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MUSIC AND THE DOMINANCE OF BRAIN

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Abstract:

The article deals with the influence of music and it rhythm which takes part as a motivator in the brain cells. Not only that various functions related with this part of brain which are activated by vibrations of the surrounding. Short term memory, long term memory and Skill memory are spoken off. Functions of left and right brain are all discussed. The functions of frontal lobe, temporal lobe, occipital lobe and Parietal lobe are explained in the introduction part. The actions performed by the cerebrum in the brain as well as cerebellum and spinal cord are also discussed in this very chapter. This chapter helps to analyse and focus on the attention of brain along with the functions performed by various parts of the brain.

Introduction:

The brain is a three pound organ which can do wonders in the mankind and the society. The brain controls the functions of the body; it interprets while communicating and embodies the essence of the mind and soul. Intelligence, knowledge, communication and emotions altogether actions some among which was performed by the brain. The brain is protected within the skull; the brain is composed of the cerebellum, cerebrum and brain stem. The central nervous system is composed of the brain and the spinal cord. The brain controls our thoughts, memory and speech, limbic activities performed by the hands and leg performed together to form the brain activities. It may also decide which side of the brain is active. The peripheral nervous system is composed of spinal nerves that branch from the spinal cord and cranial nerves that branch from the brain.

Main Parts of Brain:

Cerebrum: is the largest part of the brain which is composed of right and left hemispheres. It performs functions like touch, vision and hearing as well as speech, reasoning, emotions, learning and fine control of movement.

Cerebellum: is located under the cerebrum. Its function is to co-ordinate muscle movements, maintain posture and balance.

Brain stem: acts as a relay center connecting the cerebrum and cerebellum to the spinal cord. It performs the automatic functions such as breathing, heart rate, body temperature, wake and sleep cycles,digestion,sneezing coughing, vomiting and swallowing.

Right vs. Left: The cerebrum is divided into two halves right and left hemispheres. They are pined by a bundle of fibre called the corpus callosum that transmits messages from one side to the other. Each hemisphere controls the opposite side of the body. If a stroke occurs on the right side of the brain the left arm or leg may be weak or paralyzed. It should not be mis understood that all the functions of the hemispheres are shared. In general, the left hemispheres control speech, comprehension, arithmetic and writing. The right hemisphere controls creativity, special ability, artistic and musical skills. The left hemisphere is dominant in hand use and language in about 92% of people.

Lobes of the brain: The cerebral hemispheres have distinct fissures, which divide the brain into lobes. Each hemisphere has 4 lobes. Frontal, temporal, parietal and occipital. Each lobe may be divided further into small segments.

Frontal Lobe:

- Personality, behavior, emotions
- Judgment, planning, problem solving
- Speech: speaking and writing(Broca's area)
- Body movement
- Intelligence, concentration, self awareness.

Parietal Lobe:

- Interprets language and words
- Sense of touch, pain , temperature(Sensory stripe)
- Interprets signals from vision, hearing, motor sensory and memory.
- Spatial and visual perception.

Occipital Lobe:

- Interprets vision(Color,light,movement)

Temporal Lobe:

- Understanding language (Wernickes area)
- Memory
- Hearing
- Sequencing and organizing.

Language: Generally the left hemisphere of the brain is responsible for language and speech and is called dominant hemisphere. The right hemisphere plays a large part in interpreting visual information and spatial processing.

Broca's Area: It lies in the left frontal lobe. The damage to this part of brain may cause speech defects. It is called broca's aphasia.

Wernicke's Area: It lies in the left temporal lobe. Damage to this area causes wernicke's aphasia. The individual may speak in a long sentences that have no meaning and unnecessary words and even create new words. They can make speech sounds, however they have difficulty in understanding speech and are therefore unaware of their mistakes. The surface of the cerebrum is called as cortex. It looked with a folded appearance with hills and valleys. The cortex contains 16 billion neurons (The cerebellum has 70 million -86 billion totals) that are arranged in specific layers. The nerve cell bodies color the cortex grey brown giving it its name grey matter (neuron). Beneath the cortex are long nerve fibres that connect the brain areas to each other called white matter (axons). Neuron is inter-connected to axons. The cortex has a folded appearance. A fold is called as gyrus and the valley between is a sulcus. The folds of cortex forms the increased brain structures allowing more neurons to fit inside the skull and enabling higher functions. Each fold id called a gyrus and each grooves between folds is called a sulcus. There are names for the folds and grooves that help to define specific brain regions. White matter traces connect areas of the cortex to each other. Messages can travel from one gyrus to another, from one lobe to another, from one side of the brain to the other and to structure deep in the brain.

Coronal Cross:

Hypothalamus: Is located in the floor of the third ventricle and is the matter control of the autonomic system. Thus it plays the role of control behaviors like hunger, thirst, sleep and sexual response. It regulates body temperature, blood pressure, emotions and secretion of hormones.

Pituitary Gland: It lies in a small pocker of bone at the base called the sella turcica. The pituitary gland is connected to the hypothalamus of the brain by the pituitary stalk, The master gland. It controls other endocrine glands in the body. It secretes hormones that control sexual development, promote bone and muscle growth and respond to stresses.

Pineal Gland: It is located behind the third ventricle. It helps regulate the body's internal clock and circadin rhymes by secreting melatonin. It plays the role in sexual development.

Thalamus: Serves as a relay station for almost all information that comes and goes to the cortex. It plays role in pain sensation, attention, alertness and memory.

Basal Ganglia: Includes the caudate, putamen and globus pallilus. These nucleis work with the cerebellum to coordinate fine motions such as finger tip movements.

Limbic System: Is the center of our emotions, learning and memory included in the system are the cingulated gyri, hypothalamus, amygdale (Emotional reactions) and hippocampus (memory).

Memory: Memory which has proved to be a complex process that includes three phases: encoding (deciding the importance and message), storing and recalling. Different areas of the brain are involved in different types of memory. Paying attention and rehearsing in order for an event to move from short term to long term memory called encoding.

Limbic System: The structure of limbic system involved in memory formation. The prefrontal cortex holds recent events briefly in short term memory. The hippocampus is responsible for encoding long term memory.

Short Term Memory: Which is also called working memory, occurs in the prefrontal cortex. It stores information for about one minute and its capacity is limited to about 7 items. (ex.) dialing phone number.
To memorize a sentence which was just read?

Long Term Memory: It is processed in the hippocampus of the temporal lobe and is activated when you want to memorize something for a longer time. This memory has unlimited content and duration capacity. It contains personal memories as well as facts and figures.

Skill Memory: Cerebellum is processed. It relays information to the basal ganglia. It stores automatic learned memories like tying a shoe, plying instrument or riding a bike.

Ventricles and Cerebrospinal Fluid: The brain has hollow fluid cavities called ventricles inside the ventricles is a ribbon like structure called the choroid plezus that makes clear colorless cerebrospinal fluid(CSF).CSF flows within and around the brain and spinal cord to help cushion it from injury. This circulating fluid is constantly being absorbed and replenished.CSF is produced inside the ventricles deep within the brain CSF fluid circulates inside the brain and spinal cord and then outside to the subarachnoid space.

Common Sites of Obstruction:

- Foramen of monro
- Aqueduct of sylvius
- Obex

There are two ventricles deep within the cerebral hemisphere called the lateral ventricles both the ventricles connect with the third ventricle through a separate opening called the foramen of monro. The third ventricle connected with the 4th ventricle through a narrow tube. Called the aqueduct of sylvius, from the fourth ventricle, CSF flows into the subarachnoid space where it bathes and cushions the brain. CSF is recycled by special structures in the superior sagittal sinus called arachnoids villi. A balance is maintained between the production and absorption of fluid. A disruption or damage can cause build up of CSF, which can cause enlargement of ventricles (Hydrocephalous) or cause a collection of fluid in the spinal cord (syrengo myellia)

Skull: The purpose of a bony skull is to protect the brain from injury. The skull is formed from 8 bones that form together along sutur lines. These bones include the frontal, parietal, temporal, occipital and ethnoid. The face is formed from 14 paired bones including the maxilla, zygoma, nasal, platine, lacrimal, inferior nasal conchae, mandible and vomer.The brain is protected inside the skull. The skull is formed from 8 bones. Inside the skull are three distinct areas called anterior fossa, middle fossa and posterior fossa. A view of cranial nerves at the nbase of the skull with the brain removed. Cranial nerves originate from the brain stem, exit the skull through holes called foramina and travel to the parts of the body they innervate. The brain stem exits the skull through the foramen magnum. The base of the skull is divided into three regions anterior, middle and posterior fossae. All the arteries, veins and nerves exit the base of the skull through holes called foramina, the big hole in the middle is where the spinal cord exits.

Cranial Nerve: The brain communicate with the body through the spinal cord and twelve pairs of cranial nerve, ten of the twelve pairs of cranial nerves controls hearing, eye movement, facial sensations, taste, swallowing and movement of the face, neck, shoulder and tongue muscles originate in the brain stem. The cranial nerves for smell and vision originate in the cerebrum.

Number	Name	Function
I	**olfactory**	**smell**
II	**optic**	**sight**
III	**oculomotor**	**moves eye, pupil**
IV	**trochlear**	**moves eye**
V	**trigeminal**	**face sensation**
VI	**abducens**	**moves eye**
VII	**facial**	**moves face, salivate**
VIII	**vestibulocochlear**	**hearing, balance**
IX	**glossopharyngeal**	**taste, swallow**
X	**vagus**	**heart rate, digestion**
XI	**accessory**	**moves head**
XII	**hypoglossal**	**moves tongue**

Meanings: The brain and spinal cord are protected by three layers of tissue called meninges, from outward towards inward the duramater, arachnoids mater and piamater. Duramater, archnoidmater and piamater.

Duramater: It is a strong, thick membrane that closely lines the inside of the skull. Its two layers, perosteal and meningeal dura are fused and separate only to form venous sinuses. The dura creates little folds or compartments. There are two special dural folds, the falx and the tentorium. The falx separates the right and left hemispheres of the brain and the tentorium separates the cerebrum from the cerebellum.

Arachnoids Mater: Is a thin, web like membrane that covers the entire brain, the arachnoids is made of elastic tissue. The space between the Dura and arachnoid membranes is called the subdural space.

Pia Mater: Hugs the surface of the brain followed by grooves and folds. The pia mater has many blood vessels that reach deep into the brain. The space between the archnoid and pia is called the subarachnoid space. It is here the CSF bathes and cushions the bone.

Blood Supply: Blood is carried to the brain by two paired arteries, the internal carotid arteries and the vertebral arteries. The internal carotid arteries supply most of the cerebrum.

The common carotid artery courses up the neck and divides into the internal and external carotid arteries. The brain's anterior circulation is fed by the internal carotid arteries (ICA) and the posterior circulation is fed by the vertebral arteries. The two systems connect at the circle of Willis.

The vertebral artery supplies to cerebellum, brain stem and the underside of the cerebrum. After passing through the skull, the right and left vertebral arteries join together to form the basilar artery. The basilar artery and the internal carotid arteries "Communicate" with each other at the base of the brain called the circle of Willis. The communication between the internal carotid and vertebral basilar systems is an important safety feature of the brain. If one of the major vessels become blocked. It is possible for collateral blood flow to come across the circle of Willis and prevent brain damage. The internal carotid and vertebral basilar system are joined by the anterior communicating (ACOM) and posterior communicating arteries (PCOM).

Blood Drain: The venous circulation of the brain is different from that of the rest of the body, usually arteries and veins together flow separately and drains in specific areas of the body. So it makes to think that there would be a pair of vertebral vein and internal carotid veins. But this is not the case with brain. The major vein collector's are integrated into the Dura to form venous sinuses- not to be confused with the air sinuses in the face and nasal region. The venous sinuses collect the blood from the brain and pass it to the internal jugular veins. The superior and inferior sagittal sinuses drain the cerebrum, the cavernous sinuses drains the anterior skull base. Which exit the skull and form the jugular veins. These two jugular veins are essentially the only drainage of the brain.

Cells of the Brain: The brain is made of two types of cells (i) nerve cells (neurons) (ii) glia cells

Nerve Cells: There are many sizes and shapes of neurons, but all consist of a cell body, dendrites and an axon. The neuron conveys information through electrical and chemical signals. A electrical circuit is made up of numerous wires connected in such a way that when a light switch is turned on, a light bulb will beam. A neuron that is excited will transmit its energy to neurons within its vicinity. Neurons transmit their energy or "talk" to each other across a tiny gap called a synapse. A neuron has many arms called dendrites, which acts as a antennae for picking up messages from other nerve cells. These messages are passed to the cell body, which determines the messages passed along. Important message are passed to end of the axon where sacs containing neurotransmitters open into the synapse. The neurotransmiting molecules cross the synapse and fit into special receptors on the receiving nerve cell, which stimulates that cell to pass on the message. Nerve cells consist of a cell body, dendrites and axon. Neurons communicate with each other by exchanging neurotransmitters across a tiny gap called a synapse. These synapse are increased in a brain tissue up to the age of 12 randomly. It improves the creativity of the person.

Glia Cells: Glia (Greek word meaning glue) is the cells of the brain that provide neurons with nourishments protection and structural support. There is about 10 to 50 times more glia than nerve cells and is the most common type of cells involved in brain tumours. Astroglia or astrocytes are the care takers. They regulate the blood brain barrier, allowing nutrients and molecules to interact with neurons. They control homeo stasis, neuronal defense and repair, scar formation and also affect electrical impulses.

Oligodendroglia Cells: create a fatty substance called myelin that insulates axon allowing electrical messages to travel faster. Ependymal cells line the ventricles and secrete (CFS)

Micro Glia: Are the brains immune cells, protecting it from invaders and cleaning up debris, they also poune synapses.

The brain controls all bodily functions from thoughts emotions and memories to the word, sight, hearing, touch and taste from the bearing of the heart to the circulation, digestion, respiration, formation and elimination of urine and function of endocrine glands, from the regulation of body temperature to the adaptation.

The brain sends back and forth message through the spinal cord and from there through the peripheral nervous system. Functional asymmetry of the two hemispheres also related to the biochemical and ultra structural differences, in fact there are higher levels of the neurotransmitter nor epinephrine and more white matter on the right whereas higher levels of dopamine and more gray matter on the left hemisphere.

In 19th century the ability to recognize a musical composition in novice listeners has been located in the left hemisphere. In the 60's it has been shown that the functions delegated to the music comes mainly from right hemisphere.

Osborne and gale have monitored the activity of both right and left hemispheres by EEG when non musician subjects were presented with music, showing that the right side of the brain is most activated.

Right hemisphere is associated with musical skills and good three –dimensional orientation but musical skills and good three dimensional orientation but musical processing requires a large cortico-subcortical network which is distributed throughout both cerebral hemisphere and the cerebellum.

In fact the authors have performed a study by magnetocephalography in 8 musician and 8 non musicians showing the right hemisphere dominance in non musicians and symmetrical distribution in both hemispheres in musicians.

Stewarte has emphasized the musicians as the model par excellence for studying the role of experience in sculpting brain processes.

As Tudor et. al. affirmed that the lateralization depends also on the cultural influence, so the Japanese hemisphere, where as westerner's process the same music in the right hemisphere. Males irrespective of talents are more lateralized than females.

Many of these discussions leads to absolute pitch (AP) is a rare phenomenon that has fascinated musicians and scientists alike for over a century. Absolute pitch learned from earlier from intensive musical training.

Absolute Pitch is to be largely innate and others that AP may be relatively independent on musical experience and that there are different types of AP according to the style of the music. Each of which can be ascribed to discrete neurobiological mechanisms.

AP is characterized by a greater left than right symmetry of fractional anisotropy in core fibres of the superior longitudinal fasciculus, by indicating that its plasticity is a function of musical expertise.

Recent neuroscience studies revealed that intensive learning experiences involve changes in brain anatomy and /or function. In fact brain structural differences are present between professional musicians and non musicians with respect to size, asymmetry or gray mater density of specific cerebral regions, repeated practice optimizes neuronal circuits by changing the number of neurons involved, the timing of synchronization and the number and strength of excitatory and inhibiting synaptic connections. The enhanced auditory responses in musicians are accompanied by their enlarged cortical areas such as medial part of heschl's gyrus and the anterior part of corpus callosum.

The voxel based morpho metric study proves that in musicians' gray matter volume in the broca's areas increases significantly, specifically in the left pars opercularis.

Methodology: Normative Survey Method

Sample: College Students

Objectives of the Study:

General Objectives:

- To find out the level of brain dominance of the college students.
- To find out the level of emotional intelligence of the college students.
- To find out the level of leadership traits of the college students.

Hypothesis:

There is no significant association between mother's occupation of the college studentsand their left and right brain dominance.

Table: Association between mother's occupation and brain dominance of college students

Brain Dominance	Degrees of freedom	Calculated 'χ^2' value	Remarks at 5% level
	6	9.62	NS

For (6) df at 5% level of significant,

NS-not significant)

It is inferred from the above table that there is no significant association between occupation of mother of the college students and their brain dominance.

Conclusion:

It is brain which plays a vital role in the organization of human body is enthrusted through soft skills. Music another way of exit to stress will dominantly do this role.

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