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1. LEARNING OUTCOMES

After studying this module, you shall be able to -

- Define Selective Attention
- Determine what influences selective attention
- Explain Broadbent's Filter Model of Attention
- Explain Filter Attenuation

2. INTRODUCTION

As discussed earlier, Attention can be referred to as the behavioural and cognitive process of selectively concentrating on one aspect of the environment while ignoring other things. We can also refer to it as the allocation of processing resources. In layman language, when you are paying attention to something particular, all your focus lies around that object. For example, consider that you are watching your favourite TV series. Your mother keeps calling you but all your attention is directed towards TV and you tend to ignore other things demanding your concentration.

Attention is one of the most important topics, in which a lot of studies are being conducted in areas of psychology, cognitive neuroscience and neuropsychology. We are bound to wonder about the causes of signals that generate attention and also to understand the impact of these signals on the turning characteristics of the sensory neurons. It also tries to assess intercorrelation between information processing units such as perception, learning etc. What happens when our attention is diverted? What causes us to drop everything at hand and redirect all our attention to some new issues in our environment? How do we prioritize which issue deserves our attention first? Neuropsychologists have been trying to answer these questions. But to comprehend the theories that have been proposed, we first need to understand what Selective Attention is.

3. SELECTIVE ATTENTION

As you read these words, 100 million sensory messages may be clamouring for your attention. Only a few of these messages register in awareness; the rest you perceive either dimly or not at

all. But you can shift your attention to one of those unregistered stimuli at any time. For example, how does the toe of your right foot feel right now?

Attention, encompasses two courses of selective attention:

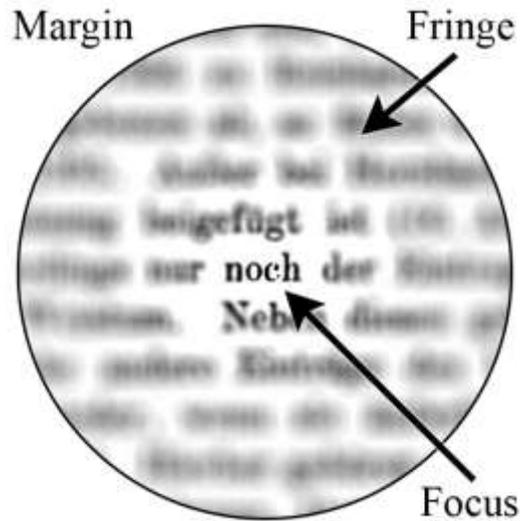
1. Selectively attending to specific stimuli
2. Sorting aside simultaneous sensory input

A technique called *shadowing* has been used to experimentally study these processes. The results of such investigation reveals that attention to multiple stimuli at a given time is difficult, however, fast shifting between the messages is possible. The blanks occurring as a result of set shifting are covered by our general knowledge. For example, people listening to music and working on a math problem 'simultaneously' are actually either listening to music or focusing on the math problem at a particular instant. They can divert their attention from the math problem and catch up with how much the song has passed.

3.1 Visual Attention

We are aware that visual attention operates on two stages, and that is why it is called a two stage process. At the initial level, attention is proposed to be scattered over entire visual field with simultaneous cognitive functioning activated. For example, you are given a book to read and you are told to go on a certain page and read a certain paragraph. When you are operating on the first stage, you take a look at that page in general while parallel paying attention to the exact paragraph you have been asked to read.

At the secondary level, only specific inputs are attended to and cognitive functioning follows a serial mode. For instance, while reading, the attention is directed towards specific words and other words form the context for the current reading which forms the margin. Since they fall in the margin, one is not consciously aware of the words but certainly gains help to extract meaning for the current reading. Basically, you read each word individually while being oblivious to the words accompanying that particular word.



3.2 Selective Auditory Attention

Selective auditory attention or **selective hearing** is instinctive cognitive activity. It refers to selective attention to a specific type of an auditory stimulus such as a sound or a particular type of voice. The noises that happen in the environment are sensed but not attended to and hence are also not perceived. To grab a better understanding of this, imagine yourself in a party standing with a group of people, having a discussion on, let's say, psychology. Since it's a party, there is noise everywhere in the environment. You are able to be a part of your discussion because you are focusing on the specific source of spoken words and other noise is automatically ignored.

3.3 Inattention Blindness

Electronic recording and brain-imaging studies have revealed that unattended stimuli register in the nervous system but do not enter immediate experience. Inattention blindness is a term coined to refer to incapacity of the brain to encode information that is not consciously given attention to. You can look right at something without "seeing" it if you are attending to some other stimuli. This is what happens when you are deep in thoughts and you're directly staring at someone without realizing it. Also, inattention blindness is surely relevant to finding that cell phone conversations significantly reduce driving performance. You don't expect to pay attention on the road ahead if you are hearing on phone that your mother has been admitted to a hospital! Right? Also, it's a very bad idea to drink and drive as alcohol ingestion increases inattention blindness.

3.4 Environmental and Personal Factors in Attention

Characteristic of stimulus and personal features emerge as two strong determinants of attention.

Stimulus characteristics that attract our attention include intensity, novelty, movement, contrast and repetition. Sexually oriented stimuli are especially attention grabbing. No wonder advertisers use these properties in these commercials and packaging.

Internal factors, such as our motives and interests act as powerful filters and influence which stimuli in our environment we will notice. For example, if you are a graphologist, you will be particularly interested in a handwriting sample before you notice anything else.

This all is basically about prioritizing which stimuli are we going to register and attend to and which stimuli can be ignored for a while. These factors are the core of selective attention and are under extensive study to help understand the concepts of attention better.

4. THEORIES OF SELECTIVE ATTENTION

4.1 Broadbent's Filter Model of Attention

Human processing system using an information processing metaphor was first explained by Donald Broadbent. With this goal, Broadbent posited a model based on limited information processing capacity. He stated that humans carry the capacity to selectively choose information for processing and scrutinize information for subsequent later processing. In layman language, there is a certain capacity beyond which humans don't process information. Also, humans passively prioritize as to which information or what part of information has to be processed early as compared to the remaining information.

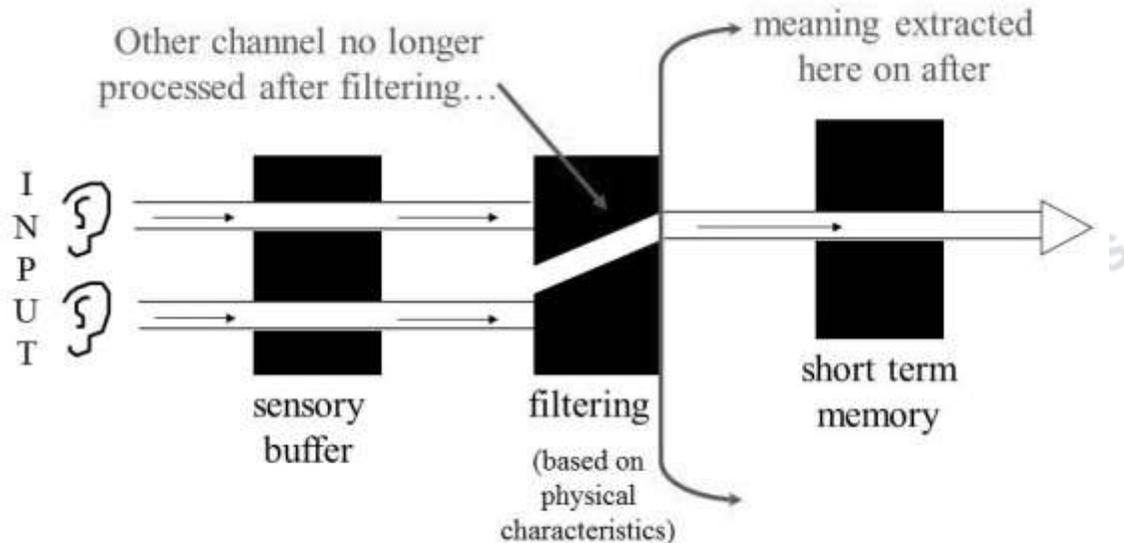
Keeping in mind that the capacity is limited, Broadbent suggested that a strict scrutiny is required for information processing. He explained that selection of stimuli is based on certain common physical aspects such as colour, structure, intensity etc. Semantic features stand distinct and complex than physical characteristics and therefore posit limited ability to store sensory input. Hence, based on structural properties, selective information is processed while unattended data is eventually faded.

Additional to this is target oriented actions that requires attention to be controlled; thus it leads to high degree of selectivity for information-processing stream. During the development of this rationale, he stressed on allocation & scrutiny of sensory input to attended or unattended channels. Basically, the initial filtration occurs when the incoming stimuli is segregated in to the ones which will be attended and the ones which won't be attended. What's noteworthy here is that selection of the channel is directed by attentive processes. In case if an individual is aiming to attend to a stimulus conforming to the present target, voluntary attention will come in play. However, in case where irrelevant extra sensations are received, reflexive attention will come at play. To comprehend this, imagine a group of typists sitting in a room all ready for instructions on what to type. Each typist has been assigned to a different person. As soon as the work begins, there are sounds of legal documents being recited in the room. But an individual typist only hears what his boss is saying instead of what other typist's boss is reciting. What the typist doing here is mere segregation of incoming stimuli into attended and unattended channels. This demonstrates how he uses voluntary attention to fulfil his current goal. If suddenly his colleague asks for paper, he would not be distracted and hand him over the paper. This is how he uses reflexive attention to respond to a sensory event.

Information after transiting through the filter, gets encoded in short term memory. Basically, after information has passed the filter, apart from it being available for short- term memory, it is also

open for strategic changes in specific pieces of information before its permanent transfer to the long- term memory.

This explanation further proposes that there exists an irresistible amount of information entering the channels and because of that a selective filter is required to effectively deal with it. How is that done? By making sure a double filtration process where already filtered initial messages are again filtered for subsequent processing. The theory emphasizes on scrutiny at the beginning stage only as information to be further processed is selected at the initial level itself.



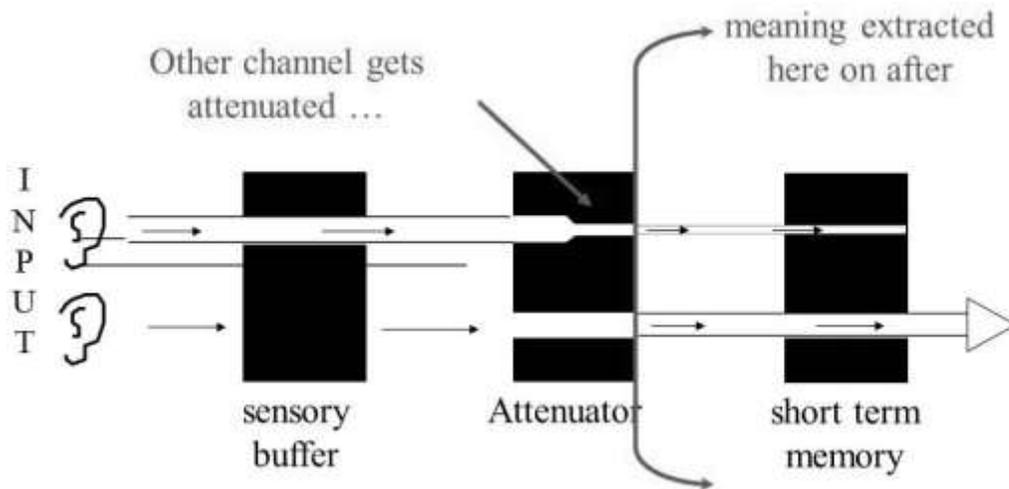
4.2 Filter Attenuation Theory

The word 'attenuation' basically refers to weakening in force or intensity. It is the property of something that has been weakened or reduced in thickness or density.

Anne Triesman, a graduate student of Broadbent's, proposed a substitute explanation called the Filter Attenuation Theory. The reason for developing this alternate view was her lack of belief in working of the filter as decision maker in discerning the conscious acknowledgement of sensory input. The explanation completely favours the working through an early- selection filter. Therefore, the filter plays a role attenuating information received by the unattended channels. Remember we discussed in Broadbent's theory that there is a division of sensory input into attended and unattended channels? It is understood that the unattended channel deal with weakly attended stimuli. In order to gain self-acknowledgement, the stimuli should exceed a threshold. He proposed that this threshold is determined by the compilation of words' with their meaning. Significant words like one own name lie at a low threshold level whereas other uncommon words such as 'file' lie at greater threshold for their conscious acknowledgement to happen. Thus, in such manner, the semantic characteristics of the stimuli act as its own filter. You must have experienced how your attention instantly shifts if you hear your name being mentioned in the discussion of an adjacent group of people. This is the mechanism behind it! Another interesting thing to note here would be the fact that not everybody's name would have a low threshold for

you. If the adjacent group of people mention a stranger's name, like Sam, it would have a high threshold and not gain your awareness. Interesting, right?

We have seen that this particular theory of attention preserves both the concept of early selection of information as well as use of physical characteristics as deciding factors for their inclusion as attended or unattended stimuli. Passing through beginning stage of attenuation, stimuli is then processed by hierarchy of analyzers executing higher order functioning for more significant information. The basic fact of the theory is that information that has been selected as the attended stimuli will accomplish complete higher order processing whereas the unattended stimuli will not be subject to such processing and thus be stored only for physical factors than meaningful inferences. Further, the process of attenuation and higher order functioning is controlled by the present needs and targets. At the same time, there are lack of resources to comprehend the unattended material which is then eventually lost.



Recognition threshold

This aspect focuses on the level of threshold 'minimum initiation necessary' to be hit for gaining conscious awareness. More this threshold is low, higher is the probability of sensory information to be recognized post attenuation process also. As mentioned earlier, your name has a lower threshold for you than the capital of Uganda.

Threshold Affectors

Context and priming

Context is a set of facts or circumstances that surround a situation or event. It is imperative in lowering the threshold needed for identification of input by forming expectant environment for concerned input. This indicates that any word can be easily identified with the aid of context. Context works as a priming agent making input easily approachable and thus reducing its threshold mark. Consider the following statement "*the table is round*". The word 'round' here

will automatically gain recognition as a result of the context in which it is stated. The initial words will act as priming agents thus reducing its threshold level.

Subjective Importance

Words that involve subjective significance are more likely to have lower level of threshold. You are more likely to process the stimuli if it says your house is on fire!. Words or phrases that share a close link with your personal identity will surely in most of the circumstances will be recognized. In contrast, words that carry multiple meaning depend heavily on the context and the priming agents. Stereotype words, taboo words are also more easily recognized than other common words of our regular usage.

Hierarchy of Analysers

This system economises information processing. It finely attenuates the unattended information and eases the attended information to be adequately recognised and processed. In case of overwhelming sensory input, it scrutinizes information and protects sensory bombardment. When processing load is less, complete hierarchy processing takes place and when processing load is high attenuation becomes more active and avoids processing of irrelevant stimuli.

5. SUMMARY

- *Attention* can be referred to cognitive act of including specific things in the stream of conscious focus while excluding other stimuli in the margin.
- *Selective Attention* refers to focusing all your attention of a specific source of incoming stimuli. It incorporates double way of selection : Selectively attending to specific stimuli and sorting aside simultaneous sensory input
- *Attentional blindness* is a term coined to refer to inability of unattended input to gain conscious awareness.
- Attention is strongly affected by both characteristic of stimulus and personal features
- *Broadbent's Filter Theory of Attention* propose a model based on limited information processing capacity. He stated that humans carry the capacity to selectively choose information for processing and scrutinize information for subsequent later processing.
- *Attenuation Theory* is a revision of Broadbent's Theory of Selective Attention and apart from supporting an early selection filter, it also states that the filter also attenuates sensory input given to the unattended channel.

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