Course: Introduction to Psychology (8411)
Semester: Autumn, 2021

ASSIGNMENT No. 2

Q. 1 Evaluate and discuss the concept of sensing with examples.

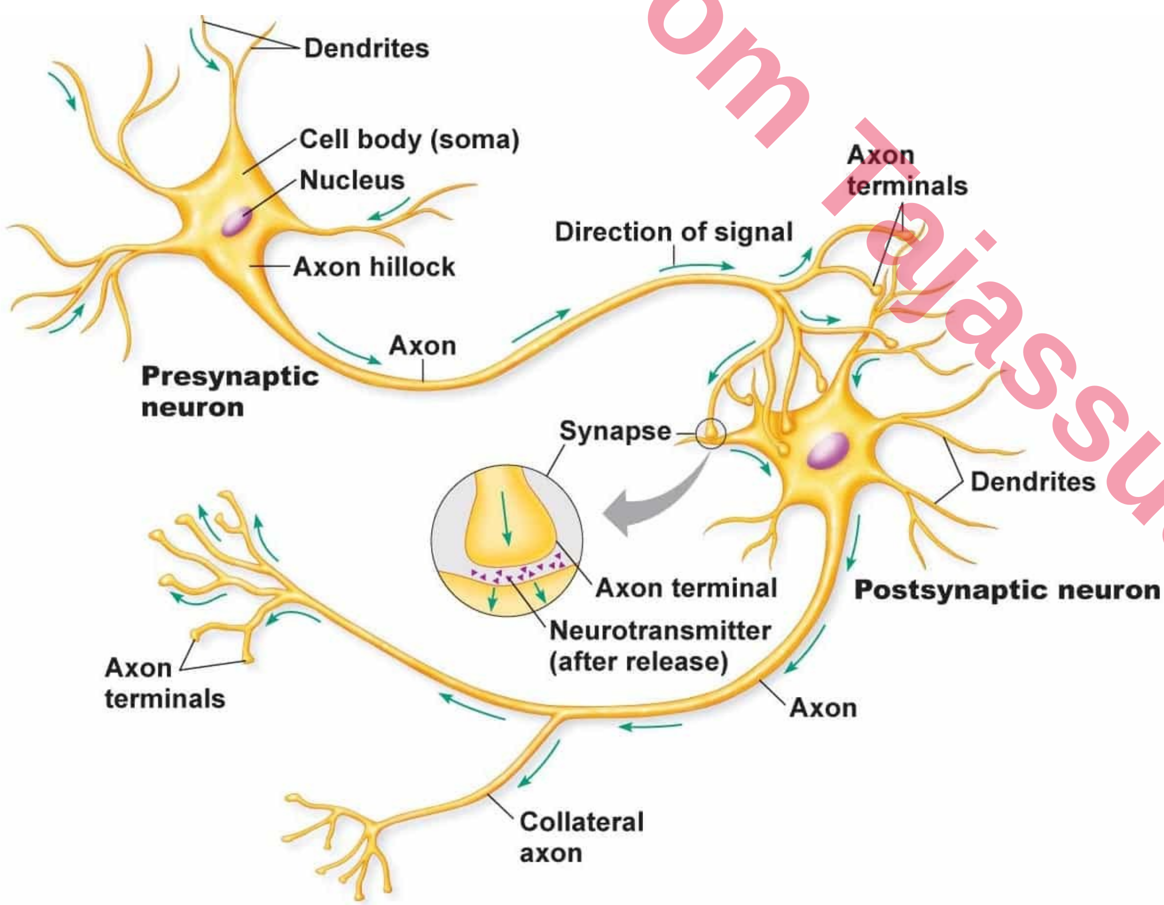
When a ligand, a small molecule that acts as a signal, binds to a receptor, a series of pathways occur within the cell that help activate a target protein or molecule.

In other words, a signal molecule latches onto a specific binding site, turns on another target molecule downstream of the receptor, and continues turning on other target molecules and proteins until the designated signal is produced. This signal produced then moves up the spine and to the brain where neurons are located.

Your brain is home to approximately 100 billion neurons, nerve cells that allow you to react to signals. These minute cells work in a very synchronized manner. A neuron consists of a nucleus, axon, dendrites, myelin sheath, and an axon terminal.

A signal is transmitted to a neuron in the form of an electrical impulse known as an 'action potential' which then moves from the dendrites of the neuron to the axon terminal. The action potential causes the nerve cell to release neurotransmitters (signaling molecules) which then bind to the receptor on the next neuron.

The area between the two neurons where all of this is taking place is called the synapse. If the electrical charge on these neurotransmitters that are released into the synapse is above the threshold, then an action potential will be fired, but if not, then nothing will happen and that will be the end of the signal transduction. These two states are known as the excitatory and inhibitory states respectively.



When a group of neurons experience this change in electrical impulse, they generate an electrical field which resembles a small vibration and which can be then detected on the scalp by an EEG sensors.

In short: the brain receives an electrical signal, which causes an action potential within neurons. The action potential moves across neurons through a synapse, which generates an electrical field that is detectable by sensors on the scalp.

EEG Sensors

Discovered in 1924 by a German Psychiatrist, Hans Berger, Electroencephalography technology, or EEG, works by measuring the difference in electrical field that is produced by neurotransmission in real time. In traditional EEG testing, rows of electrodes are placed on a person's scalp with a wire that hooks them up to an amplifier that strengthens the waves that are picked up, and a computer which records all of the data.

The data is presented on a graph in real time as the electrodes are picking up the electrical field on the scalp. Scientists decode this data by analyzing the types of waves that are presented. There are a total of five different wavelength patterns: Delta, Theta, Alpha, Beta, and Gamma (least to greatest in wavelength frequency).

These neural patterns that are picked up by the electrodes are then used by researchers to analyze cognitive behavior. For instance, in sleep research, researchers will look for delta waves to see how deep a patient is able to fall asleep. Likewise, they will look for higher frequency waves such as gamma or beta waves to check if the patient is still in REM sleep.

With its noninvasive method of use, this technology allows scientists and physicians to record when and where a particular activity has taken place in a subject's brain. From these findings, they are then be able to interpret how the subject was feeling during a particular conversation – were they bored and unresponsive? Engaged and thinking critically? Were they focused on the conversation or task without any interruptions?

From sleep behavior to consumer behavior, EEG technology allows us to delve deeper into the human brain on a more factual basis.

The IoT Method to Brain Sensing

In 2014, with almost $170,000 and 644 backers, Joel Murphy and Conor Russomanno successfully released OpenBCI (BCI standing for Brain Computing Interface), an open source biosensing platform that allows consumers to track the electrical activity produced by the brain, heart, and muscle.

For the first time ever, this technology became accessible to the general public, which paved the way for world changing inventions.

Fast-forward to 2017 and you can find brain sensing products all over the web. From a headband that allows users to meditate to trendy eyewear that help athletes stay fashionable while also improving their focus, these devices are becoming prevalent in everyday life. But how do these companies incorporate EEG technology into these products to begin with?

Just as a traditional EEG cap places electrodes all across the skull, headbands like InteraXon's Muse Brain Sensing Headband work by placing sensors along the forehead and behind the ears. Once the headset is paired with its application, the electrical impulses that are read by the sensors are immediately visualized in the app.
Depending on the types of brainwaves that are picked up, the application determines if the user needs to become more focused or not. If the waves increase in frequency, that indicates to the software that the user is distracted from the given task, and as a feedback response to these waves, the application increases the volume of the sound that the user is hearing in an attempt to get the user to refocus.
While extremely straightforward, in order to get the most accurate reading, one needs electrodes to be places all over the scalp, and around the eyes since the impulses are spread across the skull like mini vibrations.

With the frontal cortex being the primary location for problem solving, judgement, and impulse control, it makes sense why the Muse Brain Sensing Headband has sensors that are placed along the forehead.
While it may not be able to get an accurate read on the brain as a whole, it is able to track the activity of the frontal lobe, where our ability to control focus is located. Thus, this headband can strongly aid in training the frontal cortex to react more calmly to impulse and think through actions rationally with a more focused mindset.

Brain Chipping: The Future of Brain Computing Technology

Brain sensing technology is prominently used for its many medical benefits including helping cancer patients relieve stress to increase rate of recovery. However, what if these efforts can be put toward making everyday life easy and seamless as well?

By now, we've all heard of the new trend called "chipping," well what if we used this same method to control everyday tasks such as turning on/off lights, locking the doors to your house, turning off your alarm clock in the morning, etc.?

At the rate this technology is being leveraged by major tech companies such as SpaceX, within the next few decades (possibly earlier), we will see people getting sensors implanted along their skull and integrated with different software to allow human beings to take full control of their lives.

Q. 2 Why the study of consciousness is important in the present circumstances? Discuss with examples.

Consciousness refers to your individual awareness of your unique thoughts, memories, feelings, sensations, and environments. Essentially, your consciousness is your awareness of yourself and the world around you. This awareness is subjective and unique to you. If you can describe something you are experiencing in words, then it is part of your consciousness.

Your conscious experiences are constantly shifting and changing. For example, in one moment you may be focused on reading this article. Your consciousness may then shift to the memory of a conversation you had earlier with a co-worker. Next, you might notice how uncomfortable your chair is, or maybe you are mentally planning dinner.

Types of Consciousness

There are a number of things that can cause changes or alterations in consciousness. Some of these occur naturally, while others are the result of things such as drugs or damage to the brain. Changes to consciousness can also result in changes in perception, thinking, understanding, and interpretations of the world.

Some different states of consciousness include:

- Dreams
- Hallucinations
- Hypnosis
- Meditation
- Sleep
- States induced by psychoactive drugs

There are two normal states of awareness: consciousness and unconsciousness. Altered levels of consciousness can also occur, which may be caused by medical or mental conditions that impair or change awareness.

Altered types of consciousness include:

- Coma
- Confusion
- Delirium
- Disorientation
- Lethargy
- Stupor

Doctors and healthcare professionals may use different assessments to measure and assess levels of consciousness. Scores on these assessments may be used to guide diagnosis and treatment decisions.

Uses

Understanding different levels of consciousness can help healthcare professionals spot signs that someone might be experiencing a problem.

For example, sudden changes in consciousness might be a sign of:

- Aneurysm
- Brain infections
- Brain tumor or injury
- Dementia or Alzheimer's disease
- Drug use
- Epilepsy
- Heart disease
- Heatstroke
- Lack of oxygen to the brain
- Low blood sugar
- Poisoning
- Shock
- Stroke

History of Consciousness

For thousands of years, the study of human consciousness was largely the work of philosophers. The French philosopher Rene Descartes introduced the concept of mind-body dualism or the idea that while the mind and body are separate, they do interact.

Once psychology was established as a discipline separate from philosophy and biology, the study of the conscious experience became one of the first topics studied by early psychologists.

Structuralists used a process known as introspection to analyze and report conscious sensations, thoughts, and experiences. Trained observers would carefully inspect the contents of their own minds. Obviously, this was a very subjective process, but it helped inspire further research on the scientific study of consciousness.

The American psychologist William James compared consciousness to a stream—unbroken and continuous despite constant shifts and changes. Psychoanalyst Sigmund Freud focused on understanding the importance of the unconscious and conscious mind.

While the focus of much of the research in psychology shifted to purely observable behaviors during the first half of the 20th century, research on human consciousness has grown tremendously since the 1950s.

Theories of Consciousness

One of the problems with the study of consciousness is the lack of a universally accepted operational definition. Descartes proposed the idea of cogito ergo sum ("I think, therefore I am"), suggested that the very act of thinking demonstrates the reality of one's existence and consciousness. While today, consciousness is generally defined as an awareness of yourself and the world, there are still debates about the different aspects of this awareness.

Research on consciousness has focused on understanding the neuroscience behind our conscious experiences. Scientists have even utilized brain-scanning technology to seek out specific neurons that might be linked to different conscious events. Modern researchers have proposed two major theories of consciousness: integrated information theory and global workspace theory.

Q. 3 Explain the Reasoned Action Theory and its importance with examples.

The theory of Reasoned Action was developed by Martin Fishbein and Icek Ajzen as an improvement over Information Integration theory (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). There are two important changes. First, Reasoned Actions adds another element in the process of persuasion, behavioral intention. Rather than attempt to predict attitudes, as does Information Integration theory (and several others), Reasoned Action is explicitly concerned with behavior. However, this theory also recognizes that there are situations (or factors) that limit the influence of attitude on behavior. For example, if our attitude leads us to want to go out on a date but we have no money, our lack of money will prevent our attitude from causing us to go on a date. Therefore, Reasoned Action predicts behavioral intention, a compromise between stopping at attitude predictions and actually predicting behavior. Because it separates behavioral intention from behavior, Reasoned Action also discusses the factors that limit the influence of attitudes (or behavioral intention) on behavior. The second change from Information Integration theory is that Reasoned Action uses two elements, attitudes and norms (or the expectations of other people), to predict behavioral intent. That is, whenever our attitudes lead us to do one thing but the relevant norms suggest we should do something else, both factors influence our behavioral intent. For example, John's attitudes may encourage him to want to read a Harry Potter book, but his friends may think this series is childish. Does John do what his attitudes suggest (read the book) or what the norms of his friends suggest (not read the book)? Specifically, Reasoned Action predicts that behavioral intent is created or caused by two factors: our attitudes and our subjective norms. As in Information Integration theory, attitudes have two components. Fishbein and Ajzen call these the evaluation and strength of a belief. The second component influencing behavioral intent, subjective norms, also have two components: normative beliefs (what I think others would want or expect me to do) and motivation to comply (how important it is to me to do what I think others expect). Therefore, we have several options for trying to persuade someone. The first group of options are like the strategies identified by information integration theory:

- Strengthen the belief strength of an attitude that supports the persuasive goal.
- strengthen the evaluation of an attitude that supports the persuasive goal

- weaken the belief strength of an attitude that opposes the persuasive goal
- weaken the evaluation of an attitude that supports the persuasive goal
- create a new attitude with a belief strength and evaluation that supports the persuasive goal
- Remind our audience of a forgotten attitude with a belief strength and evaluation that supports the persuasive goal.

For example, suppose you wanted to persuade your roommate, Pat, to go see a movie. If Pat had a positive attitude toward that movie ("I've heard that movie is funny"), you could try to increase the belief strength ("Everyone says it is funny; no question about it") or evaluation ("That movie isn't just funny, its hilarious!") of that attitude. If Pat had a negative attitude toward attending the movie ("The movie theater is decrepit") you could try to reduce the belief strength ("They remodeled it") or evaluation ("The important thing is the movie, not the theater") of that negative attitude. You could create a new favorable attitude ("I heard the soundtrack to this movie is great!") or remind Pat of a favorable attitude. However, the addition of subjective norms creates several other options:

- strengthen a normative belief that supports the persuasive goal
- increase the motivation to comply with a norm that supports the persuasive goal
- reduce a normative belief that opposes the persuasive goal
- reduce the motivation to comply with a norm that opposes the persuasive goal
- create a new subjective norm that supports the persuasive goal
- Remind the audience of a forgotten subjective norm that supports the persuasive goal.

For example, you could try to strengthen an existing normative belief ("No one should sit home on a Friday night") or increase the motivation to comply ("You'll really be depressed if you stay home -- people are right when they say you shouldn't stay home on the weekend"). If Pat thinks it is wrong to go to a movie with a roommate instead of a date, you could try to weaken this normative belief or her motivation to comply with it. Furthermore, you could try to create a new norm ("Everybody is going to see movies made by this director") or remind Pat of a forgotten norm. Finally, the fact that there are two influences on behavioral intention, attitudes and norms, gives one final possibility for persuading others: if one component (attitudes, norms) supports the persuasive goal more than the other, make that component more important than the other.

Many theories in health education and health promotion seek answers to the fundamental question of why people behave the way they do. More specifically, theories are used to try to understand and predict how and why people change their unhealthy behaviors to healthier ones.

ReCAPP has reviewed some of the important health education and health behavior theories in past editions including Social Learning Theory, the Health Belief Model, and Stages of Change. This edition of ReCAPP is dedicated to better understanding the Theory of Reasoned Action.

The Theory of Reasoned Action (TRA),[1] first developed in the late 1960s by Martin Fishbein and revised and expanded by Fishbein and Icek Azjen[2] in the decades that followed, is a theory that focuses on a person's intention to behave a certain way. An intention is a plan or a likelihood that someone will behave in a particular way in specific situations — whether or not they actually do so. For example, a person who is thinking about quitting smoking intends or plans to quit, but may or may not actually follow through on that intent.

To understand behavioral intent, which is seen as the main determinant of behavior, the TRA looks at a person's (or population's) attitudes towards that behavior as well as the subjective norms of influential people and groups that could influence those attitudes.

Let's say, for example, that you intend to read this article to find out more about the TRA and how it could apply to your work. In order to try to predict whether or not you would actually read the article, the TRA would explore your attitude about reading the article (whether your attitude is positive or negative) and the norms that you perceive from people around you (e.g., your colleagues) about whether or not this would be a good thing to do. According to the TRA, attitudes and norms are the main influences on intention, which, in turn, is the main motivator of behavior.

Where do our attitudes and norms come from? According to TRA, our **attitudes** toward a particular behavior are influenced by a combination of two related factors: our beliefs about the outcome of the behavior (i.e., is the outcome likely or unlikely?) and our evaluation of the potential outcome (is the outcome a good thing or a bad thing?).

In this example, your attitude would be shaped by whether or not you think reading the article is likely to be relevant to your work (the outcome of the behavior) and whether or not you think learning something new that could be relevant to your work would be beneficial to you and to your organization (your evaluation of the outcome).

Your attitude could be based on a number of different factors — your past experiences reading health education articles, your sense of whether or not you can learn something from reading versus going to a training about TRA, etc.

From the TRA perspective, the important aspect of your attitude is whether or not it is positive, negative, or neutral. For example, if you strongly believe that reading the article (or getting a mammogram, or using a condom, or whatever the behavior might be) will lead to a desirable outcome, then one could say that you have a positive attitude toward that behavior. Likewise, if you strongly believe that the behavior will lead to an undesirable outcome, you are likely to have a negative attitude about it.

Q. 4 Exploring and learning are important for growth and development. Critically discuss this statement with examples.

Education is fundamental to development and growth. The human mind makes possible all development achievements, from health advances and agricultural innovations to efficient public administration and private sector growth. For countries to reap these benefits fully, they need to unleash the potential of the human mind. And there is no better tool for doing so than education.

Twenty years ago, government officials and development partners met to affirm the importance of education in development—on economic development and broadly on improving people's lives—and together declared Education for All as a goal. While enrolments have risen in promising fashion around the world, learning levels have remained disappointingly and many remain left behind. Because growth, development, and poverty reduction depend on the knowledge and skills that people acquire, not the number of years that they sit in a classroom, we must transform our call to action from Education for All to Learning for All.

First, foundational skills acquired early in childhood make possible **a lifetime of learning.** The traditional view of education as starting in primary school takes up the challenge too late. The science of brain development shows that learning needs to be encouraged early and often, both inside and outside of the formal schooling system. Prenatal health and early childhood development programs that include education and health are consequently important to realize this potential. In the primary years, quality teaching is essential to give students the foundational literacy and numeracy on which lifelong learning depends. Adolescence is also a period of high potential for learning, but many teenagers leave school at this point, lured by the prospect of a job, the need to help their families, or turned away by the cost of schooling. For those who drop out too early, second-chance and nonformal learning opportunities are essential to ensure that all youth can acquire skills for the labor market.

Second, **getting results requires smart investments**—that is, investments that prioritize and monitor learning, beyond traditional metrics, such as the number of teachers trained or number of students enrolled. Quality needs to be the focus of education investments, with learning gains as the key metric of quality. Resources are too limited and the challenges too big to be designing policies and programs in the dark. We need evidence on what works in order to invest smartly.

Third, **learning for all means ensuring that all students,** and not just the most privileged or gifted, acquire the knowledge and skills that they need. Major challenges of access remain for disadvantaged populations at the primary, secondary and tertiary levels. We must lower the barriers that keep girls, children with disabilities, and ethnolinguistic minorities from attaining as much education as other population groups. "Learning for All" promotes the equity goals that underlie Education for All and the MDGs. Without confronting equity issues, it will be impossible to achieve the objective of learning for all.

Achieving learning for all will be challenging, but it is the right agenda for the next decade. It is the knowledge and skills that children and youth acquire today—not simply their school attendance—that will drive their employability, productivity, health, and well-being in the decades to come, and that will help ensure that their communities and nations thrive.

Q. 5 Discuss and evaluate the various types of memory conceptualization with examples.

Our memory is part of being human. It is also an indicator that we experienced and lived to this day. Theoretically, memory is our ability to encode, store, retain and consequently recall information and past experiences in the human brain. In other words, past experiences influenced our present and future behavior. When the outcome is negative we tend not to repeat what caused it, but if the outcome is positive we do the opposite.

For example, as you go to work, you use a certain road every time. However, that route is always experiencing traffic jams that cause you to be late for work. By chance, one day you used another smaller road and you found that it is less congested and thus you arrive earlier to work than usual. From that day onwards since the smaller road benefits you more you will use it more frequently. This means, you used your previous experience and act accordingly the next time you go through the same situation again.

In this paper, we will discuss and delve into more about memory as a whole. We will first discuss on the stages of the Multi-store model of memory which was founded by two researchers, Richard Atkinson and Richard Shriffin. The next section consists of what Short Term Memory and Long Term Memory are and their differences. This second section is a direct continuity of Memory Stage which is in the first section. The last section of the contents is in a different direction altogether. It consists of my own conceptualization the functions of memory system in human interaction model

One of the most used memory models by psychologists and non-psychologists alike is the Multi-Store model by Atkinson and Shiffrin (1968). They describe memory in terms of information flowing through a system. There are three stages of learning and memory of the Multi-Store model. The three stages which are processes are called Encoding, Storage and Recall or Retrieval (McLeod, 2007).

The first stage, which is also the most important stage in creating new memory is called Encoding. It is the process which allows the information collected to be transformed or converted into a form that can be stored within our brains to be recalled later on. The process of Encoding is done in four different ways which are: Acoustic, Visual, Semantic and Tactile Encoding (Mastin, n.d.).

Acoustic Encoding is the encoding (remembering and understanding) of the sounds that you hear: especially the sounds of words. When you repeat information rhythmically it is considered as Acoustic Encoding. For instance, learning the “ABC”. The alphabets of the “ABC” are put into a song similar to the nursery rhyme song “Baa Baa Black Sheep”. Other than making the learning of ‘ABC’ more enjoyable, children will remember them faster. It is the same case for the learning of the multiplication timetable. When reciting multiplication timetable, many can recite “six times six equals to thirty-six” rhythmically. This is due to the fact that the sound of the number “six” was highlighted three times.

When Acoustic Encoding is the encoding of sound, Visual Encoding is the encoding of image. Visual Encoding relates to visual sensory information which is stored within the iconic memory (temporarily) first and later transferred into the long-term storage (permanent). One of the vital elements in visual encoding is the amygdala, which is a complex structure of neurons. Visual input as well as other systems’ input are accepted in the amygdala where the conditioned stimuli are then encoded into positive or negative values. As an example, if you are shown a list of words for one second. You would find that you will be able to remember if there was a word which is written in different color, or if there was a word written in bold or underlined. Visually encoded information is very fleeting and we forget them easily. We remember better when the information is encoded acoustically.

The next type of Encoding is Semantic Encoding. Semantic Encoding is the processing of meaning, especially of words, though not exclusively. Most of the time it works hand in hand with Visual Encoding. For instance, when someone says "animal, grey and large" you will build a mental image on what he/she are referring to which is most probably an elephant. The last of the them is Tactile Encoding. It is based on the encoding of feeling especially touch. In a nutshell, each of the types of Encoding(s) starts with stimulus which gives out impulses/signals (nerve) which later will be processed and encoded. Paying attention is important when our memory is to be properly encoded. Thus, not all stimuli will pass through our conscious awareness, instead some will be filtered out.

After the Encoding Stage comes the Memory Stage. According to Atkinson and Shriffin's (1968) "Memory Stage Model", there are three distinct stages in the Memory Stage itself. They are Sensory Memory/Store, Short Term Memory and Long Term Memory. All three differ in terms of capacity, function and duration.

Sensory Memory which is at times called Iconic Memory holds information only for a few seconds (brief storage information). For instance, while flipping through a magazine we see eye-catching wordings of an advertisement, but after flipping to next the page we cannot remember what was actually written. This stage implies that something perceptual takes place. A stimulus might already be gone but we may still perceive it after even for just a brief moment. The next two stages of the Memory Stage will be discussed it Section 2.0. .The information people received which is stored in sensory memory is just long enough to be transferred to short-term memory

The last stage of the stages of learning and memory of the multi-store model is the Retrieval Stage/Memory Retrieval. It is a process of getting or recalling information from your Storage Memory. For instance, if you can remember what you bought yesterday, information is successfully recalled from your memory into your conscious mind. The process of Retrieval is stimulated by the Retrieval Cues that includes mood and associations. If one cannot retrieve an information the cause may simply be because they did not pay attention enough, thus only some were encoded in the memory or it might be something as serious as having an amnesia.

Ultimately, the role of short-term memory is to file information for temporary usage. If it is not consolidated, it is discarded. This process of discarding is important to make room for learning and new memories. But once a memory is stored in the long-term memory bank, it is stored there forever. It may not feel like it is stored there forever. Sometimes, you may not be able to recall something that is stored in the long-term memory bank—nevertheless, it is there. Because once memory is stored, it is permanent.

Short Term Memory (STM) has a limited storage capacity. Only about seven (plus or minus two) unrelated chunks of items can be held with a time duration of 20-30 seconds at once (Mohs, 2007). For example, remembering a phone number until it is keyed into a mobile phone. After a few seconds you might not remember the set of phone numbers anymore if no effort is made to retain them. However, by using memory strategies, we can somewhat increase our memory capacity. Take for instance a ten-digit number such as 9006783456 may be too long for the use of Short Term Memory. For the set of number to stay in your STM and long enough for you to key in your mobile phone is to break it into chunks like 900-678-3456.

On the other hand, Long Term Memory (LTM) has an unlimited storage capacity for information. In Short Term Memory, information remains as long as we think about it and will be discarded once we stop. In LTM, information is permanently stored in human memory. To retain information in LTM, a relation should be made between the new information to the ones we already know. This process is known as coding as information. Short Term Memory lacks this coding process, thus information is fleeting. If an information is important enough in the STM, it will be transferred to LTM. If there is an effort in retaining information like repetitively going through the information again and again (reviewing) we can remember it permanently. The more repetition and reviewing of information is made, the brain makes more neuronal connections (stronger neural pathways). At the same time, between the two neurons, the synapses become stronger because of more frequent signals passed between them. It is also important to realize that for memory to be consolidated there should be no interference present. In addition, when it comes to consolidation of memory and learning, sleeping plays an important role for both of them. This is proven by the founding that during sleep, the genes of rats are more expressive. In the hippocampus, the displayed activities during spatial learning is replayed.

The next aspect that would be highlighted is their forgetting mechanism. In both STM and LTM a loss of information can be experienced. However, their forgetting mechanism differs from one another (Walton, 2010). In STM, loss of information can happen when there is interference. Interference happens when old information interferes with the learning of the new information. This thus makes the stored information irretrievable. Besides the Intereference Theory, there is also the Decay Theory. Decay happens when information is gradually forgotten as time goes by. It is important to note that it is not because of the effects of replacement as the Interference Theory.

In contrast, Long Term Memory, loss of information is due to retrieval failure and not loss of the information. When information is not encoded correctly, our Long Term Memory will discard it out of the system. However, our memory can retrieve information if the cue matches the cue present during encoding time on the condition that loss of information is not because of brain trauma from accidents or neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases.