

Task-fMRI Group and Functional Connectivity Analysis of the Brain During Faradarmani Consciousness Field Connection

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ABSTRACT

Taheri Consciousness (T-Consciousness) was introduced and defined by Mohammad Ali Taheri as one of the constituent components of the Cosmos in addition to matter and energy, from which Taheri Consciousness Fields (TCFs) are derived. TCFs are not matter or energy, but they can be proven by scientific experiments. The effect of Faradarmani CF, as one TCFs, was examined in this study. Faradarmangar is a certified and trained individual who has been entrusted with the TCFs. Task fMRI has played a critical role in recognizing the specific functions of the different regions of the human brain during various cognitive activities. This study aimed to investigate the group analysis and functional connectivity in the Faradarmangars' brains during Faradarmani CF connection. Using task functional MRI (task-fMRI), we attempted the identification of different activated and deactivated brain regions during the TCFs connection. Clusters that showed significant differences in peak intensity between the task and rest groups were selected as seeds for seed-voxel analysis. Connectivity of group differences in functional connectivity analysis was determined following each activation and de-activation network. In this study, we report the fMRI-based representation of the FCF connection at the human brain level. The group analysis of the FCF connection task revealed activation of the frontal lobe (BA6/BA10/BA11). Moreover, seedbased functional connectivity analysis showed decreased connectivity within activated clusters and posterior Cingulate Gyrus (BA31). Moreover, we observed increased connectivity within deactivated clusters and the frontal lobe (BA11/BA47) during the FCF connection. Activation clusters as well as the increased and decreased connectivity between different regions of the brain during the FCF connection, firstly, validates the significant effect of FCF and secondly, indicates a distinctive pattern of connection with this non-material and non-energetic field, in the brain.

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INTRODUCTION

Researchers have tried to discover how cognitive functions are organized in the brain for more than a century. Functional Magnetic Resonance Imaging (fMRI) is a powerful non-invasive technique that has allowed researchers to peek into a living brain while it carries out specific tasks and thereby sees which parts of the brain are active as they are carried out (Delcomyn, 1998). Activation is defined as a brain region with changes in Blood-Oxygenation-Level-Dependent (BOLD) signal (Ogawa et al., 1990). In other words, activity in a specific brain area is associated with an increase in blood flow to this area, which provides the oxygen and glucose necessary for the neural activity (Vincent et al, 2009). Increasingly, fMRI is being used for investigating the dysfunction that takes place in diseases like Alzheimer's (Greicius et al., 2004, Koenig et al., 2008), Parkinson's (Moody et al, 2004, Skidmore et al, 2011), Schizophrenia (Kim et al., 2010, Walter et al., 2009) and others. In addition, fMRI is particularly suited for screening the effects of pharmacological agents on pain processing within the human central nervous system (Schweinhardt et al., 2006).

Functional activity studies have also been used to clarify the level of functional communication between brain regions. Functional connectivity is defined as the temporal dependency between spatially remote neurophysiological events (Firston, 1998, Fox and Raichle, 2007). For the first time Biswal and colleagues demonstrated that during rest-state, there were high degrees of temporal correlation both within and across the sensorimotor cortex (Biswal et al., 1997, Biswal et al., 1995). Various investigations have reported connectivity between the left and right hemispheric motor cortex during rest (Van den Heuvel et al., 2010).

The default mode network (DMN) has been identified as the brain system that is preferentially active when individuals are not focused on the external environment (Buckner et al., 2008, Raichle et al., 2001). DMN has also been involved in self-referential mental activity (Gusnard et al., 2001). Goal-directed behaviors cause lower activity in brain areas that include the medial frontal cortex, the medial and lateral parietal cortex, and limbic and paralimbic brain regions, and have been considered the default network (Pallesen et al., 2009). Among these areas, the medial prefrontal cortex (mPFC) most principally shows decreases during the goal-directed behaviors in fMRI (Gusnard et al., 2001). It has been reported that activity and connectivity of DMN are involved in the integration of cognitive and emotional processing (Greicius et al., 2003) as well as mind-wandering (Mason et al., 2007). In addition, several studies have explored the alteration within this network in cognitive dysfunction diseases, such as schizophrenia (Bluhm et al., 2007, Whitfield-Gabrieli et al., 2009, Calhoun et al., 2008) and depression (Grimm et al., 2008).

For a long time, the question of the relationship between mind-body, behavior, and specific regions of the brain has been examined by many researchers. The reductionist approach by some researchers shows that every part of the brain has some specific functional role (Delcomyn, 1998). Chen et al., 2019, provides evidence for directed information network architecture in the cerebral cortex using resting-state fMRI and suggest that features of the information flow configuration during rest underpin the cognitive ability in humans.

Numerous research projects have been conducted to explore how the mind interacts with the brain and with the major neurological chang-



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es during this interaction. For example, the brain has been extensively studied under meditation or mindfulness states, indicating that mindfulness is associated with brain activation and/ or connectivity of several regions in the brain (Marchand, 2014). According to a systematic review, mindfulness increased insular cortex activities across the seven regions. However, they failed to find any robust evidence for increased activities in the specific prefrontal cortex sub-regions studies (Young et al., 2017). Recently, a fMRI study during Transcendental Meditation practice showed that blood flow patterns were higher in anterior cingulate and dorsolateral prefrontal cortices but lower in the pons and cerebellum (Mahone et al., 2018). It has been reported that Meditation is associated with reduced activations in the DMN relative to performing active tasks in meditators compared to controls (Garrison et al., 2015). Similarly, it has been found that in several different meditations including Concentration, Loving-Kindness, Choiceless Awareness, DMN (medial prefrontal and posterior cingulate cortices) are deactivated compared to control (Brewer et al., 2011).

The nature of consciousness and its place in science has received much attention in the current century. Many philosophical and scientific theories have been proposed in this area. In the 1980s, Mohammad Ali Taheri introduced novel fields with a non-material/non-energetic nature named Taheri Consciousness Fields (TCFs). In this perspective, T-Consciousness is one of the three existing elements of the universe apart from matter and energy. According to this theory, there are various TCFs with different functions, which are the subcategories of a networked universal internet called the Cosmic Consciousness Network (CCN). The major difference between the theory of TCFs and other

theoretical concepts about consciousness is related to the practical application of the TCFs. These fields can be applied to all living and non-living creatures, including plants, animals, microorganisms, materials, etc.

Mohammad Ali Taheri, the founder of Erfan Keyhani Halqeh, a school of thought, introduced a new science in 2020 as a branch of this school. He coined the term Sciencefact for this new science because it utilizes scientific investigations to prove the existence of T-Consciousness as an irrefutable phenomenon and a fact. Although science focuses solely on the study of matter and energy and Sciencefact, by contrast, explores the effects of the [non-material/non-energetic] TCFs, Sciencefact has provided a common ground between the two by conducting reproducible laboratory experiments in various scientific fields, and it has used the scientific approach in proving TCFs.

The influence of the TCFs begins with the Connection between CCN as the Whole Taheri Consciousness of the universe and the subjects of study as a part. This Connection called "Ettesal" is established by a Faradmangar's mind (a certified and trained individual who has been entrusted with the TCFs). The human mind has an intermediary role (Announcer) which plays a part by fleeting attention to the subject of study and then the main achievement obtained as a result of the effects of the TCFs. These fields cannot be directly measured by science, but it is possible to investigate their effects on various subjects through reproducible laboratory experiments (Taheri, 2013).

The research methodology in the study of T-Consciousness has been founded on the process of *Assumption, Argument, and Proof*, in which the basic Assumption is: The Cosmos was formed by a third element called T-Consciousness that is dif-

ferent from matter and energy.

The Argument: The existence of TCFs can be demonstrated by their effects on matter and energy (e.g., humans, animals, plants, microorganisms, cells, materials, etc.)

The Proof is the scientific verification of the effects of TCFs on matter and energy (according to the Argument) through various reproducible scientific experiments.

Accordingly, to investigate and verify the existence, effects, and mechanisms of TCFs, the following five research phases (Phases 0 through 4), and the aims of each phase are outlined below.

Phase-0 studies aim to prove the existence of TCFs by observing their effects. The nature of T-Consciousness and what it is will not be addressed in this phase. Phase-1 explores the varied effects of different TCFs. Phase-2 examines the reason behind the varied effects of these fields. Phase-3 investigates the mechanism of TCFs effects on matter and energy. Finally, Phase-4 draws significant conclusions, particularly with regard to the *mind and memory of matter* and their relation to the T-Consciousness, etc.

In previous experiments, it is observed that the MCF7 cancer cell line (Taheri et al., 2020a), wheat plant under salinity stress (Torabi et al., 2021), and Alzheimer's disease rat models (Taheri et al., 2021) are significantly affected under the influence of FCF. Further details about the theory of TCFs according to Taheri and the types of experimental studies are provided in this review (Taheri et al., 2020b).

In previous research (Taheri et al., 2020c), the electrical activity of the brain during the Faradarmani connection was screened in a Faradarmangar population and it was observed that the 34-40 Hz frequency band power in the frontal

lobe was significantly increased. This increase was mainly in the medial frontal gyrus (BA6) and after that, in the paracentral lobule of the brain during the performance of the Faradarmani connection task compared to the no-task rest condition in the same Faradarmangar population. In the present study, in order to complete and further develop the previously mentioned accounts, the brain activity of a different Faradarmangar population was investigated, this time using the fMRI technique. The aim of the present study is to examine the specific behavior of the human brain while communicating with the FCF using task groups and functional connectivity analyses.

METHODS

In the present study, we performed task-fMRI group analysis and functional connectivity analysis of a Faradarmangar population and compared their brain region activities during task performance and rest. The task is referred to the activity during which a Faradarmangar connects to the CCN. This study was approved by the ethics committee at the Iran University of Medical Sciences (approval ID IR.IUMS.REC.1399.293).

PARTICIPANTS

The participants in this study are 20 healthy persons (men and women in equal numbers) with a history of at least 2 years of practicing as being Faradarmangar. The age range of the samples was between 20 and 50 years ($MD=35.5\pm 9.16$).

TASK DESIGN

In this study, three rest blocks (rest 1, 2, and 3)



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and two task blocks (task 1 and 2) were defined, and the study began with the rest state (Figure 1). The purpose of this design, in addition to providing the conditions for observing more contrast between the task and rest modes, was to examine the changes in the brain activity in the shift from task to rest mode. The possibility of ending the connection with FCF after the initial start has not been studied experimentally. Therefore, in this study, we examined the process of disconnection modes called resets 2 and 3 between the modes of connection with FCF (task blocks 1 and 2).

The task in this study is defined as the establishment of the connection with the FCF by the participants. At the beginning of each task block, a voice played, and individuals were asked to close his/her eyes and begin this connection during their fMRI scan. The study began with a resting state (without connection to the FCF and with open eyes) and the total scan time in the task and rest states was 15 minutes per person. The rest, the blocks present a fixation point (+) for 180s. All comparisons in this study were between the task and rest states of a participant group.

fMRI Data Acquisition

Imaging was carried out at the national brain-mapping laboratory, Tehran, Iran. Volun-

teers were laid down in the MRI system, and the head coil was used to decrease head motion and to increase the signal-to-noise (SNR) ratio. Data were acquired while applying a 3 Tesla magnetic field (Siemens, MAGNETOM Prisma) with a standard 20 channel head coil. T2x weighted, three-dimensional functional images were acquired by applying a BOLD sensitive gradient echo and echo-planar imaging (EPI) sequence with echo time (TE) of 30 ms and repetition time (TR) of 3000 ms. Through each TR, 34 axial slices were obtained at a 90° flip angle with 64x64 matrix size, 210 mm FOV, and 3x3x3mm voxel size. The functional scans contained 248 volumes per participant. With high resolution, whole-brain images were obtained from each volunteer applying a T1 weighted MPRAGE sequence (TR 1800 ms, TE 3.47 ms, 7° flip angle, 176 slices, 256x256 mm FOV, 1x1x1mm voxel size).

Task fMRI analysis

Task fMRI analysis was performed with a statistical parametric mapping software package (SPM12) (Wellcome Department of Cognitive Neurology, London, UK). The pre-processing step included field map correction, realignment, and co-registration of functional and anatomical scans, normalization, and smoothing. Moreover,

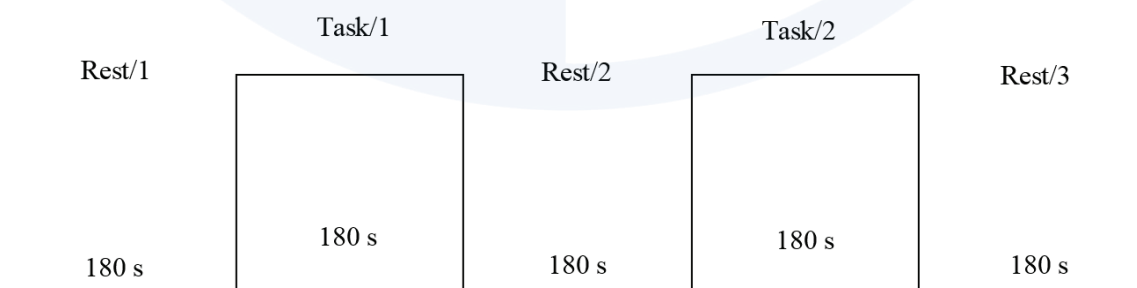


Figure 1. Block Task-Rest design and their duration in the present study.

Low-frequency noise was removed by applying a high-pass filter (cutoff period = 100s) to the fMRI time series at each voxel. The amount of the head motion was checked, and the threshold was considered lower than Voxel Size (3mm). Significant hemodynamic changes for each condition were examined using the general linear model with boxcar functions convoluted with a hemodynamic response function. Statistical parametric maps for each contrast of the t statistic were calculated on a voxel-by-voxel basis.

fMRI connectivity and Group analysis

Data pre-processing for fMRI connectivity analysis was performed using a pre-defined pipeline of CONN toolbox (version 19. c) (Whitfield-Gabrieli and Nieto-Castanon 2012). The analysis involved the following steps: (1) estimation and correction of the participant's head movement (realignment and unwarp), (2) slice timing correction, (3) fragmentation of different brain regions (Gray/White/CSF), and normalization of data on standard MNI space. Subsequently, in the de-noising stage, fMRI signals were passed through a 100 s highpass filter to remove drift effects and respiratory and cardiac noise from the signal. In order to perform functional connectivity analysis, the peak coordinates of the activated clusters in fMRI data analysis were considered as seeds with a radius of 10 mm. Functional connectivity analysis was performed by generalized psychophysiological interaction (gPPI) (McLaren et al., 2012) in the 1st-level analysis step. The effects are reported according to the contrast for activation networks such that Task > Rest and for inactivation networks Rest>Task among all participants in the seed-to-voxel analysis mode.

In the 2nd-level analysis step, for each partici-

pant, the average gPPI model of the BOLD time series of each seed was computed from their respective functional images as the representative of the desired seed and was further correlated with the time courses of whole-brain voxels using Pearson correlation analysis.

STATISTICAL ANALYSIS

In task fMRI analysis paired T-test was used to form contrasts and the p-value was set at 0.05. In functional connectivity analysis, statistical significance for all comparisons was set at $p < 0.05$, FDR corrected for cluster-level (cluster threshold) and $p < 0.001$, uncorrected for voxel level (height threshold).

RESULTS

Group analyses of task fMRI

The activated and deactivated brain regions

The activation and deactivation of brain regions were measured during the FCF connection

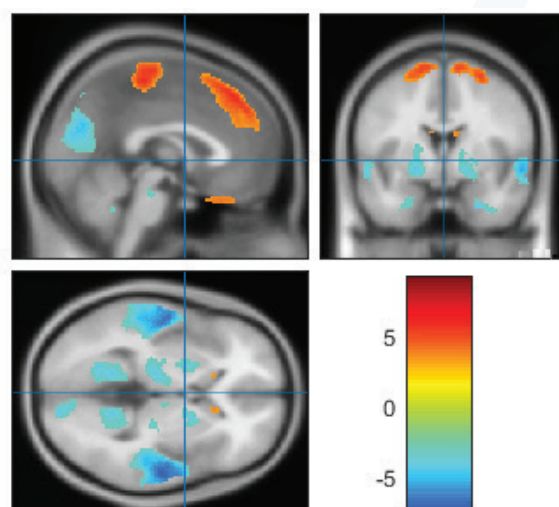


Figure 2. Activation and deactivation of brain regions during FCF connection in the Faratherapist population of the present study [red means higher and blue means lower activity].



as shown in Figure 2. The fronto-parietal lobes of two brain hemispheres show remarkably increased activity during the FCF connection. On the other hand, the temporal and the occipital lobes of the left and right hemispheres show deactivation during the CF connection.

The 3D representation of the activated and deactivated areas of the brain during communication is shown in Figure 3.

Interestingly, there is a symmetry in the activated and deactivated areas during the FCF connection, which is also significantly different compared to the rest, as shown in Figure 3. The contrast comparison of the tasks from Reset 1 and all Reset blocks in the activation and deactivation regions is shown in Figure 4.

As can be seen in Figure 4, the different Rest considerations resulted in remarkable changes in the intensity and areas of activation and deactivation in the Faradarmangars brain. For more clarifi-

cation, the three sagittal views of (a) and (c) from Figure 4 are expanded and shown in Figure 5.

Activation and deactivation cluster analysis

Activation and deactivation clusters measured during FCF connection are shown in Tables 1 and 2, respectively. The threshold for this analysis was set at p-value= 0.001, intensity=3.0916, and cluster size=5.

As can be seen in Table 1, the right and left frontal lobes as well as the sub lobar regions of the brain are remarkably activated during the FCF connection (more than 50 voxels). The most activated areas are observed in the Precentral Gyrus in the white matter of the right frontal lobe (BA6). Subsequently, the left and right sub-lobar regions, BA11 and BA10 are also the activated regions.

The most deactivated areas (more than one thousand voxels) in the FCF connection are shown in Table 2. The deactivation is highest in the white

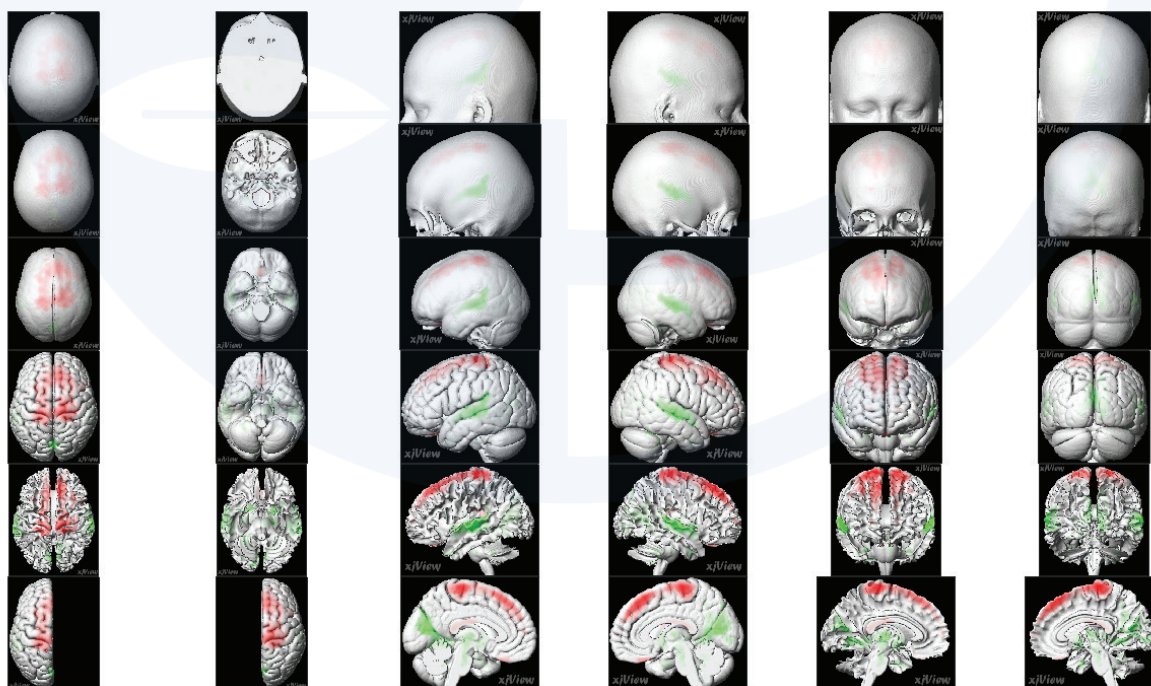


Figure 3. Render a 3D view of the brain of the Faradarmangar's population during the task (FCF connection) fMRI in all directions (top, bottom, sagittal and dorsal views).

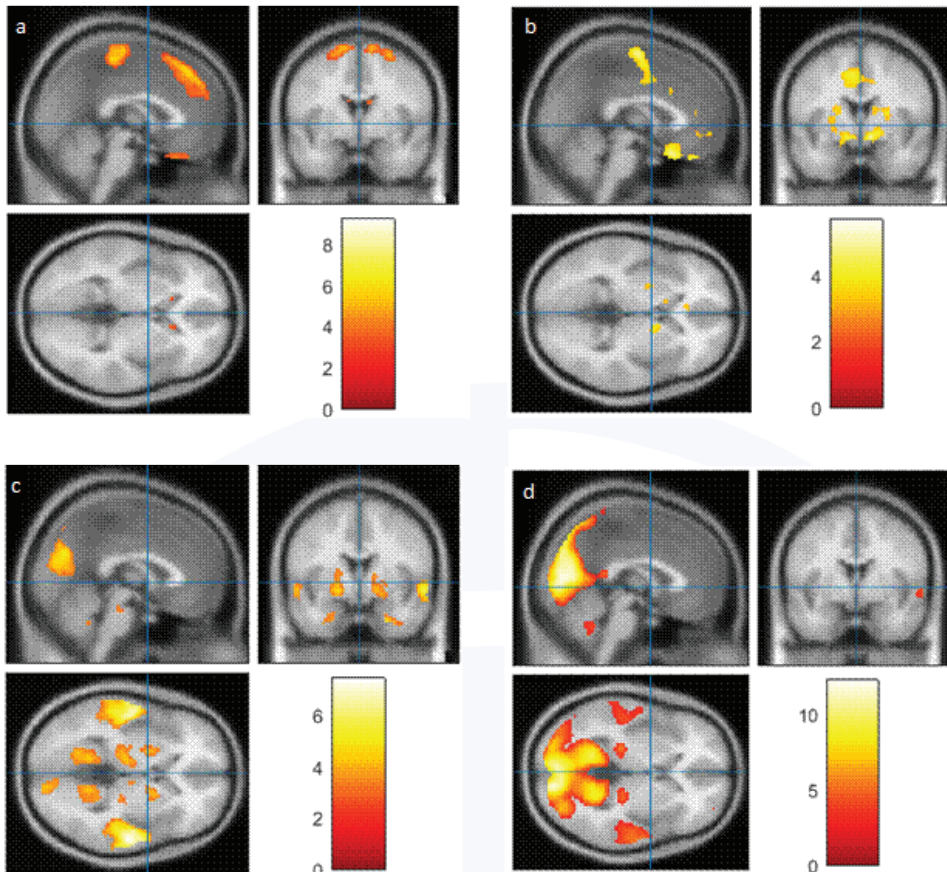


Figure 4. Activation and deactivation areas of Faradarmangars brain during FCF connection; activation in (a) Task>Rest I and (b) and Task >Rest; deactivation in (c) Rest>Task (d) and Rest>Task.

Table 1. The number of voxels, peak MNI coordinate, related regions, and intensity in the activation clusters during FCF connection. The activation clusters with no. of voxels in thousand orders are highlighted in gray.

Activation clusters	Number of voxels	Peak MNI coordinate	Cerebrum	Lobe	Peak MNI region	Peak intensity
1	173	-4 34 -28	Left	Frontal	Rectal Gyrus (BA11)	4.1921
2	16	-10 24 -20	Left	Frontal	Medial Frontal Gyrus	3.6603
3	18	12 22 0	Right	Sub-lobar	Caudate_R (aal)	3.5045
4	14	-14 22 2	Left	Sub-lobar	Caudate_L (aal)	3.3306
5	6	-32 -48 2	Left	Sub-lobar	Lateral Ventricle	3.563
6	33	-16 62 6	Left	Frontal	Medial Frontal Gyrus	3.8461
7	56	20 64 6	Right	Frontal	Superior Frontal Gyrus (BA10)	3.963
8	396	-20 -38 14	Left	Sub-lobar	Lateral Ventricle	5.2362
9	225	18 -28 20	Right	Sub-lobar	Caudate	4.7855
10	8993	14 -24 72	Right	Frontal	Precentral Gyrus	9.1736

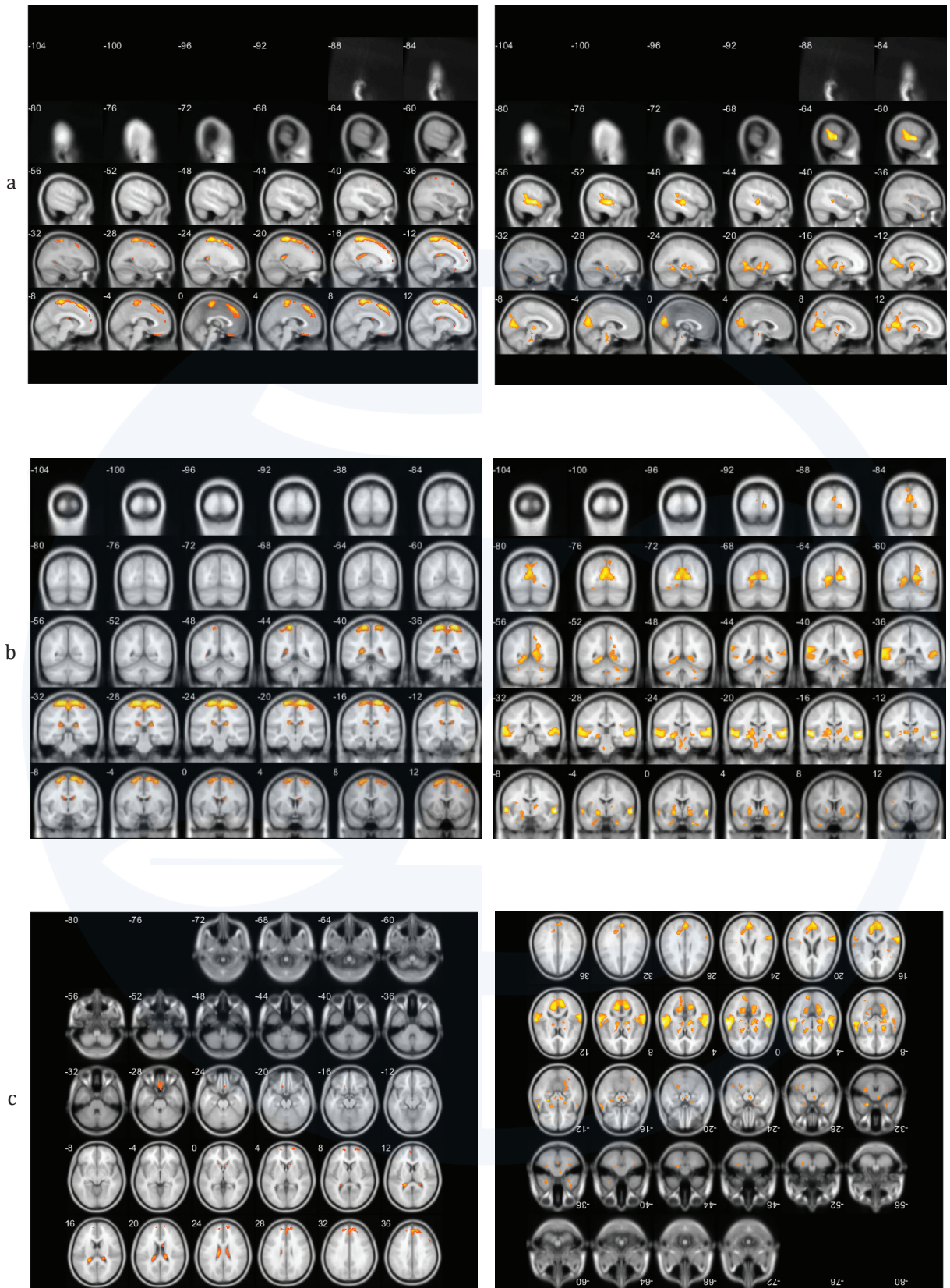


Figure 5. Activation (Left) and deactivation (Right) areas of Faradarmangars brain during the FCF connection in Task>Rest I and Rest>Task, respectively, in (a) sagittal, (b) coronal, and (c) transverse views.

Table 2. The number of voxels, peak MNI coordinate, related regions, and intensity of deactivation clusters during FCF connection. The activation clusters with no. of voxels in thousand orders are highlighted in gray.

Deactivation clusters	Number of voxels	Peak MNI coordinate	Cerebrum	Lobe	Peak MNI coordinate region	Peak intensity
1	45	28 -52 -52	Right	Cerebellum Posterior	Cerebellar Tonsil	-3.6114
2	29	20 -42 -42	Right	Cerebellum Posterior	Cerebellar Tonsil	-3.7023
3	36	-32 -48 -34	Left	Cerebellum Anterior	Culmen	-3.5606
4	121	26 0 -34	Right	Limbic	ParaHippocampal_R (aal)	-4.5244
5	1293	-24 -22 -6	Left	Sub-lobar	Optic Tract	-5.1218
6	193	32 -44 -34	Right	Cerebellum Anterior	Culmen	-3.837
7	11	2 -54 -34	Right	Cerebellum Anterior	Vermis_9 (aal)	-3.3818
8	6	10 -26 -34	Right Brainstem	undefined	Pons	-3.1819
9	43	46 -50 -28	Right	Cerebellum Anterior	Culmen	-3.8079
10	8	-28 -56 -24	Left	Cerebellum Posterior	Declive	-3.3039
11	2023	58 -18 0	Right	Temporal	Superior Temporal Gyrus	-7.3881
12	51	8 -20 -16	Right Brainstem	undefined	Midbrain	-3.7833
13	39	-32 -72 -14	Left	Occipital	Brodmann area 18 // Fusiform_L (aal)	-3.6249
14	145	30 -16 -12	Right	Sub-lobar	Hippocampus_R (aal)	-4.4384
15	4271	12 -60 10	Right	Limbic	Calcarine_R (aal)	-5.3935
16	491	18 2 -8	Right	Sub-lobar	Extra-Nuclear	-4.2654
17	2153	-54 -14 0	Left	Temporal	Superior Temporal Gyrus	-6.6313
18	15	32 -80 -10	Right	Occipital	Inferior Occipital Gyrus	-3.57
19	23	-34 -8 18	Left	Sub-lobar	Insula // Brodmann area 13	-3.6764
20	14	-44 14 18	Left	Frontal	Sub-Gyral	-3.392
21	17	56 -62 22	Right	Temporal	Superior Temporal Gyrus // Brodmann area 39	-3.4743
22	9	34 -28 22	Right	Sub-lobar	Extra-Nuclear	-3.4575

matter of the right limbic lobe in the Calcarine region, followed by the gray and white matter of the right and left temporal lobe, in the superior temporal gyrus (BA22). Finally, deactivation was also observed in the white matter of the sub lobar region of the left cerebrum in the optic tract.

FUNCTIONAL CONNECTIVITY ANALYSIS

Functionally related regions in the activated areas

The results of the seed-to-voxel analysis are

shown in Table 3. These measurements consider the peak activity points of the analyzed fMRI in Task > Rest with an uncorrected P-value <0.001.

The information on the voxels that were functionally related to the peak of the activated areas with a p-value uncorrected <0.001 is provided in Table 4.

As shown in Table 4, there is increased connectivity between activated clusters during FCF connection (Table 3) and the posterior cingulate gyrus (left BA31). The sagittal view of the functionally related clusters is detected, and its effect size is shown in Figure 6.

Functionally related regions in the deactivated areas

The results of seed-to-voxel analysis, considering the peak activity points of the analyzed fMRI

data as seed (Table 5), in Rest1 >Task and p-value uncorrected <0.001, are as follows.

The information of the clusters and voxels that were functionally related to the peak of the deactivated areas in rest condition in comparison with task (Rest-Task contrast), with p-value uncorrected <0.001 is given in the Tables 6 and 7.

As shown in the cluster dimension of Table 6, two clusters with increased connectivity between deactivated clusters during FCF connection (Table 5), corresponds to BA47 and BA11 regions in the right frontal lobe. The sagittal view of the detected functionally related clusters and their effect size can be seen in Figures 8 and 9.

Table 3. Activity peak in *Task-Rest* contrast of fMRI data considering cluster threshold 50 voxels and FWE = 0.05.

#	X	Y	Z	Voxel
Cluster 1	-4	34	-28	173
Cluster 2	20	64	6	56
Cluster 3	-20	-38	14	396
Cluster 4	18	-28	20	225
Cluster 5	14	-24	72	8993

Table 4. Activation of functionally related clusters in the related voxels and regions.

Cluster No.	X
Dimension	x: -4 y: -30 z: +42
Cluster 5	128 voxels covering 5% of atlas.PC (Cingulate Gyrus, posterior division) 18 voxels covering 0% of atlas.PreCG I (Precentral Gyrus Left) 30 voxels covering 0% of atlas.not-labeled

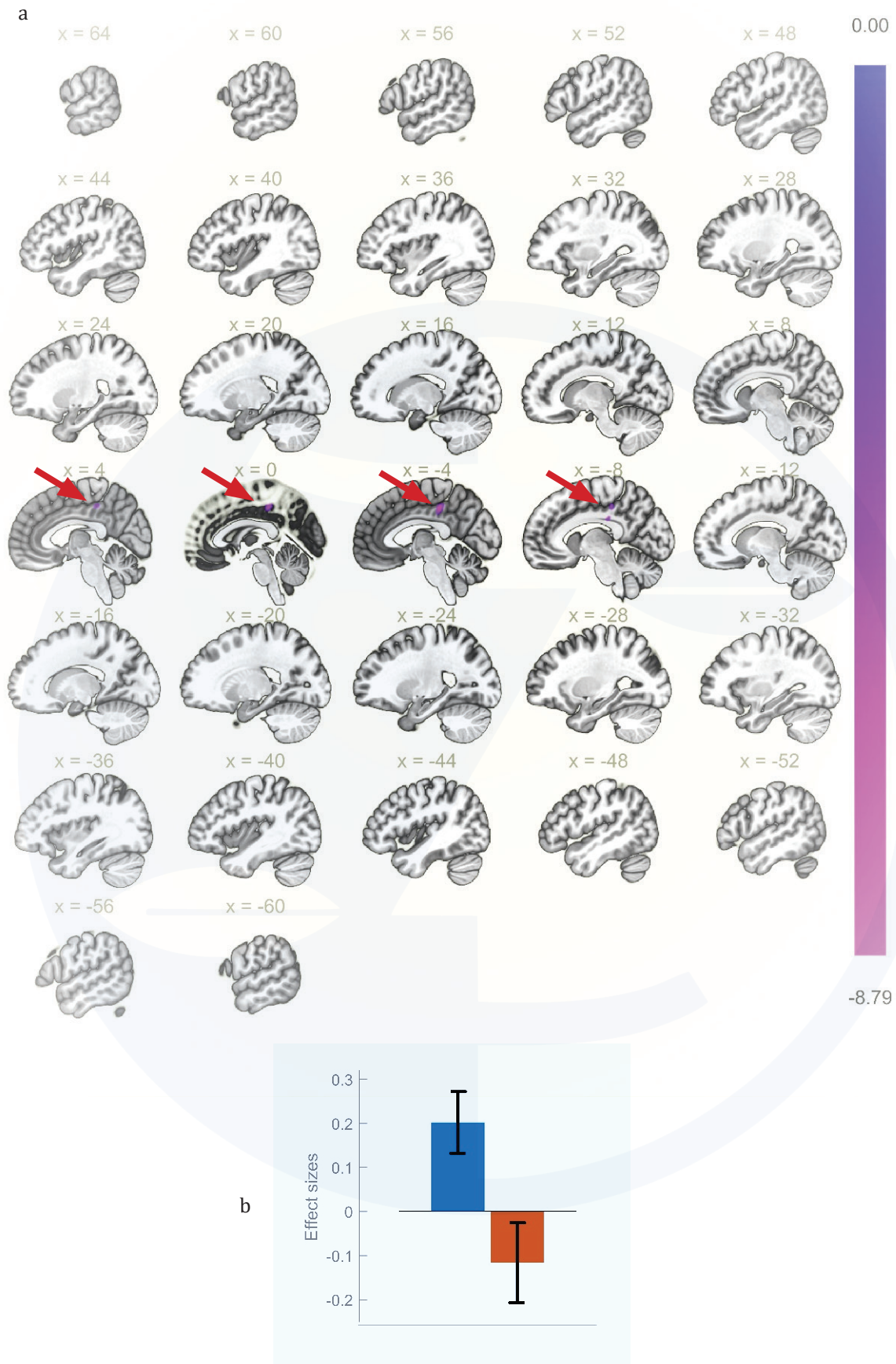


Figure 6. The area associated with functionally related activation clusters (red arrows) from the (a) sagittal view, and (b) its effect size diagram that shows FCF connection with the red bar.



Table 5. Activity peak in the Rest-Task contrast of fMRI data considering cluster threshold 50 voxels and FWE = 0.05.

Cluster Number	X	Y	Z	# Voxel
1	26	0	-34	121
2	-24	-22	-6	1293
3	32	-44	-34	193
4	58	-18	0	2023
5	8	-20	-16	51
6	30	-16	-12	145
7	12	-60	10	4271
8	18	2	-8	491
9	-54	-14	0	2153

Table 6. Deactivation in the functionally related clusters.

Cluster	Cluster (x,y,z)	size	size p-FWE	size p-FDR	size p-unc	peak p-FWE	peak p-unc
1	+50 +18 -12	136	0.021966	0.032768	0.000799	0.994287	0.000090
2	+10 +60 -14	147	0.026336	0.045301	0.001105	0.998435	0.000149

Table 7. Deactivation in the functionally related clusters in voxels and related regions.

Cluster	No. of Voxels	Related Regions
1	47	covering 3% of atlas.IC r (Insular Cortex Right)
	34	covering 1% of atlas.TP r (Temporal Pole Right)
	8	covering 1% of atlas.FOrb r (Frontal Orbital Cortex Right)
	4	covering 0% of atlas.Putamen r
	2	covering 1% of atlas.FO r (Frontal Operculum Cortex Right)
2	41	covering 0% of atlas.not-labeled
	-61	covering 1% of atlas.FP r (Frontal Pole Right)
	52	covering 1% of atlas.FP l (Frontal Pole Left)
	34	covering 0% of atlas. not-labeled

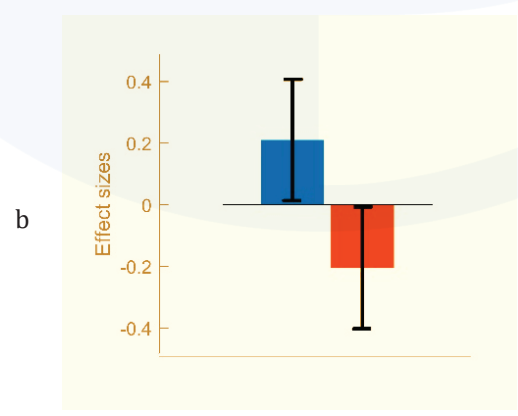
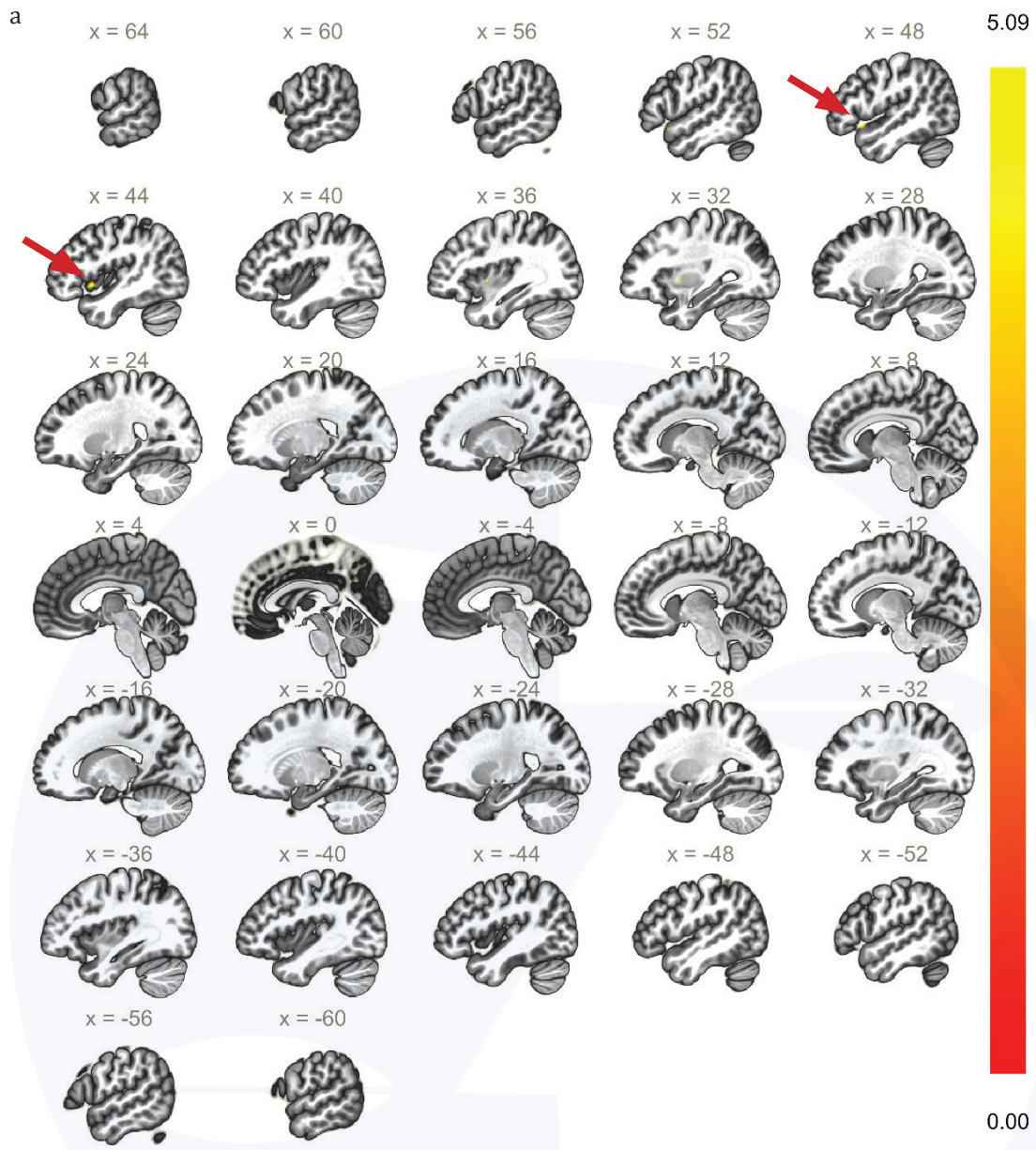
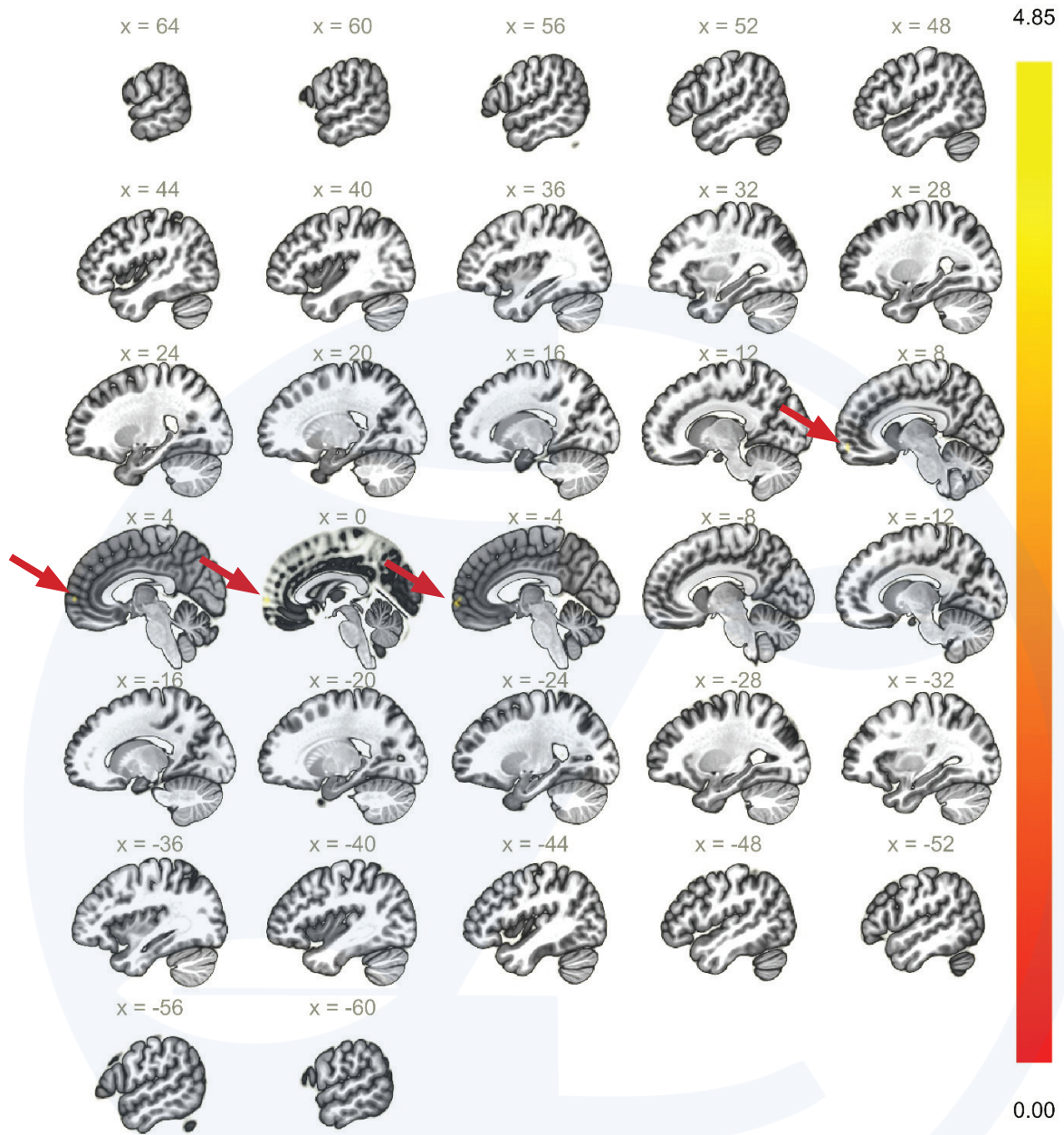


Figure 7. Areas associated with deactivation of functional regions in cluster I (red arrows) from the (a) sagittal view, and (b) its effect size diagram that shows FCF connection with a red bar.

a



b

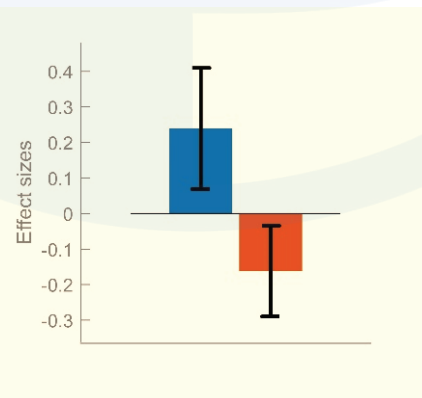


Figure 8. Areas associated with deactivation of functional regions in cluster 1 (red arrows) from the (a) sagittal view, and (b) its effect size diagram that shows FCF connection with a red bar.

DISCUSSION

In this study, we measured the activation and deactivation of the brain regions and analyzed the results using task fMRI and functional connectivity analyses. According to the results, connection to CF leads to the activation of frontal lobe regions of the brain. These findings are in alignment with the previous studies on the examination of Faradarmangar's brain (Taheri et al., 2020) where the majority of the activity occurred in the BA6 regions. On the other hand, connection to FCF led to a decrease in the activities of calcarine limbic lobes and BA22 temporal lobes. The analyses of functional connectivity in activated and deactivated regions of the brain show that functional connectivity is increased during FCF connection within the BA31 region. Conversely, upon disconnection from FCF, functional connectivity is increased in the BA11/47 region instead.

Similar to the previous findings (Taheri et al., 2020), the electrical activities of the brain are activated in the frontal lobes upon connection to FCF. The distinguishing characteristic of the frontal lobe is its property as a traffic hub within the nervous system that connects to other regions of the brain and vice versa (Baars and Fage, 2013). In our study, the BA6 region within the frontal lobe shows the highest activity during FCF connection. The BA6 region is the biggest part of the Brodmann region and is commonly referred to as the premotor cortex which plays a role in motor sequencing and planning movements (Catalan et al., 1998). Even though many functions are attributed to this region, playing a role in cognitive functioning is among them (Tanaka et al., 2005). Other roles suggested for the BA6 region include memory (Ranganath et al., 2003) and attention (Nobre et al., 1997).

After BA6, the BA10/11 part of the frontal lobe is the next region that is highly activated. BA10/11 is also a part of the prefrontal cortex (PFC) and is located in the frontal region of the frontal lobe. This region is developed in one of the final time-points during evolution and constitutes more than 1/4th of the cortex (Fuster, 2009). The functions attributed to BA10 involve memory encoding (Ranganath et al., 2003), memory retrieval (Tulving et al., 1994), and working memory (Zhang et al., 2003). It is also reported to play a role in personality integrity (Ciorciari et al., 2019). To date, there have not been many examinations on the style of reacting and correlations of this region with personality due to the difficulty of studying the association between these regions when using fMRI tests.

The reduction in functional connectivity between BA10/11 and BA31 is one of the intriguing findings in this study. As suggested in DMN literature, the default network hubs are commonly between mFPC and the PCC cortex (Buckner et al., 2008). The observed decrease may be due to the absence of correlation between the activated regions and the default network. It also rejects the possible synchronicity and connection between the default network and brain activity during FCF connection.

In this study, we also observe deactivated brain regions during connection with FCF. The limbic brain region, located on the left and right medial sides of the brain, is the most primitive part of the brain and is shared with other mammals, reptiles, amphibians, and fish. The main functions of this region are the regulation of emotions, sexual responses, and homeostasis in humans (Michael et al., 2010). The decreases in the limbic regions during FCF connection are within the calcarine parts



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which house the primary visual cortex (Johns, 2014). Additionally, the optical tracts located within the lobes in the left cortex show reduced activity under connection with FCF. This decrease is concomitant within the BA22 regions which is the same as the auditory association cortex (Mirz et al., 1999).

This decrease in activity in the visual and auditory areas of the brain is related to the opening of the eyes in the rest mode and the voice message heard at the end of it and entering the task mode. On the other hand, the increase in functional connectivity is observed within the deactivated regions and parts of PFC (BA47/11) which in the case of BA11, there is a correlation with part of the activated areas of the brain. This result clearly indicates a change in brain activity between the state associated with the FCF and disconnection from it, as a result of the task and rest designed in the present study.

As a whole, we can summarize our findings in four parts: (1) FCF connection has a distinct characteristic effect on the human brain, (2) FCF leads to the activation of the human brain regions and

changes various brain connectivity networks, (3) the activated parts of the brain are mostly associated with the more advanced brain frontal lobe regions and functional connectivity is activated opposite to the default networks (due to reductions in BA31 hub), and (4) the correlation between the deactivated and activated regions suggest a switch in Faradarmangar's brain during FCF connection, especially within the BA11 region.

Examining the other brain regions and comparing the various regional activities in larger and more diverse study populations can help shed light on the significance of FCF connection and its effects findings. Additionally, investigating the effects of FCF on brain functions in neurological diseases are the future considerations of the authors of this study.

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