Neural Correlation of Faradarmani Consciousness Field Mind Mediation: A Comparative Functional Connectivity and Graph Analysis

Mohammad Ali Taheri[1], Fatemeh Modarresi-Asem[2], Noushin Nabavi[3], Parisa Maftoun[4], Farid Semsarha[5*]

* Corresponding author: Farid Semsarha
Email: Semsarha@ut.ac.ir

1. Sciencefact R&D Department, Cosmointel Inc. Research Center, Ontario, Canada
2. Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Research Services at University of Victoria, British Columbia, Canada
4. Independent Researcher, Kuala Lumpur, Malaysia
5. Institute of Biochemistry and Biophysics (IBB), University of Tehran, Tehran, Iran

DOI https://doi.org/10.61450/joci.v1i2.20

Abstract

The study of brain networks using Electroencephalography (EEG) data analysis—based on statistical dependencies (functional connectivity) and mathematical graph theory concepts—is a well-established approach in neuroscience and cognitive science for investigating both healthy and clinical populations. T-Consciousness Fields, based on the theory of Mohammad Ali Taheri, and their applications in optimizing target systems, have been explored in various studies. This study investigates the neurofunctional impacts of the Faradarmani Consciousness Field (FCF) at the cortical level in Faradarmangars (Faradarmani practitioners). Based on this theory, Faradarmangars are one of the essential components involved in mediating the function of the FCF. To investigate this, the functional and effective connectivity, as well as EEG-based brain graph measures, of the brains of Faradarmangars are compared with those of non-Faradarmangars during the FCF Connection. According to the findings of the present study, compared with non-Faradarmangars, the brains of Faradarmangars exhibited significantly reduced activity in the delta (BA8), beta 2 (BA4/6/8/9/10/11/32/44/47), and beta 3 (across 34 of the 52 Brodmann areas) frequency bands, predominantly in the frontal lobe and, to a lesser extent, in the parietal and temporal lobes. Furthermore, analyses of functional and effective connectivity within the frontal network revealed widespread reductions in dominant connectivity, primarily in the beta 3 frequency band throughout the frontal network. In contrast, graph theory analysis of the Faradarmangars' brains demonstrated increased activity in the O2, T5, F4, F3, FP2, and F8 regions, together with a significant decrease in characteristic path length and increases in global efficiency, the clustering coefficient, and transitivity. Overall, the higher graph efficiency, together with the reduced brain activity and connectivity observed during the mind's mediation under the influence of the FCF, supports the proposed passive, detector-like function of the human brain during connection with this T-Consciousness Field.

Keywords: Brain Graph, EEG, Faradarmani Consciousness Field, T-Consciousness Fields, Functional Connectivity.

Introduction

Understanding consciousness and its underlying mechanisms has been one of the most challenging topics in neuroscience and cognitive science over the past century. Numerous scientific and philosophical theories have been proposed in this field. Regardless of whether consciousness is considered to originate within the brain or to arise from processes beyond the brain (the Hard Problem of Consciousness proposed by David Chalmers) [1], it is possible to investigate brain function during various activities and under different states of health and disease using a range of experimental approaches.

According to Taheri's theory, T-Consciousness Fields are non-frequency-based fields that are subsets of the Cosmic Consciousness Network (CCN). The effects of these fields begin through a brief, momentary attention initiated by the mind of the announcer, who is referred to as a Faradarmangar [2]. The present study analyzes EEG data from Faradarmangars and non-Faradarmangars using statistical dependencies (functional connectivity) and concepts from mathematical graph theory to investigate the brain's neural correlates during the Faradarmani Consciousness Field (FCF) Connection.

Various techniques, including functional magnetic resonance imaging (fMRI), positron emission tomography (PET), electroencephalography (EEG), magnetoencephalography (MEG), transcranial magnetic stimulation (TMS), or combinations of these methods, can be used to examine different aspects of brain function [3]. Each technique has its own strengths and limitations. Among them, EEG offers higher temporal resolution than PET or fMRI, allowing brain responses to stimuli to be measured on the millisecond timescale. EEG enables the detection of voltage fluctuations at the scalp that arise from the synchronized electrical activity of large populations of neurons located near the scalp. In addition, these oscillations occur across different frequency bands, making it possible to compare the relative power of these bands under different experimental conditions [3]. Consequently, the effects of various stimuli, referred to as tasks, can be measured with high temporal precision and compared with the baseline condition (resting state or no stimulus).

Various analytical approaches are applied to EEG data to obtain more comprehensive information about brain activity and its underlying processes. These analyses are based on the premise that the human brain is organized according to two fundamental principles: functional segregation and functional integration [4]. According to the principle of functional segregation, the cerebral cortex can be regarded as a non-homogeneous system composed of structurally distinct (brain anatomy) and functionally specialized (processing specific stimuli) regional modules. In contrast, the principle of functional integration emphasizes that no single brain region is sufficient to carry out a specific cognitive process independently. Rather, dynamic interactions and information exchange among different brain regions are essential. This principle forms the basis of functional connectivity studies, which examine the synchronization of spatially separated neurophysiological events during specific tasks in order to identify the associated brain networks [5].

The most recent approach to analyzing functional brain connectivity, which examines the organization of brain network patterns, is graph theory. In graph-based analysis of EEG signals, stable characteristics of EEG activity that cannot be captured by other linear analytical methods can be identified and described [6]. In this context, graph theory has revealed distinctive features that differentiate healthy individuals from patients, providing important evidence regarding the pathophysiological processes underlying disrupted brain connectivity [7]. According to the T-Consciousness Fields Theory, the human brain can function as a powerful detector, revealing the manifestations of such a connection [8]. The electrical activity of the brains of Faradarmangars during the FCF Connection was investigated in a previous study [9]. In the present study, we aimed to examine the functional differences between the brains of Faradarmangars and those of non-Faradarmangars during the FCF Connection. To this end, EEG recordings from both groups were compared. The EEG data from the Faradarmangars were analyzed using effective

connectivity and graph theory to identify the distinctive characteristics of their brain networks during the functioning of the FCF.

Methods

This study was designed to investigate and compare the effects of the FCF on EEG characteristics as biomarkers of brain function in two different groups. A total of 45 volunteer Faradarmangars (33 women and 12 men; age range: 20–50 years; M = 34.5, SD = 7.10) and 15 volunteer non-Faradarmangars (11 women and 4 men; age range: 20–50 years; M = 34.3, SD = 5.90) were randomly selected to participate in the study.

Application of the Faradarmani Consciousness Field

Two procedures were employed to apply the FCF. First, in the Faradarmangar group, each participant initiated the FCF Connection for themselves (this procedure is referred to here as 'Announcement') (Figure 1). Announcement is the process by which the Faradarmangar, through a brief, momentary attention directed toward both the subject under study and the T-Consciousness Field, initiates the action of the Field. In the present study, the subject under investigation in the Faradarmangar group was the Announcer themselves. The Faradarmangars (shown as the Announcer in Figure 1) were trained and certified individuals who had successfully completed a two-year training program conducted by Mohammad Ali Taheri or his authorized instructors. During this program, participants received both theoretical and practical instruction in the application of the T-Consciousness Fields.

EEG activity was recorded using a 19-channel system under both resting and task conditions. During the resting condition, participants remained with their eyes closed without performing any task. Under the task condition, participants in the Faradarmangar group were instructed to initiate the FCF Connection using the method they had been trained to perform. In contrast, during the task condition for the non-Faradarmangar group, a Faradarmangar established the Connection between the subject under study (a non-Faradarmangar participant) and the Cosmic Consciousness Network (CCN) (Figure 1).

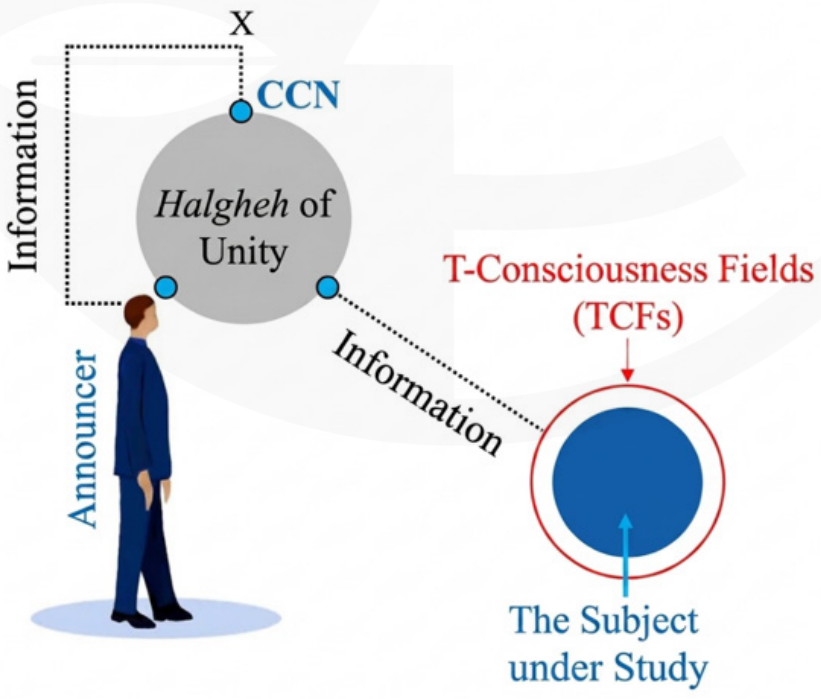


Figure 1. The mechanism of 'Announcement' and 'Connection' between the subject of study and the Cosmic Consciousness Network (CCN) via T-Consciousness Field, based on Taheri's Theory.

It is worth noting that applying T-Consciousness Fields has been made available to researchers free of charge. For this purpose, interested parties should visit the Cosmointel Research Center website[1]. Further details are provided in the General Considerations section of this issue.

EEG Assessment

The volunteers in this research were comfortably seated in a dimly lit, sound-attenuated room. Approximately 15 minutes later, EEG data for the task with eyes-closed were collected using a 19-channel system (EEGR 19-26, Medicom, Russia). The data processing and analysis stages were carried out similarly to the previous study [9].

Regional Analysis

In the present study, 'exact low-resolution electromagnetic tomography' (eLORETA) was used to estimate cortical electrical activity from scalp EEG data [10, 11]. The nearest voxel to each seed point was selected to define the regions of interest (ROIs). Intracranial spectral density was computed from the EEG data using the eLORETA software with a frequency resolution spanning 1–80 Hz. Functional eLORETA images of spectral density were generated for eight frequency bands: delta (1.5–4 Hz), theta (4–8 Hz), alpha 1 (8–10 Hz), alpha 2 (10–13 Hz), beta 1 (13–21 Hz), beta 2 (21–30 Hz), beta 3 (31–40 Hz), and gamma (40–80 Hz).

Significant differences between cortical voxels and group comparisons were assessed using statistical nonparametric mapping (SnPM) with randomization. This procedure determines the critical probability threshold for the observed *t*-values while correcting for multiple comparisons across all voxels and frequency bands. This methodological approach is implemented in the eLORETA software and is based on Fisher's permutation test [12]. A total of 5,000 permutations were performed to determine statistical significance for each randomization test. T-level thresholds corresponding to statistically significant differences ($p < 0.05$ and $p < 0.01$) were applied, and the associated *T*- and *p*-values are reported after correction for multiple comparisons [13, 14].

Functional and Effective Connectivity Analysis

The Brodmann areas (BAs) of the brain, as implemented in the eLORETA software according to the Talairach Daemon (http://www.talairach.org/), were used to define the regions for the analysis of functional and effective connectivity. Lagged Phase Synchronization (LPS) was employed as the measure of nonlinear functional connectivity.

Graph Analysis

Graph-theoretical analysis was performed using the BRAPH toolbox [15]. Using this toolbox, the brain atlas, subject groups, and connectivity matrices were specified, and weighted undirected graph analysis was carried out. After loading the Talairach functional atlas into BRAPH, the EEG data were imported into the software, thereby defining the network nodes. Based on weighted undirected brain connectivity, the toolbox computed the edges representing the relationships between nodes. Differences between the two groups at both the nodal and global levels were evaluated using nonparametric permutation tests (1,000 permutations).

Results

Given the mediating role of the mind in Faradarmangars during the establishment of a Connection with T-Consciousness Fields (such as the FCF), brain activity was measured and compared between the Faradarmangar and non-Faradarmangar groups during the task condition (the FCF Connection). For simplicity, the brain activity of the Faradarmangar and non-Faradarmangar groups during the FCF Connection task is hereafter referred to as the experimental and control conditions, respectively.

Comparison of Regional Measurements

The frequency bands exhibiting reduced activity, obtained from the comparison of EEG data recorded during the task condition in the experimental and

1. www.cosmointel.com

control groups, together with their corresponding brain regions, are presented in Table 1.

Table 1. Frequency bands showing a significant decrease in activity during task conditions: a comparison between the experimental and control groups with corresponding details (p value < 0.001, threshold 1.19).

Frequency	X (MN)	Y (MN)	Z (MNI)	BA	Lobe*	Structure*
Delta	-35	20	50	8	Frontal	Middle Frontal Gyrus
	-40	20	50	8	Frontal	Middle Frontal Gyrus
	-35	25	50	8	Frontal	Middle Frontal Gyrus
Beta 2	148 coordinates in BA regions*: 10 (54), 11(62), 32(1), 4(1), 44(1), 47(3),6(7), 8(12), 9(7)				Frontal (147) Parietal (1)	Anterior Cingulate (1) Inferior Frontal Gyrus (8) Medial Frontal Gyrus (20) Middle Frontal Gyrus (45) Orbital Gyrus (6) Precentral Gyrus (11) Rectal Gyrus (4) Superior Frontal Gyrus (53)
Beta 3	2079 coordinates in BA regions*: 10 (134), 11 (228), 13 (135), 18(6), 19(59), 2(5), 20(109), 21(105), 22(89), 24(1), 25 (19), 27(2), 28(19), 32(36), 34(15), 35(13), 36(30), 37(96), 38(126), 39(29), 4(6), 40(165), 41(26), 42(19), 43(12), 44(51), 45(58), 46(43), 47(210), 5(8), 6(43), 7(1), 8(49), 9(132)				Frontal (905) Limbic, A (36) Limbic, I (1) Limbic, P (69) Limbic, P (35) Occipital (64) Parietal (179) Sub-lobar, Ext (10) Sub lobar, Ins (111) Temporal (587)	Fusiform Gyrus (86) Inferior Frontal Gyrus (1) Inferior Temporal Gyrus (75) Insula (1) Middle Temporal Gyrus (147) Sub-Gyral (11) Superior Temporal Gyrus (240) Supramarginal Gyrus (8) Transverse Temporal Gyrus (18)

Values in parentheses indicate the frequency of each item across all coordinates

As shown in Table 1, during the task condition, the experiment group exhibited a significant decrease in delta, beta-2, and beta-3 wave activity compared to the control group. The specific brain regions associated with the reduced activity of these three frequency bands (presented in Table 1) are illustrated in Figure 2.

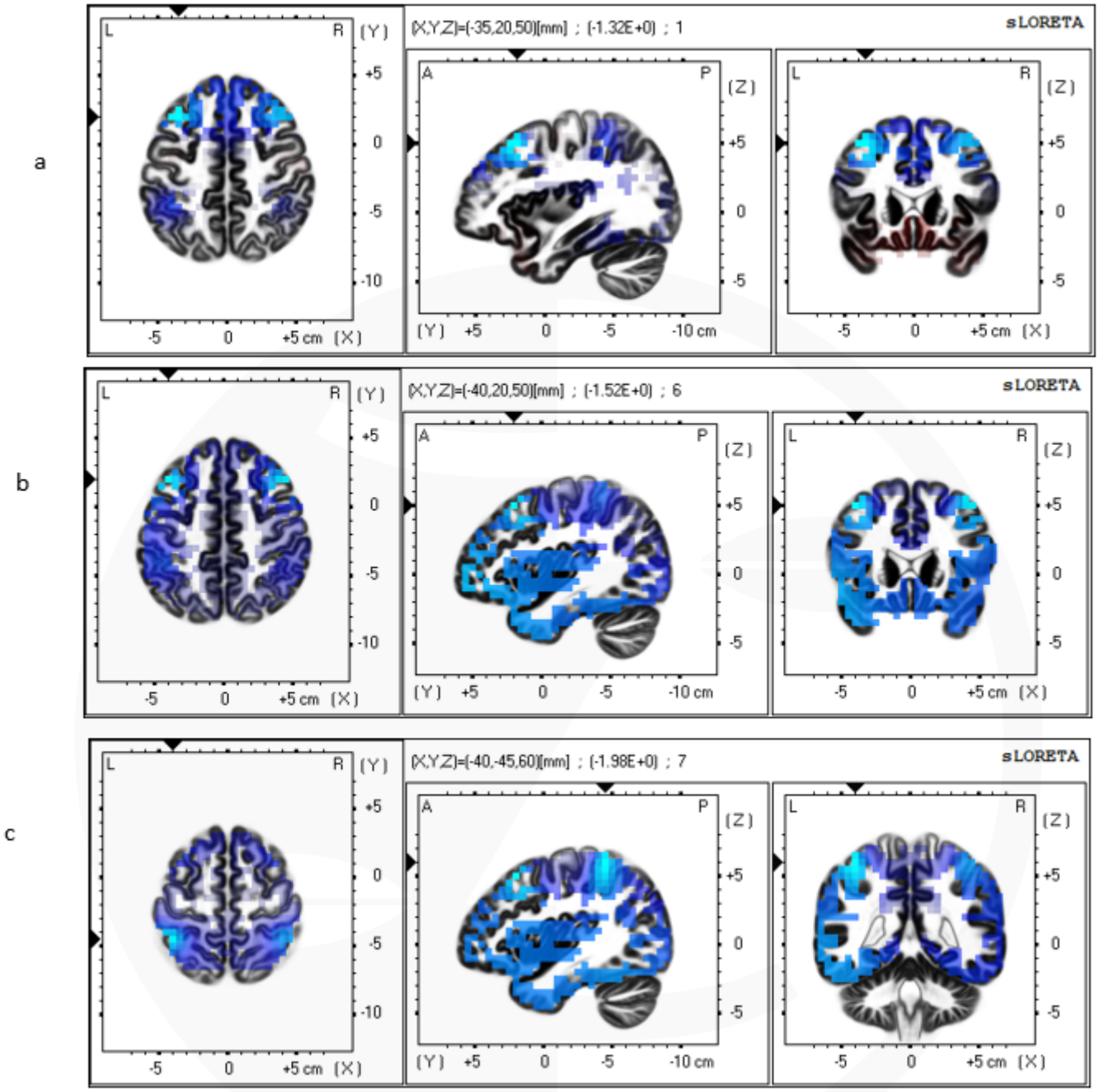


Figure 2. Cross-sectional (left), sagittal (center), and coronal (right) views of the brain regions in the Faradarmangar group exhibiting reduced activity (relative to the control group) in (a) the delta frequency band, (b) the beta-2 frequency band, and (c) the beta-3 frequency band during the Faradarmani Consciousness Field Connection.

Functional Connectivity Analysis

The synchronization of spatially separated neurophysiological events was measured in the brains of the experimental and control groups. Functional connectivity within the frontal network was then compared between the experimental task and control task conditions. The results are presented in Figure 3 and Table 2.

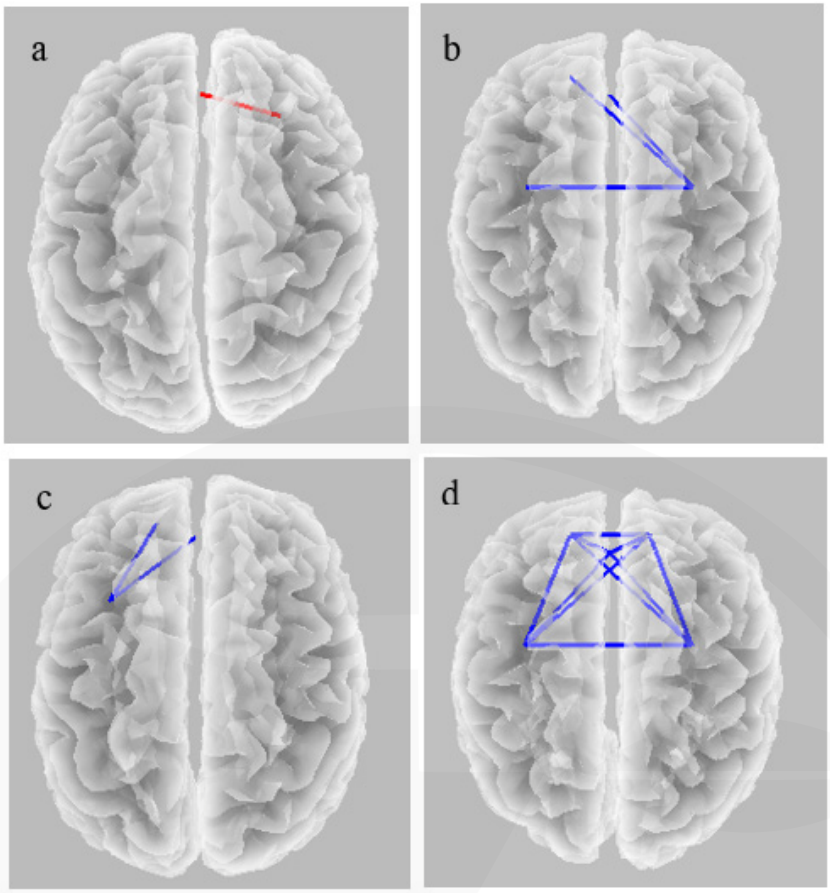


Figure 3. Increases (red) and decreases (blue) in connectivity between different regions in the experiment group compared to the control group across various frequency bands: (a) alpha-1, (b) alpha-2, (c) beta-2, and (d) beta-3.

Table 2. Alterations in connectivity between different regions of the frontal brain network in Faradarmangars compared to non-Faradarmangars (p-value < 0.05, threshold=2.06).

Frequency band	Related regions	Change in the connectivity
Alpha1	rSFG-ACC	Increase
Alpha2	rSFG-ACC rSFG-lMFG rSFG-LSFG	Decrease
Beta 2	LSFG-ACC LSFG-LmFG	Decrease
Beta 3	All parts of the frontal network	Decrease

Differences in connectivity within the delta, theta, beta-1, and gamma frequency bands between the two studied groups are not statistically significant. Furthermore, as shown in Table 2 and Figure 3, the only instance of increased connectivity is observed in the alpha-1 frequency band, whereas the most pronounced decrease in connectivity between different frontal brain regions can be observed within the beta-3 frequency band.

Effective Connectivity Results

To determine the alterations in the direction of information transfer across different components of the frontal network in both the experimental and control groups, we evaluated effective connectivity, as illustrated in Figure 4. The results indicate that only the delta frequency band exhibits a reduction in information flow from the rmFG to the LSFG regions (between the left and right hemispheres) in the experiment group compared to the control group.

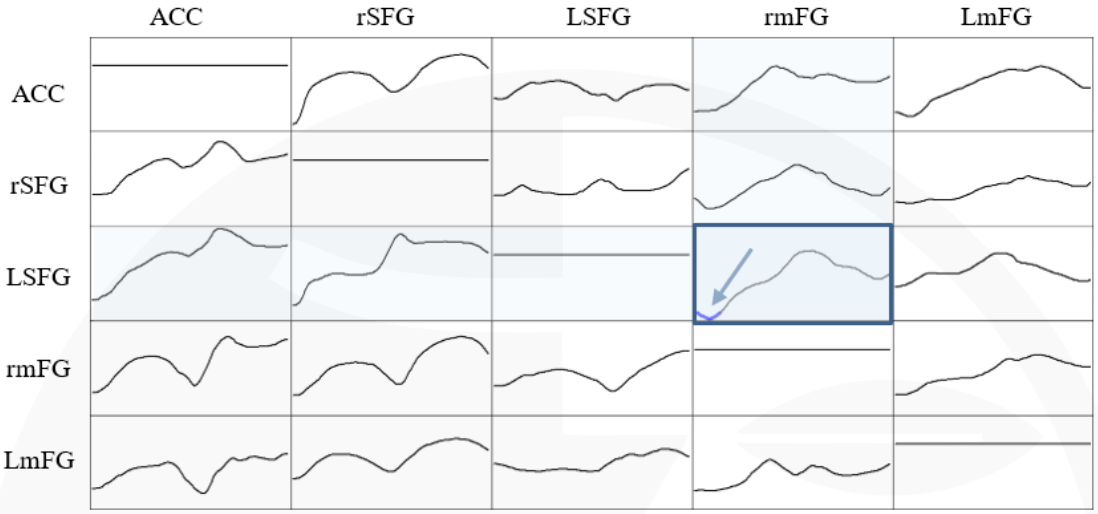


Figure 4. The effective connectivity matrix of the frontal brain network in the Faradarmangar group (compared to the control group) illustrates a reduction in information flow between the highlighted regions within the delta band (indicated by the blue arrow) (p-value = 0.022, threshold=2.1).

Graph Analysis

The graph analysis of brain activity for the experiment group compared to the control group is presented in Table 3 and Figure 5.

Table 3. Main metrics of the brain graph of Faradarmangars during Connection with Faradarmani Consciousness Field compared to the control group.

Measure	Experimental	Control	difference	p (1-tailed)
Char. path length	2.0854	2.3921	-0.3067	0.005
Global efficiency	0.5696	0.5092	0.0603	0.005
Local efficiency	1.4695	1.1839	0.2855	0.004
Clustering	0.518	0.4329	0.0851	0.001
Transitivity	0.7759	0.6494	0.1265	0.002

Regarding the global network topology, the results show a significant decrease in characteristic path length and an increase in global efficiency, clustering coefficient, and transitivity in the experiment group compared to the control group. At the regional level, node degree had a significant difference between the two groups. A normal functional network is characterized by a high clustering coefficient (an index of functional segregation) between neighboring nodes and a short path length (an index of functional integration) between any pair of nodes. In other words, there must be a proper balance between local specialization and global integration.

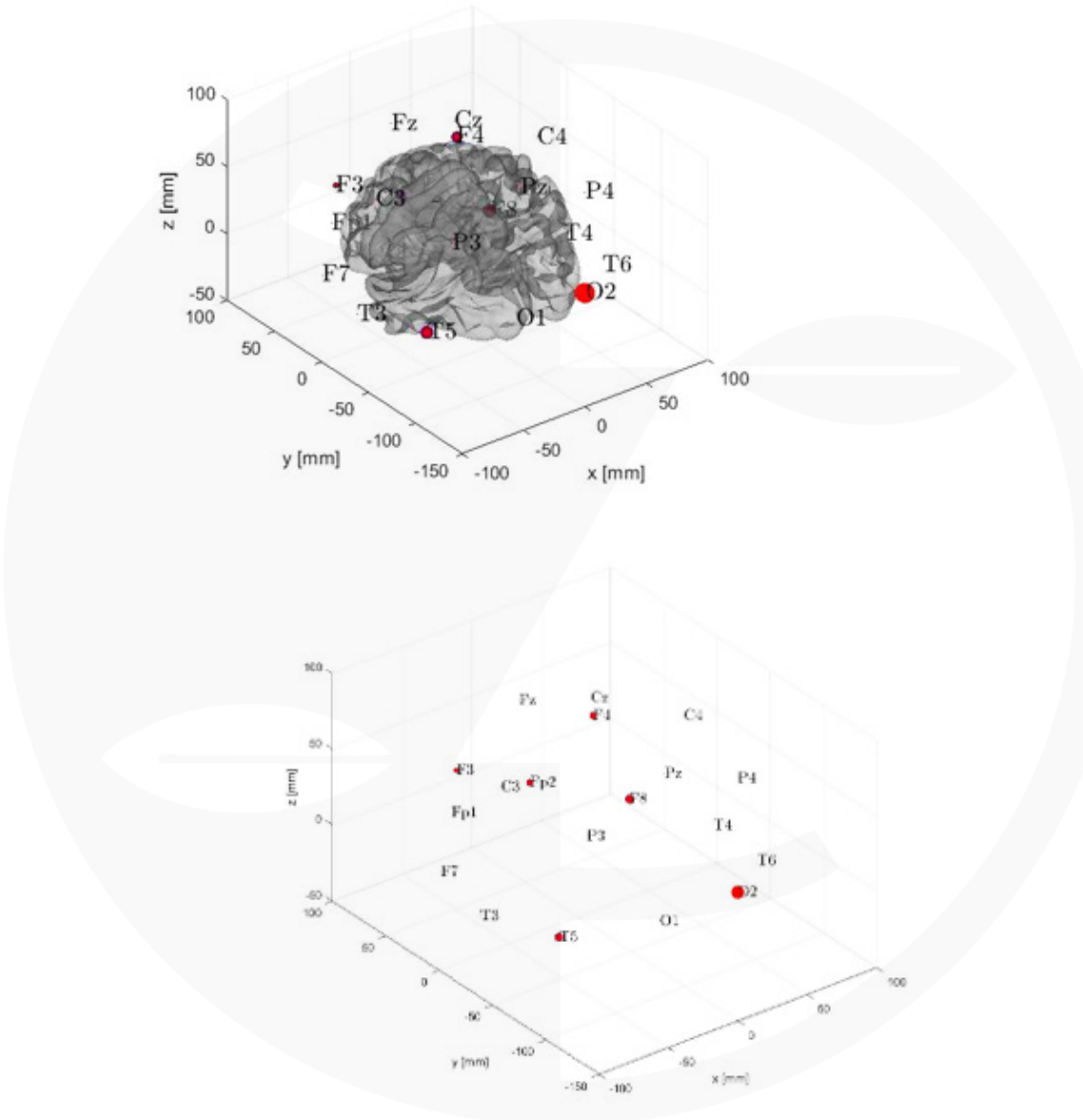


Figure 5. Graph analysis indicating increased connectivity (compared to the control group) within the highlighted region in the experiment group.

As shown in Figure 5, the activity of regions O2-T5-F4-F3-FP2-F8 in the experiment group is higher than in the control group. In fact, these regions in the experiment group have the most connections with their neighboring regions.

Discussion

Studying brain activity is very important in the consciousness research. Studies done so far in this field measure brain activity during specific tasks in cognitive science, behavioral science, and neuroscience. In the present study, both groups were placed under a Cosmic Consciousness Network (CCN) Connection. The Faradarmangar group served as the 'Announcers,' establishing the Connection for themselves, whereas the control group functioned solely as the recipients of the Connection. The marked difference in brain activity between the two groups reflects the mediating role of the mind in the Faradarmangar group. According to Taheri's theory and the intermediary role of the Faradarmani practitioner's mind in initiating the function of T-Consciousness Fields, this study compared their brain activity with that of non-practitioners or non-Faradarmangars (controls) under the same conditions, to observe possible differences attributable to this mediating role (mediating the function of T-Consciousness Field) at the brain level.

According to Mohammad Ali Taheri's theory, the human brain acts like a 'detector' when exposed to the FCF, and the result of this Connection is the repair of the system under treatment. For this Connection to begin, the presence of a person in the role of Faradarmangar (Faradarmani practitioner) is essential. Previously, in a study conducted by the authors of this article, the electrical brain activity of Faradarmangars was examined [9]. The results of that study showed an increase in gamma frequency in the frontal-parietal and DMN regions of the brain in Faradarmangars compared to the control group.

Since Connection with T-Consciousness Fields is possible for all humans through Faradarmangar(s), the effects were interpreted in two contexts: non-Faradarmangars exposed to the FCF and Faradarmangars serving as study subjects while being exposed to the FCF. On the other hand, what is observed in the comparison of brain manifestations in Connection with FCF between the two populations of Faradarmangars and random non-Faradarmangars (larger than the previous study) is purely the result of being a Faradarmangar during the mind's intermediation in the function of the FCF.

In the present study, consistent with the findings by Taheri and colleagues [9], not only was there no increase in activity in the frequency bands and regions associated with other meditation and mindfulness methods, but there was also a significant decrease in delta activity. Beta 2 and beta 3 frequency bands are observable in different brain regions. Furthermore, compared to the previous mentioned study, it can be concluded that the increased activity observed in the gamma frequency band is the result of Connection with the FCF in humans, regardless of whether one is a Faradarmangar or not.

Delta waves are the slowest recorded brain waves. They are often found in infants and young children and are observed in the deepest levels of relaxation and restorative sleep [16]. The decrease in delta waves is consistent with the conscious state of "emptiness" in meditation [17]. In contrast, beta 2 waves (mid-range beta: 15–20 Hz) are associated with increased energy, anxiety, and performance, and beta 3 waves (high beta: 18–40 Hz) are associated with stress, anxiety, paranoia, high energy, and high arousal [16]. The decrease in the beta 2 and beta 3 frequency bands in the Faradarmangar group during the mediation of the FCF function indicates a disengagement from the active and stimulated state of the brain and an overall reduction in conscious brain activity during this state.

Continuing the study of changes caused by the intermediation of the FCF function in the present study led to finding various types of decreases and increases in the pattern of connections between different brain regions during this state. Mental intermediation of Faradarmani function in the connectivity study (connections between different brain regions) shows that for the alpha1 frequency band, there is an increase in functional connectivity only between the ACC and rSFG regions, and multiple decreases in functional connectivity

between various regions of the frontal network for alpha2 and beta2/3 (in all frontal networks). Also, regarding the delta band between the left and right brain and in the frontal network, which is generally associated with cognitive and motor activities during human evolution, a decrease in information flow is observed [18]. Furthermore, graph analysis of the brain during mental intermediation of the FCF function shows a distinct brain graph with higher global efficiency associated with a specific task and six nodal regions, all of which can be considered indicators and representations of mental intermediation in Faradarmani function at the brain level of Faradarmangars.

In summary, considering five of the eight brain frequency bands and 39 of the 52 Brodmann areas (BAs), the findings of this study demonstrate widespread reductions in frequency-band activity together with a marked decrease in functional connectivity, particularly within the frontal lobe. Alongside these reductions, and despite the observed increase in global graph efficiency, these findings support the hypothesis that, in the role of a Faradarmangar, the human brain functions primarily as a passive yet powerful detector, indicator, and mediator of the operation of the FCF, rather than as an active operator or initiator. Based on these findings, further investigation of the effects of other T-Consciousness Fields on the brain, as well as the application of additional neuroimaging techniques such as fMRI, is warranted.

Acknowledgments

The authors thank the National Brain Mapping Laboratory of Iran (NBML) (Tehran, Iran) for providing data collection services for this research work.

References

1. Chalmers, D. J. (1995). Facing up to the problem of consciousness. *Journal of consciousness studies*, *2*(3), 200-219.

2. Taheri MA: “Human from another outlook” Interuniversal Press; 2nd Edition (September 26, 2013). ISBN-13: 978-1939507006, ISBN-10: 1939507006 2013.

3. Hecht, E., & Stout, D. (2014). Techniques for studying brain structure and function. In *Human paleoneurology* (pp. 209-224). Cham: Springer International Publishing.

4. Friston, K. (2002). Beyond phrenology: what can neuroimaging tell us about distributed circuitry?. *Annual review of neuroscience*, *25*(1), 221-250.

5. Friston, K. J. (1994). Functional and effective connectivity in neuroimaging: a synthesis. *Human brain mapping*, *2*(1-2), 56-78.

6. Ismail, L. E., & Karwowski, W. (2020). A graph theory-based modeling of functional brain connectivity based on EEG: a systematic review in the context of neuroergonomics. *Ieee Access*, *8*, 155103-155135.

7. Vecchio, F., Miraglia, F., & Rossini, P. M. (2017). Connectome: Graph theory application in functional brain network architecture. *Clinical neurophysiology practice*, *2*, 206-213.

8. Taheri, M. A. (2014). The purpose of practicing Faradarmani treatment; an Iranian complementary and alternative medicine. *Procedia-Social and Behavioral Sciences*, *114*, 75-79.

9. Taheri, M. A., Semsarha, F., & Modarresi-Asem, F. (2020). An Investigation on the Electrical Activity of the Brain during Fara-Darmani Connection in the Fara-Therapist Population. Preprints 2020, 2020090679 (doi: 10.20944/preprints202009.0679.v1).

10. Pascual-Marqui, R. D. (2007). Discrete, 3D distributed, linear imaging methods of electric neuronal activity. Part 1: exact, zero error localization. *arXiv preprint arXiv:0710.3341*.

11. Pascual-Marqui, R. D., Lehmann, D., Koukkou, M., Kochi, K., Anderer, P., Saletu, B., ... & Kinoshita, T. (2011). Assessing interactions in the brain with exact low-resolution electromagnetic tomography. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *369*(1952), 3768-3784.

12. Nichols, T. E., & Holmes, A. P. (2002). Nonparametric permutation tests for functional neuroimaging: a primer with examples. *Human brain mapping*, *15*(1), 1-25.

13. Canuet, L., Ishii, R., Pascual-Marqui, R. D., Iwase, M., Kurimoto, R., Aoki, Y., ... & Takeda, M. (2011). Resting-state EEG source localization and functional connectivity in schizophrenia-like psychosis of epilepsy. *PloS one*, *6*(11), e27863.

14. Imperatori, C., Della Marca, G., Brunetti, R., Carbone, G. A., Massullo, C., Valenti, E. M., ... & Farina, B. (2016). Default Mode Network alterations in alexithymia: an EEG power spectra and connectivity study. *Scientific reports*, *6*(1), 36653.

15. Mijalkov, M., Kakaei, E., Pereira, J. B., Westman, E., Volpe, G., & Alzheimer's Disease Neuroimaging Initiative. (2017). BRAPH: a graph theory software for the analysis of brain connectivity. *PloS one*, *12*(8), e0178798.

16. Abhang, P. A., Gawali, B. W., & Mehrotra, S. C. (2016). *Introduction to EEG-and speech-based emotion recognition*. Academic Press.

17. Hinterberger, T., Schmidt, S., Kamei, T., & Walach, H. (2014). Decreased electrophysiological activity represents the conscious state of emptiness in meditation. *Frontiers in psychology*, *5*, 99.

18. Leisman, G., Moustafa, A. A., & Shafir, T. (2016). Thinking, walking, talking: integratory motor and cognitive brain function. *Frontiers in public health*, *4*, 179575.