

responses and does not involve mediation by any ideas, reasoning or thinking. Exemplifying his views Thorndike (1911) writes.

The cat does not look over the situation, much less think it over, and then decide what to do. It bursts out at once into the activities helped by instincts and experiences.

## **Thorndike's Laws of Learning**

Thorndike propounded the following laws of learning on the basis of his theoretical notions about the learning process.

### **1. The law of readiness.**

When any conduction unit is ready to conduct, for it to do so is satisfying. When any conduction unit is not in readiness to conduct, for it to conduct is annoying. When any conduction unit is in readiness to conduct, for it not to do so is annoying.

This law is indicative of the learner's state to participate in the learning process. Readiness, according to Thorndike, is preparation for action. It is essential for learning. If the child is ready to learn, he learns more quickly, effectively and with greater satisfaction than if he is not ready to learn. This shows us not to force the child to learn if he is not ready but to also not miss any opportunity of providing learning experiences if the child is prepared to learn. The right moments concerning the learning situation and the learner's state of mind should be recognized and maximum use should be made of this knowledge by the teacher. He should also make an attempt to motivate the students by stimulating their attention, interest and curiosity.

### **2. The law of effect.** In the words of Thorndike:

When a modifiable connection between stimulus and response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased. When made and accompanied or followed by an annoying state of affairs, its strength is decreased.

In other words, learning can be said to have taken place properly when it results in satisfaction and the learner derives pleasure from it. In the situation when the child meets failure or is dissatisfied, the progress of learning is blocked. All pleasant experiences have a lasting influence and are remembered for a long time, while the unpleasant ones are soon forgotten. Therefore, the satisfaction and dissatisfaction, pleasure or displeasure resulting from a learning experience decides the degree of its effectiveness.

This law emphasizes the role of rewards and punishment in the process of learning. Getting a reward as a result of some learning motivates and encourages the child to proceed with increased intensity and enthusiasm while punishment of any kind discourages him and creates a distaste for that learning.

**Revised law of effect.** Based upon his later researches Thorndike, after 1930 realised that his law of effect was not really correct. He found that while a pleasant or satisfying situation resulted in the strengthening of the connection between stimulus and response, an unpleasant or annoying situation did not necessarily decrease the strength of this connection. From this he concluded that while reinforcements in the form of reward or incentives increase the strength of the S-R connection, unpleasant experiences in the form of pain or punishment do not necessarily weaken it. Thorndike's views regarding the effectiveness of negative measures like punishment in the breaking of undesirable habits and behaviour modification revolutionized the task of rearing and education of children.

**3. The law of exercise.** This law has two sub-parts: the law of use and the law of disuse which may be stated as:

*The law of use.*

When a modifiable connection is made between a situation and response that connection's strength is, other things being equal, increased.

*The law of disuse.*

When a modifiable connection is not made between a situation and response, during a length of time, that connection's strength is decreased.

As will be seen, the law of use refers to the strengthening of a connection with practice and the law of disuse to the weakening of connection or forgetting when the practice is discontinued. It can be said in short, that the law of exercise as a whole emphasizes the need for repetition.

**Revised law of exercise.** After 1930, Thorndike revised not only the law of effect but also the law of exercise. Further work and experiments on the law of exercise demonstrated that both the laws of use and disuse do not work as effectively as propounded by him earlier. He later held that use in the shape of mere repetition does not result in effective strengthening of the connection, nor does the disuse or lack of practice result in the total weakening of the connection. Mechanical use or disuse, therefore, does not necessarily lead to effective learning or total forgetting. Thorndike may thus be said to have discarded the law of use and disuse after 1930.

All these three laws—the law of readiness, the law of effect, and the law of exercise—are significant in many kinds of learning in our life. The laws may be applied to the following proverbs and maxims: "You can lead a horse to the water but you cannot make it drink." "Nothing succeeds like success." "Practice makes a man perfect".

In addition to the laws of readiness, exercise and effect, Thorndike's idea of connectionism led to the enunciation of the following important laws:

**1. Law of multiple response or varied reactions.** This law implies that when an individual is confronted with a new situation he responds in a variety of ways trying first one response and then another before arriving at the correct one.

**2. Law of attitude.** Learning is guided by a total attitude or 'set' of the organism.

The learner performs the task properly if he has developed a healthy attitude towards the task.

**3. Law of analogy.** An individual responds to a new situation on the basis of the responses made by him in similar situations in the past, i.e., he makes responses by comparison or analogy.

The law of analogy propounded by Thorndike led to his famous "identical elements theory" of the transfer of learning or training which states that transfer from one situation of learning to another depends upon the extent and number of elements or components which are common to both situations. It also matches the concept of generalization according to which the similarity of the learning situations or elements increases the likelihood of similar responses.

**4. Law of associative shifting.** This law states that "Any response may be elicited from the learner, of which he is capable, in association with any situation to which he is sensitive". In other words, any response which is possible can be linked with any stimulus. Thorndike clarified his stand through an experiment in which he demonstrated how a cat can be trained to stand up on command. To begin with, a piece of fish is dangled before the cat while you say 'stand up'. After a number of trials, a stage would come when it would not be necessary to show the fish. The oral signal or command alone will then evoke the response. The idea elaborated by this law gave birth to a new theory of learning, known as the *theory of conditioning*.

**Thorndike's contribution in the field of learning.** Thorndike's theory of trial and error is of great significance in the field of education. It explains the process of learning among animals and human beings on the basis of actual experiments. Not only human learning but animal learning also follows the path of trial and error. A child when confronted with a mathematical problem, tries several possibilities before he arrives at the correct solution. Even discoveries and inventions in the various fields of knowledge are the result of the trial and error process.

For example, Archimedes was confronted with a problem set by his Emperor. There was a 'drive' in that he would be beheaded if he failed to find the solution to the problem. There was a 'block' in that he could not think of any solution. The problem was difficult. He went on experimenting and made a number of attempts (trials) to solve the problem. One day, while having a bath, he met with accidental success and this led to the formulation of the law of floating bodies.

Excessive indulgence in the methods of trial and error, without caring for the development a logical line of thought should not, however, be encouraged under any circumstances. We cannot reduce human learning to a mechanical and random process as advocated by this theory. It must be supported by reason, understanding and insight. Trials and practice coupled with insight, will make the process of learning more effective than either of the methods adopted singly.

Thorndike's laws of learning carry some useful implications. These are:

1. If one wants to learn something, one should prepare oneself for it by first understanding fully its importance. An instructor or a teacher, on the other hand, in order to teach effectively, must try to prepare the learner by bringing the mechanism of motivation into play.

2. Whatever we want to learn or teach, we must first identify the aspects which are to be remembered and those which may be forgotten. After this, we may try to strengthen the links or connections between the stimuli and responses of those things which are to be remembered, through repetition, drill and reward. For forgetting, the connections should be weakened through disuse and unpleasant results.
3. What is being taught or learnt at any one time should be linked with the past experiences and learning on the one hand and with the future learning on the other, in order to benefit from the mechanism of association, connection or bonds in the process of learning.
4. The learner should try to see the similarities and dissimilarities between the different kinds of responses to stimuli and by comparison and contrast try to apply the learning from one situation to another similar situations.
5. The learner should be encouraged to do his task independently. He must try various solutions of the problem before arriving at the correct one. But in every case he should be careful not to waste his time and energy by proceeding blindly and repeating his mistakes.

In short, Thorndike's theory of trial and error learning and his laws of learning have been a significant contribution to the field of learning. It has made learning purposeful and goal-directed and has emphasized the importance of motivation. It has also given an impetus to drill and practice and highlighted the psychological importance of rewards and praise in the field of learning.

kinds of transfer can occur: (i) Positive transfer, (ii) Negative transfer, (iii) Zero transfer.

**Positive transfer.** Transfer of learning or training is said to be positive when the learning or training carried out in one situation proves helpful to the learner in another situation. Examples of such transfer are:

1. The knowledge and skills related to school mathematics help in the learning of statistical computation.
2. The knowledge and skills acquired in terms of addition and subtraction in mathematics in school may help a child in the acquisition of knowledge and skills regarding multiplication and division.
3. Learning to play badminton may help an individual to play ping pong (Table Tennis) and lawn tennis.
4. Learning to drive a particular brand of car, e.g. Maruti 800 may help an individual to drive other cars, e.g. Opel Astra.
5. Learning Hindi may help a student learn Punjabi or Gujarati.

**Negative transfer.** Transfer of learning or training is said to be negative when learning or training in one situation hinders, interferes or weakens the learning in another situation. Examples of such transfer are:

1. Having learned to pronounce "But" correctly, the child may find it difficult to pronounce "Put" correctly.
2. One's regional language or mother tongue may create problems in one's learning the correct pronunciation and intonation related to one's national or foreign language.
3. One who is driving an auto-start kinetic Honda Scooter may find difficulty in driving Bajaj or Vespa scooter.
4. Having learned to drive on the right-hand side the tourists from Japan or USA may find it difficult to drive in India or UK where vehicles are to be driven on the left-hand side.

**Zero transfer.** Transfer is said to be 'zero' when learning or training in one situation does not have any significant influence over the learning or training in another situation. Such a situation may arise when the learning activities and subject areas have nothing in common between them. In such cases, it is quite natural that possession of knowledge and skill related to one area may have no or quite minimal effect on the acquisition of knowledge and skill related to another area. Examples of such a transfer may now be cited:

1. Learning history may neither help nor hinder the learning of economics.
2. Learning to play football may not help or hinder learning to play volleyball.
3. Learning to play Guitar or Sitar neither helps nor hinders one's performance in her cooking or laundry class.

**Experimental illustration of the transfer types.** Let us analyse the hypothetical experimental findings for illustrating the three transfer types. Suppose a group of students learn a task B, in 10 practice sessions. Another group of equivalent

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# Attention

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## MEANING

We use the word 'attention' frequently in our day-to-day conversation. During lectures in the classroom, a teacher calls for your attention to what he is saying or what he writes on the blackboard. At a railway station or other public places, announcements start with "your attention please" before informing the passengers or other people about the schedules of the trains or some other matter of public interest. Thus attention is taken as a power, capacity or faculty of our mind, which can be turned on or off at will or something in kind or form that can be lent or given to this or that situation. However, this notion, as we shall find out, is misconceived. Attention can never be considered as a force or a faculty of the mind. We must try to understand it in terms of an act, a process or a function. Therefore, the use of this term as a noun is misleading. It may be better understood as a verb like attending or a process involving the act of listening, looking at or concentrating on a topic, object or event for the attainment of a desired result. Let us consider a few definitions provided by eminent authorities in order to understand the proper meaning of this word.

*Dumville (1938):*

Attention is the concentration of consciousness upon one subject rather than upon another.

*Ross (1951):*

Attention is the process of getting an object of thought clearly before the mind.

*Morgan & Gilliland (1942):*

Attention is being keenly alive to some specific factor in our environment. It is a preparatory adjustment for response.

*Roediger et al. (1987):*

Attention can be defined as the focusing of perception that leads to a greater awareness of a limited number of stimuli.

*Sharma, R.N. (1967):*

Attention can be defined as a process which compels the individual to select some particular stimulus according to his interest and attitude out of the multiplicity of stimuli present in the environment.

## Signs and Effects of Attention

How can we know that a particular individual is paying attention or not? In this connection much can be said through observation of the symptoms or reactions that accompany the state of preparedness or alertness required by the process of attention. As a person initiates the state of attention, he may turn his head, fix his eyes or set his ears toward the object of attention. Besides this, the muscles and the biological functions of the body may be seen to be specifically preparing for the object of attention. He may adopt a specific posture or hold his breath, or his respiration rate may slow down. In this way, from the observable symptoms in the form of stance, bodily conditions and facial expressions, we may decide whether or not a person is paying attention. However, for drawing more reliable and definite conclusions, the experimenter must try to avail the introspection analysis report prepared by the subject himself. He should also try to test the validity and reliability of his conclusions by studying attentively the effects of the efforts made by his subject.

Some of these effects of attention may be summarized as follows:

1. Attention helps in bringing about mental alertness and preparedness. As a result one tries to apply one's mental powers as effectively as possible.
2. Attention helps in providing proper deep concentration by focusing one's consciousness upon one object at one time rather than on any others.
3. It makes us better equipped to distinguish or identify the object of attention from others.
4. Attention acts as a reinforcement of the sensory process and helps in the better organisation of the perceptual field for maximum clarity and understanding of the object or phenomenon under observation.
5. Attention provides strength and ability to continue the task of cognitive functioning despite the obstacles presented by the forces of distraction like noise and unfavourable weather conditions.
6. When attention is paid to an object, even the process or phenomenon yields better results in the form of the amount and quality of learning, remembering, transfer of training, thinking, reasoning and problem-solving as well as displaying the inventive abilities and creative functioning.

## NATURE OF TRANSFER OF LEARNING

Learning is the most fundamental problem of education. It is well said that nothing is learnt for its own sake. Learning is dynamic process and so what is learnt in one situation must be capable of being applied in future life and further situations. It means what is learnt in one situation must have some transfer value. Following points describe the nature of transfer of training or learning:

1. **Transfer is lateral:** Transfer of learning or training is the application of understanding and skills learnt in the school to real life situations outside the school.
2. **Transfer is sequential:** Transfer of learning or training is also sequential in nature. Learning at one level of behaviour facilitates new learning at a comparable level of behaviour.
3. **Transfer is horizontal:** Transfer is horizontal when the learner stays within the same behavioural category in making the transfer. Lateral and sequential transfers are called horizontal transfer.
4. **Transfer is vertical:** Transfer is vertical when learning at one behavioural level facilitates learning at a higher behavioural level.
5. **Transfer is bilateral:** Transfer is bilateral when training imparted to one lateral of human body automatically transfers to another lateral.



6. **Transfer is utilisation of previous knowledge:** Transfer of learning is based on the previous knowledge of the learner. Learner makes use of past knowledge to interpret the new situation.
7. **Transfer is deliberate:** Transfer very much depends upon a deliberate effort on the part of the learner to interpret a new situation in the light of the past.
8. **Transfer is generalisation:** Generalisation is said to be the crux of transfer of training. Transfer takes place to the extent that one can generalise his experiences. The transfer is more when the learner is able to generalise his reactions from one situation to another. It is the extension of idea to a new field.
9. **Transfer is a matter of intelligence:** The amount of transfer is closely related to the intelligence of the learner. Brighter children tend to transfer their learning more effectively than average or dull children.
10. **Transfer is association:** Transfer is effective and quick when the learner is able to develop and association between two contents or tasks.
11. **Transfer is active and creative:** Transfer is said to be the result of activity and creativity. Transfer is greater or quick when children discover principles for themselves then when they are told the principles. It is effective when learner develops insight and a desire to explore the solution of given situation himself.
12. **Transfer is purposeful:** Transfer of learning is most likely to happen when learners discover that what they learnt is applicable to various contexts.
13. **Transfer is utilisation of mental capacities:** Learner makes use of his mental capacities like thinking, reasoning, memory, understanding, imagination etc. in transfer of learning from one situation to another.

### SCOPE OF TRANSFER OF LEARNING

The problem of transfer of training is one of the most interesting and important areas in the study of education and educational psychology. It has a wide scope in education. Some of the important areas of transfer of learning are as under:

1. **Types of transfer:** The scope of transfer of learning or training includes the study of types of transfer viz. positive transfer, negative transfer and zero transfer. It also studies the factors affecting various types of transfer of learning.
2. **Theories of transfer:** The scope of transfer of learning or training includes the study of various theories of transfer viz. formal discipline theory, theory of identical elements, theory of generalisation etc.
3. **Approaches to transfer:** The scope of transfer of training or learning includes the study of various approaches to transfer of training or learning viz. behavioural approach, cognitive approach, work-based approach etc.
4. **Experiments on transfer of training:** Experiments conducted on sensory-motor transfer, practical materials, memory, problem solving constitutes the scope of transfer of learning or training.
5. **Factors affecting transfer of training:** The scope of transfer of training includes the various factors affecting transfer of training. It studies the role and impact of meaningfulness of contents or similarity of contents in the transfer of training or learning.
6. **Educational implications:** Educational implications of transfer of learning or training for achieving maximum positive transfer constitute the scope of transfer. It suggests desirable changes in curriculum and methods of teaching for increasing the possibilities of transfer.

6. ... striving considered from the point of view of its effects on cognitive process."

## NATURE OF ATTENTION

Attention is the first step in the learning process. Successful educational programmes are designed to sustain the attention of the students in the teaching and learning process. It is the foundation for memory and information retention. Following points describe the nature of attention:

1. **Attention is a state of consciousness:** A child in the class is aware of so many things around him. For example, while perceiving the black board writing in the classroom, he is aware of the

presence of the chart on the walls, the teacher, his activities and the activities of the student sitting beside him. But he is not aware of all these things very clearly. His consciousness is focussed on the words and sentences written on the black-board.

2. **Attention is unstable and short-lived:** Attention has a shifting tendency. It fluctuates or shifts from one object to another or one aspect of the object to another aspect. Continuous attention means continuity with plenty of shifting.
3. **Attention is selective:** We do not attend all the stimuli at a time in the environment. Our reaction is selective. Only those stimuli which suit our interest and attitude are able to attract attention, others are ignored. The stimulus which is more important and useful than the other is attended at once whereas the less important ones are attended later on. In this way attention represents a narrow field and is always selective.
4. **Attention is a state of alertness:** Attention requires a preparedness or alertness on the part of learner. A child prepares or adjusts himself to the stimulus situation. He goes into a process of physical, mental and emotional alertness or preparedness.
5. **Attention is purposive:** Attention is purposive in nature. A child concentrates his attention on an object with a purpose. The intensity of the attention depends upon the purpose. The stronger the purpose, the maximum the attention.
6. **Attention is attracted by new things:** Attention is always attracted by new things. Newness attracts quickly than traditional one. A new teacher attracts the children very much in the school.
7. **Attention could be involuntary or voluntary:** Attention may be involuntary or voluntary. Involuntary attention is spontaneous, free, natural and passive. It does not need much effort. It is

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almost like a reflex action. On the other hand, attention is voluntary when it is deliberate. It is the result of self-initiated activity.

8. **Attention is cognitive, affective and conative:** Attention involves all the three aspects of behaviour. While attending the mind *knows* something, *feels* something and *does* or tends to do something.
9. **Attention has a narrow range/scope:** Attention cannot be divided. We cannot attend to two unrelated objects at the same time. The problem is usually referred to as *Division of Attention*.
10. **Attention affects motor adjustments:** Attention affects motor adjustments such as postural adjustment and adjustment in the central nervous system. The changed body posture enables the sense-organs to function best. It also helps to concentrate.
11. **Attention could be overt or covert:** Overt attention is the act of directing sense organs towards a stimulus source. Covert attention is the act of mentally focusing on particular stimuli.
12. **Attention is a motivational process:** Motivation plays a very important role in capturing the attention of the students. Motivation arouses interest among the learner and makes him attentive.

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2. **Intensity of voice:** Intensity of voice plays an important role in capturing the attention of the students. A harsh voice of a teacher attracts the attention of the students.
3. **Contrast:** Contrast in voice is advisable. Hence use of contrast in voice is advisable. Contrast in voice brings contrast in attention of students.
4. **Movement:** Movement in voice is effective. Hence any effective movement of the body may help in capturing the attention of the students.
5. **Repetition:** Repetition of important points helps in capturing the attention of the students.

a deliberate and conscious effort on the part of an individual to select one out of the various stimuli present in his environment and bring it to the centre of his consciousness in order to perceive it clearly to achieve a desired result.

Attention

Various theories have been put forward to explain the selective nature of one's attention. According to early selection theories like the filter theory, unattended signals are filtered or screened out at the level of the senses before they can reach the perceptual system. Late selection theories on the other hand, deny such filtration at the sensory level and maintain that the attention to one signal or source occurs much later, just before conscious awareness.

Attention is a state of physical as well as mental preparedness and alertness on the part of an individual which may be adjudged through keen observation of his body postures and positions, physiological changes and by studying the yields of the attended learning or problem solving activities.

Normally, we can attend to only one thing at a time. However, there are people who can attend to more than one or even to many tasks at the same time. They are said to possess a larger *span of attention*, i.e., ability to organise a larger perceptual field in a given spell or short duration. The span of attention can be experimentally studied with the help of an instrument called a tachistoscope.

Attention cannot be held continuously with the same intensity for a long duration. In course of time when the centre of consciousness shifts or fluctuates from one object to another or from one part of the same object to another part, it is termed as *shifting or fluctuation of attention*. This study of fluctuation of visual attention can be experimentally made with the help of a device called Masson's Disc.

The phenomenon of *division of attention* is concerned with the task of paying attention simultaneously to a number of stimuli in one's environment. The division of attention adversely affects the products of attention. However, it may be seen that work products suffer less if the tasks being attended to are simple and similar in comparison to difficult and dis-similar tasks.

Attention may be broadly classified as *volitional or voluntary*, i.e., maintained by one's will power and *non-volitional or involuntary*, i.e., without exercise of one's will. While in implicit, volitional attention a single act of volition is sufficient to bring about attention, in explicit volitional attention, we need repeated acts of will to sustain it. Non-Volitional attention also has two categories: *enforced non-volitional* attention aroused by the instincts and *spontaneous non-volitional* attention aroused by the sentiments.

Attention is guided and controlled by *external as well as internal factors*. External factors present in one's environment are: nature of the stimulus, intensity and size of the stimulus, contrast, change and variety, repetition of stimulus, movement of stimulus, etc. Internal factors represent the factors lying within the person himself like interest, motives and mind set.

To obtain better results in learning one has to hold the subject's attention for a desirable length of time without disruption. This needed activity is termed *sustaining of attention*. One has to make serious and deliberate efforts to sustain attention by taking care of all the factors responsible for maintaining attention and eliminating or reducing the forces of distraction.