

The Theory of Classical Conditioning by Ivan Pavlov and its Educational Applications

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Abstract :

This study aims to shed light on one of the most important learning theories that many specialists in the field of psychology and educational sciences have been interested in studying, which is the theory of classical conditioning by Ivan Pavlov. The research dealt with giving an overview of this theory, as well as presenting some of the most important experiments that Pavlov performed on animals (dogs), in addition to presenting the basic concepts of this theory. Conditional response properties, factors affecting conditional learning, conditions for the occurrence of classical conditioning (conditioned reflex action), evaluation of Pavlov's theory; that is, highlighting strengths and weaknesses. Finally, the research attempted to answer one of the questions raised about pedagogical applications Ivan's Pavlov's classical conditioning theory.

Key Words: *theory; learning; education; stimulus; response*

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Introduction:

Learning theories emerged in the early twentieth century AD and researchers are still working to develop it until the present time. Behavioral schools are among the philosophical schools that were interested in theories of learning and teaching, although signs of similar theories appeared and worked on it in the pre-behavioral stage. Learning theories Where can be classified into two groups:

Cognitive learning theories: including Gestalt and Piaget's cognitive development theory and information processing model and Behavioral learning theories and Pavlov's theory of classical conditioning that includes Skinner's operant conditioning theory and Edward Thorndike's theory (the trial and error model). Each group bases its interpretation of the learning process on a set of different assumptions.

Scientists have paid great attention to studying the subject of learning and trying to explain it in humans and even animals. Indeed, it is the basis of human behavior because the learning process is involved in most of our voluntary behaviors.

Among these scholars one can mention Ivan Pavlov the initiator of classical conditioning theory who studied the physiology of digestion in dogs. The idea of learning in an interconnected manner, and these theories emphasize connection between environmental goals and behavior. Learning is viewed as a process of forming connections and identifying these theories as a) Stimulus Theories and b) Response or Mechanical Theories.

Based on the above, the following questions can be asked:

What are the principles and foundations on which Ivan Pavlov's theory of behavioral conditioning depends?

What are the conditions for stimulus and response to happen?

What are the strengths and weaknesses of behavioral conditioning theory?

What are the most important educational applications inspired by Pavlov's theory?

I. Significance of the Research:

The importance of the topic stems from the following:

1. Interest of researchers and specialists in psychology and educational sciences in the field of education and all topics related to them, including learning theories.
2. The importance of learning theories in general and Pavlov's classical conditioning theory in particular, in addition to the importance of its educational applications in the field of education and learning.

II. Research Aims:

1. The study aims at shedding light on Pavlov's classical conditioning theory and its most important characteristics, in addition to addressing the extent of its contribution to the educational field.
2. Contributing to enriching scientific research in this field.

III. Defining Concepts:

1. Theory:

1.1 **General definition:** A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.

1.2 **Theory as a concept:** "A study of a specific topic in a rational and logical manner, in order to conclude a set of results that contribute to strengthening the main idea on which the theory is built."

2. Learning:

(Guilford, Joy Paul) (1897–1987): defines learning as a change in behavior that occurs as a result of a stimulus.

As for the Ramzya Gharib, learning refers to a modification to the behavior of an organism that helps it solve a problem it encounters and wants to solve".
Ramzya Gharib (1971, p. 15)

3. Teaching:

3.1 **Generally:** It is from the verb to teach, and he taught him something in a way so he learned, and from it is the Almighty's saying: (And He taught Adam all the names, then He presented them to the angels and said, "Inform Me of the names of these if you are truthful." [Al-Baqarah: 31].

3.2 **Terminologically:** The activity whose intended goal is to achieve learning, which is practiced in a way that respects the mental development of learners and their ability to make independent judgment and with the aim of knowledge and understanding.

4. **Learning Theories:**

It can be said that learning theories refer to a set of ideas or opinions that are coherent in a reasonable way, and can be used in researching educational problems. Behaviorists believe that learning occurs as a result of the link between stimulus and response.

It is also defined as logical, proven descriptive statements that specialize in studying the phenomenon of learning, trying to understand and explain it, and proposing solutions to learners. Mohamed Ziad Hamdan (1996)

5. **Education:**

5.1 General Definition: The process of receiving or giving systematic instruction, especially at a school or university.

5.2 Terminology: It is the set of operations through which a society must transfer its acquired knowledge and goals to maintain its survival, and at the same time it means the continuous renewal of this heritage for individuals who carry it. It is a process of growth and has no goal other than more growing. It is life itself with its evolution and renewal.

John Dewey defines it as: "The group of operations that a society or social group use to transfer its acquired powers and goals in order to secure its existence and their continuous growth. It is "a continuous organization of experience ".

6. **Stimulus:**

It refers to an action or procedure on an organism to obtain a specific reaction to a specific event, and the stimuli may be auditory or visual or physical.

7. **Response:**

Response means an action that follows one or several influences that affect the body of living organisms, and the simplest type of response is a rapid and direct reaction to a stimulus or stimuli. These reactions are produced by the cells of living organisms, which are characterized by certain sensing characteristics that stimulate them towards stimuli.

Response is also a certain reaction or shown ability object through which the organism interacts with its environment and with various stimuli, both internal and external, the response occurs because the organism is on its way

to establishing a balance in the cell and its components and a balance throughout the body. This balance occurred based on nutrition, which is meant to balance the different nutrients in the body and then counteract any influence.

IV. About Ivan Pavlov:

He is a Russian scientist, born in 1849–1936. In his early years he studied theology to be a monk like his father, but he changed his mind and decided to study body composition and what is known as the science of physiology. Pavlov won the Nobel Prize in 1904 about a research in the physiology of the digestive system. The research led to the discovery of what is known today as the theory and law of classical conditioning.



V. Classical conditioning theory by Ivan Pavlov:

The historical discovery of the theory of conditional reflex is linked to the name of the famous Soviet psychologist Ivan Petrovich Pavlov (1849–1936), the pioneer of scientific research on the physiology of motor nervous activities. (Physiology of higher nervous activity), who through his activities in this field was able to leave significant impacts on the theories and opinions of physiologists and physiological psychology throughout the twentieth century.

Ivan Pavlov believes that complex psychological activities are a product of the relationship between the organism and the environment and are nothing other than

conditioned reflexes that embody the organism's response to the environment in which it exists, which in turn represents an external factor. In addition to innate reflex actions that are based on biological anatomical foundations, there are acquired conditional reflex actions. It expresses the most advanced forms of human activities.

The story of discovering the conditional reflex began when Pavlov was conducting his research on the dog's salivary secretions. He noticed that the dog's saliva began to flow before the food (a piece of meat) reached its mouth. The dog would salivate just by seeing the person offering it food or hearing his steps only. Although this observation is simple and ordinary, Pavlov found in it his starting point for researching the function of the brain, and it provided him with a new way to analyze brain processes without resorting to the usual method of physiologists who used to resort to brain surgery and removing some of its aspects in order to understand the functions of the amputated parts. From this standpoint, it was said that Pavlov's greatness lay in his ability to discover the importance of a seemingly simple phenomenon, and that this ability of genius insight enabled him to reach new genius insights in the field of brain physiology itself.

From this standpoint, Pavlov began his research on blood circulation and the nervous structure of the digestive system. Through research and physiological experiments on the nervous organization of the digestive system, he was able to reach his great discovery about conditional reflexes. In the context of his scientific experiments, Pavlov noticed that the reflex action of the digestive system Saliva does not only occur as a result of direct contact between food and the oral salivary glands, but it also occurs under the influence of some signals that are spontaneously linked to natural stimuli, such as the sounds that precede a meal. Pavlov gave the term reflex action at a distance, which is the reaction resulting from signals and sounds, calling it conditional reflexes. It later became clear to the scientist Pavlov that the neural responses to the reflex action of salivation are not only linked to special physiological factors (this means the factors that directly carry out the incitement process) but are also linked to other psychological factors. In this context, he employs the concept of "psychic secretion" within the framework of his lectures on the secretions of the salivary and digestive glands in the year (1897).

On the other hand, Pavlov found his opportunity to test the relationship between the psychological phenomenon and the physiological phenomenon. Drooling just because of seeing the person offering food or just hearing his voice is not a physiological

phenomenon because on the physiological level there is no relationship between the two parties, and the drooling depends on the physiological level on the contact between the food. And saliva papillae in the mouth. From this standpoint, Pavlov called the drooling associated with viewing the term “psychological salivation.” In doing so, he wanted to point out that the resulting behavior is psychological and not physiological, and this is due to the absence of an objective physiological relationship between viewing and saliva secretions. In this path, Pavlov tried to study the fundamental relationship between psychological phenomena and physiological phenomena by discovering the relationship between external stimuli and higher nervous brain functions. Freud also believed that the occurrence of psychological secretions leads to the construction of new relationships that are recorded in the cortex of the brain or in the cerebral cortex in higher animals. . Thus, he wants to prove that psychological behavior in humans is based on biological and physiological foundations centered on the cerebral cortex in humans or higher animals.

Through these observations of saliva secretions, Pavlov conducted a continuous series of experiments on dogs in order to scientifically determine the movement of this phenomenon and draw its manifestations in the form of clear scientific laws, as a result of which he defined the basic concepts of his theory, which are related to reinforcement, extinction, generalization, and interconnection. And learning.

1. Pavlov's Experiment:

The experiment is based on a basic assumption: that an organism is born with many innate reactions that represent its behavior, and as it grows older, voluntary behaviors begin to appear (as a result of the learning process). The experiment goes through stages, which are:

1.1 The first stage: (before creating the condition – before training)

Pavlov placed a hungry dog inside a soundproof box. Then he presented food (a natural stimulus) to him, and he salivated (a natural response) as soon as he saw the food.

1.2 The second stage: (during police training – during training)

Pavlov presented an artificial stimulus (neutral stimulus) that had nothing to do with the salivation response, namely (the sound of the bell) just before offering food to the dog. He noticed at first that the dog did not pay attention to the sound of the bell, but rather secreted saliva at the sight of the food. Then Pavlov repeated the temporal

association between the dog hearing the sound of the bell and offering it. Food immediately after ringing the bell several times.

Pavlov rang the bell (conditioned stimulus) without offering the dog food afterward, and it salivated (conditioned response).

1.3 The third stage: (after forming the condition – after training)

Drooling just by hearing the sound of the bell is a conditional response. Aspects of the issue can be clarified with the following example:

M1– Natural stimulus (a piece of meat) ----- Natural response (saliva secretion) Q1

M2– Conditioned stimulus (bell sound) ----- Natural response (hearing) Q2

A natural stimulus (a piece of meat) + a conditioned stimulus (the sound of a bell) + repeated association leads to a conditioned response, which is the secretion of saliva.

In another way, the following equation can be formulated:

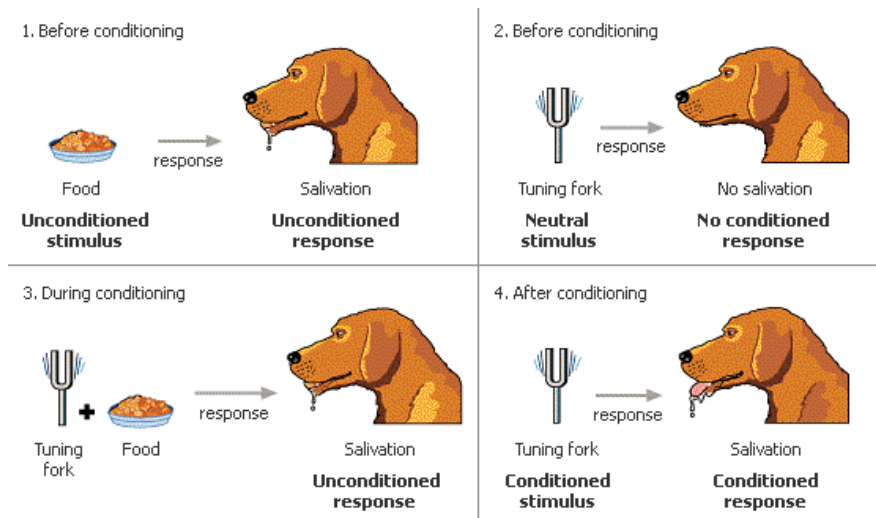
$M1 + M2$, and with repetition – $S1 + S2$, and as a result – $M2 - S1$.

The previous diagram shows that the stimulus that was neutral (the ringing of the bell), and due to the connection, can play the role of the natural stimulus, which is a piece of meat, and lead to a conditioned response, which is salivation in the dog.

Although this experiment appears to be naive or a mere conclusion in its data, at the scientific level it represents an extremely important and dangerous innovation.

Pavlov and those who followed his example tried to prove that the system of our behavior and feelings is an objective product of conditional responsive relationships that have their roots deep in the cerebral nervous system in humans. In doing so, he seeks to emphasize the saying of the dialectical unity between material existence and psychological existence in humans and that psychological life is the foundations. Neural for the objective relationship between the brain and external stimuli.

As a result, Pavlov defined his system of concepts for the theory of conditional foundations, especially those related to how the conditional response is built, its limits, the extent of the continuity of these responses over time, and how extinction, reinforcement, and generalization occur.



Source: <https://www.age-of-the-sage.org/psychology/pavlov.htm>

2. Basic Concepts in Pavlov's Theory:

2.1 The unconditioned stimulus:

It is the natural stimulus, as it is a strong and effective stimulus, capable of causing a response. It is called unconditioned because its power is in itself and because it is able to invoke the response by itself, and it does not need to be conditioned by other stimuli in order for the response to occur.

2.2 Unconditioned response:

It is the natural response resulting from a natural stimulus, and it is a learned and unconditioned response.

2.3 Conditional stimulus:

It is a neutral stimulus and cannot elicit a response on its own, but it can elicit a response if it is coupled and conditioned with another strong stimulus such as the natural stimulus (food).

2.4 Conditioned response:

It is a response resulting from the conditioned stimulus. It is a learned response resulting from the pairing between the natural and conditioned stimuli. It differs from the unconditioned (natural) response, as the natural response is stronger and longer lasting than the conditioned response.

2.5 Stopping:

This is the gradual decrease in the conditioned response, due to presenting the conditioned stimulus without reinforcement (the natural stimulus). A gradual decrease in the amount of the conditioned response is observed. In Pavlov's experiment, there was a gradual decrease in the amount of saliva that flowed.

2.6 Extinction:

This means completely stopping issuing the conditioned response. While a conditioned stimulus is presented without reinforcement, the response gradually decreases until it finally reaches the stage of complete disappearance, that is, extinction, meaning that there is a cessation of the response and then extinction.

2.7 Spontaneous return:

After a period of time is extinguished, the conditioned response (salivation) may return again, and then it is quickly extinguished. This is due to the learner's feeling that reinforcement may occur after the conditioned stimulus in this attempt.

2.8 Generalization:

which is that stimuli that are similar and close to the conditioned stimulus may elicit the same response that the original conditioned stimulus elicits. A child who is afraid of a cat that has hurt him before may be afraid of all similar cats and even of animals that resemble a cat, such as a rabbit and a dog.. ..etc.

2.9 Discrimination:

It is a process that comes after the generalization process, as the learner is able to respond to a specific stimulus and not other similar stimuli, meaning that the learner

responds to the reinforced stimulus, and neglects the non-reinforced stimuli, even if they are similar to the original stimulus.

2.10 Conditional response:

*Conditioning and pairing are affected by the nature of the process in which this pairing takes place, and has nothing to do with genetic factors or any factors specific to the organism.

* External factors surrounding the organism affect the process of pairing and conditioning – such as the sound of noise – and therefore we must neutralize, exclude and remove these stimuli.

* The current conditioned stimulus can be replaced by any other conditioned stimulus, as the latter is able to invoke the same response that the first stimulus summoned, and therefore the matter is related to the natural stimulus regardless of the nature of the conditioned stimulus. For example: If we replace the sound of the bell with lighting a light bulb and the pairing is completed, we will get the same result.

* The more possibility there is to isolate external factors and distracting stimuli, the better and faster the learning.

3. Factors affecting Conditional Learning:

External factors affect conditional learning. Conditioned stimuli other than the ones we want may be created, and therefore they must be excluded and neutralized, as Pavlov did when he lined the room in which he conducted the experiment.

* Repetition affects the occurrence of the response and thus the occurrence of learning. Therefore, repetition is considered a basic condition for learning to occur, but this repetition must not exceed the required limit so as not to lead to boredom and saturation.

* Repetition and distributed practice were found to be better than concentrated practice.

* Learning is better and better if the natural stimulus comes after the conditional stimulus, that is, presenting the bell and then the food, than if we present the food and then the bell.

* There must be motivation to learn in order for the response to occur and learning to occur together. In Pavlov's experiment, the dog must be in a state of hunger in order for it to react and respond.

* Living organisms are affected by individual differences, whether human or animal. Some dogs in Pavlov's experiment needed (10) attempts for pairing and conditioning to occur, while others needed at least (15) attempts for learning to occur.

4. Conditions for classical conditioning (conditioned reflex action):

In order for classical conditioning to occur and a conditioned response to appear in the organism, the conditions of the experiment must be set and everything that could disturb the experiment and its results must be excluded (sound, noise, smell, something that attracts the eye...), that is, the organism must be completely isolated from the external environment and special conditions must be provided, and we leave it to adapt. with her.

4.1 There must be a temporal conjunction between the presentation of the natural stimulus (meat, food...) and the conditional stimulus, the conditional stimulus (first) and then the natural stimulus in order for the response to occur through repetition (i.e. after linking the two stimuli). If the opposite were true, the organism would not pay attention to the conditional stimulus present in the situation.

4.2. During the experiment, the ideal time between the natural stimulus and the conditioned stimulus must be taken into account. Pavlov set this time at a quarter of a second, and this time should not be much longer or much shorter, as it is the ideal time for the connection between the conditioned and natural stimuli to occur.

4.3. It is easier for conditional learning to occur (whenever distracting factors are removed) from the situation, because the presence of a third stimulus will affect the learning process.

4.4. Conditional learning does not occur unless an important element is available, which is the natural stimulus (reinforcement) in Pavlov's experiment (food).

4.5. There is a direct relationship between the intensity of the natural stimulus and the strength of conditioning, the air puff and the eye blink response.

4.6. If the conditioned response occurs and no reinforcement is provided, the conditioned association begins to gradually fade and then extinguish.

4.7. If the reinforcer (the natural stimulus) is re-presented in conjunction with the conditioned stimulus, even once again (after extinguishing), the conditioned response is issued again, automatic retrieval.

4.8. The conditioned response is the same as the original response, but it appears for a stimulus other than its natural stimulus.

5. Evaluation of Pavlov's theory:

5.1 Strengths:

- * One of the most important theories explaining how learning occurs.
- * I am able to explain many emotional and emotional aspects.
- * Using the principles of conditional association and reinforcement to learn new behaviors or replace unwanted behaviors.

5.2 Weaknesses:

- * According to the theory, we can only explain simple learning situations and cannot explain learning complex skills (methods of solving problems or acquiring motor skills).
- * Pavlov's theory did not indicate the cognitive processes that take place during the formation of conditioning.
- * Criticism was made that human behavior is more complex than being reflexive, involuntary reactions.
- * According to the theory, the organism does not learn new responses, but rather learns to issue the same responses to new stimuli that are not the original stimuli, and therefore no new responses will be learned.

6. Educational applications of Pavlov's theory:

6.1. Benefiting from the principle of generalization and distinction:

Learning concepts, facts, and knowledge depends largely on this principle, and also when teaching children to extract a common characteristic from a group of phenomena, or teaching them to distinguish between letters, words, shapes, and numbers.

6.2. Benefiting from the principle of reinforcement:

Whereas reinforcement is considered a basic condition for learning.

6.3. The Principle of reverse conditioning:

This principle is used to treat many undesirable behaviors among learners, and by it we mean creating new requirements that contradict those requirements that already exist. For example: A child who feels fear as a result of seeing a cat, since this fear was originally formed as a result of negative conditioning. If we wanted to use reverse conditioning with this child, we would create a new desirable conditioning. For example, we associate and condition the appearance of the cat with something that is

desirable to the child, such as a piece of candy, for example, and we repeat that more. From time to time, until the child feels happy and pleased just by seeing the cat instead of the previous fear response.

6.4. Repetition and exercise:

Repetition greatly affects the occurrence of learning, and we benefit from this in learning letters and words, memorizing the Qur'an, and poetry, as well as in learning history and geography, and in learning manual skills such as printing, swimming, industrial...etc.

6.5. Continued presence of motivation:

The teacher must arouse students' motivation, and maintain this arousal most of the time in order for learning to occur, and without motivation, learning is weak.

6.6. Limit distractions:

Learning is better when away from distractions and noise, so the learner must keep these distractions away.

6.7. Identifying the elements of the situation to be learned:

This means defining what is meant, and determining exactly what we want from the learner, so that there is no confusion, overlapping, or absorption in details and details at the expense of the main position. Many students do not know the answer, but they do not know what is meant by the question.

6.8. Benefiting from the extinction principle:

This is represented by the teacher neglecting some bad behaviors, not focusing on them, and ignoring them. This leaves the impression on the learner that these behaviors are not valuable, and with the passage of time, this learner begins to abandon and forget them.

6.9. Formation of states of love and hate:

Most cases of love and hate result from the formation of conditional associations, either positive or negative. Hate is formed in a person as a result of seeing a person or place associated with something hateful, and repeating this more than once, as this generates feelings of hate. If we want to get rid of this, we have to use reverse conditioning.

VI. Conclusion:

Studies and research in the field of psychology and educational sciences are still ongoing in order to research how the learning process occurs. As well as the search for

the goal of this process, the achievements that have been achieved in the fields of learning and teaching demonstrate the extent to which psychologists and educational specialists benefit and use learning theories in their fields of specialization, especially education. Among these theories, we mention the theory of classical conditioning by Ivan Pavlov, which was adopted in His research focused on studying animals (the dog) and then generalizing the results to humans. The fruits of his theory were also applied in the educational field.

Pavlov's theory is based on the idea that neutral stimuli can cause a certain behavior in an organism as a result of their association with natural stimuli, both reinforcing and aversive. This confirms the principle of association and repetition of association, but it is difficult to explain all human behavior according to this principle, due to the multiplicity of behavior variables and its factors. In addition, the scientist Pavlov overlooked the mediating stimuli and perception processes that mediate between stimuli and responses, and this is what made Pavlov's theory of classical conditioning Limited to specific aspects of human behavior. Among our educational applications: forming some good habits and erasing some bad behavioral habits by pairing these habits with repulsive stimuli, in addition to providing some educational skills, such as learning letters and numbers. Finally, we hope that such theories will receive deeper studies and applications in broader fields.

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