

CEREBRAL CORTEX AND PSYCHOLOGICAL FUNCTIONS: THE ROLE OF LOBES IN THE HUMAN BRAIN

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Abstract

In this theoretical paper, there is presented some of the research exploring the relationship of psychological functions to the brain's cerebral cortex. After many years of studies, there has been found that what we call as 'mind' in biology and psychology has to do with the cognitive abilities humans demonstrate in order to associate themselves with the inhabited world. In this article, cognitive abilities are touched upon and discussed in terms of the brain's lobes. The scope of this paper is neither to exhaust existing literature, nor to present a new information on the topic. This article has been composed to the objective to assist students of psychology, particularly those studying the modules of biological and cognitive psychology, so through this general presentation and discussion of the topic to be able to identify how psychological behaviour is related to some of the neuronal functions and cognitive capabilities of the cerebral cortex.

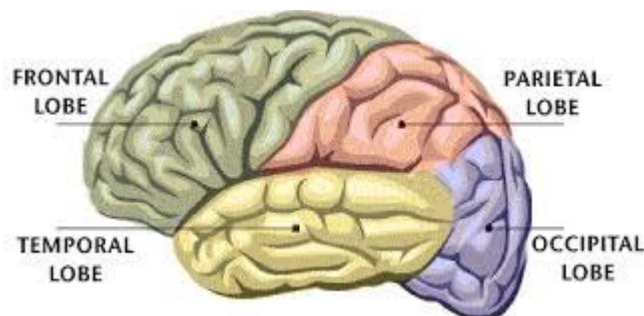
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Prolegomena

This paper has been written in a 'student-type manner' for use and general information to students of biological and cognitive psychology. I have chosen this type of writing the paper, so to be easily comprehended by students, who would like a general introduction to the topic. In general, students will be able to obtain an understanding as to the premises referred to the scientific underpinnings of the human mind as a computational device as well (Varvatsoulias, 2014). In this line, student will be able to approach the topic with less 'jargon' terminology, but in a sense of acquiring the knowledge regarding the attributional elements the mind consists of cognitively. So, and in such a 'student-type manner', students will become capable of keeping in their understanding how our cognitive abilities components present their faculties through our brain structures and differing lobes

Introduction

Psychology is the study of human mind and behaviour. The definition of behaviour is related to an outward appearance of the human functioning which derives from inward starting points. Psychology discusses both the functioning and the starting points by attempting to examine them in association with human brain. This paper will discuss cerebral cortex and its link to the psychological functions of man, to relate the cerebral cortex with human behaviour. The question about such a relationship is very valuable, for it seeks to integrate human psychological functions with functions of the brain. The brain is a very complex part of the human organism. It is a system of billions of cells that work together in order to control the entire organism of man. The branch of psychology which deals with the human brain and its influence on bodily and psychological consensus of man, is called biological



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psychology. Biological psychology seeks to understand human behaviour by connecting it to the functional apparatus of brain. The brain in order to be traced and linked with human behaviour, needs to be examined under its constituent parts, such as the cerebral cortex.

Main Part

The cerebral cortex is divided into four parts. These are the frontal lobes, the parietal lobes, the temporal lobes and the occipital lobes. The frontal lobe is the motor association cortex of the brain. It is the direct controller of human behaviour. The parietal lobe, located behind the primary somatosensory cortex is related with the somatosensory association cortex. It is the place of perception and memory. The occipital lobe can be found at the back and down the middle of the brain. It handles and analyses the visual information of it. It has to do with the aspect of recognition, in a wider sense: if it is damaged through blindness or loss of vision, the individual is not in the position to store most of the visual information, so he lacks to recognize or recall on persons and things. The temporal lobe is found on the side of the brain and subserves information related to the auditory and visual association cortex. It is argued to be the place of speech and language. Through this part, humans are able to understand sounds of the environment, as well as the distance and the three dimensions of space (Carlson et al., 2004, pp. 131ff).

The cerebral cortex or grey matter is the regulatory system of brain. It is the outer layer of brain. It covers almost 80% of the entirety of it. Something about 90% of it is called neocortex because it has derived from the recent evolution of the brain -something about 40000yrs ago (homo sapiens sapiens) (Pinel, 2003, p. 70). It can be found under the human skull followed by the meninges and the cerebrospinal fluid. The cerebral cortex consists of a great amount of cells dedicated to control the functions of its parts. It is divided in three areas: the primary visual cortex, the primary auditory cortex and the primary somatosensory cortex. These three areas cover the surface of the brain. The primary visual cortex is related with the visual information coming through the brain and it can be found at the back of it. The primary auditory cortex receives information which relates to the auditory system of brain and is situated on the fissure of the surface of the side of the brain. The cerebral cortex proceeds its functions through a hierarchy of actions and activities. Psychologists understand this hierarchy by addressing it to the sensory parts of brain. The general process of the sensory parts –mainly, the primary somatosensory one- of brain is connected with the aspect of perceiving which is working under two general phases: sensation and perception. Sensation is the process of detecting the presence of stimuli and perception is the higher-order process of integrating, recognizing and interpreting complete patterns of sensations (Pinel, 2003, p. 163). Thus, the primary somatosensory cortex is the receptive area. It receives information from various parts of the body and translates them to touch, taste and temperature. It is located in the middle of the brain and behind the central fissure (Carlson et al., 2004, p. 131).

Perception and memory, vision, speech and language, refer to the understanding of behaviour in humans. All these are found and work through the areas and parts of the cerebral cortex. The consideration of psychological functions is comprehended through the idea of the occupational organization of the cerebral cortex. They are the preoccupations of the cerebral cortex in order for man to connect himself with the environment, the others and most of all to ‘translate’ all information he receives in relation to himself. The term ‘psychological functioning’ is understood through this occupational perspective of the cerebral cortex. Psychological functions are the methods used by the cerebral cortex for the overall adjustment of human behaviour in association to the outward appearance of the human status. Examples are mentioned the man’s emotional states, defense mechanisms, self-identity and self-concept that refer to an individual’s performance in a given environment, the perspective of personal development or involvement in daily activities for specific reasons and factors that enhance the functional capacity of a person’s course in life (Árnadóttir, 1990, p. 9).

The cerebral cortex is the spare capacity of tissue which explains the characteristics of cognition. In order to be discussed the understanding of psychological functions and their relation and connection with the cerebral cortex there are four important aspects taking place in the human brain. The one refers to the two hemispheres of the brain, the next is called cerebral asymmetry, the third questions the consideration of localization and the final discusses the aspect of plasticity in relation to the idea of ‘environmental enrichment’.

The consideration of two hemispheres is mainly understood through the differences of functions occurring in them. Both hemispheres are related to higher-level cognitive functions. They are specialized in different types of processing these functions. The left hemisphere is associated with linguistic and analytical processing, whereas the right with perceptual and spatial processing. The organizational differences between the hemispheres have been clearly comprehended through the so-called split-brain patients. Split-brain is connected with epilepsy. By studying such split-brain patients, psychologists became aware to identify the separate functions of the right and left hemisphere. The right hemisphere can understand only the simplest linguistic commands, whilst the left displays full comprehension (Anderson, 2000, p. 24).

Cerebral asymmetry ensues from the issue of the representation of language. Information about cerebral asymmetry and its functionality emanates from many sources, mainly experimental ones. (Rose, 2004, p. 13). The aspect of cerebral asymmetry is concerned with the different performance of both hemispheres. To understand and discuss the cerebral asymmetry of the brain psychologists pursue it through the analytic-synthetic theory which is connected with the two interlinked modes of thinking of the psychological functioning of brain, one interpretative and one systematic. Through the interpretative and systematic approach it is argued that proportions and combinations coming out of the cerebral asymmetry assist towards explaining the stimulus information and the sequencing and in detail relevance of the processing of behaviour within brain. Cerebral asymmetry is apprehended through the overall configuration and organization of brain in terms of *gestalts* and wholes (Harris, 1978, p. 463).

The aspect of localization in the cerebral cortex refers to how psychological and behavioural functions are localized within specific cortical areas. Through localization it is understood that organizational principles of the cerebral cortex are modified in a hierarchical scale. Localization of the functions of the brain refers to an individual's personality and intellectual capacities. In order for the localization of the cortex to be discussed there has been developed a branch in biological psychology which is called *phrenology*. *Phrenology* assists both neurologists and psychologists to comprehend the psychological and behavioural areas of the cortex. Localization is concerned with the so-called projection areas of the cortex which subserve psychological functioning and behaviour in the cerebral cortex. The definition of projection in this context implies the cartography of the brain into distinctive regions, a kind of mapping which is self-sustained. These areas are the primary projection area, the primary sensory area and the primary motor projection area. All localization projecting areas contribute to thinking and behaviour, as well as to the cortical understanding of the grey matter, relating with a vast number of mental functions and activities which also discern humans from other living species (Gleitman et al., 1999, pp. 30-31).

Finally, plasticity is related with the environmental enrichment which means that the brain 'behaves' in accordance with the ecological aspects of the ordinary everyday routine. The brain is actively involved and stimulated through information received from the environment. Same does the cerebral cortex as well. Through the environmental enrichment there is observed a considerable increase of cortical weight, of cortical surface area and of cortical depth. It is also encountered increased dendritic branching, together with more dendritic spines. Plasticity helps also in longer synapses, more neuroglia and higher RNA/DNA synthesis. The cerebral cortex is changing in terms of cellular activity, neural circuitry and transmitter chemistry by responding to demands of the received information (Rose & Johnson, 1996, pp. 1-20). Plasticity means that cerebral cortex is not a stable apparatus. It is always rearranged and reorganized by itself. It is its quality to functionality in accordance to given circumstances, whether of health or injury, along with structural flexibility.

The psychological functions address the everyday activities of man. The frontal lobes of the cerebral cortex are called the executive part of the brain. They receive information and attribute it to the aspect of behaviour. It can be said that the frontal lobes are the regulatory part of personality because they enhance the functions coming through the other parts of the cerebral cortex. The idea of psychological functioning and its relation to the cerebral cortex comes out of the performance components of it which are situated in the somatosensory and visual association cortex (Árnadóttir, 1990, p. 11). The term 'association cortex' refers to the concepts of perceiving, learning and remembering, planning and acting. The association cortices, are not only located at the back of the brain (parietal and occipital lobes), but also found in the

frontal and temporal lobes; the psychological functioning is processed there and then it is transmitted to the frontal lobes, so to be demonstrated as behaviour.

The aspect of behaviour in the frontal lobes is concerned with the preparation and evaluation of the performance tasks which relate to the functional demands of the other parts of the cerebral cortex elaborated by the environment. The performance tasks cultivate human behaviour and affect the man's performance skills. Then, through associations, coming out mainly from the somatosensory cortex, they return as new information which is stored in the various lobes of the brain and advance the man's psychological functioning.

In the frontal lobes –and in the part of the primary motor cortex- there are psychological functions that are connected with speech and thought. Speech and thought are connected with planning and programming of actions. The performance that is coming out of the combination between speech and thought relates to the skill of an individual to be able to maintain psychologically the description and execution of a plan along with the reasons why he needs to do that in a particular way and not in a different one. Each performance has different levels of processing. The frontal lobes assist towards the understanding of processing a performance in relation to not using non-meaningful movements and objects that can impair the capacity of an individual to perform unanimously with his utmost output. On the other hand, the regulation of complex actions refers again to the frontal lobes. Such complex actions are organizing and sequencing, determination and creativity, impulsiveness towards following or abandoning tasks, the expression of concrete thoughts, the increased flexibility of conceptual behaviour, the analysis and synthesis in problem-solving and the use of symbols in thinking, whether in abstraction or in coalescence (Árnadóttir, 1990, pp. 126ff).

The frontal lobes are related to the understanding of cognition towards foreseeing the consequences of an action taking place or already taken. This can be seen when a person maintains a concrete and solid thinking about activities he has taken part, as well as his ability to decide of twists and turns that will enable him to handle situations difficult or different. The flexibility of a person to work through situations along with different activities is also understood by observing his orientation towards goal-directed movements and actions and towards the formation of processing patterns, in order to achieve his objectives.

However, the frontal lobes do not only relate to a psychological state of a good functionality in man. They also refer to serious impairments that work through which are as much acute as they appear in everyday life. In the orbitofrontal lobe it is found the psychological aspect of learning which apart of its understanding working through memory, it also possesses the understanding of educating an individual through one's personal mistakes, as well as any new strategies needed for learning to be attained in relation to the knowledge acquired from the environment. There are functions in the orbitofrontal cortex which for various reasons can be damaged and to result in disturbances that affect the individual involved, whilst also others. These are called emotional impairments and affective disorders. They refer to lesions causing disturbed emotions in personality, in the state of consciousness, inasmuch affecting cognition and memory. In a more detailed sequence they produce aggression, carelessness, frustration, perseveration, irritability, restlessness and depression. People with such impairments in the frontal lobes, appear with a behaviour of fluctuations in mood, they are cyclothymic as well as not consistent with changes through external stimuli, nor with the intensity of emotional variations. They also exhibit blunted emotional responses and indifference towards environmental stimuli, such as the dipole of pleasure and pain (Árnadóttir, 1990, p. 142).

On the other hand, orbitofrontal lesions may result in euphoria and facetiousness. Euphoria and facetiousness are disturbances which apply to the involvement of attributional processes and describe emotional states through internal physiological conditions, like the ones related with the frontal lobes. Such conditions turn an individual to behave as offensive as farcical, as well as either angry or in an exaggerated feeling of elation. The various lesion arousals of the frontal lobes underline the type of psychological behaviour, an individual experiences, when the physiological processes of the brain have been considerably affected (Eiser, 1986, pp. 193-194).

The frontal lobes are concerned with personality. The clinical research has shown that the frontal lobes, if damaged, result in psychological disturbances linked with anxiety, phobias, hallucinations or delusions

(Walsh, 1978, p. 147). In particular, there are sufferings coming out from frontal lobe lesions like hypochondriasis, paraphrenia, distortions with persistent guilt-laden ruminations, as well as compulsive-obsessive behaviour about aspects regarding the life of an individual, such as likes and dislikes or the avoidance of others. That kind of behaviour refers to past and fearful anticipations of the future in the direction one to be living isolated, because one considers one is 'exploited' by others (Robinson & Freeman, 1954, as cited by Walsh, 1978, p. 146).

Behaviour revealing emotional and affective disorders may be manifested in daily activities. Restlessness may be evident when a person has a difficulty remaining in an activity for a long time. The person may also be impatient and frustrated or hostile and aggressive towards others and also to exhibit lack of motivation when is asked to participate in something. The person may also lack in critical judgment or touching and crying, as well as feeling abandoned. Some other times one may feel emotionally excited and intolerant when trying to perform a task or when one feels one is unable to perform it. That kind of impairments relate to frontal lobes, most notably to the prefrontal one, upturning the social understanding along with the personal understanding of oneself within society (Árnadóttir, 1990, p. 143). For instance, what is called 'asocial or antisocial behaviour' does not only refer to what is presented as an attitude towards others. The prerequisites of such behaviour can be found in the cerebral cortex and indeed in the basis of behaviour understanding which lies in frontal lobes. During the prefrontal lobe damage there may be lack of understanding of oneself in relation to one's identification of one's own mistakes or a lack of self-criticism which can also be found to the aforementioned diminished awareness of social rules (Damasio, 1985, pp. 339-376).

The parietal lobes are connected with the frontal lobes through the central fissure. They are concerned with ideations, conceptualizations, planning and choosing a strategy of action and motor executions. For all that work which is directed through the parietal lobes, Ayres (1985, p. 5) terms it as 'praxis' which "enables individuals to put together the components of the physical world and the people's physical and intellectual selves in order to do, to act purposefully on and in that world effectively". And he continues: "Praxis defines the neurological process by which cognition directs motor action; motor or action planning is that intermediary process which bridges ideation and motor execution to enable adaptiveness with the physical world" (p. 23). In the parietal lobes, planning is connected with the cognitive process, such as thinking and execution of thoughts. In order one to work out effective and cognitive understandings that relate to one's plans, one needs to know exactly what to do, how to do it, as well as the conceptual process which is needed towards one's intended targets. An individual knowing about his conceptual processes, he is dependent upon the sensory integration and knowledge of one's particular capabilities, one knows how to be motivated and constructively carrying out one's movements in life. Although the whole process of the parietal lobes, as much as of all lobes, is taking place automatically, it is imperative for a person to know and understand the perspectives of it, as well as the problems that may be encountered. When an individual understands that such problems are about to occur, one needs to alter the tasks requirements have been raised, requiring perhaps changes regarding planning and execution of them (Árnadóttir, 1990, p. 153).

The parietal lobes, and specifically the posterior part of them, are also concerned with the ability a person to produce designs by coping, drawing or constructing upon command or spontaneously (Siev et al., 1986, p. 179). That kind of 'construction upon command' refers to mostly any type of performance in which parts are working together or articulated to construct a single entity or an object. The latter means that different spatial organization tasks, as well as the evaluation of them is related to perceptual motor-executive qualities of the so-called constructional capacity of an individual (Benton, 1985, p. 175). If for any reason, there is a lesion affecting the parietal lobes, what one can see concerning the spatial organization tasks, is the spatial-relations syndrome. In this syndrome there are observed the dysfunction to meeting the trouble in differentiating foreground from background and difficulties with form constancy; in other words, difficulties relating to inability distinguishing the forms and variation of things, as well as an inability to interpret and deal with concepts related to spatial positioning of objects, such as a lack of position of space and difficulties with spatial relations (Árnadóttir, 1990, p. 162).

In particular, the right parietal lobe seems to be more involved in the mediation of spatially related behaviour. The parietal lobes describe also the understanding of the body scheme. They relate to the

knowledge an individual needs to possess about one's body parts and their relationship in the aspect of movement, the decision what schemes to be engaged, in order emotions and thoughts to take place or to assist towards daily activities. The parietal lobes deal also with the understanding of the environment in relation to the particular space an individual occupies. The way the parietal lobes work, helps the individual into comprehending difficult tasks and achieving missions of specific objectives. On the other hand, parietal lobes deal with discriminative tactile sensation and localization of touch. In this way they transfer information to other sensory cortices of the cerebral cortex and associations which are interrelated with other lobes. In general, the parietal lobes play an important role in the mediation of many psychological functions, most of them had been referred previously. The parietal lobes provide a topographical-oriented functioning which pertain to an ideational and constructional receptiveness of the ecological background an individual lives, as well as performance components comprehension and recognition which are considered as much vital as helpful for an individual to adapt oneself properly in a given environment and one's relations with others. According to the clinical research, parietal lobes have the ability to identify stimuli and drives, to apply them in relation to the needs of an individual and also to store them back through any tactile response received from the environment for future regeneration.

Temporal lobes refer to the auditory cortex and provide increased acuity of the hearing capacity. The auditory cortex is related to perception. It enhances the amount of memory in the cerebral cortex. Perception and memory generate associations which interlink all four lobes together. Auditory information is connected with the auditory stimuli of the temporal lobes which expand to auditory signals coming through ears. Perception in the auditory cortex is also connected with attention. Through the psychological function of perception the messages entering the temporal lobes can be identified. Results from clinical research indicate that people choose to attend to a message on the basis of their physical characteristics. However, the gravity lies within the auditory cortex. And that means there is evidence that individuals select messages to process in relation to their semantic content. This ability of the auditory cortex helps psychologists to understand that memory stores relevant auditory information which entered the temporal lobes in the past. In other words, when an individual partakes in a conversation, the subjects - or maybe the subjects - that come up describe the understanding of the hidden demonstrations of the importance of discussion unfolded. The latter means that through the auditory cortex individuals are capable of shadowing a message on the basis of meaning rather than on the basis of what ear physically hears (Anderson, 2000, pp. 77-78).

Nevertheless, there is also an alternative interpretation had been given by Deutsch & Deutsch (1963 - as cited by Anderson, 2000, p. 79) which expands basically the understanding of the auditory selection hypothesis. They have suggested that the auditory information entering the temporal lobes refers to the capacity limitation in the perceptual system which proceeds completely unattenuated, thus, less influencing the response system of the auditory cortex. In this context, they believe that individuals perceive multiple messages, but they can shadow only one message at a time. In other words, people need some time, in order to selecting which message needs to be traced. Individuals, if they were to use the aspect of meaning, in order to acquire the knowledge of the auditory information, they would post an ear-attention to catch up the message following. In this also context, they explain why people tend to forget information which relates to the semantic meanings entering the temporal lobes through the auditory system.

Perception, on the other hand, is related with imagery. The connection between perception and imagery implies that individuals are very sensitive to the entrance and cultivation of the auditory structure of their images. Psychologists speak of a tremendous variety of the aspect of imagery and the performance ensuing from that (Anderson, 2000, pp. 118-119). Through imagery there is generated a processing of information which relates to what individuals have stored before through hearing. In other words, an individual by closing his eyes and listening to familiar voices or sounds, as well as to unfamiliar ones, is able to construct images from that hearing, thereby representations which connect to topographical considerations lying in the auditory system of the brain (Carlson et al., 2004, p. 28). Kosslyn (1973, pp. 90-94) have concluded that people could very easily reply to a question after an auditory cognition test and indeed very close to the right answer. The understanding of imagery applies performance tasks that

come to play a very important role in the process of the auditory information coming to be stored in the temporal lobes.

Memory and its relation to the auditory cortex is connected with the understanding of learning. The auditory cortex deals with learning in the way to functioning in response to experience. Through the ability of learning and remembering individuals acquire experiences which increase and preserve the psychological functioning of knowledge. Temporal lobes relate to memory by forming long-term representations of auditory information. The auditory information entering the temporal lobes results in two kinds of memory storage. The one is called semantic memory and the other episodic memory. Semantic memory describes the explicit storage of information regarding general facts, whereas episodic memory, although it refers also to explicit storage of information, it, nonetheless, describes particular events of one's life (Pinel, 2003, pp. 269 and 272). If it is encountered a lesion in the temporal lobes, there are problems like amnesia taking place. It is worth to stressing the evidence that such kind of lesion has been examined in pupils of mainstream schools without affecting their progress in school life, nor their language ability and factual knowledge (Vargha-Khadem et al., 1997, pp. 376-380).

The occipital lobes house the primary and secondary visual areas. They are concerned with the orientation of the entire organization of man. They receive information from the environment visually and transfer them to optical images. These images help the sensory parts of the cerebral cortex to construct perceptions and store them to memory. Memory for the occipital lobes – as well as for the orbitofrontal lobe - is a storehouse describing an individual's knowledge about the world and his experiences through it. Knowledge is a psychological function which works in relation to the representations of memory in the occipital lobes. These representations are interconnected by pathways or associations. Memory is activated through the visual information entering the occipital lobes. Then, the information received is 'translated' to reason, comparative understanding, activation of concepts, labeling of the objects that come through the visual information to the occipital lobes and turned to memory, as well as an activation of the sensory knowledge which connects them to the other experiences already have been stored (Klatzky, 1984, pp. 16-17).

The more the visual information enters the occipital lobes, the more the aspect of perceiving is more accurate. Lesions in any part of the occipital lobes engender disturbances such as prosopagnosia – difficulty in recognizing familiar faces or loss of knowledge of others (Carlson, 1998, p. 178)-, object-agnosia –an individual is not responding properly to visually presented material-, associative visual agnosia –when, although there is adequate visual perception, the visual cortex, nevertheless, is disconnected from the language or the visual memory stores. The occipital lobes are also considered to be the foundation to processing somatosensory experiences through language elaboration and intellectual functions, such as recognition (Bauer & Rubens, 1985, p. 190).

The aspect of recognition is very important procedure in the occipital lobes. Through recognition a person is able to undertake and execute activities in everyday life. In relation to persons, an individual recognizes the gender of them, whether they are beautiful or not, attractive and so on. In relation to objects, an individual can understand the shape of them, the weight and the reasons for using them in a particular way. The visual information which concerns recognition, advances the sensory areas of the cerebral cortex to store more conceptual information from the environment and upgrade it to cognitive responses in the brain (Árnadóttir, 1990, p. 183).

The occipital lobes relate also to the understanding of abstract concepts. The abstract concepts refer to the visual information an individual receives and underline the psychological functioning of constructing general approaches to comprehensions of the environment. As an example, it can be said that the abstract concept of the idea of identification enters the visual parts of the occipital lobes through lines or embedded figures. Then, they are transformed to pictures, in order the information to be stored and appear integrated and analytical. The analysis and integration of information is elaborated through specific forms of understanding which advances the other functions of the cerebral cortex in view to the comprehension of the psychological features and functions that lie underneath.

The occipital lobes are associated with the analysis of the forms and patterns received through visual information. They contain the primary visual areas. Two of the fundamental psychological functions they subserve are movement and orientation. They are sensitive to colour and analyze the visual stimuli

proportioned to them, by employing many independent features and representations of locations of these features (Anderson, 2000, p. 44). In line with that, the occipital lobes are concerned with higher order visual properties, such as recognizing a friend in a crowd. This corresponds to the understanding of visual attention which is of a great and enormous significance for a person to get familiarized whether with a particular individual or an object. The aspect of familiarization is another psychological function coming out of the functionality of the occipital lobes. The consideration of familiarization apart from its theoretical importance refers also to a very important practical aspect: that of the hierarchical structure of images. Through the visual information entering the brain, there are also entering complex mental images which need to be well organized individually, so to be properly apprehended. Complex images are formed in the occipital lobes in a hierarchy of units. They are patterned in various sub-areas at the back of the brain, in order to be stored as representations of figures, so to be quickly recognized when they come to consciousness. In other words, an object stored, is recalled through an object of new visual information which reminds the one stored before. Thus, an object been recalled, is attributed to more or less the same aspects of representations taken from those sub-areas of the occipital lobes (Anderson, 2000, pp. 122-123). Complex images are therefore stored to specific topographic delineations of the visual stimuli. The activity of the occipital lobes corresponds to the spatial stimulus of the stimulus, thereby to the psychological functioning of familiarization of known or unknown subjects and objects. The occipital lobes are concerned with different types of visual information which come up with general and specific knowledge representations to the degree a information to be anticipated through understandings of brain localization which were mentioned in the introduction of the present paper.

What is understood as psychological functioning in relation to the cerebral cortex refers to the layered motor and sensory information stored in the grey matter of the brain which transfers images and meanings to psycho-conceptual experiences. These experiences are acquired through memory, language and learning and apply to general and particular functions of the cerebral cortex itself (Changeux, 1983, pp. 408-409).

Psychological functioning and cerebral cortex are interrelated. The parts of the cerebral cortex create the psychological functions in man. The relation between cerebral cortex and psychological functions provides the understanding of a combination of the external environmental factors and the internal performance components that carry out the behaviour required to participate in or execute an individual's functional coordination of the physical, emotional and cognitive elements (Árnadóttir, 1990, p. 12). The performance of daily activities in a man's life is consisted of integrated functions of the different cerebral areas of the cortex. The cerebral areas are used to analyze performance in regard to the psychological status of man, such as planning complex motives or initiatives and patterns of actual manifestations of personal orientations in life.

Psychological and behavioural understanding address the functioning of the cerebral cortex. This can be clearly hypothesized through the clinical research which deals with brain. The cerebral cortex is involved in behavioural tasks performances which come up as a result of psychological responses. It is apparent, though, that task performances, in relation to behaviour, include stimuli of recognition, interpretation, storage and retrieval of information, the meaning of which is attributed through past and present experiences (Llorens, 1986, p. 104).

The cerebral cortex is the aggregate agent of an individual's reactions in a given environment. It is responsible for the individual's behaviour through the functioning of the four lobes. It is stimulated through motor and sensory sub-areas which develop both the cortex and the man's understanding about present. The cerebral cortex or grey matter contains all inward information as replies to outward influences. That information is funneled into psychological movements which advance the initiation and functioning of the grey matter. For instance, the visual information houses in the occipital lobes observations taken from outward sources. Then, they are stored in memory which, in turn, converts them to imaginations, conceptions and cognitions. Finally, they are demonstrated as behaviour in relation with the environment.

Planning and programming of actions is one of the mostly used behavioural performances which are connected with psychological functioning, thus exhibiting a complex interaction of processing and response. The performance of daily activities takes place in line with requirements of adequate emotional

and conceptual functioning, such as perception, comprehension of the performance components, cognitive coordination and configuration of the everyday needs in life. In this way, an individual becomes psychologically adept in view to meet his expectations fruitfully.

Psychologists consider that the idea of functional performance, in relation to a task, comes through the functional dependence of the cerebral cortex. In this orientation, the functionality of the grey matter is gaining understanding in formation with the factors that underlie and the psychological background and meaning of the aspect of the cerebral cortex (Árnadóttir, 1990, p. 1). Cognitive and perceptual functions provide a systematic interpretation of the psychological functioning of the cerebral cortex. The scientific data discussed in the main part of the paper were drawn from various biology and psychology-based sources which describe and analyze the functionality of the grey matter in terms of behavioural and emotional receptions.

The behavioural response is related to the overall psychological state of man, in view to his daily performances, whereas the emotional one to the tactile, sensational and perceptual background of this functioning. The psychological functioning in connection with the cerebral cortex is directed towards the developmental continuum of the self, by contributing to the understanding of personality according to:

1. factor-relating schemes which develop interrelations among various factors,
2. situation-relating understandings which refer to predictions about the development of personality regarding situations of everyday life and
3. the situation-producing state of personality which describes goals as aims of activities, in order to supplement the psychological functioning of the cerebral cortex with everyday behavioural processes.

The psychological functioning of the cerebral cortex refers to the overall abilities of an individual to accomplish performance tasks of his role as an individual. The idea of performing a task implies that an individual by employing certain cerebral activities is able to follow developmental stages in life which refer to the psychological integration of personality. The cerebral cortex is producing and influencing, whilst also subserving the psychological functions of personality and this is well understood through clinical observation along with the structural understanding of personality, in relation to one's behavioural undertakings and activities. **Conclusion**

Psychological functioning and cerebral cortex are in cohesion with one another.

The discussion which took place provides that understanding and can be summarized in the following points:

- *the aspect and capacity of cognition together with lower and higher level functions,*
- *linguistic and analytical processing,*
- *thinking and comprehension,*
- *configuration and organization of the psychological functioning through conditioning gestalts and wholes in relation to behaviour,*
- *increase of task performance abilities in connection with learning and remembering,*
- *associations about planning and acting,*
- *functional coordination of physical, emotional and cognitive elements,*
- *functional integration of motives and initiatives,*
- *planning patterns and perceptual structures of actual manifestations of personal orientations in life,*
- *thinking and connecting actions with planning and programming, through combinations between speech and execution of thoughts,*
- *functional ability in organizing and sequencing, determination and creativity,*
- *increased flexibility of conceptual behaviour,*
- *understanding and executing cognitions towards foreseeing consequences of actions and occurrences,*
- *shaping perceptual structures through visual and auditory information,*
- *functionality of praxis through ideations and conceptualizations,*
- *perceptual motor-executive qualities of an individual's constructional capacity,*
- *ideational and constructional receptiveness of the ecological background,*
- *identifying stimuli and drives through tactile and visual responses,*

- generation of complex images stored to topographic delineations of the visual stimuli,
- familiarization with known or unknown subjects and objects,
- retrieval of information through sensation to consciousness.

By interpreting psychological functioning through the cerebral cortex it becomes apparent that physiological and chemical substances which are involved in the development of the brain elaborate the psychological terms employed towards interpreting human behaviour. It is true that biological psychology bridges many gaps that relate to the observation and prediction of human behaviour.

The psychological understanding deriving from the organization and faculties of the cerebral cortex provide the psychologists and the neuroscientists with a more functional view of the human brain, as well as the apprehension of human entity in connection to its behavioural patterns and attitudes. The psychological functioning is subserved through the cerebral cortex and vice versa. Psychologists are expected to be familiar with the functions of the cerebral cortex, in view to be able to discerning and interpreting the understandings of it, so to discuss the considerations and meanings of human psychology more apprehensively (Bourguignon, 1981 - as cited in Changeux, 1983, p. 399).

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