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Commentary

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Exploring the neural and biophysical correlates of consciousness and religious and meditative practices: a commentary

Abstract

This commentary synthesizes findings from four articles exploring consciousness, meditative practices, and subtle physical phenomena. An article on fractals and consciousness[1] proposes a theoretical link between consciousness and fractal processes, suggesting inherent limitations in modeling consciousness. An article on religious practice[2] presents a study on the neurophysiological and biological effects of chanting Nam-Myoho-Renge-Kyo, revealing specific sound frequencies, increased prefrontal cortex activity, and enhanced microbial metabolism. An article on ultraweak photon emission[3] describes changes in emission patterns during meditation, suggesting influence on metabolic processes. Complementing these, a new observational study[4] explores correlations between chanting Nam-Myoho-Renge-Kyo and subtle variations in local natural radioactivity, reporting higher detected counts and increased variability during chanting periods, aligning conceptually with consciousness influencing random physical systems (e.g., PEAR, GCP). The commentary interprets Gardiner's fractal concepts through the lens of chanting effects, suggesting links between fractal brain activity and chanting, and connects ultraweak photon emission results to neural and metabolic changes. Furthermore, it integrates the radioactivity findings as another empirical layer, suggesting potential correlations between the focused state of chanting and subtle physical effects on the environment. While acknowledging limitations like single-subject or small sample sizes and the need for further studies, the commentary underscores the interdisciplinary nature of consciousness research and the potential for convergent findings across diverse methodologies, including neurophysiology, biophysics, and environmental measurements, in understanding the profound effects of meditative and religious practices.

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Introduction

The enduring mystery of consciousness continues to drive interdisciplinary research across various scientific domains. While the neural correlates of consciousness have been extensively investigated, exploring diverse biological systems and practices that modulate conscious states offers valuable complementary insights. This commentary synthesizes the findings from four distinct articles that approach the study of consciousness and its alterations through varying lenses: a theoretical proposition linking consciousness to fractal processes across biological systems,[1] an empirical investigation into the neurophysiological and broader biological effects of a specific Buddhist religious practice,[2] a biophysical analysis of the impact of meditation on ultraweak photon emission,[3] and an observational study exploring potential correlations between this chanting practice and variations in natural radioactivity.[4] By examining these diverse perspectives, the commentary aims to highlight the complexity of consciousness research and the potential for convergent findings across different methodologies and levels of physical reality.

The article by Gardiner[1] posits a fundamental role for fractal processes in the manifestation of consciousness in both animals and plants. Drawing parallels between the fractal nature of electrical signaling in animal nervous systems, exemplified by increased gamma wave synchrony during meditation, and the fractal patterns observed in plant growth, the Author suggests a universal principle at play. A key argument presented is the inherent unidirectional information flow within fractal systems, linked to the second law of thermodynamics and increasing entropy, which purportedly renders a complete model of consciousness mathematically unattainable. This provocative theory challenges reductionist approaches and proposes an intrinsic limit to our understanding of conscious phenomena.

The article by Ruggiero[2] presents an empirical study examining the effects of chanting Nam-Myoho-Renge-Kyo by a long-time Nichiren Shoshu Buddhist practitioner. The investigation encompasses an analysis of sound frequencies produced during chanting, changes in prefrontal cortex activity measured using functional near-infrared spectroscopy (fNIRS), and alterations in the metabolic activity of probiotic cultures exposed to the chanting. The findings reveal specific sound frequencies within the chanting that resonate with known biological effects, a modest increase in prefrontal cortex activity during chanting followed by a significant increase afterward, suggesting enhanced focused attention and subsequent cognitive enhancement. Notably, the study also reports increased metabolic activity in probiotic cultures exposed to the chanting, hinting at potential local and non-local effects. The Author concludes by emphasizing that the spiritual practice transcends purely neurophysiological explanations.

The article by Van Wijk et al.[3] investigates the impact of meditation on ultraweak photon emission, a biophysical phenomenon associated with metabolic processes and radical reactions within living systems. The study recorded ultraweak photon emission in five subjects before, during, and after meditation, utilizing a photomultiplier for detection. The results indicated changes in ultraweak photon emission following meditation, including a decrease in emission in a subject with high pre-meditation values and a common decrease in the kurtosis and skewness of the photon count distribution across subjects. Fano factor analysis of photon emission from the hands of two subjects revealed fractal-like long-range correlations in the pre-meditation state, which

were absent after meditation, suggesting a shift towards a less ordered ultraweak photon emission structure. The Authors interpret these findings as evidence that meditation influences the intricate interplay of oxidative and anti-oxidative reactions that govern photon emission.

Adding another dimension to the empirical investigation of chanting effects, an observational study by Ruggiero[4] explored potential correlations between the practice of chanting Nam-Myoho-Renge-Kyo and subtle variations in local natural radioactivity. Utilizing a sensitive radiation detection instrument, this study continuously monitored metrics such as Counts Per Second (CPS) and the energy spectrum during chanting and control periods. While acknowledging the preliminary nature and limitations of a single-subject design, the analysis, including quantitative assessment of spectrograms, suggested subtle changes in the pattern of detected radiation events. Specifically, the chanting periods appeared to be associated with a higher total integrated count and increased variability in CPS fluctuations compared to control periods. These findings, while requiring further rigorous investigation, align conceptually with the broader research area exploring the potential for focused human consciousness or intention to influence the statistical properties of random physical systems, as investigated by projects like PEAR and GCP. This study introduces the possibility that the effects of deep meditative or religious practice might extend beyond biological systems to potentially interact with fundamental physical phenomena.

Synthesis and discussion

The theoretical framework proposed by Gardiner[1] suggests that consciousness in animals is closely linked to fractal electrical signaling in the nervous system, exemplified by the increased gamma wave synchrony observed during meditation. Ruggiero,[2] provides empirical support for the notion that a particular religious meditative practice is associated with specific changes in brain activity, particularly within the prefrontal cortex, a region crucial for higher-order cognitive functions often implicated in conscious awareness and focused attention. The observed increase in prefrontal cortex activity during and after chanting could potentially reflect a shift in the fractal dynamics of neural oscillations within this region. As suggested by Gardiner,[1] the complex patterns of electrical activity underlying consciousness may indeed exhibit fractal properties, and the focused mental state induced by chanting might modulate these fractal characteristics, leading to the observed changes in fNIRS signals.

Furthermore, Gardiner[1] draws a parallel between fractal electrical signaling in animals and fractal growth patterns in plants, suggesting a universal principle of consciousness linked to microtubule function and information flow. While Ruggiero[2] does not directly investigate microtubule activity, the finding of specific sound frequencies within the chanting that resonate with known biological effects, including frequencies linked to chloride ion movements, opens intriguing possibilities. Chloride ion channels are known to play a role in neuronal signaling, which is mediated by the cytoskeleton, including microtubules. It is speculative, but one could hypothesize that the specific frequencies generated during chanting might influence cellular processes at a fundamental level, potentially affecting cytoskeletal dynamics and, consequently, the fractal nature of neural activity.

The study on ultraweak photon emission by Van Wijk et al.[3] provides a biophysical perspective on the effects of meditation that can be interpreted through the lens of the findings in Ruggiero's article of 2024a regarding the effects of chanting. Van Wijk et al.[3] demonstrate that meditation can alter ultraweak photon emission, which is indicative of changes in metabolic processes and radical reactions. Ruggiero,[2] focusing on the specific meditative practice of chanting Nam-Myoho-Renge-Kyo, reveals increased prefrontal cortex activity, suggesting a shift towards focused attention and enhanced cognitive processing. It is plausible that this altered neural state during and after chanting is associated with the changes in metabolic activity and radical reactions reflected in the ultraweak photon emission data of Van Wijk et al.[3] The increased energy expenditure and altered biochemical processes in the brain during focused attention could contribute to the observed modifications in photon emission.

Moreover, Ruggiero[2] identifies specific sound frequencies produced during chanting, including Schumann resonance (8 Hz) and solfeggio frequencies known to exert various biological effects. It is conceivable that these specific sound frequencies could influence the metabolic state of the body at a cellular level, thereby affecting the production and characteristics of ultraweak photon emission, as seen by Van Wijk et al.[3] The increased metabolic activity observed in probiotic cultures exposed to chanting further supports the idea that sound can have a direct impact on metabolic processes in biological systems, potentially influencing photon emission.

Integrating the findings from Ruggiero,[2] which suggests subtle correlations between chanting and variations in natural radioactivity, adds another layer of complexity and potential convergence to this interdisciplinary picture. The observed increase in detected counts and variability during chanting periods, while preliminary, aligns conceptually with the broader phenomenon of consciousness potentially influencing random physical systems, as investigated by projects like PEAR and GCP. If replicated and validated, these findings could suggest that the focused psycho-physiological state achieved during chanting might have subtle, measurable effects on the local physical environment, potentially extending beyond the biological realm to influence phenomena typically considered purely random, such as radioactive decay or the interaction of radiation with a detector. This adds a new empirical dimension to the discussion, suggesting that the effects of deep meditative practice might manifest not only in altered brain states[2] and biophoton emission patterns[3] but also in subtle interactions with fundamental physical processes.

The finding by Van Wijk et al.[3] that meditation shifts the Fano factor of ultraweak photon emission from a fractal process with long-range correlations to a more random (Poisson-like) distribution is also intriguing when considered alongside the increased prefrontal cortex activity reported by Ruggiero,[2] the concept of entropy discussed by Gardiner,[1] and the potential influence on random physical processes suggested by Ruggiero.[3] The focused attention and enhanced cognitive control associated with increased prefrontal activity might lead to a more regulated and less chaotic state of overall metabolic activity, which could be reflected in the altered pattern of photon emission. The coherence observed in ultraweak photon emission before meditation, which is diminished after, might represent a baseline state of metabolic activity that is modulated by the focused intention and altered neural activity induced by the practice of chanting, potentially leading to a state of modified entropy as suggested by the link between consciousness and entropy by Gardiner.[1] Furthermore, if the chanting practice can indeed subtly influence random physical systems like detected radioactivity,[2] this might represent a manifestation of consciousness interacting with the inherent randomness or "noise" of the physical world, potentially relating to concepts of entropy reduction or information transfer at a fundamental level, as speculated within frameworks exploring consciousness and quantum physics.

Limitations and future directions

Several limitations should be considered when interpreting these findings. The article by Gardiner[1] presents a theoretical argument

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without direct empirical validation within the context of the specific findings of the other articles that are the object of this commentary. The articles by Ruggiero[2] and Van Wijk et al.[3] involve relatively small sample sizes, limiting the generalizability of their findings. Similarly, the observational study by Ruggiero[4] is limited by its single-subject design and the inherent variability of natural background radiation. Future research should aim to investigate the fractal properties of brain activity during chanting and other meditative practices more directly, potentially using techniques like EEG with fractal dimension analysis. Studies with larger sample sizes are needed to confirm the findings of Ruggiero[2] and Van Wijk et al.[3] and to further explore the mechanisms underlying the observed correlations, including the potential influence of specific sound frequencies on neural and cellular processes, the link between meditative practices and changes in entropy across different biological systems, and the relationship between modified neural states and ultraweak photon emission. Crucially, the intriguing findings regarding natural radioactivity[4] require rigorous replication with controlled experimental designs, larger sample sizes, and simultaneous monitoring of environmental variables to rule out confounding factors. Comparative studies examining the effects of different meditative practices and control conditions on random physical systems would also be valuable.

Conclusion

This commentary integrates theoretical concepts of consciousness as a fractal phenomenon with empirical findings on the effects of a specific religious meditative practice (chanting Nam-Myoho-Renge-Kyo in the context of Nichiren Shoshu Buddhist Liturgy) on brain activity, sound frequencies, microbial metabolism, and detected natural radioactivity. The observed changes in prefrontal cortex activity and the potential influence of chanting frequencies on cellular processes might reflect modulations in the fractal dynamics of neural activity and metabolic states. The intriguing correlation regarding microbial metabolism and ultraweak photon emission also suggests broader systemic effects of meditation that could be linked to fundamental principles of entropy and information flow in biological systems. The addition of preliminary findings suggesting subtle correlations with natural radioactivity introduces a new dimension, hinting at potential interactions between the focused state of chanting and fundamental physical processes, conceptually aligning with research on consciousness influencing random systems. While further rigorous research, particularly with larger sample sizes and controlled designs, is essential to solidify these interpretations and elucidate the underlying mechanisms, this synthesis underscores the value of interdisciplinary approaches in unraveling the complex nature of consciousness and the profound effects of meditative practices on the brain, body, and potentially the surrounding physical environment.

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Conflicts of interest

The author declare that there are no conflicts of interest.

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