

Human Brain Communication Mechanism Based on Sound Signals

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Abstract - It is very recent research area that needs more innovation in future “How human brains communicate with each other without speaking any words?” As we know that our brain begins to mature even before birth. Although it continues to mature throughout the life but human brains do not mature at the same rate in individual. It developed at different rate of development at different ages of life in individual. It must not be surprising that our whole body grows at different rates — we reach teens at different ages and our emotional maturity is start at different ages as well. At the stage of developing, the mammals began to interact with the world while their neural development was incomplete. A communication among whole body parts is activated during under development. In this article firstly, I want to explain various functions and structure of human brain. And secondly I will explain how communication system of our brain communicates messages from one part to other part of human body and how to communicate with others brains.

Keywords - Brain Communication System, Brain Computer Interface, Human Computer Interface, Brain Function Reengineering.

I. INTRODUCTION

If I have a classroom full of students about the same age and they are equally ready to learn a particular topic or idea. But you can understand they cannot grasp at same level. Thus it is highly significant for teachers as well as parents to realize that maturation of the brain of each student influences learning eagerness. Particularly for teachers it is more practical and hence it is essential for teachers to design lessons and selecting which strategies to be use for growth of brain of each student to focus on topic.

I am a person of computer science field and actively involved in neuroscience study. Here is a presentation of comparison between a computer networks with nervous system. Nerve is look like a wire of a network cable and neurons work like a data packet. My study is focused on two basic principles Physiological and Psychological. First I would like to explain according to physiological study. What Are the Main Structural Divisions (Lobes) In the Brain, And How Do They Relate to Psychological Functions? Human brain is divided into four main structural parts as shown in figure-1:

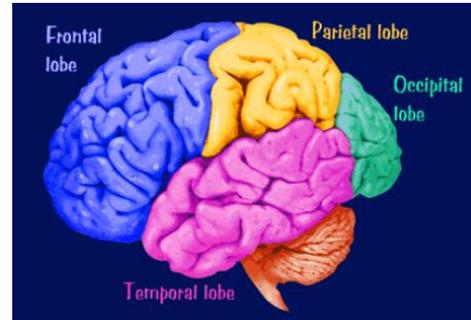


Figure 1 Human Brain Divisions

1. FL-Frontal Lobe (In judgments and decision-making)
2. PL-Parietal Lobe (In processing sensory information)
3. OL-Occipital Lobe (In visual processing)
4. TL-Temporal Lobe (In processing of semantics of speech and vision)

A human brain is one of the most complex systems of this world. Currently many technologies exist to record brain waves and how human brain functions, but it is rare to control human brain from outer world. It means there is not a single technique available to reengineer the human brain. We cannot communicate with human brain directly. We can record brain signal, we can analyze brain signal but we are unable to control human brain with external device. In [1] and [2] I study the concept of brain to brain communication and try to work on sound signals and brain communication. I am trying to communicate with human brain using external device that produce different sound signals, so that we can control human brain. Here is a hypothesis of this process that our brain can directly communicate to other brain (telepathy) as shown in figure-2:



Figure 2 Brain Telepathy

Now we will explain a schematic division of human brain is as shown in figure- 3:

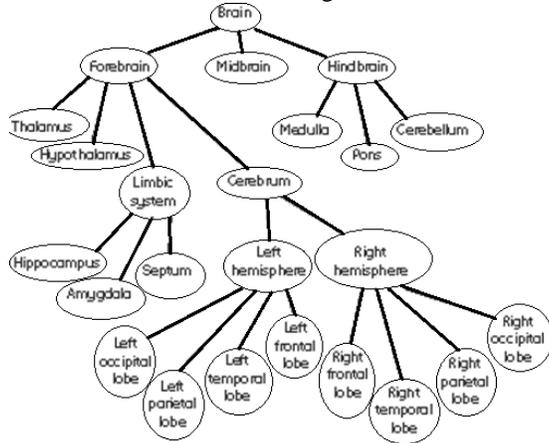


Figure 3 Schematic Division of Human Brain

Forebrain Structure and Functioning

The forebrain is the most recent development of human brain and it is the largest part of the human brain. Let's explore this massively advanced, yet evolutionarily young, portion of our supercomputer human brain. The term forebrain means 'last brain,' or it is most recently development portion of human brain. It controls every voluntary movement and the integration of sensory information to all our higher abstract thought, logic, speech, and emotions. Mainly the development of the forebrain in human is representing why we humans are so intellectually advanced comparatively to others mammals.

Midbrain Structure and Functioning

The midbrain is an important area of the convergence of sensory information. Although the midbrain is much more important to control body responses without their forebrain as long as their midbrain is intact. It is relatively small in human but an important region in human brains. The roof of the midbrain, called the tectum which means "roof", this roof is responsible to integrate incoming visual, tactile, and auditory signals in order to coordinate reflex responses. The tectum contains nerve tracts that attach directly to the thalamus and link up to the cerebrum and other forebrain regions.

Hindbrain Structure and Functioning

The brain begins as a primordial tube-like structure that develops rather quickly into three distinct parts in womb. The hindbrain forms as a next form of the spinal cord. The Hindbrain is composed of the medulla, the pons, and the cerebellum. It controls functions outside conscious control, such as breathing and blood flow. we can say the medulla controls essential functions of the brain, the Pons controls activities like sleeping, waking, and dreaming and the Cerebellum controls balance and co-ordination for movement of body parts. Damage in cerebellum impairs fine motor skills, so a patient injured in this area would have trouble

playing the guitar and carem and even will face problem to type a paper.

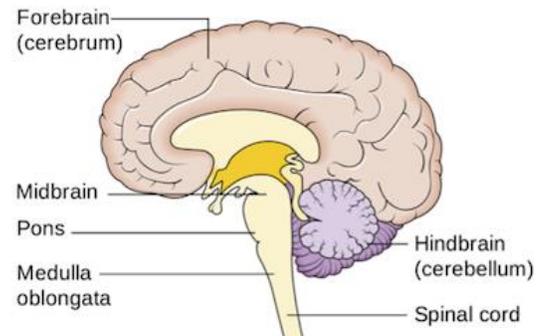


Figure 4 brain division

Now for the Psychological study I start an experiment of sound signals with some graduate students. As we know that our brain is communicate with our five sense organs but superficially if treated brain as CPU, I consider three input units i.e. Ears, Eyes, Nose and two output units Mouth and Face. Since it is easy to record brain signals for current technocrat's so we will assumed that firstly communicate with brain through sound signal. It is assumed that various type of sound wave make a different impact on human brain and output can we recorded on face and from mouth. I started to take this test on a group of 5 graduate students with 6 types of sound signals of different tones, pitch and frequencies. They produce approximately similar type of face reactions. It concludes that relative sound signal impact in a similar way on human brains.

Speaking without a word

Many times we feel in resting position that someone is talking to me and we are responding. It means there are some thought process exists that producing sound signals in our brain. Imagine that, we are living in such a world where verbal communication is not possible, people of that world would be able to speak to each other using only their thoughts process. Scientists have been ruminating that the brain-to-brain communication in humans is possible, and it appears as thought process. Due to this thought process dreams could feel a reality. So we can say such type of system would be made possible via major advances in the technology that have been achieved to communicate with human brain using different type of sound signals.

In my study, I consider two adult persons of different gender and apply similar sound signals for 10 minutes then placed in separate rooms. They were given the task of painting on a paper, they paint approximate similar pattern on paper and complete it successfully approximately in same time span. According to Miguel Nicolelis, the study's lead author, [7]

“They synchronized their brains and they achieved the task by creating a super brain — a structure that is the combination of three brains.”

Alternatively, another experiment that tested brain synchronicity in four goats in resting position, after 10-12 minute sound effect they all are fighting for water from a single bucket. It means they are producing similar effect of sound and I got to communicate with similar results using similar sound. Similarly we can get some sound effects on human brain for a difficult activity without speaking any word and can get higher accuracy in solving problems when they combined in thought process.

Recently, the researchers have focused on human brains. In one study, researchers placed two people in separate rooms and gave them the task of playing a game of 20 questions on a computer using only their minds. They transmitted “yes” or “no” answers with the help of an EEG cap, which tracked the brain activity of one person and triggered an electrical current in the other person’s brain.

Brain to Brain Communication using sound wave

Previous studies have already revealed that a human can have a alert thought about moving an arm or a leg, and that thought can be conveyed via EEG-based brain-computer interaction to a computer. But my new study takes that we can produce a super brain if combine our thought process and further by adding a next human brain to the end of the communication system. Neuroscientist Uri Hasson shows [6] the meeting of the minds that occurs every time we talk to each other. Here is an experiment of human brain synchronicity using verbal communication. We had an idea of the hierarchical chain of image frames in human brain during talking, and experiment is based on “from sounds to words to ideas”, what happen in a listener’s brain while listening to real-life stories? But what is going on in the speaker’s brain while telling it? We asked the storyteller and listener to go into the fMRI scanner and compared their brain responses while telling the story and responses of the listeners listening to the story. In figure- 2, the result is explaining the similarity of thought process in both brains. But it is enough to surprise how this coupling is possible. We saw the brain responses in both brains (the listeners’ brain while listening to the story) they were actually coupled and producing similar effect.

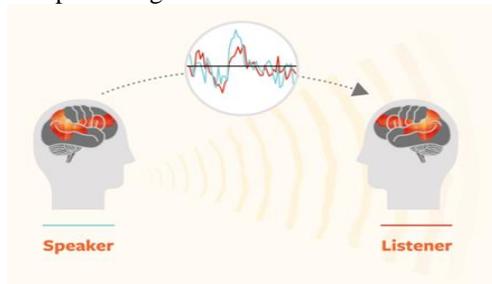


Figure 3 fMRI result

Towards mind to mind communication without using language and gesture, it would be a remarkable step in human brain communication, but it requires an important proof of principle for the development of brain-to-brain communications using sound signals.

Transcranial magnetic stimulation (TMS) is a relatively new method of pain-free stimulation of brain cells. In 2011, researchers described in two studies how they discovered the activity of distinct brain cell types changed with different TMS patterns.

It is already explained in [3] that:

1) During communication, sound signals uttered by the speaker couple the listener’s brain responses with the speaker’s brain responses;

2) Our brains have developed a common neural protocol that allows us to use such brain coupling to share information.

Forming the Thought Pattern

A continuous series of sound signals make it each other in inflowing the cortex. Each sound signal is conducted through the cortex determined by its inclination pattern and by its information content. At some point of the information in signal pattern is brought to consciousness for an instant as a picture, a sound, a taste, etc. Each pattern continues without pause beyond this point of consciousness. The path of accessibility takes is determined by the interconnections of the neurons in the cortex and this path will be referred to as processing the image and sound signal. As this re-circulated signal pattern returns through the brain structures, it triggers the pathways of stored items associated with it contains. This brings these associated items into the cortex where they stimulate additional neurons. The entire set of cortical neurons stimulated simultaneously, whether brought to consciousness or not, will be called a thought pattern. Each thought pattern is constantly changing as successive sensory signals bring into it impulses for new stimuli and their associated items while signals from earlier detections expire through habituation.

Future of Brain to Brain Communication

One day, we could attempt to take it up another mark in order to find how individual thought process can affect decisions of other without speaking to each other. The thoughts of one person could be transmitted to another person through proper sound signals influencing the decisions they make.

It could be a game changer for paralyzed people and other medically unfit persons to communicate and to perform some physical activity. A synchronization of multiple brains acting as a macrobiotic computer, could allow people to receive help from others when learning how to use an exoskeleton to improve physical progress. Today’s it is quite difficult to create a device that mimics pure telepathy for paralyzed people because our brains are unique with different type of thought process and our thoughts being influenced by our individual memories and experiences. But after thought process communication the resulting brain patterns make it

hard for neuroscientists to develop super brain patterns, but in future some new signal processing will make it easy and possible to communicate without speaking words or brain to brain communication will potentially trigger to another person's brain activity.

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