1. Details of Module and its structure

Module Detail	
Subject Name	Psychology
Course Name	Psychology 02 (Class XI, Semester - 2)
Module Name/Title	Sensation and Attention – Part 1
Module Id	kepy_20501
Pre-requisites	Knowledge about functioning of sensory organs.
Objectives	1. To understand the nature of sensory processes, 2. To explain the processes and types of attention,
Keywords	Sensation, Cognition, Absolute Threshold, difference Threshold Attention, Sustained and Selective Attention

2. Development Team

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Knowing the World Around Us

The world in which we live is full of variety of objects, people, and events. If you see the space you are sitting in, you may find so many different things.

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You may see a table, chair, books, bag, watch, pictures the wall, ceiling, sky sunshine, clouds and many other things. The size, shape and colours are different. If you move around you will find many other things trees, animals and other buildings. These are common-place experiences and we hardly need to make any effort to recognize each. But have you ever wondered as to how do we get this information about each of these things in our world? The knowledge about various objects becomes possible with the help of our sense organs (e.g., eyes, ears…). Our organs collect information from varied sources and provide us with the information. We have very specialised sense organs to deal with these different stimuli.

As human beings we are bestowed with a set of seven sense organs. These sense organs are also known as **sensory receptors** or information gathering systems, because they receive or gather information from a variety of sources. Five of these sense organs collect information from the external world- these are eyes, ears, nose, tongue, and skin. While our eyes are primarily responsible for vision, ears for hearing, nose for smell, and tongue for taste, skin is responsible for the experiences of touch, warmth, cold, and pain. Specialised receptors of warmth, cold, and pain are found inside our skin. Besides these five external sense organs, we have also got two deep senses. They are called **kinaesthetic and vestibular** systems. They provide us with important information about our body position and movement of body parts related to each other. With these seven sense organs, we register ten different variety of stimuli. For example, you may notice whether a light is bright or dim, whether it is yellow, red or green, and so on. As far as sound is concerned, you may notice whether it is loud or faint, whether it

is melodious or distracting, and so on. These different qualities of stimuli are also registered by our sense organs.

Sense Modalities

Our sense organs provide us with first-hand information about our external or internal world. The initial experience of a stimulus or an object registered by a particular sense organ is called **sensation**. It is a process through which we detect and encode a variety of physical stimuli. Sensation also refers to immediate basic experiences of stimulus attributes, such as "hard", "warm", "loud", and "blue", which result from appropriate stimulation of a sensory organ. Different sense organs deal with different forms of stimuli and serve different purposes. Each sense organ is highly specialised for dealing with specific information. Hence, each one of them is known as a sense modality.

The information collected by our sense organs forms the basis of all our knowledge. The sense organs register several kinds of information about various objects. However, in order to be registered, the objects and their qualities (e.g., size, shape, colour) must be able to draw our attention. The registered information must also be sent to the brain that constructs some meaning out of them. Thus, our knowledge of the world around us depends on three basic processes, called sensation, attention, and perception. These processes are highly interrelated; hence, they are often considered as different elements of the same process, called **cognition**.

Nature and Variety of Stimuli

The external environment that surrounds us contains a wide variety of stimuli. Some of them can be seen (e.g., a house), while some can be heard only (e.g., music). There are several others that we can smell (e.g., fragrance of a flower) or taste (e.g., sweets). There are still others that we can experience by touching (e.g., softness of a cloth). All these stimuli provide us with various kinds of information. We have very specialised sense organs to deal with these different stimuli. As human beings we are bestowed with a set of seven sense organs. These sense organs are also known as sensory receptors or information gathering systems, because they receive or gather information from a variety of sources. Five of these sense organs collect information from the external world. These are eyes, ears, nose, tongue, and skin.

Functional Limitations of Sense Organs

Before we move on to a discussion of sense organs, it is important to note that our sense organs function with certain limitations. For example, our eyes cannot see things which are very dim

or very bright. Similarly, our ears cannot hear very faint or very loud sounds. The same is true for other sense organs also. As human beings, we function within a limited range of stimulation. For being noticed by a sensory receptor, a stimulus must be of an optimal intensity or magnitude. The relationship between stimuli and the sensations they evoke has been studied in a discipline, called **psychophysics**.

In order to be noticed a stimulus must carry a minimum value or weight. The minimum value of a stimulus required to activate a given sensory system is called **absolute threshold** or absolute limen (AL). For example, if you add a granule of sugar to a glass of water, you may not experience any sweetness in that water. Addition of a second granule to water may also not make it taste sweet. But if you go on adding sugar granules one after another, there will come a point when you will say that the water is now sweet. The minimum number of sugar granules required to say that the water is sweet will be the AL of sweetness.

It may be noted at this point that the AL is not a fixed point; instead it varies considerably across individuals and situations depending on the people's organic conditions and their motivational state. Hence, we must assess it through several trials. The number of sugar granules that may produce the experience of "sweetness" in water on 50 per cent of occasions will be called the AL of sweetness. If you add a greater number of sugar granules, the chances are greater that the water will be reported more often as sweet than plain.

As it is not possible for us to notice all stimuli, it is also not possible to differentiate between all stimuli. In order to notice two stimuli as different from each other, there must be some minimum difference between the value of those stimuli. The smallest difference in the value of two stimuli that is necessary to notice them as different is called **difference threshold** or difference limen (DL). To understand it, we may continue with our "sugar water" experiment. As we have seen, the plain water is experienced as sweet after the addition of certain number of sugar granules. Let us remember this sweetness. The next question is how many sugar granules will be needed in the water in order to experience its sweetness as different from the previous sweetness? Go on adding sugar granules one after another tasting the water each time. After addition of a few granules, you will notice at a point that the water is now sweeter than the previous one. The number of sugar granules added to the water to generate an experience of sweetness that is different from the previous sweetness on 50 per cent of the occasions will be called the DL of sweetness. Thus, difference threshold is the minimum amount of change in a physical stimulus that can produce a sensation difference on 50 per cent of the trials.

Thus, understanding of sensations is not possible without understanding the AL and DL of different types of stimuli (for example, visual, auditory), but that is not enough. Sensory processes do not depend only on the stimulus characteristics. Sense organs and the neural pathways connecting them to various brain centres also play a vital role in this process. A sense organ receives the stimulus and encodes it as an electrical impulse. For being noticed this electrical impulse must reach the higher brain centres. Any structural or functional defect or damage in the receptor organ, its neural pathway, or the concerned brain area may lead to a partial or complete loss of sensation.

Attentional Processes

In the previous section we mentioned that sensory modalities that help us in collecting information from the external world and from our internal systems. As we explore the world around us, we can see that many stimuli impinge upon our sense organs simultaneously, but yet we do not notice all of them at the same time. Only a selected few of them are noticed. For example, when you enter your classroom you encounter several things in it, such as doors, walls, windows, paintings on walls, tables, chairs, students, schoolbags, water bottles, and so on, but you selectively focus only on one or two of them at one time. *The process through which certain stimuli are selected from a group of others is generally referred to as* ***attention***.

It may be noted that besides selection, attention also refers to several other properties like *alertness, concentration, and search*. **Alertness** refers to an individual's readiness to deal with stimuli that appear before her/him. While participating in a race in your school, you might have seen the participants on the starting line in an alert state waiting for the whistle to blow in order to run. **Concentration** refers to focusing of awareness on certain specific objects while excluding others for the moment. For example, in the classroom, a student concentrates on the teacher's lecture and ignores all sorts of noises coming from different corners of the school. In **search** an observer looks for some specified subset of objects among a set of objects. For example, when you go to pick up your sibling from the school, you just look for them among innumerable others.

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Attention has a focus as well as a fringe. When the field of awareness is centered on a particular object or event, it is called focus or the focal point of attention. On the contrary, when the objects or events are away from the centre of awareness and one is only vaguely aware of them, they are said to be at the fringe of attention.

Attention has been classified in different ways-a process-oriented view divides it into two types, namely selective and sustained. We will briefly discuss the main features of these types of attention.

Selective Attention

Selective attention is concerned mainly with the selection of a limited number of stimuli or objects from a large number of stimuli. Wehave already indicated that our perceptual system has a limited capacity to receive and process information. This means that it can deal only with a few stimuli at a given moment of time. The question is, which of those stimuli will get selected and processed? Psychologists have identified a number of factors that determine the selection of stimuli.

Factors Affecting Selective Attention

Several factors influence selective attention. These generally relate to the characteristics of stimuli and the characteristics of individuals. They are generally classified as "external" and "internal" factors.

External factors are related to the features of stimuli. Other things held constant, the size, intensity, and motion of stimuli appear to be important determinants of attention. Large, bright, and moving stimuli easily catch our attention. Stimuli, which are novel and moderately complex, also easily get into our focus. Studies indicate that human photographs are more likely to be attended to than the photographs of inanimate objects. Similarly, rhythmic auditory stimuli are more readily attended to than verbal narrations. Sudden and intense stimuli have a wonderful capacity to draw attention.

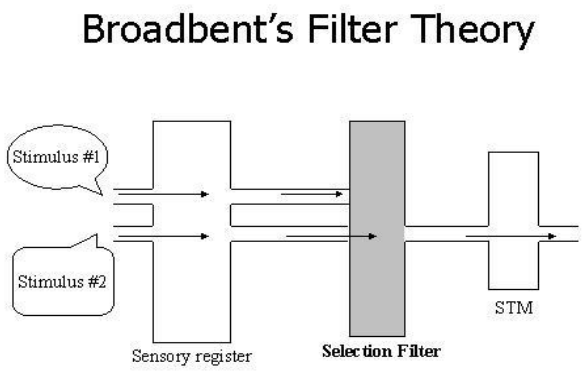
Internal factors lie within the individual. These may be divided into two main categories, viz. motivational factors and cognitive factors. **Motivational factors relate to our biological or social needs.** When we are hungry, we notice even a faint smell of food. A student taking an examination is likely to focus on a teacher's instructions more than other students. **Cognitive factors include factors like interest, attitude, and preparatory set.** Objects or events, which

appear interesting, are readily attended by individuals. Similarly, we pay quick attention to certain objects or events to which we are favourably disposed. Preparatory set generates a mental state to act in a certain way and readiness of the individual to respond to one kind of stimuli and not to others.

Theories of Selective Attention

Different theories have been developed to explain the process of selective attention. We will briefly discuss these.

Filter theory was developed by Broadbent (1956). According to this theory, many stimuli simultaneously enter our receptors creating a kind of "bottleneck" situation. Moving through the short-term memory system, they enter the selective filter, which allows only one stimulus to pass through for higher levels of processing. Other stimuli are screened out at that moment of time. Thus, we become aware of only that stimulus, which gets access through the selective filter.



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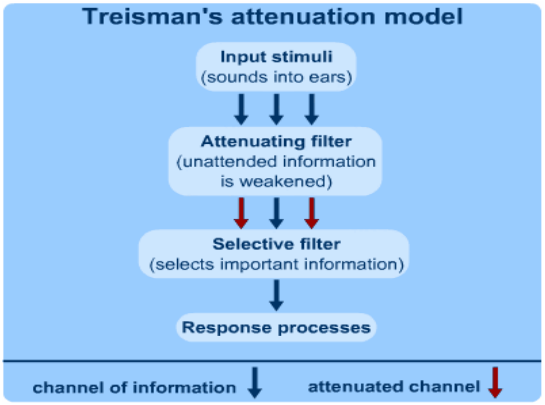
Filter-attenuation theory was developed by Triesman (1962) by modifying Broadbent's theory. This theory proposes that the stimuli not getting access to the selective filter at a given moment of time are not completely blocked. The filter only attenuates (weakens) their strength. Thus, some stimuli manage to escape through the selective filter to reach higher levels of processing. It is indicated that personally relevant stimuli (e.g., one's name in a collective dinner) can be noticed even at a very low level of sound. Such stimuli, even though fairly weak, may also generate response occasionally by slipping through the selective filter.



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Multimode theory was developed by Johnston and Heinz (1978). This theory believes that attention is a flexible system that allows selection of a stimulus over others at three stages. At stage one the sensory representations (e.g., visual images) of stimuli are constructed; at stage two the semantic representations (e.g., names of objects) are constructed; and at stage three the sensory and semantic representations enter the consciousness. It is also suggested that more processing requires more mental effort. When the messages are selected on the basis of stage one processing (early selection), less mental effort is required than when the selection is based on stage three processing (late selection).

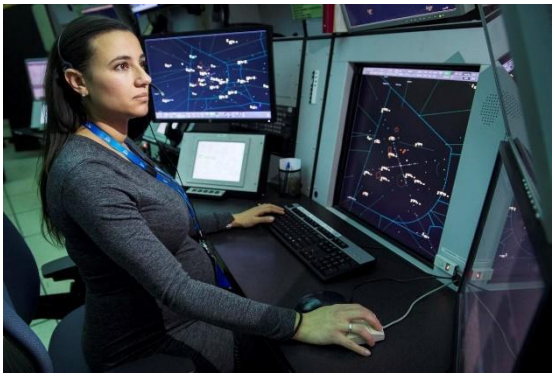
For example: There are several food items on the table. You select one item over the other food items (visual image). Now you represent it with the word 'ice cream' (semantic representation) finally you connect to the item as an ice cream (the visual and semantic representation- the term and what the item is).

At stage one you just notice the food item so less mental effort is required, whereas by stage three more mental effort is required.

Sustained Attention

While selective attention is mainly concerned with the selection of stimuli, sustained attention is concerned with concentration. It refers to our ability to maintain attention on an object or event for longer durations. It is also known as "vigilance". Sometimes people have to concentrate on a particular task for many hours. Air traffic controllers and radar readers provide us with good examples of this phenomenon. They have to constantly watch and monitor signals on screens. The occurrence of signals in such situations is usually unpredictable, and errors in detecting signals may be fatal. Hence, a great deal of vigilance is required in those situations.

ATC Picture



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Factors Influencing Sustained Attention

Several factors can facilitate or inhibit an individual's performance on tasks of sustained attention. **Sensory modality** is one of them. Performance is found to be superior when the stimuli (called signals) are auditory than when they are visual. **Clarity of stimuli** is another actor. Intense and long-lasting stimuli facilitate sustained attention and result in better performance. **Temporal uncertainty** is a third factor. When stimuli appear at regular intervals of time, they are attended better than when they appear at irregular intervals. **Spatial uncertainty** is a fourth factor. Stimuli that appear at a fixed place are readily attended, whereas those that appear at random locations are difficult to attend.

Divided attention

Sometimes we can also attend to two different things at the same time. When this happens, it is called divided attention. Divided attention does not really exist because at one time you are only selected one set of stimuli over the others. It is more or less a quick switching of attention from one to other. You may have seen people driving a car and talking to a friend, or attending to phone calls on a mobile set, or putting on sunglasses, or listening to music. If we watch them closely, we will notice that they are still allocating more effort to driving than to other activities, even though some attention is given to other activities. It indicates that on certain occasions attention can be allocated to more than one thing at the same

time. However, this becomes possible **only with highly practiced activities**, because they become **almost automatic** and require less attention to perform than new or slightly practiced activities.

Automatic processing has three main characteristics; (i) It occurs without intention, (ii) It takes place unconsciously, and (iii) It involves very little (or no) thought processes (e.g., we can read words or tie our shoelaces without giving any thought to these activities).

Practical Implications of Attention

Attention has several practical implications. The number of objects one can readily attend to in a single glance (span of attention) is used to design the number plates of motorbikes and cars so that the traffic police can easily notice them in case of traffic violations.

Source: https://www.bing.com/th?id=OIP.fzZSwx3kCcbpAavkRhTIggHaFj&pid=Api&rs=1

Number of children fail to perform well in school simply due to the problems of attention-Attention Deficit Disorder.

Understanding the process of attention has thus been used to improve the quality of human life.