Brain Involvement in Learning

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The brain is the main organ of the human body which makes mankind the most distinguished species among all living beings. The human brain is much more complex than the most advanced computer in the world. It can perceive, interpret and make meanings of external and internal stimuli, as well as think independently and learn using new and old information.

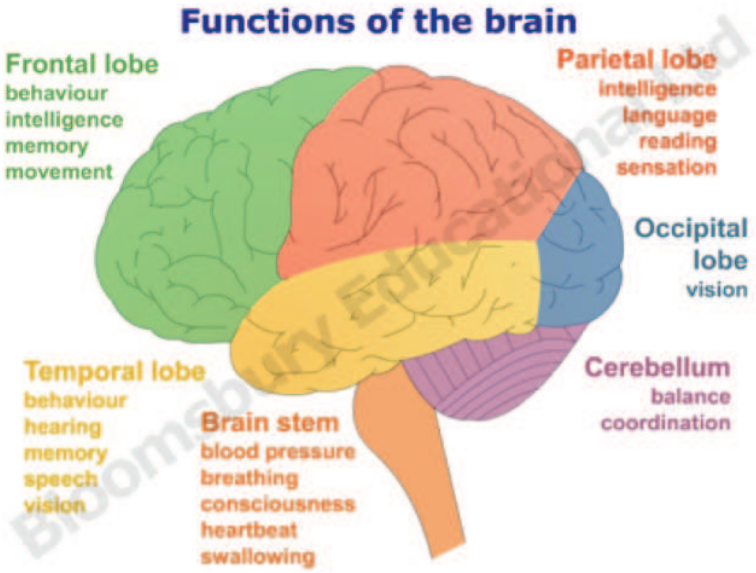


Figure 1 Anatomy of brain

Anatomy of the Brain

As brain is very important for functioning of the human, it is protected by a thick bony skull and a buffer of a fluid called cerebro-spinal fluid. It is also covered by a thin film called menenges. Brain connects to the rest of the central nervous system by brain stem, which connects to the spinal cord within the canal of vertebral column (the chain of bones in the back). Spinal cord receives impulses from body parts and sends them back to the body parts from the brain.

The average brain weighs about 1.4 kg and has two hemispheres, the left and right hemispheres. Each hemisphere is divided in to several lobes. The surface of the brain is increased by formation of involutions called gyri and is about 2,500cm2 . Gyri are separated from each other by sulci. Each part of the brain has a separate and a distinct function. The following diagram shows specific areas in the brain.
Cross section of the brain shows outer gray matter which is involved in complex higher functions of the brain, and the inner white matter which is a bundle of nerves running to and from the gray matter.

How the brain functions

The functional unit of a brain is called a "neuron". The messages are transmitted via these neurons as impulses. An impulse is transmitted from one neuron to another by the axon of the sender. Because these axons are separated by the synaptic gap the sender's axons secretes a neurotransmitter which diffuses across the gap and stimulates the receiving neuron. When the neural impulse travels down the sender's axon, it triggers terminals at the end of the axon to release the neurotransmitter, and this neurotransmitter is picked up by the receptors of the receiving neuron. This structure is called a 'synapse'. When it comes to learning, it is believed that there is a structural change in the neurons to make the synapse more efficient.

Psychology of learning

The long term learning is a complex process and is carried out by the cortex of the brain. However certain areas of brain have specific functions. For e.g. the visual aspects of learning are stored mainly in the visual cortex situated in the occipital lobes whereas the motor aspects of learning are stored in the motor regions.

Learning produces a relatively permanent change in behaviour or behavioural potential by experience. It is not only applicable to academic learning, but to a host

of other social and emotional development which occurs through learning. When it comes to understanding about learning and memory, much information comes from research done by scientists using experiments. In his classical experiment, Ivan Pavlov, a Russian scientist of the early 20th century, showed that animals can learn from previous experiences by conditioning. In his simple experiment he demonstrated that pairing food with a sound of a bell at each meal can make a dog to salivate in the absence of food but when it heard the same bell ringing. This is called "classical conditioning".

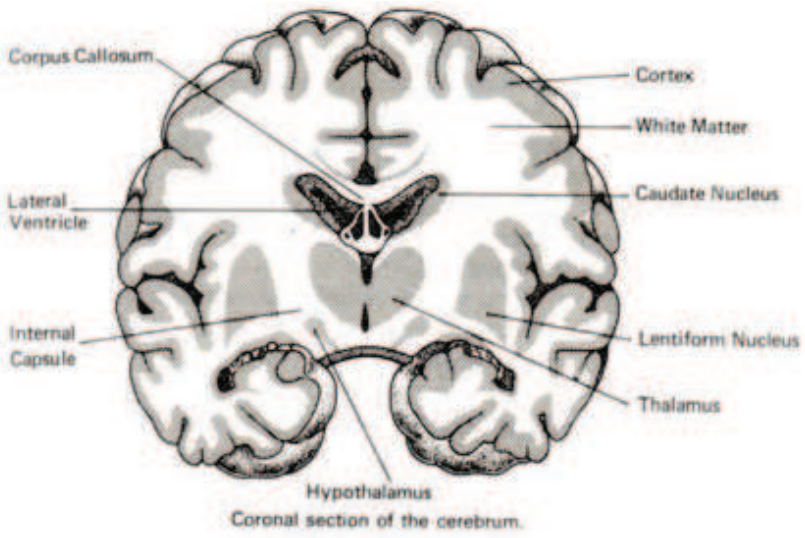


Figure 2 Cross section of the brain

Another form of learning is "operant conditioning", where an individual makes actions/trails and learn form its consequences. A child who is praised for good behaviour learns to behave well. In this way certain phobias are explained. A young boy, who is criticised by elders when he speaks in public, can develop a phobia to speak in public. This unwanted learning can be 'un learnt' by regular praising of public speaking (consequences of action made rewarding by adults), then he reduces fear attached to it and develop confidence in public speaking

In complex learning, more than making simple associations, an individual applies mental representations of world and then operate on these representations forming strategies.

Learning can be enhanced by several factors.

- Motivation
- Knowledge of result
- Intelligence
- Maturation and interest
- Methods of learning
  e.g. Repetition and practice

Many of us have different styles of learning. Learning styles can be defined as an individual's consistent way of responding to and using stimuli in the context of learning. Learning styles mainly comprise of visual (see), auditory(hear) and tactile(feel).

One needs to find out his predominant style, and making use of that significantly improves memory. As an example a person whose learning style is predominantly visual style would benefit from using diagrams, figures etc, whereas a person who prefers

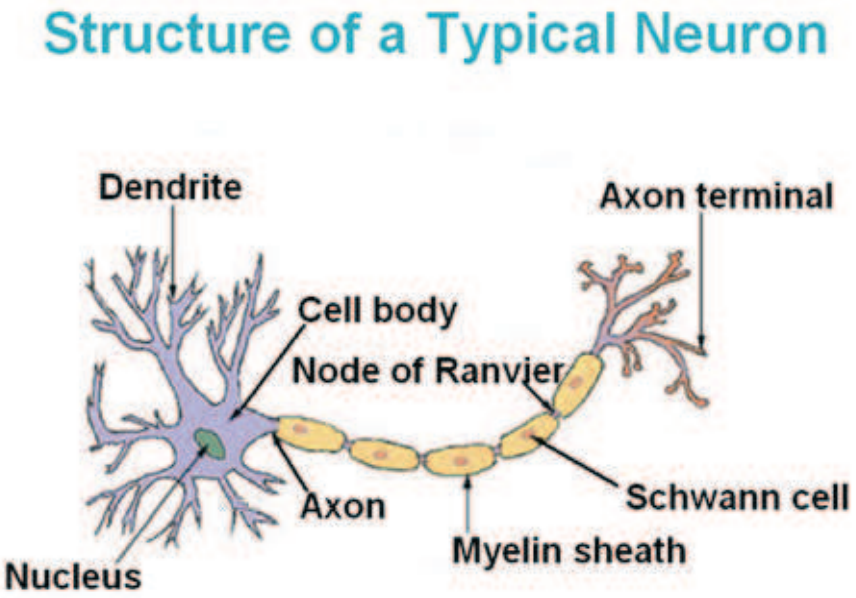


Figure 3 Structure of a neuron

auditory style of learning would benefit by reading aloud and by discussing. However, one should use more than one method, and it is much more beneficial to be actively involved in the learning process to improve memory. The retention rates following different methods are as follows.

To make the process of learning more effective and to improve retrieval at examinations, following methods can be used.
The visual learning techniques to enhance memory are as follows;

- Draw a map of events in history or draw scientific process
- Make outlines
- Copy what's on the board
- Draw diagrams
- Take notes, make lists
- Use a colour code
- Research Notes
- Watch videos
- Outline reading
- Use Flashcards
- Use highlighters, circle words, underline

The auditory learning techniques are;
- Using word association to remember facts and lines
- Record lectures
- Watch videos
- Repeating facts with eyes closed
- Participate in group discussions

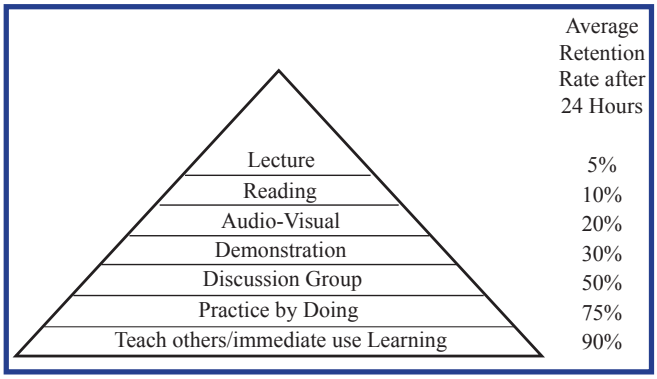


Figure 4 Retention rates following different methods of learning

- Use audiotapes for language practice
- Tape record notes after writing them

Tactile learning techniques are;
- Study in short blocks
- Take lab classes
- Role play
- Take field trips, visit museums
- Study with others
- Use memory games
- Use flash cards to memorize

To perform well at examinations one should organize themselves.

Following are useful hints to study.

- **Use a time table**
  Knowledge on the available time frame and allocating sufficient time to each subject is important. One needs to allocate sufficient time to relax, enjoy and to do daily tasks.

- **Have regular sleep**
  At least six hours of night sleep is necessary to refresh the brain to function more effectively.

- **Eat healthy and exercise**
  These are important for a healthy brain function and circulation. Avoid fast food and eat fresh vegetables and fruits.

- **Do group studies to enhance memory**
  Have small groups of 3- 5, appoint a group leader and have objectives for each session. Avoid being a social group that wastes time gossiping. Each person has to actively participate. Avoid passive participation.

- **Study in an environment closer to exam situation**
  Studying in the library, class room or using a desk improves memory at the exam. Avoid studying on the bed.

- **Have all study material ready**
  Collect all past question papers, reading material beforehand.

- **Be prepared to study**
  Avoid distractions like mobile phone calls when you study. Have a separate time for those.

- **Have a comfortable area to study**
  Avoid being too comfortable, otherwise you may fall a sleep.

- **Do effective reading. Reading from a-z is not useful**
  To enhance memory use 'PQRST' method.

P – Preview
First read previous examination questions on the section you are going to study to get an idea. Even if you do not know the answers, this would help you to prioritize important areas to study.

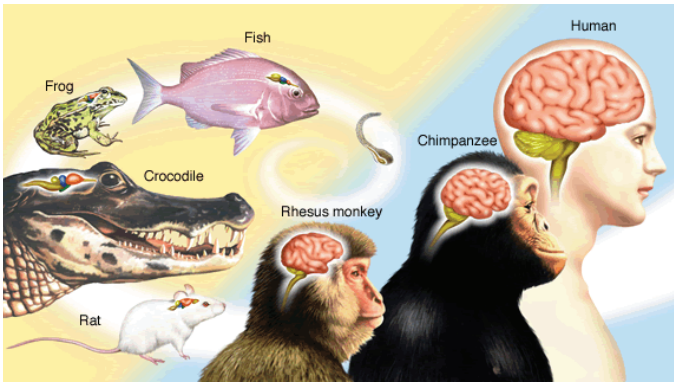
Q – Question
Question yourself what you are going to study. If in doubt, ask your teachers and peers.

R – Read
Now you are ready to read. Read to enhance knowledge, not merely to pass examinations. Try to use different styles to remember (e.g. underlining, use colors)

S – Self recitation
After reading do self recitation to enhance remembering.

T – Test
Test your knowledge now by answering the past question papers. Try to get your answers corrected by a teacher or a peer.

- **Categorization enhances retrieval**
  A librarian putting books to shelves in an order will help readers to take out books from appropriate place. In the same way memories deposited in an orderly manner would help recovering of those in a systematic manner at the exam situation. When you keep books material in an order.



- **Rehearse**
  Rehearsal improves memory.

- **Dealing with anxiety**
  Many students find it difficult to cope with exam anxiety. Best way to deal with anxiety is to study methodically and prepare for the examination adequately. Last minute cramming is less effective and increases anxiety. Avoid last minute discussions and comparing with peers. Relax the day before, engage in religious activities and have a good sleep at night. If one feels unable to handle this anxiety feel free to seek help from your doctor. Do not use any unprescribed medication as that might interfere with your performance at the examination.

All the points mentioned above are proven, simple and effective methods to enhance learning and memory. Learning can be an enjoyable task and you can pass exams well if you study well. How ever good you are, some times you may not achieve your goal at competitive examinations. But do not think you are a failure. You will succeed in your future, in what ever path you chose to do, because you have learnt effective methods of learning. In the long run, you are an achiever in life!

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