow James Gross (Stanford), we found that a seven-minute intervention was enough to increase feelings of closeness and connection to the target of meditation on both explicit measures. In addition, we noted improvement on implicit measures that participants could not voluntarily control; this suggests that their sense of connection had changed on a deep-seated level. Fredrickson tested a nine-week loving-kindness meditation intervention and found that the participants who went through the intervention experienced increased daily positive emotions, reduced depressive symptoms, and increased life satisfaction. A group led by Sheethal Reddy at Emory with foster children showed that a compassion intervention increased hopefulness in the children. Overall, research on compassion interventions has shown improvements in psychological well-being, compassion, and social

connection.”

Compassion not only has tremendous benefits for overall health, happiness, and well-being but also promotes longevity. This is because the act of giving activates parts of the brain that are associated with pleasure, including the median forebrain bundle and limbic system. A brain-imaging study conducted by the National Institutes of Health demonstrated that when an individual observes someone giving money to charity, the pleasure centers of the brain are equally as active as when the individual receives money.⁽⁶⁰⁾ Burriss and Rempel⁽¹⁴⁾ add that there is a neural basis for empathy, as “previous human imaging studies focusing on empathy for others’ pain have consistently shown activations in regions also involved in the direct pain experience, particularly anterior insula and anterior and midcingulate cortex.”

Virtual Reality as a Passive, Easy to Learn Technique with Significant Clinical and Medical Benefits for Health, Wellness, and Happiness

More recently, using virtual reality (VR) has been very effective for phobias, pain management, and palliative care. Parsons and Rizzo (as cited in Creel)⁽¹⁷⁾ did a meta-analysis on 21 studies that examined the effectiveness of virtual reality therapy in treating anxiety disorders. They found that this new line of therapy is highly effective in treating anxiety disorders, especially for fear of flying and panic disorder with agoraphobia. Additionally, clients also prefer VR therapy over conventional therapy, as one study found that “...only 3% of 150 participants suffering from specific phobias refused VR exposure, while 27% refused in vivo therapy.”⁽⁵⁴⁾ Researchers suggest that the reason this VR method works is that the individual is restructuring neurological pathways in the brain that are activated when the individual faces one’s fear, in particular to teach the limbic system that one’s fear is not actually a threat.⁽¹⁶⁾ When phobics encounter the feared stimuli, they will experience a strong emotional response initiated by the insula and the amygdala in the brain, which produces unpleasant physiological reactions in the body. The body will react to the stimuli whether it is real or virtual. By exposing the afflicted individual to the feared stimuli in a virtual reality setting and with the assistance of a therapist, phobics have the ability to trick their brains into thinking that the phobia is not a real threat after all.⁽¹⁶⁾

VR has recently been developed for pain management to relieve burn victims’ pain during wound care.⁽¹⁾ Burn patients usually report excruciating pain during wound care such as bandage changes and wound cleaning, even when opioids were used. Hoffman, Patterson, and Sharar⁽¹⁾ developed a VR experience to distract patients from the pain during wound care and have found that it works better than opioids because it distracts the mind from processing pain signals. The thalamus is often targeted by anaesthetics, as there is emphasis on “...the critical role of the intralaminar thalamus in modulating the cortical circuits for consciousness.”⁽³³⁾ This technique is now being researched as pain control for soldiers injured in combat.

Virtual Reality and the Treatment of Cancer Patients and for Palliative Care

VR has been previously used as an intervention to induce positive emotions and promote relaxation states.⁽⁹⁾ One study examined the implications of this treatment on hospitalized metastatic cancer patients and the research revealed positive results for acute pain management

as well as for neuropsychological assessment and rehabilitation.⁽⁹⁾ The patients reported the VR treatment as pleasant and useful, and the data revealed improved mood states. Another study investigated the implications of VR for cancer patients in palliative care to provide them with emotional support and to encourage them to pursue an active lifestyle.⁽⁴⁷⁾ The researchers concluded that VR technology can be used to support communication between patients and others, to provide emotional and mental support through their crisis, and to actually treat cancer.

Other research has found that exceptional cancer patients who survived advanced cancer all had one thing in common: personal activism.⁽²⁷⁾ Personal activism is “...manifested in taking charge and getting involved in the process of diagnosis and treatment, as well as becoming more altruistic in their relationships with others. In many cases, this was reflected in a change in a philosophy about life.” Researchers⁽⁵⁵⁾ on remission contend, “It shows that it is possible for the body to clear cancer – even if it is incredibly rare.”

The Present Study

In this present study, an innovative virtual reality meditative technique (VRMT) was developed to quickly, within minutes, enable people to passively experience advanced meditative and mystical states with the positive accompanying effects. There is no learning required, it is relatively effortless, thereby not requiring years for developing skills and techniques of imagery, visualizations, or long sessions of hypnotic induction or psychotherapy, which all require active attention and extensive practice. The VRMT is not intended to be exactly identical to the natural meditation state, but rather it is intended as an aid to guide users into a state of consciousness that mirrors the meditative and mystical states of consciousness.

This VRMT technique resembles a reverential type of meditation, wherein the purpose is to invoke feelings of reverence and surrender to a higher being. In this present study, the reverential state was achieved by presenting participants with sacred visuals and sounds of various Hindu deities in a ceremonial setting. All movie clips and audio were chosen to induce a deep state of “*Bhakti*”—*an intense love for God and Reverence for the Universal Cosmic mind*, or a person’s unique concept of a “higher entity” or what some mystics call the Cosmic or “God,” or what some quantum physicists and scientists might call the quantum unified field of consciousness.

It was hypothesized that with this VRMT intervention, participants would experience a shift from beta to alpha and theta brain waves, as well as feelings of compassion, awe, serenity, and happiness. The visuals and audio (media) used in this study were specific for the Hindu participants. For future studies, the investigators will develop VRMT (audio/visual media) for other religions/philosophies/cultures/belief systems, the eventual goal being customization for each person for optimal therapeutic efficacy and positive effects.

Methodology (Virtual Reality/Psychophysiology and EEG)

This exploratory study was conducted at three Virtual Reality/Psychophysiology research labs: MedTech Group (Medical Technology), 7th Dimension health, and Health Psychology Associates.

Participants

The sample of this study included eight participants in total, of which three were male and five were female. The mean age was 56.8 years ($SD=12.8$) ranging from 34 to 77 years of age. All of the eight participants reported that this was their first experience with virtual reality. All necessary consent forms and ethical requirements were met. Since the VRMT in this study was culturally specific to Hindu practitioners, the sample for this study included only Hindu practitioners or those raised in a Hindu environment.

Instrumentation

1. Paper and pencil tests and self-report questionnaires.

- A. Expanded Tellegens Absorption Scale (ETAS).** This test was used to determine participants' susceptibility to psychological absorption. Absorption is defined as " 'a disposition, penchant, or readiness to enter states characterized by marked cognitive restructuring' experienced as either narrowed or expanded attention, and a 'readiness to depart from more everyday life cognitive maps and to restructure.' "(28) The test has two different subscales, including the Task Absorption Scale and Imaginative Absorption. The scale is provided in Appendix A.
- B. Profile of Mood Scale (POMS).** This test was used to determine participants' mood, which was measured before and after the VRMT intervention. This scale is provided in Appendix B.
- C. 7D Questionnaire.** This questionnaire was developed by the 7D research team to determine what emotions participants were feeling throughout the experience, including boredom, sorrow, happiness, compassion, etc. Appendix C provides a sample of this questionnaire.
- D. Hood's Mysticism Scale.** This scale was used to determine whether the participants felt a mystical experience during the VRMT intervention. This scale can be found in Appendix D.

2. Electroencephalogram (EEG) analysis. For this study, the professional research grade *B-Alert 24 Advanced Brain Monitoring system- research grade** was used as the EEG equipment to detect the electrical brain activity of participants as they were immersed in the VRMT experience. The purpose of this measure was to determine whether participants' EEG activities were changing from everyday wakefulness (β) beta to the signature EEG meditative states (alpha (α), theta (θ), and sigma (Σ) states) throughout the VRMT experience. The *B-Alert 24* details can be found in Appendix E. Further details such as impedance ranges, sampling rate, sensitivities, filter settings, etc., are available at the manufacturer's website, which can also be found in Appendix E.

3. Virtual Reality Equipment. This study used the Samsung Gear VR* equipment, including a Samsung Galaxy S7 smartphone and Gear VR headset, as well as Sony

noise cancelling headphones for the VR experiences to maximize presence and immersion. The Hindu VR audio-visual media was collated by the 7D research team, which included 15 minutes of Hindu film clips inside a Hindu temple and a variety of Hindu songs. Appendix F provides details and acknowledgements for the content used in this VRMT intervention. The translations of the Hindu songs can be found in Appendix G.

Disclaimer: 7D Health does not have any commercial affiliations with any of these commercial products. The details of this equipment used are simply intended to inform other researchers so that replicated studies may be conducted.

Procedure

The data for this study were collected throughout the week of May 16th, 2016. Participants were scheduled to attend the VR laboratory on a given day and time. Upon arrival at the MedTech Group offices, participants were escorted by a researcher to the VR laboratory where they were given a battery of tests. As participants filled out these questionnaires, the researchers assembled the EEG equipment on participants' heads and conducted several impedance tests to ensure that the EEG was acquiring good quality data. This session took approximately 30 minutes. Once the first round of tests was completed, participants watched an eight-minute video on 7D Health while EEG data was recorded as the pre-test. The researchers then attached the Samsung VR equipment to the participants and the VRMT experience began as the intervention session. The researchers remained nearby during the VRMT experience in case participants required assistance at any point throughout the experience. The duration of the VRMT experience was approximately 15 minutes.

After the VRMT experience, the researchers disassembled the VR equipment but continued to record EEG data as a post-test. At this point, participants were able to express their experiences to the researchers in an interview format. Following the interview, participants were asked to complete a final battery of tests post-session to compare their initial states of being with their sequential states of being. Once the final questionnaires were completed, participants received a debriefing form that included an explanation of the details of the study and were then escorted out of the VR lab.

Results

Electroencephalogram (EEG) Brain Wave Analysis

The EEG data revealed that several participants demonstrated a shift from beta to alpha, theta, and sigma from during the VRMT intervention. The ranges are as follows:

- A. Theta: from -6.4% to 38.7%
- B. Alpha: from -11% to 7.3%
- C. Sigma (spindle): from -3.1% to 22.4%
- D. Beta: from -6.4% to 5.9%

See Figure 1 for graph of percent changes of brain waves from pre- to post- VRMT intervention for each participant. See Figure 2 for sample of EEG data collection.

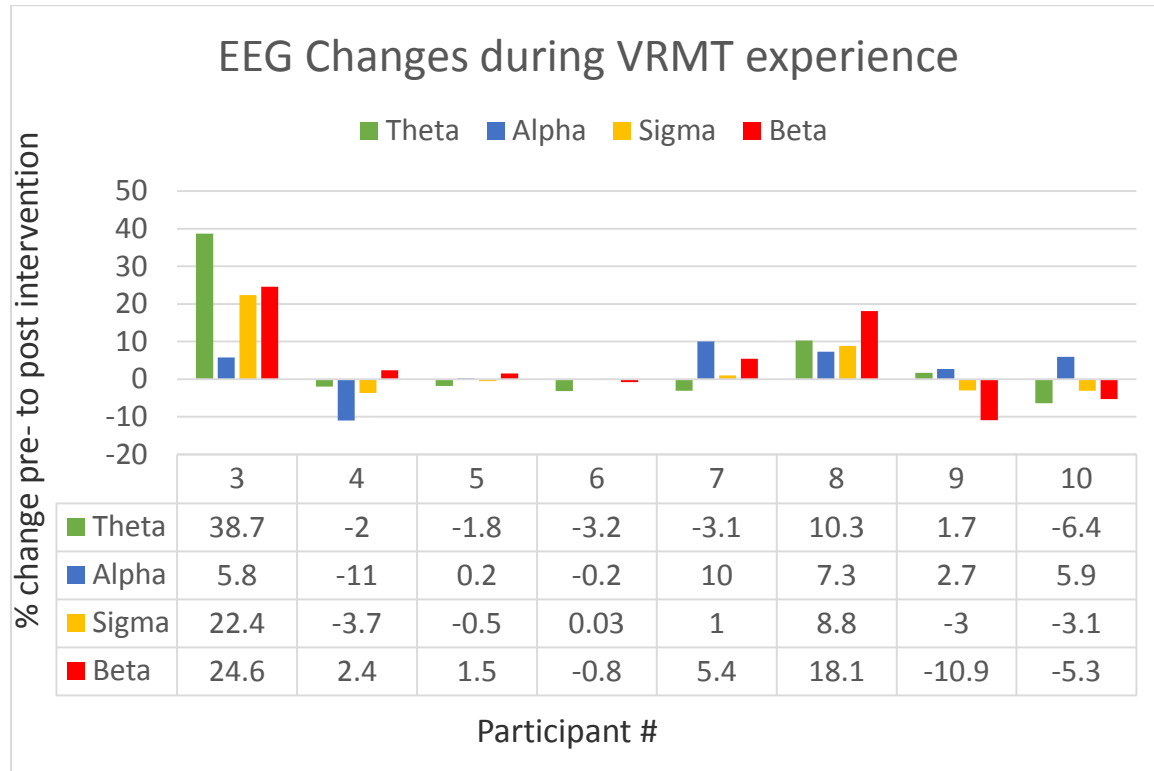


Figure 1. Brain wave changes from pre- to post-intervention

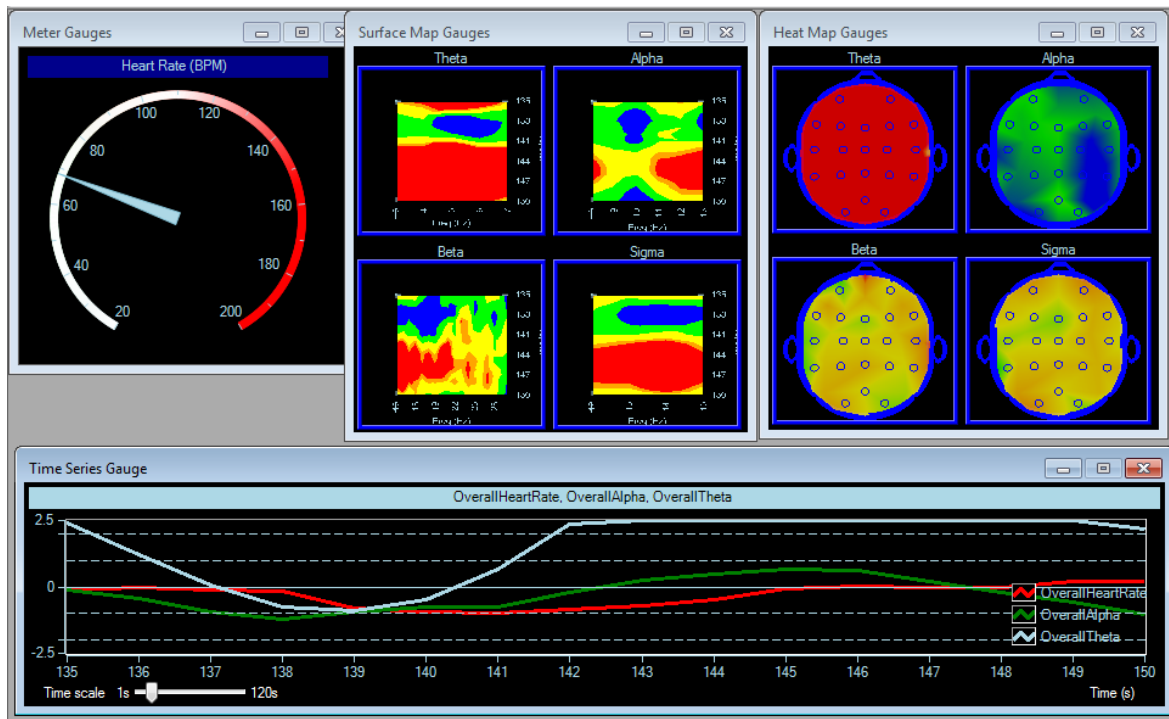


Figure 2. Sample of EEG data collection from B-Alert 24 Advanced Brain Monitoring System

Mood Improvement

Several participants reported an improvement in positive mood from pre- testing to post-intervention ranging from 16% to 67%. One participant was clearly stressed with 88% decrease in positive mood, and two participants failed to complete the post-test. See Figure 3 for details in mood improvement.

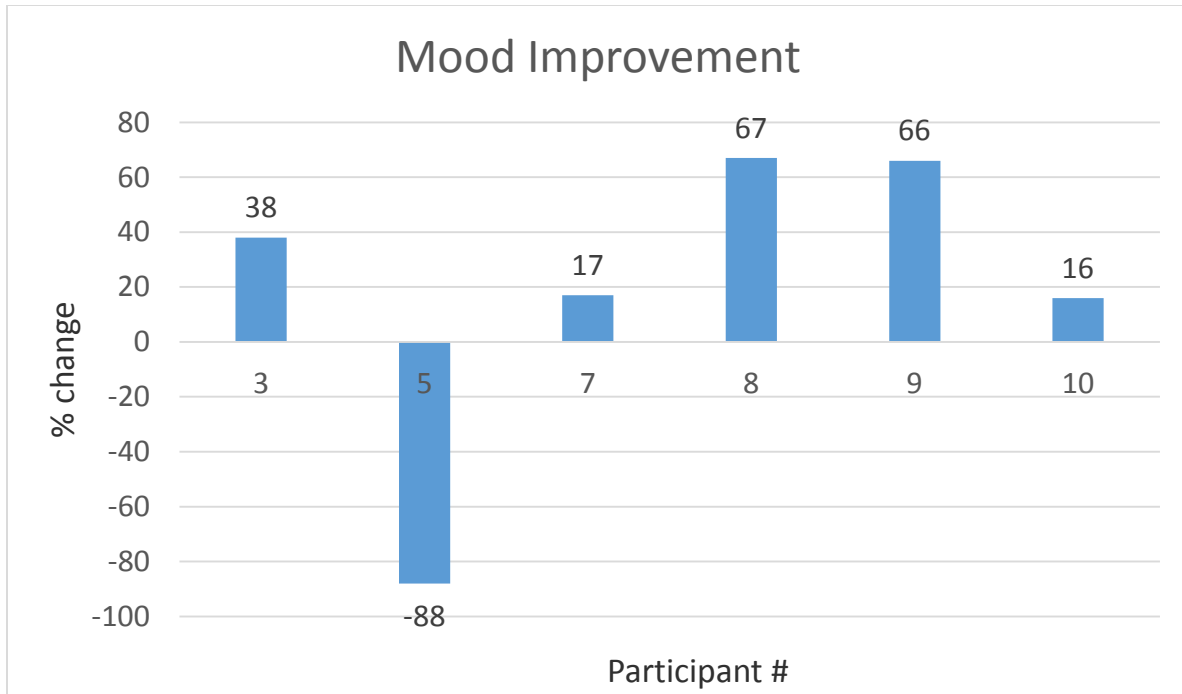


Figure 3. Mood improvement from pre to post testing

Absorption

The individual absorption scores from the sample in this study were compared to the population norm scores. It was found that all participants scored around the same range or lower than the population norm, indicating that absorption was **not** a required trait for a change in state of consciousness. See Figure 4 for a detailed chart of mean comparisons.

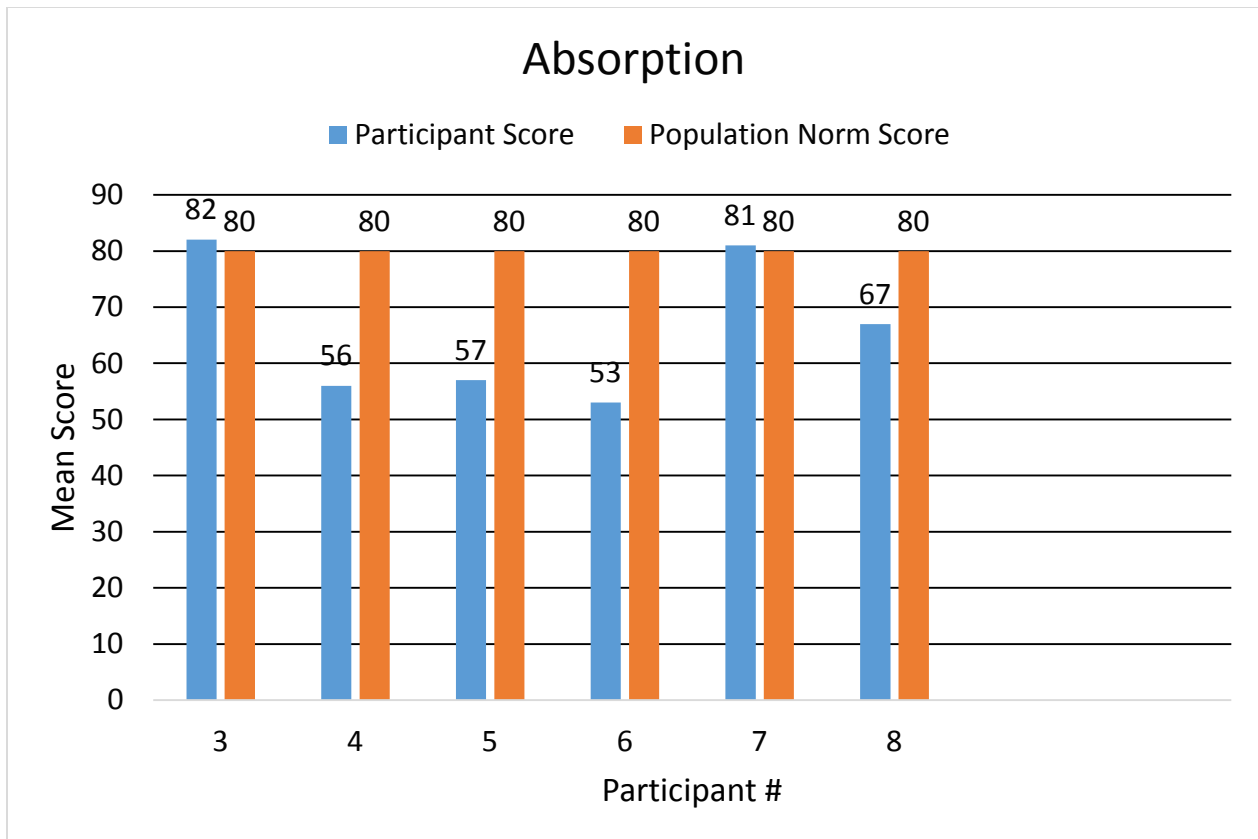


Figure 4. Mean comparisons of absorption

Qualitative Data Post-Intervention

The researchers used an experiential questionnaire to gather qualitative data, namely to understand how participants felt after the VRMT experience. Figure 5 illustrates all of the dimensions that were included in the questionnaire. After the VRMT experience, the participants reported the following average scores out of 10:

1. Immersion: 6.4/10
2. Boredom: 3.1/10
3. Crying: 3.3/10
4. Sorrow: 2/10
5. Happiness: 7/10
6. Amazement: 7.4/10
7. Compassion: 8.9/10
8. Contact with the Divine: 7.9/10

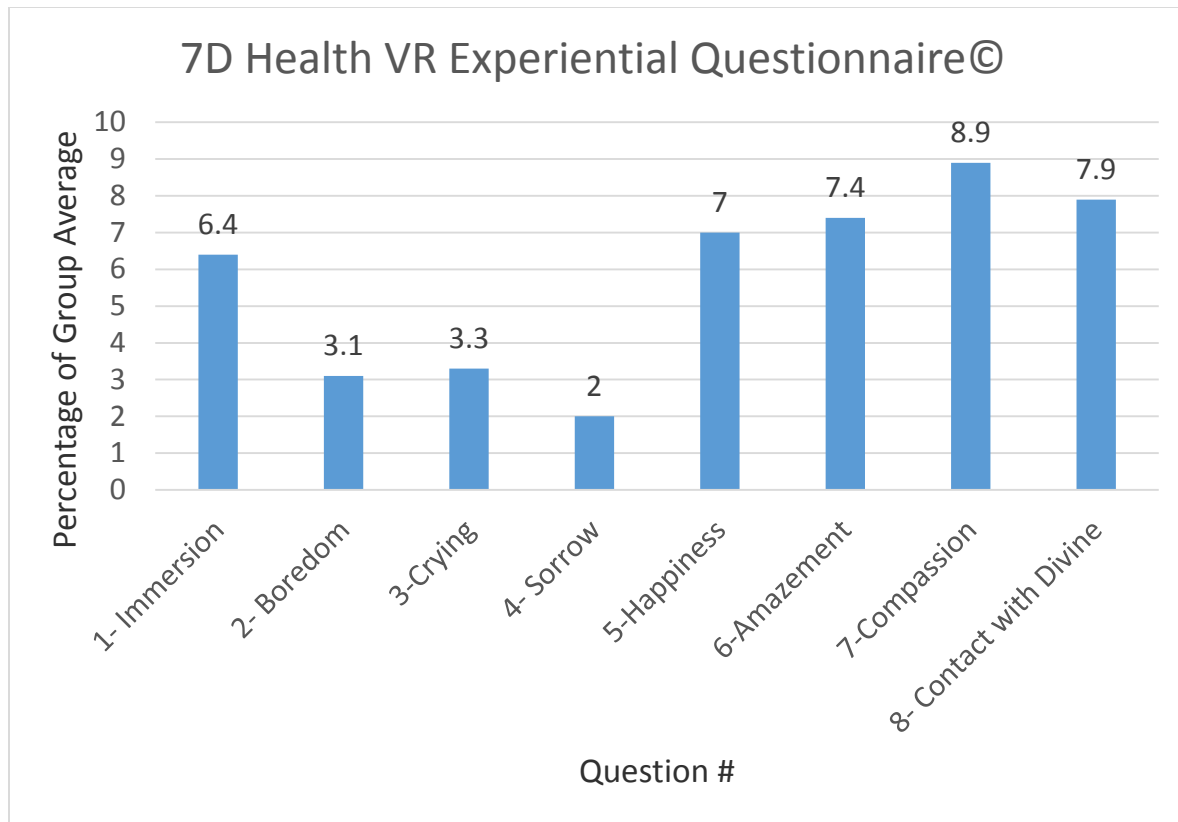


Figure 5. Group average of experiential questionnaire

Participants were also interviewed using an audio recorder after the VRMT experience, as they were asked about how they felt throughout the experience. The participants reported feeling calm and peaceful and that it was a nice experience. In particular, participant 5 reported, “I felt I was in heaven.” Some participants also reported recalling childhood memories as part a result of the VRMT experience.

Mysticism

Hood’s Mysticism Scale was used to determine whether participants perceived the virtual reality experience as mystical in the post-test. The highest possible score on the Mysticism Scale is 45. Figure 6 illustrates participants’ individual scores. Participant 4 failed to complete the scale. Five out of 7 participants (71%) scored very high in having a ‘mystical experience’ with two scoring 100% mystical experience.

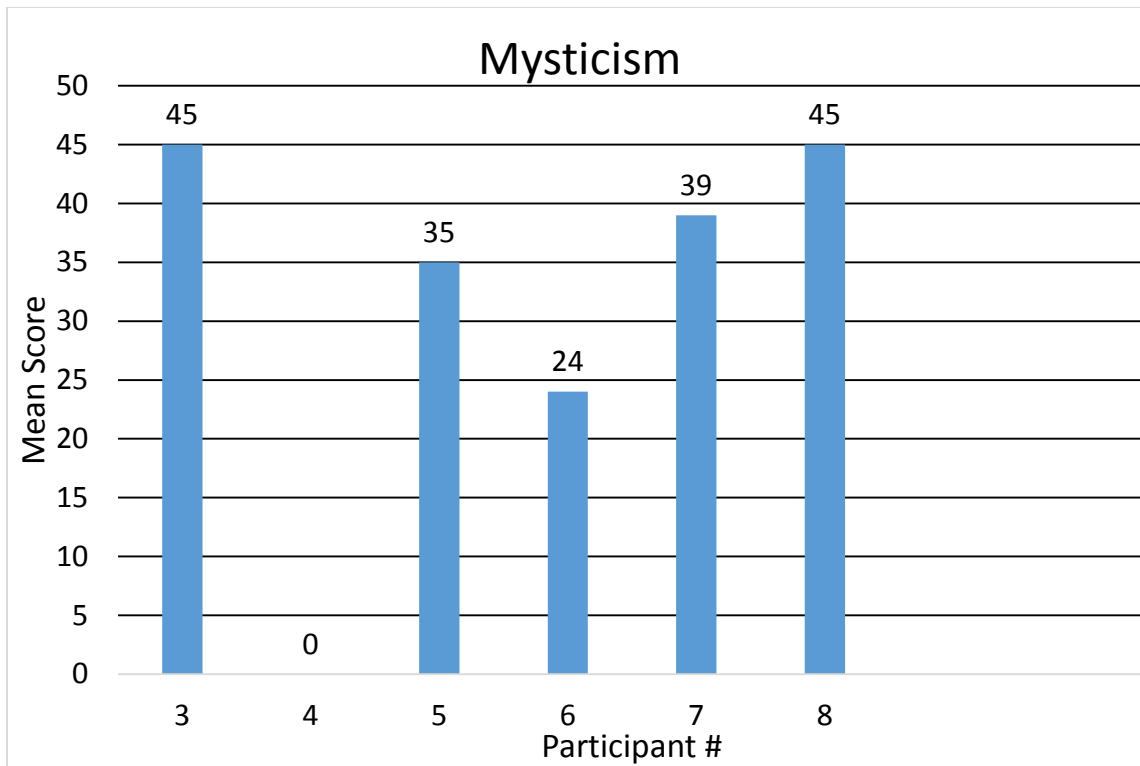


Figure 6. Individual mean scores of mysticism

Discussion

Previous studies have found that the mystical state of consciousness is associated with more theta activity in various parts of the brain. In particular, the neuroscientists Beauregard and O’Leary⁽¹⁰⁾ noted that during the mystical experience, there is more theta activity in the right inferior parietal lobule, the superior parietal lobule, the temporal cortices, as well as in the anterior cingulate cortex and the medial prefrontal cortex. Although the sample size for this pilot study was relatively small and the EEG results were not necessarily significant, further studies should investigate how the VRMT intervention can potentially induce higher states of consciousness since some of the participants demonstrated some EEG changes. Additionally, the results from the self-report data indicated that some of the participants experienced improved mood, feeling calm and relaxed. One participant even reported that she felt as though she was in heaven.

The Quantum Hologram

Accessing higher states of consciousness via VRMT could be explained by a new model of nature’s information processing, the Quantum Hologram proposed by quantum physicists Mitchell and Staretz.⁽⁴⁴⁾ The Quantum Hologram (QH) suggests that both human and animal brains store information holographically wherein information is stored as images contained within interference patterns. When quantum emissions are fired (i.e. photons of light) from the object that is being perceived, the brain will process that information as a “virtual” signal, which is a mirror image of the perceived object. The wave that stands in between the organism’s brain

and the perceived object is the resonating signal. The perceiver's brain is capable of classifying and recognizing resonating signals. Evidence suggests that every physical object has a unique resonant holographic memory. This information is stored in what is called the Quantum Hologram.

Information in the QH ranges over a variety of frequencies. For example, the most basic frequency of information in the QH is simple awareness and memory, whereas higher frequency information includes telepathy and universal knowledge. Humans can access information in the QH through the resonance process on varying levels of frequencies. Resonance occurs when the observer directs prolonged focused attention on a target object, which dissipates the distinction between subject and object, thereby enabling a deeper understanding of the target object. Resonance enhancing practices such as meditation and prayer allow for access to the transcendent information that could not be easily accessed otherwise. Icons such as pictures, statues, etc. may also be used to facilitate this resonance process.

Mitchell and Staretz⁽⁴⁴⁾ postulate that the primary means of accessing the transcendental information is by a process of resonance with the unified quantum field and the Cosmos. The combination of religious images and music that was used in this VRMT experiment was intended to activate the resonance processes for participants to access the QH, or higher states of consciousness. Dubay⁽²²⁾ adds, "Scientists are now finding that this Fourier transform process is how the brain works, as an electromagnetic frequency decoder. It is plausible that this is where wave frequencies are received and transformed into holographic images. Our brains decode this small sliver of electromagnetic frequencies and create the perceptions and sensations we experience in our consciousness. The brain retrieves 'old' information the same way it processes 'new' information – through holographic transformation of wave interference patterns. The holographic model offers revolutionary possibilities for a new understanding of the relationships between the parts and the whole. As individual human beings we are not isolated and insignificant Newtonian entities; rather, as integral fields of the holomovement each of us is also a microcosm that reflects and contains the macrocosm. If this is true, then we each hold the potential for having direct and immediate experiential access to virtually every aspect of the universe, extending our capacities well beyond the reach of our senses. Another markedly holographic processor present in our bodies and the universe is DNA. Every particle in the universe is a carrier of knowledge. In other words, in some form or another, every particle can be said to be conscious."

Dr. Suzanne Lie⁽³⁹⁾ explains that tuning into different brainwaves is similar to tuning into different radio stations. She suggests that it is possible to tune into higher states of consciousness by manipulating one's brainwaves through relaxation techniques such as meditation or relaxation. Kafatos⁽⁶⁶⁾ speaks of "undivided wholeness" as a way to resonate individual consciousness with universal consciousness. The VRMT intervention that was used in this study was designed to relax participants as they watched images of Hindu deities and listened to spiritual music and spiritual film clips. Most of the participants in this study claimed to have been relaxed by the VRMT experience, which was further reflected by the EEG readings. The implications of this are far reaching, as the relaxation technique via VRMT could address insomnia problems and an array of sleep disorders.

Theise, Neil, and Kafatos⁽⁶⁴⁾ define sentience as “sensing of the surrounding environment, complex processing of information that has been sensed...we find that sentience is not limited to the living, but throughout existence. Thus, a complexity approach shifts autopoietic theory from an emergentist to a panpsychist position and shows that sentience must be inherent in all structures of existence across all levels of scale.” David Bohm (as cited in Dossey)⁽²⁰⁾ states, “Ultimately, the entire universe (with all its ‘particles,’ including those constituting human beings, their laboratories, observing instruments, etc.), has to be understood as a single undivided whole, in which analysis into separately and independently existent parts has no fundamental status...Everything is alive. What we call dead is an abstraction.” Perry⁽⁴⁹⁾ states, “Each level of consciousness interacts with every other level because all are sentient in their own way; i.e., all members comprising each level are aware and intentional, though to lesser degrees as the levels are descended...All things are made not of atomic particles, but of God, in varying degrees. An atom has less Being than life, which has less Being than mind, which has less Being than soul, which has less Being than spirit, yet all are different levels of consciousness. A higher level integrates the data of its lower levels by ordering them into a new, subjective unity of experience.”

Possible Mechanisms

The most common mind-body techniques involve a mixture of chanting, energy medicine, hypnotic induction, imagery, meditation, specialized breathing, and visualization. These techniques require active learning, training, attention, and objective states of consciousness in which people stay more in the beta activity. As such, the brain’s reticular activating system is constantly active, which makes it more difficult to shift from objective to subjective to subconscious and advanced mystical states of consciousness. On the other hand, the VRMT intervention is passive and does not require previous learning or effort, which could make it easier for individuals to go into subjective and subconscious states of consciousness.

Neuro-endocrine/cellular/bioelectric processes can help explain possible mechanisms of the VRMT intervention. It is proposed that what is occurring during the VRMT is a combination of the following:

- A. The brain’s Reticular Activating System (RAS) is decreasing in activity (less cortical arousal).
- B. Increased limbic system and medial forebrain bundle activation (pleasure centre).⁽²¹⁾ Autonomic nervous system (ANS) balancing and increasing parasympathetic activity by virtue of breathing and deep relaxation. A shift of objective to subjective to subconscious and advanced mystical states of consciousness.
- C. Decreased thalamic (pain processing signals) activity and amygdala (rage and aggression activity). “Mindfulness meditation training decreased activity in the amygdala; this suggests that meditation in general can help improve emotion regulation.”⁽⁵⁹⁾

- D. There is also activation of the association cortical maps in the visual and auditory limbic cortices,⁽⁸⁾ whereby “...experience may directly influence brain structure and/or function.”⁽⁵³⁾
- E. Increased activation of neuroimmunoendocrine, cellular, neuropeptide network, pineal,⁽⁶¹⁾ and hypothalamic pituitary axis with an output of neurohormones.⁽²¹⁾ (See Appendix H for detailed figures of these processes.)
- F. Improved mood states.⁽¹⁶⁾
- G. Bruce Lipton⁽⁴¹⁾ states, “Science suggests that the next stage of human evolution will be marked by awareness that we are all interdependent cells within the super-organism called humanity. Researchers at HeartMath have found the impact of love itself is real and biochemically measurable, ‘When subjects focus their attention on the heart and activate a core heart feeling, such as love, appreciation, or caring, these emotions immediately shift their heartbeat rhythms into a more coherent pattern. Increasing heartbeat coherence activates a cascade of neural biochemical events that affect virtually every organ in the body’... ‘Love actually does make us healthier, happier, and longer-living.’” As such, VRMT as a reverential type of meditation could enable compassion training.

Based on previous studies, it is possible that these above changes will have an effect at the cellular level, DNA level, from biochemical and bioelectric cellular fields.^(36, 41, 52) “Receptors are molecular ‘antennas’ that recognize environmental signals. Some receptor antennas extend inward from the membrane’s cytoplasmic face. These receptors ‘read’ the internal milieu and provide awareness of cytoplasmic conditions. Other receptors extending from the cell’s outer surface provide awareness of external environmental signals. Protein receptors respond to vibrational frequencies. Through a process known as electroconformational coupling, resonant vibrational energy fields can alter the balance of charges in a protein. In a harmonic energy field, receptors will change their conformation. A receptor’s ‘activated’ conformation informs the cell of a signal’s existence. The membrane is an information processing transistor, an organic computer chip.”⁽⁴⁰⁾ Reite⁽⁵³⁾ writes, “...some of the recent work of Kandel and his associates has suggested that experiential influences may well result in alterations in gene expression per se. The work of Michael Merzenich and his associates suggests that sensory cortex anatomy and physiology is indeed reordered—written upon, so to say—relatively quickly and effectively in adult primates by new or altered experience.” Dossey⁽²⁰⁾ adds, “Recent findings in biology indicate that certain biomolecules act as superconductors and biological systems in general exhibit non-local, global properties which are consistent with their ability to function at the quantum level. These coils were used to demonstrate that quantum fields inhibit neurotransmitter uptake into nerve cells, stimulate the growth of human lymphocytes.”

It is also possible that there could be healing effects of prayer when someone is experiencing these higher state of mystical consciousness with empathic and compassionate feelings.⁽¹²⁾ Schlitz and Lewis⁽⁵⁷⁾ state, “People who pray often indicate a higher degree of life satisfaction, general happiness, and existential well-being, even when other factors (income, sex, education, race, and so on) have been taken into account.”

Imagery and Music

VR experiences are known to produce the same physiological reactions as real life situations.⁽⁵⁴⁾ During the process of imagery, neural pathways communicate directly with tissues, organs, and cells throughout the body.⁽³⁾ Whether the imagery is deliberate or not, the body will respond to the virtual reality. Critchley⁽¹⁸⁾ states, "...the way we process or react to our environment depends on our internal bodily state. The result is a system (the individual) in a state of dynamic flux internally that contributed to physical and social interaction with the external environment. As a consequence, salient events and emotive stimuli in our environment influence our internal bodily state."

However, this mind-body connection is said to be mediated by the emotions that are produced through the faculty of imagery. Previous studies have recorded different physiological states associated with different emotions, such as the variations of heart rate and blood pressure between anger and fear imagery scenes.⁽²⁴⁾ The VR imagery that was used in this study was associated with Hindu practices and deities to enable a reverential emotional response from the participants. Future VR interventions should consider the multidimensional approach for healing on all levels, using specific VRMT for various cultures/religions/beliefs/individuals.

Specialized music was an important aspect of the VRMT experience, as the combination of music with imagery maximizes one's ability to access images, feelings, and memories that support the healing process.⁽⁶¹⁾ Music is a universal language in that every person is born with the neural architecture to recognize a variety of harmonics, rhythms, and melodies without formally learning it.⁽⁶¹⁾ Previous research has found that music activates the limbic and paralimbic neural circuitry, capable of eliciting an array of emotions in response to particular music.⁽⁷⁾ Moments of "chills" (i.e. goose bumps or shivers on spine in response to music) were associated with cerebral blood flow changes in the ventral striatum, midbrain, anterior insula, anterior cingulate cortex, and orbitofrontal cortex. Even individuals who did not experience such a reaction still experienced neural changes in the amygdala, ventral striatum, and the hippocampus in response to music. Fotuhi, Do, and Jack⁽²⁶⁾ stated that the hippocampus is "...particularly vulnerable to the neurotoxic effects of obesity, diabetes mellitus, hypertension, hypoxic brain injury, obstructive sleep apnea, bipolar disorder, clinical depression and head trauma. The hippocampus possesses a particular capacity for neuroplasticity and, therefore, some interventions could conceivably slow down the rate of atrophy with ageing." Researchers have found that the emotional response from music in the brain was strengthened by the presentation of auditory information in combination with visual information.⁽⁷⁾ In particular, there was a stronger activation in the parahippocampal gyrus and temporal poles of the brain. With the combination of mental imagery and music, the VRMT intervention could help slow down the aging process and increase longevity by stimulating the hippocampus.

Music has been used for stress reduction, pain control, to induce altered states of consciousness, to intensify spiritual experiences, and to evoke emotional catharsis.⁽⁶¹⁾ It is possible to induce higher states of consciousness by selecting music that enhances a certain brainwave.⁽⁶¹⁾ For example, there are now binaural beats widely available that are used to alter brainwave frequencies to a specific state of consciousness with the use of rhythmic stimuli.⁽³²⁾ There is also

personal preference for specialized music.⁽³⁴⁾ This study used Hindu cultural specific music, as well as binaural beats to maximize the chances of accessing higher states of consciousness.

Implications

The implications of the VRMT are wide ranging, as it can be used as a tool to guide people into a state of consciousness that mirrors the meditative state. Levin et al.⁽³⁷⁾ found a “strong and significant positive associations between private (i.e., non-institutional) and subjective religiousness and lifetime prevalence of self-reports of mystical experiences.” Traditional meditative practices for accessing higher states of consciousness often required extensive practice and discipline over a long period of time, which may lead to some frustration. However, the VRMT intervention can easily guide people into those states passively so that more people may access these higher states with reduced effort.

Mind-body medicine is based on the idea that illness is a result of imbalances in the body, which may be due to maladaptive thinking patterns that are then expressed through genetic and cell activity.⁽⁶⁵⁾ Each cell in the human body undergoes thousands of biochemical reactions per second by storing and emitting bioelectric currents, known as ion pumps. Ions are atoms that carry an electrical charge, and some ions like sodium and potassium are important to cells’ functioning. Thus, every single physiological process—every breath, every muscle movement, and every process of digestion—requires ionic activity. Likewise, every psychological process—every thought, memory, belief, or feeling—also requires nerve impulses.⁽²³⁾

Scientists have found three essential electromagnetic organizing fields that regulate the human body.⁽²³⁾ The biofield is the energetic field that surrounds the human body, and it is known to regulate one’s biochemistry and physiology by conveying and transmitting energetic information about an organism. The local energy fields are electromagnetic fields found in specific regions throughout the human body that are attributed to specific physiological and psychological functions.⁽²³⁾ The meridians are large quantities of energetic pathways found throughout the body. Mind-body medicine contends that a disruption in any of these energetic pathways leads to physical illness but these energies can be rebalanced through mind-body therapies.

A large body of research has confirmed that every thought and feeling is somatically expressed through the body and that thinking and intention alone can produce immense physical reactions in the body.⁽²⁹⁾ Trieschmann⁽⁶⁵⁾ explains that atoms are electromagnetic vibratory energy composed of electrons, protons, and a neutron, but the space in between these elements is the energetic potentialities of the universe. Bundles of atoms create matter and molecules, molecules form cells, cells form organ systems and body parts, and these body parts are what make up the entire human body. Every single one of these elements operates on electromagnetic vibrations, but there are different rates and patterns of vibrations that are associated with a variety of health patterns and outcomes. For example, if the cells are vibrating at a higher frequency, the whole person feels good, but if they are vibrating at a lower frequency, the person will not feel very well.

Every thought has a vibrational frequency as well, which produces certain emotions that are usually felt throughout one's entire body. The vibratory influence of thoughts and emotions will trigger certain neuropeptides, which in turn will trigger certain cells in the human body.⁽²⁹⁾ This communication between neuropeptides and cellular molecules is what produces overall feelings of wellness and happiness, or on the contrary, feelings of lethargy and discontent depending on one's thoughts and feelings. Hence, when someone is asked whether the glass is half empty or half full, the "half full" response is likely to come from a person who is in a healthier state of well-being since positive thoughts have a higher vibratory rate compared to negative thoughts, which operate at a much lower frequency.

One study found in the *American Journal of Cardiology* (as cited in Hamilton)⁽²⁹⁾ examined whether appreciative thoughts and angry thoughts could have opposing effects in the body. Results indicated that participants who were thinking appreciative thoughts maintained smoother and more regular heart rates compared to those who were thinking angry thoughts. In fact, hostile attitudes could actually lead to heart disease, as another study found an association between hostile attitudes towards one's spouse and hardening of the arteries.⁽²⁹⁾ In addition to heart problems, anger and frustration have been found to weaken the immune system. Another study found that after merely five minutes of thinking about anger and frustration, the immune system was depressed for five hours as opposed to the participants who were told to think about care and compassion, which enhanced their immune system for five hours.⁽⁵²⁾ Although there are numerous mind-body therapies already established, VRMT could potentially be used as a mind-body medicine intervention.

Researchers at the John Hopkins and National Institute of Mental Health revealed that the neurotransmitters that send messages to the central nervous system are the same neurotransmitters that send information to the immune and endocrine systems.⁽⁵²⁾ Massey, Adam, and Vedhara⁽⁴²⁾ state, "A plethora of psychoneuroimmunology studies have now shown that chronic or long-term emotional states such as long-lasting stress, anxiety, and depression are associated with alterations in immune functioning and worsened health outcomes." Similarly, a study conducted by Broadbent et al.⁽¹¹⁾ has demonstrated that positive mental and emotional states are associated with better immune functioning. The researchers made two comparison groups of patients undergoing surgery with one group receiving only standard care, and the other group receiving standard care plus a relaxation intervention, which included guided imagery and a CD to listen to before and after undergoing surgery. Results found that the patients who received the relaxation intervention healed significantly more quickly compared to those in the control group.

Since all parts of the human body operate in a harmonious synchronicity, an electromagnetic frequency in one cell, molecule, thought, or memory will influence the frequency of the rest of the human body.⁽⁶⁵⁾ Repeated patterns of beliefs create habitual thinking patterns that can cause either positive or negative physical reactions in the body depending on the nature of one's thinking patterns. Unhealthy energetic imbalances can be addressed using VRMT technology to interrupt maladaptive thoughts, beliefs, or attitudes and be replaced with more positive thinking patterns.

Perhaps the most valuable implication of the VRMT technique is to provide collective healing to humanity by encouraging compassionate, prosocial altruistic feelings and behaviour, which we now know can be not only induced but also trained to reach a higher level. Research at the VR lab in Stanford University confirmed that VR can help encourage prosocial behaviour.⁽⁵⁶⁾ More recent work in compassion by Emma Seppälä has indicated that compassion can be trained through techniques such as meditation.⁽⁶⁰⁾

Limitations

The results from this study should be interpreted with caution as there was no control group to compare the data with and there was also no statistical data analysis conducted since the sample size was too small. The selected participants were all Hindus. Although the selection of Hindu participants may seem to pose a potential selection bias, this group of people was specifically chosen since the VRMT media (including both audio and visuals) was specifically designed for those from a Hindu culture. It may be natural to assume that Hindu practitioners are experienced meditators but this may not necessarily be the case. Future studies should determine participants' meditation experience by administering meditation questionnaires and including a control group.

Although there is the possibility that the results may have been attributed to the placebo effect, it is unlikely since neither the participants nor the researchers knew what was to be expected. To minimize the possibility of the placebo effect, future studies should have a control group, a traditional meditation group (i.e. mindfulness) as well as other VRMT experimental groups. Nevertheless, as further research continues, we should in fact **use the power and therapeutic potential of the placebo effect to produce healing effects.**

Another limitation of this study is that the researchers administered the EEG on participants' heads as they completed the questionnaires before the VRMT intervention. This may have caused potential issues with distraction or rushed responses, or it may have influenced socially desirable responses on the questionnaires. Future studies should administer the EEG equipment before or after these questionnaires are filled out.

Future Directions (Possible Research Projects)

The next frontier for the VRMT is to design personalized modules that maximize the possibility of attaining meditative resonance. These modules must consider cultural and individual differences for optimal results. The VRMT intervention that was used in this study was culturally specific to the Hindu denomination and the participants were perhaps better able to resonate with this experience because they were all devoted Hindus. It is important to understand individual differences such as culture, religion, personality, etc. to choose specific music and images for each individual to optimize resonance and the reverential state. Future studies should investigate all factors to consider when creating an intervention for a specified case/individual. It should take a multidimensional approach to capture all aspects of one's characteristics and tastes. Eventually health professionals will be able to understand what sounds and imagery will induce certain emotions and then apply them to specific cases. Additionally, people must be able to choose their own music and images to optimize their VRMT efficacy and experiences. This technique could be useful for training to develop high performance and compassionate minds.

Since this study was a pilot study and the neurotechnology is so new, it is not possible to know whether people will be able to eventually wean themselves off this technology to more easily use traditional types of meditation. Future studies should investigate this possibility. Further studies should be composed of various comparison groups to determine whether it is the reverential state that manifests healing effects. To determine this, there could be one control group with neutral audio and visual media (i.e. natural and galactic settings) which would then be compared against various experimental groups that belong to certain religions, such as Buddhism, Christianity, Islam, Judaism, Sikhism, etc., and various schools of mysticism such as AMORC.

It will also be worth exploring the potential efficacy that this VRMT can have on various health issues such as insomnia, depression, cancer, and anxiety. In addition to healing, researchers should explore the possibility of VRMT as a tool to enhance creativity, self-actualization, and compassion. If these studies look promising, then researchers could further investigate several global implications that could lead to a more harmonious world, with more scientific, social/cultural breakthroughs, fewer wars, less divisiveness, and new ways of solving global problems.

It is exceedingly important to note a word of caution to future researchers in this area. We noticed that participants who were not hurried had deeper experiences and a greater output of meditative brainwave states. It is very important to ensure when conducting this research that it be done during a day and time when a person is not scheduled to be anywhere else, as it must be done in an unhurried environment. If not, they spend more time trying to rush through the experiment and thus stay in objective consciousness. The best time to conduct the experiment is one hour before a person goes to bed alone, in a quiet space or “sanctum.”

Conclusions

This pilot study sets the stage for future larger scale studies to investigate the potential benefits of VRMT. Traditional mental imagery requires active imagery (imagery requires effort and training) and cortical arousal (the reticular activating system) and more beta activation, and it keeps a person in an active wakeful state of objective awareness. In contrast to traditional relaxation and meditative techniques, the VRMT could effectively induce an immersive deep state of absorption as a shift from objective to subjective to subconscious consciousness as it does not require attentive effort.⁽⁶²⁾ Glisky et al.⁽²⁸⁾ state that absorption is related to imaginative involvement. By accessing and experiencing higher states of consciousness that mirrors the meditative state, one’s entire bioelectric field changes and enables resonance with the quantum hologram, which enables knowledge of cosmic laws to be accessed. VRMT is purely experiential and should be maximally effective, not in a group setting in group prayer/worship, but rather in one’s own privacy to make one-on-one contact with one’s concept of the “Divine” in their “Celestial Sanctum” as described by mystical organizations such as AMORC.

In any event, the synthesis of neurosciences, consciousness, mysticism, and spirituality is crucial to the development of a spiritual paradigm for humanity’s future evolution and survival. *Mysticism, a discipline of unitary (non-polarized thinking) does not reject science but rather ennobles it.* This VRMT can become a useful neurotechnology that can guide us towards higher

global consciousness and optimal health.

Reference List

1. "Virtual Reality Pain Reduction." Human Photonics Laboratory. Accessed June 2016. <http://depts.washington.edu/hplab/research/virtual-reality/>.
2. Absolon, N., Truant, T., Balneaves, L., Goodwin, F., Cashman, R., Wong, M., and Witmans, M. "I Can't Sleep!": Gathering the Evidence for an Innovative Intervention for Insomnia in Cancer Patients." *Canadian Oncology Nursing Journal* 24, no. 3 (2014): 154-59.
3. Achterberg, Jeanne. *Imagery in Healing: Shamanism and Modern Medicine*. Boston: New Science Library, Shambhala, 1985. 5-6.
4. Alexander, C., Boyer, R., & Alexander, V. "Higher States of Consciousness in the Vedic Psychology of Maharishi Mahesh Yogi: A Theoretical Introduction and Research Review." *Modern Science and Vedic Science Journal*, 1(1), (1987): 89-126.
5. Alexander, Charles N., Frederick Travis, Mawiyah Clayborne, and Dori Rector. "Maharishi Vedic Psychology Brings Fulfillment to the Aspirations of Twentieth-Century Psychology." *Modern Science and Vedic Science Journal*. Vol. 7, no. 1, (1997): 241-266.
6. Andrea, Raymond. *The Disciple and Shambhala*. London: Francis Bacon Lodge, 1983. 1-9.
7. Armony, Jorge. *The Cambridge Handbook of Human Affective Neuroscience*. Cambridge: Cambridge University Press, 2013. 286-303.
8. Arnsten, A. F. T. "The Neurobiology of Thought: The Groundbreaking Discoveries of Patricia Goldman-Rakic 1937-2003." *Cerebral Cortex* 23, no. 10 (2013): 2269-281. doi:10.1093/cercor/bht195.
9. Baños, Rosa M., Macarena Espinoza, Azucena García-Palacios, José M. Cervera, Gaspar Esquerdo, Enrique Barrajón, and Cristina Botella. "A Positive Psychological Intervention Using Virtual Reality for Patients with Advanced Cancer in a Hospital Setting: A Pilot Study to Assess Feasibility." *Support Care Cancer Supportive Care in Cancer* 21, no. 1 (2012): 263-70. doi:10.1007/s00520-012-1520-x.
10. Beauregard, Mario, and Denyse O'Leary. *The Spiritual Brain: A Neuroscientist's Case for the Existence of the Soul*. New York: HarperOne, 2007. 275-276.
11. Broadbent, Elizabeth, Arman Kahokehr, Roger J. Booth, Janine Thomas, John A. Windsor, Christina M. Buchanan, Benjamin R.I. Wheeler, Tarik Sammour, and Andrew G. Hill. "A Brief Relaxation Intervention Reduces Stress and Improves Surgical Wound Healing Response: A Randomised Trial." *Brain, Behaviour, and Immunity* 26, no. 2 (2012): 212-17. doi:10.1016/j.bbi.2011.06.014.
12. Brown, Candy Gunther. *Testing Prayer: Science and Healing*. Cambridge, MA: Harvard University Press, 2012. 284-287.
13. Bucke, Richard Maurice. *Cosmic Consciousness: A Study in the Evolution of the Human Mind*. New York: Dutton, 1969. 2-4.
14. Burris, Christopher T., and John K. Rempel. "The Crystal Globe: Emotional Empathy and the Transformation of Self." *Consciousness and Cognition* 21, no. 3 (2012): 1526-532. doi:10.1016/j.concog.2012.06.002.
15. Chopra, Deepak. "How Meditation Affects Heart Health." Chopra.com. Accessed June 2016. <http://www.chopra.com/ccl/how-meditation-affects-heart-health>.
16. Cox, David. "Virtual Reality Can Help People Conquer Their Phobias." *The Guardian*. 2014. Accessed June 2016. <https://www.theguardian.com/science/blog/2014/oct/16/virtual-reality-phobias-public-speaking-flying>.
17. Creel, Josh. *Virtual Reality: Applications and Developments*. City of Publication Not Identified: Foster Academics, 2015. 5-6.
18. Critchley, Hugo. "Psychophysiology of Neural, Cognitive and Affective Integration: fMRI and Autonomic Indicators." *International Journal of Psychophysiology* 69, no. 3 (2008): 136. doi:10.1016/j.ijpsycho.2008.05.004.
19. Danyel, Courtney. "Can Meditation Increase Telomere Length and Longevity?" Superfoodly. Accessed June 2016. <http://superfoodly.com/can-meditation-increase-telomere-length-and-longevity/>.
20. Dossey, L. "How Healing Happens: Exploring the Nonlocal Gap." *Alternative Therapies in Health and Medicine*, Vol. 8, no. 2 (2002): 12-16, 103-110.

21. Dougherty, Patrick. *Hypothalamus: Structural Organization (Section 4, Chapter 1) Neuroscience Online: An Electronic Textbook for the Neurosciences | Department of Neurobiology and Anatomy - The University of Texas Medical School at Houston*. Accessed July 2016. <http://neuroscience.uth.tmc.edu/s4/chapter01.html>.
22. Dubay, Eric. "The Universal Fourier Transform." Eric's Esoterics. Accessed July 04, 2016. <http://ericdubay.blogspot.ca/2013/03/the-universal-fourier-transform.html>.
23. Feinstein, D. and Eden, D. "Six Pillars of Energy Medicine: Clinical Strengths of a Complementary Paradigm." *Alternative Therapies In Health And Medicine*, Vol. 14, no. 1, (2008): 44-54.
24. Finke, Ronald A. *Principles of Mental Imagery*. Cambridge, MA: MIT Press, 1989. 152-153.
25. Forman, Robert K. C. *Mysticism, Mind, Consciousness*. Albany, NY: State University of New York Press, 1999. 171-172.
26. Fotuhi, Majid, David Do, and Clifford Jack. "Modifiable Factors That Alter the Size of the Hippocampus with Ageing." *Nature Reviews Neurology*. 2012. doi:10.1038/nrneuro.2012.27.
27. Frenkel, Moshe, Shachar Lev Ari, Joan Engebretson, Noemi Peterson, Yair Maimon, Lorenzo Cohen, and Lea Kacen. "Activism among Exceptional Patients with Cancer." *Support Care Cancer Supportive Care in Cancer* 19, no. 8 (2010): 1125-1132. doi:10.1007/s00520-010-0918-6.
28. Glisky, Martha L., Tataryn, Douglas J., Tobias, Betsy A., Kihlstrom, John F., and McKoney, KM. "Absorption, Openness to Experience, and Hypnotizability." *Journal of Personality and Social Psychology* 60, no. 2 (1991): 263-72. doi:10.1037/0022-3514.60.2.263.
29. Hamilton, David R. *It's the Thought That Counts: Why Mind over Matter Really Works*. Carlsbad, CA: Hay House, 2009. 4-9.
30. Holz, Johannes, Hannah Piosczyk, Bernd Feige, Kai Spiegelhalter, Chiara Baglioni, Dieter Riemann, and Christoph Nissen. "EEG Sigma and Slow-wave Activity during NREM Sleep Correlate with Overnight Declarative and Procedural Memory Consolidation." *Journal of Sleep Research*. 21, no. 6 (2012): 612-19. doi:10.1111/j.1365-2869.2012.01017.x.
31. Hood, Ralph W., Peter C. Hill, and Bernard Spilka. *The Psychology of Religion: an Empirical Approach*. New York: Guilford Press, 2009. 435-441.
32. Huang, T.L. and Charyton, C. "A Comprehensive Review of the Psychological Effects of Brainwave Entrainment." *Alternative Therapies In Health And Medicine*, Vol. 14, no. 5 (2008): 38-50.
33. Hudetz, Anthony G. "General Anesthesia and Human Brain Connectivity." *Brain Connectivity* 2, no. 6 (2012): 291-302. doi:10.1089/brain.2012.0107.
34. Juslin, Patrik N., and John A. Sloboda. *Handbook of Music and Emotion: Theory, Research, Applications*. Oxford: Oxford University Press, 2010. 669-717.
35. Kelly, Edward F. *Irreducible Mind: Toward a Psychology for the 21st Century*. Lanham, MD: Rowman & Littlefield, 2007. 521-522.
36. Khalsa, Dharma Singh, and Cameron Stauth. *Meditation as Medicine: Activate the Power of Your Natural Healing Force*. New York: Pocket Books, 2001. 33-49.
37. Levin, Wickramasekera, and Hirshberg. "Is Religiousness a Correlate of Absorption? Implications for Psychophysiology, Coping, and Morbidity." *Alternative Therapies In Health And Medicine*. Vol. 4. No. 6 (1998): 72.
38. Lewis, Ralph Maxwell. *The Conscious Interlude*. San Jose, CA: Supreme Grand Lodge of AMORC, 1957. 31-49.
39. Lie, Suzanne. "States of Consciousness." Dr Suzanne Lie and the Arcturians on Multidimensions.com. Accessed July 2016. <http://www.multidimensions.com/the-conscious/physical-body-door/states-of-consciousness/>.
40. Lipton, Bruce. "Insight into Cellular Consciousness." Bruce Lipton. 2012. Accessed July 2016. <https://www.brucelipton.com/resource/article/insight-cellular-consciousness>.
41. Lipton, Bruce. "The Biology of Love." Bruce Lipton. 2012. Accessed July 2016. <https://www.brucelipton.com/resource/article/the-biology-love>.
42. Massey, Adam J., and Kavita Vedhara. "Psychoneuroimmunology." *International Encyclopedia of the Social & Behavioural Sciences*, 2015, 445-50. doi:10.1016/b978-0-08-097086-8.14118-2.
43. Massion, A.O., J. Teas, J.R. Hebert, M.D. Wertheimer, and J. Kabat-Zinn. "Meditation, Melatonin and Breast/prostate Cancer: Hypothesis and Preliminary Data." *Medical Hypotheses* 44, no. 1 (1995): 39-46. doi:10.1016/0306-9877(95)90299-6.

44. Mitchell, and Staretz. "The Quantum Hologram and the Nature of Consciousness." *Journal of Cosmology* 15 (2011): 190-222.
45. Nader, Tony. *Rāmāyaṇ in Human Physiology: The Structures and Functions of Human Physiology Discovered in the Eternal Epic of the Vedic Literature – Revealing the Cosmic Nature of the Unfoldment of Human Life*. Fairfield, IA: Maharishi University of Management Press, 2012.
46. Orme-Johnson, David W. "An Overview of Charles Alexander's Contribution to Psychology: Developing Higher States of Consciousness in the Individual and the Society." *Journal of Adult Development*, 2007, Vol. 7, no. 4 (2000): 199-225.
47. Oyama, Hiroshi. "Virtual Reality for the Palliative Care of Cancer." *Studies in Health Technology and Informatics* 44 (1997): 87-94.
48. Patañjali, Prabhavananda, and Christopher Isherwood. *How to Know God: The Yoga Aphorisms of Patanjali*. New York: Harper, 1953. 11-65.
49. Perry, Glenn. "Mutations of Consciousness: A Systems Approach to the Evolution of Psyche." Unpublished doctoral dissertation. San Francisco, CA: Saybrook Institute. 1992.
50. Poole, Cecil A. *Mysticism – the Ultimate Experience*. San Jose, CA: Supreme Grand Lodge of AMORC, Print. and Pub. Dept., 1982. 22, 47.
51. Puchalski, Christina. "Spirituality in Health: The Role of Spirituality in Critical Care." *Critical Care Clinics* 20, no. 3 (2004): 487-504. doi:10.1016/j.ccc.2004.03.007.
52. Rakel, David, and Nancy Faass. *Complementary Medicine in Clinical Practice*. Sudbury, MA: Jones and Bartlett, 2005. 147-149.
53. Reite, Martin. "Some Additional Influences Shaping the Development of Behaviour." *Child Development* 58, no. 3 (1987): 596. doi:10.2307/1130200.
54. Riener, Robert, and Matthias Harders. *Virtual Reality in Medicine*. London: Springer, 2012. 1-11.
55. Robson, David. "Cancer: The Mysterious Miracle Cases Inspiring Doctors | Washington University School of Medicine in St. Louis." Washington University School of Medicine in St. Louis. 2015. Accessed July 2016. <https://medicine.wustl.edu/news/cancer-the-mysterious-miacle-cases-inspiring-doctors/>.
56. Rosenberg, Robin S., Shawnee L. Baughman, and Jeremy N. Bailenson. "Virtual Superheroes: Using Superpowers in Virtual Reality to Encourage Prosocial Behaviour." *PLoS ONE* 8, no. 1 (2013). doi:10.1371/journal.pone.0055003.
57. Schlitz, M. and Lewis, N. "Directed Prayer & Conscious Intention: Demonstrating the Power of Distant Healing." Institute of Noetic Sciences. n.d. Accessed July 2016. <http://www.noetic.org/sites/default/files/uploads/files/DirectedPrayer.pdf>.
58. Schlitz, Marilyn. "Meditation, Prayer and Spiritual Healing: The Evidence." *The Permanente Journal* 9, no. 3 (2005): 63-66.
59. Seppälä, Emma. "The Compassionate Mind." Association for Psychological Science RSS. Accessed July 2016. <http://www.psychologicalscience.org/index.php/publications/observer/2013/may-june-13/the-compassionate-mind.html>.
60. Seppälä, Emma. "The Science of Compassion." Emma Seppälä, Ph.D. 2013. Accessed June 2016. <http://www.emmaseppala.com/the-science-of-compassion/>.
61. Sheikh, Anees A. *Healing Images: The Role of Imagination in Health*. Amityville, NY: Baywood Pub., 2003. 115-170.
62. Singh, Ranjje N. *Self-healing: Powerful Techniques*. London, Ontario: Health Psychology Associates, 1998. 1-73.
63. Sperry, Roger. "Science, Values, and Survival." *Journal of Humanistic Psychology*. Vol. 26, no. 2 (1986): 8-23.
64. Theise, Neil, and Kafatos, Menas. "Sentience Everywhere: Complexity Theory, Panpsychism & the Role of Sentience in Self-Organization of the Universe." *Journal of Consciousness Exploration & Research*. Vol. 4, no. 4 (2013): 378-390.
65. Trieschmann, Roberta. "Spirituality and Energy Medicine." *The Journal of Rehabilitation*. Vol. 67, no. 1. (2001): 26-32.
66. Walker Jr., Theodore. "Neoclassical Cosmology and Menas Kafatos's "Cosmos and Quantum: Frontiers for the Future"" *Journal of Cosmology* 3 (2009): 641-43.
67. Wallace, Robert Keith. *The Neurophysiology of Enlightenment*. Fairfield, IA: Maharishi International University Press, 1986. 134-155.

Appendix A

Expanded Tellegen Absorption Scale (ETAS)¹

Directions: Please read each item carefully and indicate to what degree each item is characteristic of you (1 = uncharacteristic and 5 = characteristic).

	Uncharacteristic				Characteristic
1. The sound of a voice can be so fascinating to me that I can just go on listening to it.	1	2	3	4	5
2. While acting in a play or watching television, I have sometimes really felt the emotions of the character and have become him or her for the time being, forgetting both myself and the audience.	1	2	3	4	5
3. I can sometimes recollect certain past events in my life with such clarity and vividness that it is like living them again or almost so.	1	2	3	4	5
4. If I wish, I can imagine some things so vividly that they hold my attention in the way a good movie or story does.	1	2	3	4	5
5. I can tell a story with elaborations to make it sound better and then have the elaboration seem as real to me as the actual incident, or almost so.	1	2	3	4	5
6. I am sometimes able to forget about my present self and get absorbed in a fantasy that I am someone else.	1	2	3	4	5
7. I listen so hard when having a conversation that I am not distracted by the world going on around me.	1	2	3	4	5

¹ Smith-Jackson, T., & Klein, K. W. (1997). Expanded Tellegen Absorption Scale [Database record]. Retrieved from PsycTESTS. doi: <http://dx.doi.org/10.1037/t26005-000>.

8. When I read an interesting book, the hours fly by without my noticing.	1	2	3	4	5
9. One of my better qualities is the ability to put 100 percent of my attention to a task at hand.	1	2	3	4	5
10. I can do bills or paperwork with the television or radio on and still maintain my concentration.	1	2	3	4	5
11. I do not like it when I have to divide my attention between two things at once.	1	2	3	4	5
12. When watching television, I lose myself in a character.	1	2	3	4	5
13. When with a group, I am good at listening to several conversations at once.	1	2	3	4	5
14. My day dreams are so real, I sometimes mistake them for actual events.	1	2	3	4	5
15. When driving, I have difficulty following another person's conversation because it distracts me from the road.	1	2	3	4	5
16. I can study well in a noisy environment.	1	2	3	4	5
17. I can easily become absorbed in my own thoughts.	1	2	3	4	5
18. When concentrating on a task, it is difficult for other people to get my attention.	1	2	3	4	5
19. I have difficulty concentrating.	1	2	3	4	5
20. I am easily distracted by things around me.	1	2	3	4	5

Appendix B

Abbreviated Profile of Mood Scale (POMS) (Revised Version)²

Below is a list of words that describe feelings people have. Please **CIRCLE THE NUMBER THAT BEST DESCRIBES HOW YOU FEEL RIGHT NOW.**

	Not At All	A Little	Moderately	Quite a lot	Extremely
Tense	0	1	2	3	4
Angry	0	1	2	3	4
Worn Out	0	1	2	3	4
Unhappy	0	1	2	3	4
Proud	0	1	2	3	4
Lively	0	1	2	3	4
Confused	0	1	2	3	4
Sad	0	1	2	3	4
Active	0	1	2	3	4
On-edge	0	1	2	3	4
Grouchy	0	1	2	3	4
Ashamed	0	1	2	3	4
Energetic	0	1	2	3	4
Hopeless	0	1	2	3	4
Uneasy	0	1	2	3	4
Restless	0	1	2	3	4
Unable to concentrate	0	1	2	3	4
Fatigued	0	1	2	3	4
Competent	0	1	2	3	4
Annoyed	0	1	2	3	4
Discouraged	0	1	2	3	4
Resentful	0	1	2	3	4
Nervous	0	1	2	3	4
Miserable	0	1	2	3	4

²Grove, J.R., & Prapavessis, H. (1992). Preliminary evidence for the reliability and validity of an abbreviated Profile of Mood States. *International Journal of Sport Psychology*, 23, 93-109.

PLEASE CONTINUE WITH THE ITEMS ON THIS PAGE

	Not At All	A Little	Moderately	Quite a lot	Extremely
Confident	0	1	2	3	4
Bitter	0	1	2	3	4
Exhausted	0	1	2	3	4
Anxious	0	1	2	3	4
Helpless	0	1	2	3	4
Weary	0	1	2	3	4
Satisfied	0	1	2	3	4
Bewildered	0	1	2	3	4
Furious	0	1	2	3	4
Full of Pep	0	1	2	3	4
Worthless	0	1	2	3	4
Forgetful	0	1	2	3	4
Vigorous	0	1	2	3	4
Uncertain about things	0	1	2	3	4
Bushed	0	1	2	3	4
Embarrassed	0	1	2	3	4

THANK YOU FOR YOUR COOPERATION

PLEASE BE SURE YOU HAVE ANSWERED EVERY ITEM

Appendix C

7D Questionnaire

Please circle the response that best corresponds with how you felt throughout the VRMT experience:

1=not at all, 10=very much

Did you feel aware of your surroundings?

1 2 3 4 5 6 7 8 9 10

Did you feel bored?

1 2 3 4 5 6 7 8 9 10

Did you feel like crying?

1 2 3 4 5 6 7 8 9 10

Did you feel sorrow?

1 2 3 4 5 6 7 8 9 10

Did you feel happy?

1 2 3 4 5 6 7 8 9 10

Did you feel amazed?

1 2 3 4 5 6 7 8 9 10

Did you feel compassion for humanity?

1 2 3 4 5 6 7 8 9 10

Did you feel as though you made contact with a “Divine” source?

1 2 3 4 5 6 7 8 9 10

Appendix D

Hood's Mysticism Scale³

Circle the number that best describes your present agreement or disagreement with each statement.

	strongly disagree	disagree somewhat	disagree slightly	agree slightly	agree somewhat	strongly agree
1. I had an experience in which I realized the unity of all things.	0	1	2	3	4	5
2. I had an experience which left me with a feeling of awe.	0	1	2	3	4	5
3. I had an experience in which a new view of reality was revealed to me.	0	1	2	3	4	5
4. I had an experience which seemed holy to me.	0	1	2	3	4	5
5. I had an experience in which I felt all things were alive.	0	1	2	3	4	5
6. I experienced a perfectly peaceful state.	0	1	2	3	4	5
7. I had an experience in which something greater than myself seemed to absorb me.	0	1	2	3	4	5
8. I had an experience incapable of being expressed in words.	0	1	2	3	4	5
9. I had an experience both timeless and spaceless.	0	1	2	3	4	5

³ Dakwar, E., Anerella, C., Hart, C. L., Levin, F. R., Mathew, S. J., & Nunes, E. V. (2014). Hood's Mysticism Scale – Modified [Database record]. Retrieved from PsycTESTS. doi: <http://dx.doi.org/10.1037/t33393-000>.

Appendix E

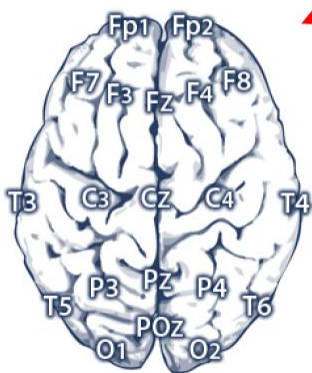
Electroencephalogram (EEG) system⁴



B-Alert X24

B-Alert X24 applies all sensors of the standard International 10-20 system simultaneously for efficient set-ups while also providing every subject a comfortable and individualized fit. Featuring the same high-quality signals as Stat X24 though labeled for non-medical applications, the system enables quantitative analysis techniques such as single-trial ERPs, LORETA/sLORETA, functional connectivity, and global brain assessments. All hardware is readily reusable with easy cleaning for repeated recordings in high throughput studies. From biomarker development to neurorehabilitation, B-Alert X24 is enhanced by a suite of robust softwares to make this the most versatile wireless-EEG system available.

Brain map of a 20-electrode strip.



Front

Back



⁴ From <http://www.advancedbrainmonitoring.com>; reprinted with permission.

Appendix F

VRMT Content & Acknowledgements

VR Developers: Kyle Ledermann (Team Leader), Mike Popovici, Sachin Singh (VR media and lyrics).

Video Content	Link
Shiv Temple 360	https://www.youtube.com/watch?v=TN0h5EsExc0
Kaleidoscope Video	https://www.youtube.com/watch?v=q2fIWB8o-bs
Hanuman Chalisa by Hari Om Sharan	https://www.youtube.com/watch?v=hL0PAYoPDJk
Apnoko Kab Hai Shyam	https://www.youtube.com/watch?v=T_GcSo8_5po
Shree Satyanarayan Ki Maha Pooja Kya Bhool Huyi	https://www.youtube.com/watch?v=JJ3MiXvvQ7Q
Bhagwat Bhagwan Ki Hai Aarti	https://www.youtube.com/watch?v=nVkvX6D4utE
Ishwar Allah Tere Naam	https://www.youtube.com/watch?v=yF_gqoF0Hu8
Shree Satyanarayan ki Maha Pooja Sab Devon Mein	https://www.youtube.com/watch?v=jcFbJzqlUts
Alpha Binaural Beat Session	https://www.youtube.com/watch?v=7cHjaJR11Qo
1947-Earth	https://www.youtube.com/watch?v=mno-fSB0XfM
OM Chanting @ 432 Hz	https://www.youtube.com/watch?v=SBiwLibZqfw
Into the Presence of God CD	Ingrid Hutchinson and Andrew Petrasunias
“Prayer” in CD	A Tibetan manuscript from the book <i>Unto thee I Grant</i> published by AMORC. ⁵

⁵ Ramatherio, Sri. *Unto Thee I Grant*. San Jose, CA: Supreme Grand Lodge of A.M.O.R.C., 1968.

Acknowledgments for YouTube Channels
1. youtube\TMVR
2. youtube\HDCOLORS
3. youtube\manwanis
4. youtube\Ultra Hindi
5. youtube\ramragbir's channel
6. youtube\Maina
7. youtube\Rafiology
8. youtube\ramragbir's channel
9. youtube\FulLengthBinaurals
10. youtube\lookmekristcdp
11. youtube\Meditative Mind - Meditation Music

Appendix G

Song Translations

Hanuman Chalisa [translation by Pandit Prakash R. Maharaj]

After cleansing the mirror of my mind with the pollen-like dust of the Guru's Lotus feet, I extol the pure, sublime glories of Sri Ram, which bestows the four-fold fruits of life (Dharma, Artha, Kama and Moksha/righteousness, wealth, noble desires, and divine salvation). Fully aware of the deficiency of my intelligence, I meditate on Pavan Kumar/ son of the Wind-God and humbly pray for strength, intelligence and wisdom to relieve me of all problems and difficulties.

Victory to thee, O'Hanuman! You are the veritable ocean of wisdom and virtue. Glory to you O'Kapisa! You illuminate all the three worlds (Entire cosmos) with your glory. You are the divine messenger of Shri Ram. The repository of immeasurable strength, known as the son of Pavan-dev and Anjani.

With Limbs as sturdy as the Vajra (mace of Indra-dev), you are valiant and brave. You are the embodiment of good sense and wisdom. You dispel the darkness of evil thoughts. You are of golden hue, brilliant and charmingly adorned with sparkling ear-rings along with curly hair.

You carry in your hand a lightning bolt and a flag of victory. On your shoulders, you wear the sacred thread of munja grass.

You are the son of Lord Shiva, as well as the darling son and joy of Shri Kesari. Your brilliance. You are the repository of learning, virtuous and fully accomplished, always keen to carry out the biddings of Shri Ram.

You are an ardent listener, always so keen to listen to the narration of Shri Ram's Life Stories. In your heart, resides Shri Ram, Lakshman and Sita.

You appeared before Sita in a diminutive form. Then assuming an awesome form you burned the city of Lanka.

With over-whelming might you destroyed the Asuras (demons) and performed all tasks assigned to you by Shri Ram with great skill.

You brought Sanjivan (an herb that revives life) and restored Lakshman back to life. Shri Raghuvir (Shri Ram) cheerfully embraced you with his heart full of joy.

Shri Raghupati (Shri Ram) ardently extolled your excellence and proclaimed that "You are as dear to me as my own brother Bharat."

The thousand-headed Shesh-naag chants your glories, stating that this is what the Lord of Shree (Ram) said while warmly hugging Shri Hanuman.

Sages like Sanaka, even Brahma, the great muni Narad himself, Goddess Saraswati and Ahisha (one of immeasurable dimensions) do likewise sing your praises.

Even Yamraj (God of Death) Kuber (God of Wealth) and the Diggals (deputies guarding the four corners of the Universe) have been vying with one another in offering homage to your glories.

How then, can a mere poet give adequate expression of your super excellence?

You rendered a great service to Sugriv. You united him with Shri Ram and installed him on the Royal Throne.

By heeding your advice, Vibhishan became Lord of Lanka. This is known all over the Universe. You leapt a distance of two thousand yoganas to swallow the Sun, thinking it to be a sweet luscious fruit.

Hardly any wonder then, that you carried the Lord's Signet Ring in your mouth.

There is no task in the world too difficult which cannot be accomplished easily by your grace and blessings.

You are the sentry at the door of Shri Ram's Divine Abode. No one can enter it without your permission.

By your grace and compassion all comforts of the world are made possible and you protect those who are fearful of anything.

You alone have the capacity to exhibit your divine splendor. Your thunderous roar arouses terror in all the three worlds (entire universe).

All the ghosts, demons and evil forces keep away, with the mere sounding of your great name, O'Mahaveer!!

All diseases, pain and suffering disappear on regularly reciting Shri Hanuman's holy name. Those who meditate on Shri Hanuman with sincerity and faith... in thought, word and deed, all who proclaim, worship and have faith in Shri Ram as the Supreme Lord and the king of penance. You make all their difficult tasks very easy.

Whosoever comes to you for fulfillment of any desire with faith and sincerity, Will he alone secure the imperishable fruit of human life.

All through the four ages your magnificent glory is acclaimed far and wide. Your fame is gloriously proclaimed all over the Cosmos.

You protect all sadhus and sants (saints and sages) and you destroy all the evil doer (demons). You are the favourite of Shri Ram.

You have the power to grant yogic powers of Eight Siddhis (power to become light and heavy at will) and Nine Nidhis (Riches, comfort, power, prestige, fame, sweet relationship etc.). This boon has been conferred upon you by Mother Janki.

You possess the power of devotion to Shri Ram. In all rebirths you will always remain Shri s Raghupati's most dedicated disciple.

Through singing of your praises, Shri Ram can be attained, and our miseries accumulated from many births are washed away.

If at the time of death one enters the Divine Abode of Shri Ram, and thereafter in all future births he is born as the Lord's devotee.

One need not entertain any other deity for prayers to be answered, since devotion to Shri Hanuman alone can give all happiness.

All calamities disappear, and all sorrows are ended by the constant repetition of the name of mighty Hanuman.

Glory, Glory, Glory to Shri Hanuman. Please have compassion on me as my own guru. Grant that all who recite the Hanuman Chalisa one hundred times, become free from the bondage of life and death and enjoy the highest bliss.

All those who recite Hanuman Chalisa (The forty Chaupais) regularly are sure to attain perfection, as Lord Shiva himself attests to.

Tulsidas, ever the servant of the Lord, pray that you may always reside in my heart. Oh! Son of the Wind-God, remover of all afflictions, and the very embodiment of auspiciousness. Please reside in my heart together with Shri Ram, Lakshman and Sita.

Dekh Tere Sansaar Ki Haalat [singer: Pradeep Jee, previously translated]

Oh lord look at the condition of your world. What is going on? How much has man changed? The sun, moon and clouds have not changed but the astonishing change in man has become a cause for concern.

The time has come when all are part of a RIOT. Today's man is nothing but a loafer. Here is a fight, over there is a quarrel. In these situations man is nakedly dancing. With Hypocrisy and deceit man is selling himself.

The devotees of Ram and the disciples of Rahim are only involved in deception and plot. How

cunning and deceitful they are! Their actions are quite obvious. Their sinful actions have transformed this land to a cemetery.

If we should continue to fight among ourselves then the process of deterioration will be intensified. How many houses are on fire? Why are so many children leaving their mothers? Bapuji weeps to see the pitiful condition of the world. Wake up, O Man!

Tere Dwar Khada Bhagwan [Hindi Lyrics translated by Pandit Prakash]

Chorus. The Lord is standing at your door, O devotee of God, fill the jholi/ bag. Your good deeds will pay dividends. So that age to age you will always be held in dignity/high esteem.

Chorus.

The vibration wakes the entire earth to see the abode of God everywhere. Coming as a beggar to your home, the Lord who looks after the welfare of the world. Saying ... Today, I am a guest of yours. Do recognize me to some extent. *Chorus.*

Today, taking away what you have accumulated, which you were thinking and saying this is mine. In an instant, all problems will be erased, that which would take lifetime after lifetime to return and repay (in order to attain God realization).

Please leave aside all your ego/pride, for you will gain immortality through your daan/gift of charity. *Chorus.*

Jai He Maha Lakshmi Maa [Lyrics Translated by Pandit Prakash R Maharaj]

Victory to Mother Lakshmi! O Mother, take me across this world of birth and death. I am standing with my jholee/bag open. Please bless me with abundance.

Mother you are compassionate and full of love. You take away the sufferings from the thousands of poor suffering souls.

We have come for Your mercy and love. Please come bless us, we put our trust in you. Diwali is coming and we are lighting diyas. By your grace, we all offer flowers and fruits. We pray that happiness and togetherness/well-being come and fill our homes. Please grant us this much blessings, O Maha Lakshmi Maa.

Shree Satyanrayan Ki Maha Pooja 1975 ... Jo bhi chahe parbal vidhata

Whatever you want awful creator [2X]

In the end, that happens...

Transgression happens, in what Hari/God destines

So that one day there is crying here.

Repeat chorus

Lord Satynarayan Satynarayan...Satynarayan

Lord Satynarayan

One reaps as one has sown

Remember to keep this in mind, o people [2X]

God's puja/worship which you rejected

This is so ignorant/wrong [2X]

That God is forgotten in the world. [2X]

That is why this is happening,

Chorus....Transgression happens in what Hari/God destines

So that one day there is crying here.

Shri sataynarayan sataynarayan...Sataynarayan

Shri sataynarayan

Whatever is happening in the world [2X]

It is all the game of God

The people are engaged in begging [2X]

Moneylender is jailed

That same fruit will they will reap [2X]

Just as what is happening...

Chorus

Shri sataynarayan sataynarayan...Sataynarayan

Shri sataynarayan

Whatever we have forgotten in life

Now you forget that

By obtaining the fruit of God's grace,

From the thorns, flowers will blossom.

Forgive those, [2X]

Forgive those who with their tears, they

Wash the Lord's feet

Chorus

Sri Satyanarayan....

Prabhujee Dayaa Karo [by George Harrison and Ravi Shankar]

Oh Lord God, have compassion on me. Please fill my mind/being with your divine presence/love.

I do not know any Tantra, Mantra or Pooja/worship rituals.

I believe in you only.

I have been wandering all over the world in search of you.

Please come now and hold my hand and lead me (into God consciousness).

Shree Satyanarayan Ki Maha Pooja Kya Bhoor Huyi

We come to you for shelter and protection, please save us

We come to you for shelter and protection, please save us

We come to you for shelter and protection, please save us

O Lord Satyanarayan, have mercy on us

O ocean of compassion have mercy on us

Ocean of compassion have mercy on us

Have mercy, You, O Lord have mercy!
Why have you forgotten us, why are you angry with us
O my God/Lord
How can I do my Prayers to get my blessings/rewards
Why have you forgotten us, why are you angry with us
O my God/Lord
How my Lord,
How can I do my Prayers to get my blessings/rewards
Why have you forgotten us, why are you angry with us
Your puja/worship, your doorway
You come and do as you wish
Your puja/worship, your doorway
You come and do as you wish
You are not listening, then O Lord who resides within us
You are not listening, then O Lord who resides within us
O my lost mind, who shall I call for help
Seeing the glimpses of the beat of life's drum
Seeing the gift of life
Why have you forgotten us, why are you angry with us
Please remove the blinding darkness now
Please remove the blinding darkness now
Please light the lamp in the temple of my mind
So by you, these things will not happen

Please light my life's lamp
If the sun sinks on my beloved, then
If the sun sinks on my beloved, then
The body will be bereft of company
Why have you forgotten us, why are you angry with us
Lord Satyanarayan, please forgive me
Please remove all my errors
Save me and grant me my beloved
Please return to me the wealth of my life
Return to me the wealth of my life
Return to me the wealth of my life

Ishwar Allah Tere Naam

Chorus: your names are Ishwar and Allah,
Give wisdom to all O God!
The entire world's your children!
Those dwelling on this earth,
All have been nurtured in your lap,
No one is inferior nor superior!
The entire world are your children.
Divisions of castes and races,
Where can lies be at your door?
For you all are the same!
The entire world are your children.

Of no value is the birth!
Birth isn't the measure of person,
All are recognised by their deeds!
The entire world are your children.

Bhaagavat Aarti

This is the aarati of the immortal Lord, by which sinners are freed of sins.
This is the immortal book, the way to salvation.
It is the fifth Veda.
By this sacred knowledge the universal light is kindled through God's grace.
The world becomes blissful by this aarati.
Sins are dispelled by this Bhaagavat aarati.
This light of peace is holy, clean, pure and dispeller of sins.
It reveals the glory of God.
It brings bliss and destroys the sins of the sinners.
This magnificent aarati reveals the maaya of the world and clears all paths to God.
All faults are corrected by this aarati of Shri Raama Ghansyaam.
This is the glorious aarati by which all sinners are freed from sins.

Shree Satyanarayan Ki Maha Pooja (1975)

All Gods are aspects of Lord Vishnu
There is no difference in God.
There is no other Pooja as the Pooja of Satyanarayan
Sri Satyanarayan ji's great puja, great puja. [3X]
Incense, light and Prasad/food offerings is made. [2X]

Whoever sings the praises of Hari/God and listens to the katha/message with faith and devotion

All their noble desires are fulfilled

Age to age Lord Vishnu's devotee bow their heads

Chorus...

Sri Satyanarayan ji's great puja, great puja. [3X]

Across India from house to house,

Great fame shall spread...

North, South,, East West ...

Wherever they sing the praises of God who is

Gracefully adorned with Shank (conch shell), discus, mace and (lotus flower), to him who has
four arms.

Chorus...

Sri Satyanarayan ji's great puja, great puja. [3X]

The craving of the Soul

Oh God! When will you come and fill my heart with joy? Come into my heart and open the veil which prevents me from seeing you everywhere. I see you in the air, in the tree and stones and I feel your presences everywhere. I am so thirsty to see you. When will you come to me? Please come and quench my thirst. Oh God, whom shall I call lord? I know none other than you. I shall call your name until eternity. Please come into my heart and fill my soul with eternal bliss. In my heart, in my eyes, in my every breath. In my soul and in my every moment you are present. Yet, I cannot see you. Oh lord, please come into my heart and take me into your arms into an eternal journey. I am yours and none other.

Appendix H

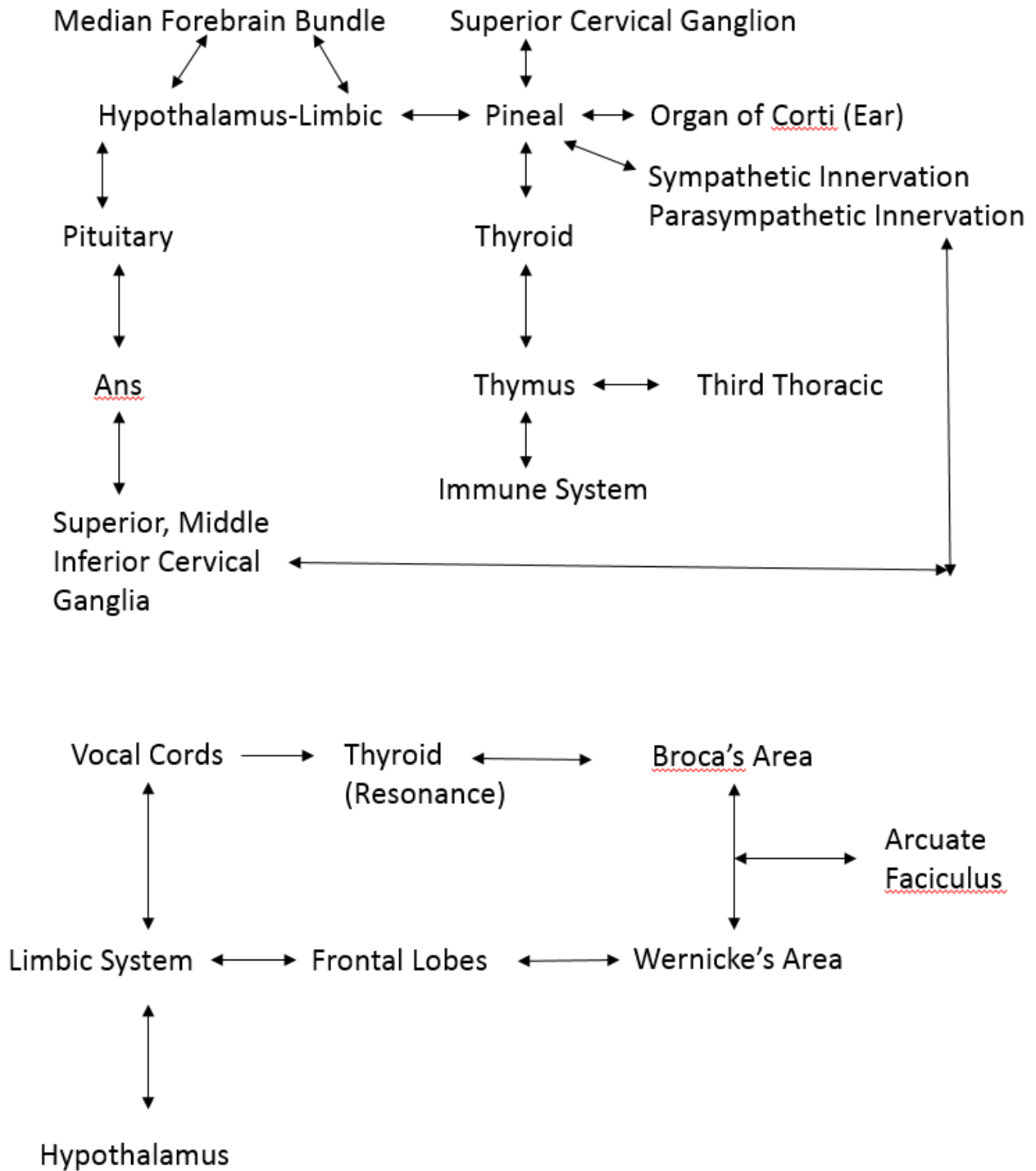


Figure 7. How VRMT can stimulate all neuroendocrine systems and induce limbic kindling. (Author's model)

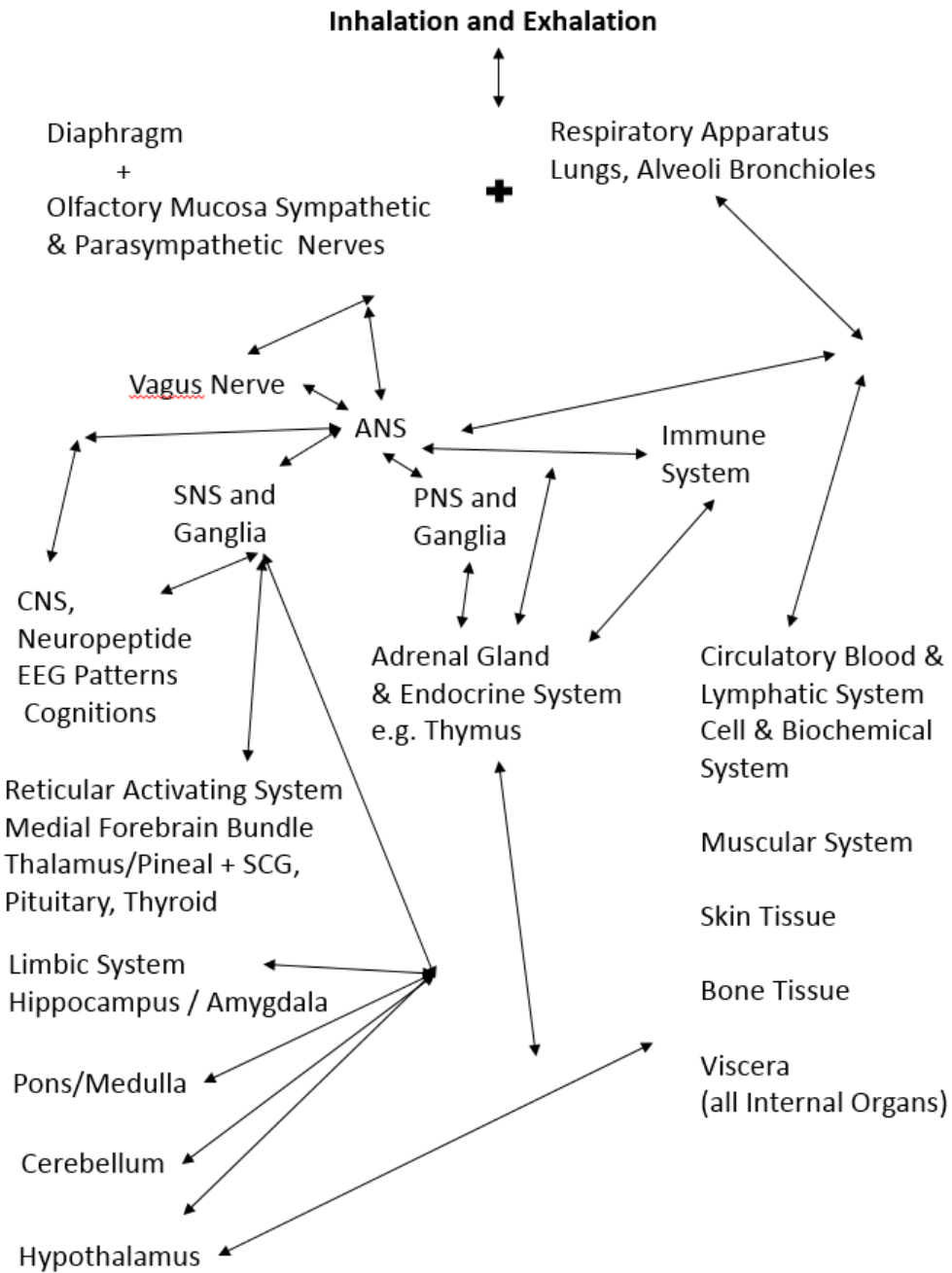


Figure 8. Proper breathing stimulated the olfactory mucosa and apparatus that stimulates and interacts with all structures shown in the diagram. Full treatment breathing profoundly influences the entire central nervous system (CNS), autonomic nervous system (ANS), important ganglia (e.g., superior cervical ganglion (SCG)), immune, endocrine, cardiovascular, and muscular systems. Quite important are the SCG influences on the pineal, pituitary and hypothalamus, and the SCG is in turn influenced by the ANS which is influenced by the breathing through a vast system of nerves, neuropeptides, hormones, and enzymes. (Author's model)