

Classical Conditioning

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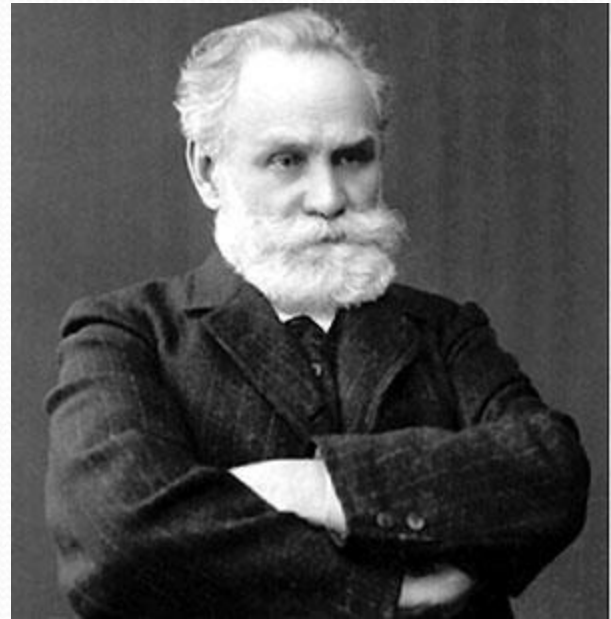
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Objectives:

1. Acquire Knowledge of the process of classical conditioning.
2. Understand the methods involved in the experiment of classical conditioning.
3. Understanding about the four key elements of classical conditioning.
4. Apply the implication about Ivan Pavlov's Classical Conditioning.

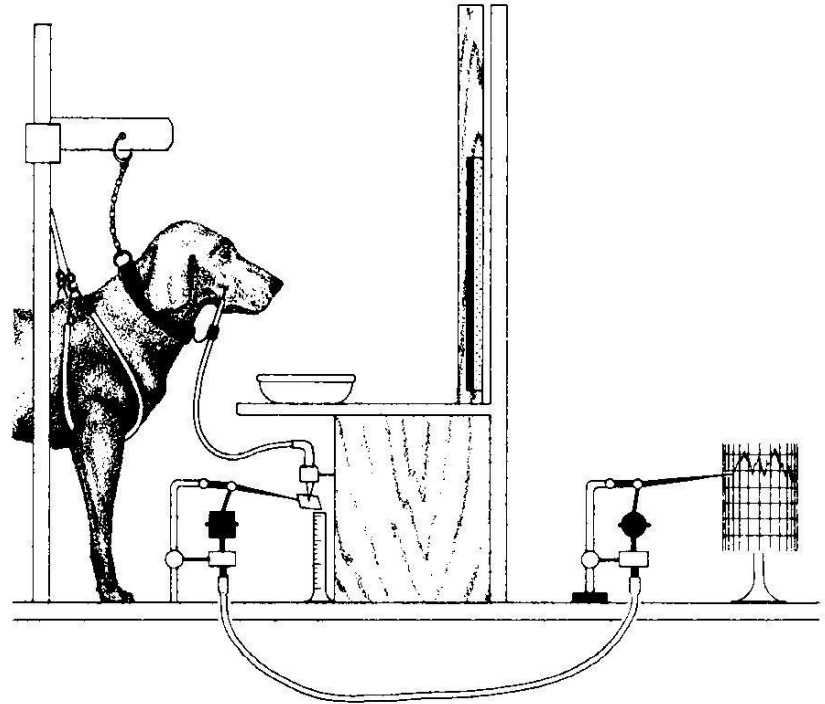
Ivan Pavlov (1849-1936)

- Pavlov, a Russian physiologist, first described classical conditioning in 1899 while conducting research into the digestive system of dogs.
- He was particularly interested in the role of salivary secretions in the digestion of food and was awarded the Nobel Prize for Medicine or Physiology in 1904.



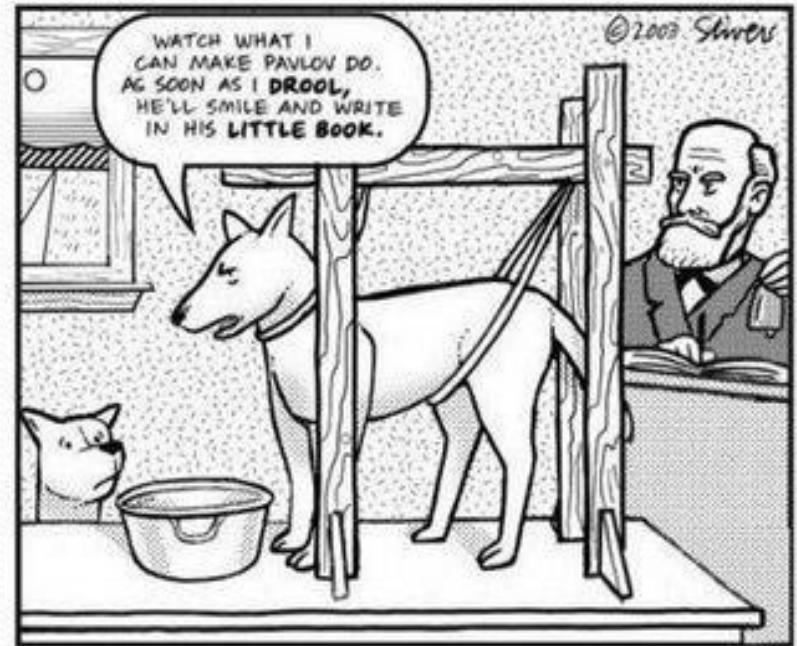
Pavlov's Research

- Pavlov used an apparatus to measure the amount of saliva produced when a dog ate.
- The flow of saliva occurred naturally whenever food was placed in the dog's mouth, as salivation is an involuntary, reflex response.



Pavlov's Method

- Dog was restrained in a harness to avoid extraneous variables.
- Meat powder was placed directly on the dog's tongue or in the bowl.
- A tube was surgically attached to the dog's cheek near one of the salivary glands and a fistula was made so that the saliva drained straight out into a measuring device.
- Further on, more sophisticated measuring devices were used to measure the speed of saliva flow.



What did Pavlov observe?

- Pavlov observed that the dogs salivated not only at the sight of the food, but also at the sight or sound of the lab tech who had been preparing the food.
- Pavlov was intrigued by these unintentional observations & he decided to conduct further experiments.
- His subsequent experiments provided clear evidence of a form of learning based on the repeated association of 2 different stimuli.

- A **stimulus** is any event that elicits a response from an organism.
- A **response** is a reaction by an organism to a stimulus. In Pavlov's experiment, the

stimulus of *food* initially produced the response of *salivation*.

- Eventually the sight or sound of the tech became the stimulus.

How is this response explained?

- The salivation response is controlled by the autonomic division of the PNS.
- Involuntary.
- The salivation had become associated with, and conditioned to, a new stimulus – the lab tech.
- This process is in essence the process of classical conditioning.



What is Classical Conditioning?

- Also known as respondent conditioning refers to a form of learning that occurs through the repeated association of 2 or more different stimuli.
- Learning is only said to have occurred when a particular stimulus consistently produces a response that it did not previously produce.

- In classical condition, a response that is automatically produced by one stimulus becomes associated, or

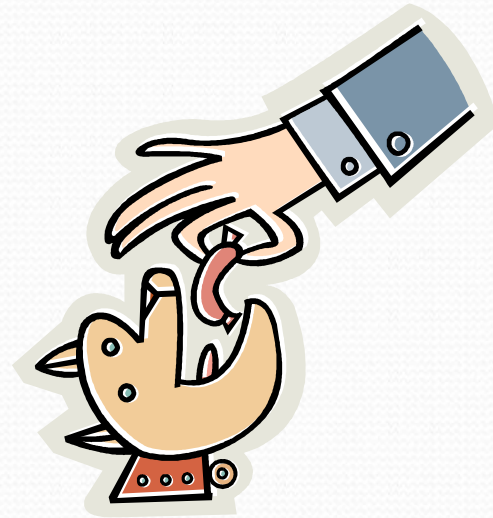
linked, with another stimulus that would not normally produce this response.

Key Elements of Classical Conditioning

There are 4 key elements that are used to describe the process of classical conditioning.

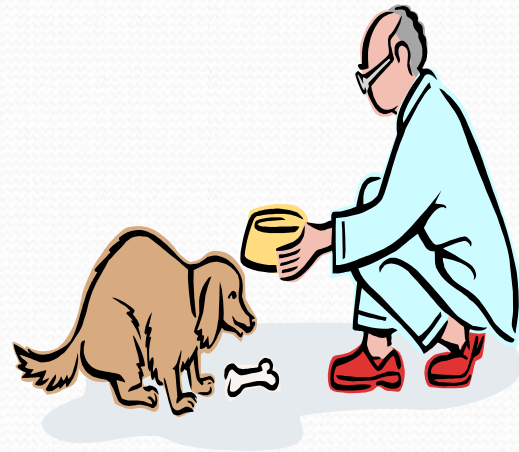
1. Unconditioned Stimulus

- The unconditioned stimulus (UCS) is any stimulus that consistently produces a particular, naturally occurring, automatic response.
- In Pavlov's experiment, the UCS was the food (meat powder).



2. Unconditioned Response

- The unconditioned response (UCR) is the response that occurs automatically when the UCS is presented.
- A UCR is a reflexive, involuntary response that is predictably caused by a UCS.
- In Pavlov's experiments, the UCR was the salivation.



3. Conditioned Stimulus

- The conditioned stimulus (CS) is the stimulus that is *neutral* at the start of the conditioning process and does not normally produce the UCR.
- Yet, through repeated association with the UCS, the CS triggers a very similar response to that caused by the UCS.
- *Association* refers to the pairing or linking of 1 stimulus with another stimulus.
- In Pavlov's experiments, the bell and subsequently other stimuli were initially *neutral*, but each became associated with the meat powder.

- Once conditioning has occurred and the originally neutral stimulus produces the response of salivating, then it is called
- The CR occurs after the CS has been associated with the UCS.
- The behaviour involved in

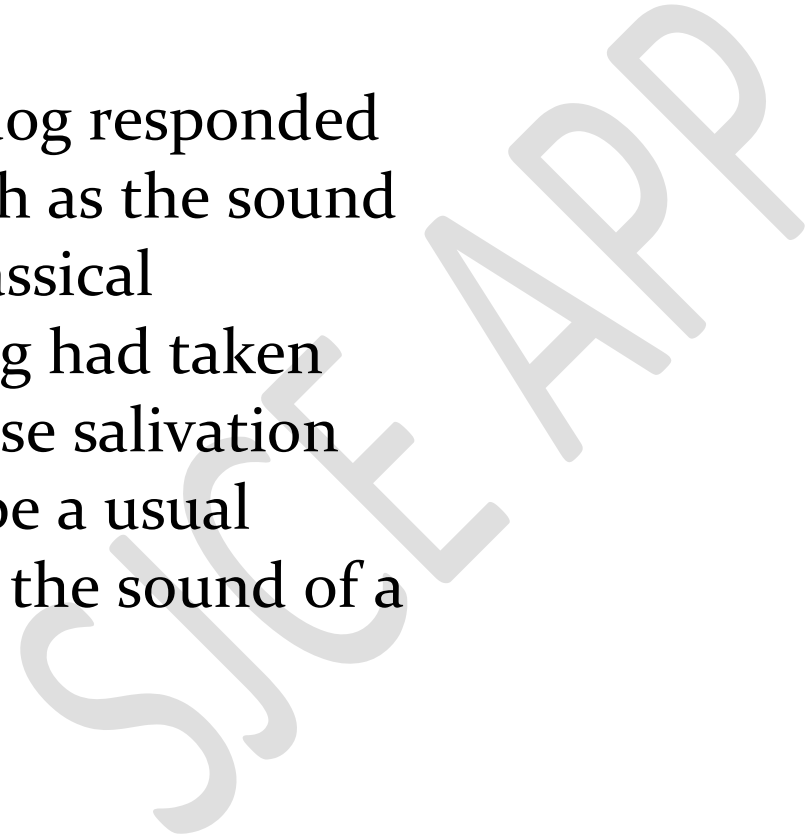
4. Conditioned Response

the CS.

- The conditioned response (CR) is the learned response that is produced by the CS.
- a CR is very similar to that of the UCR, but it is triggered by the CS alone.
- Pavlov's dogs displayed a CR (salivation) only when



they began to salivate to a CS.

- When the dog responded to a CS, such as the sound of a bell, classical conditioning had taken place because salivation would not be a usual response to the sound of a bell.
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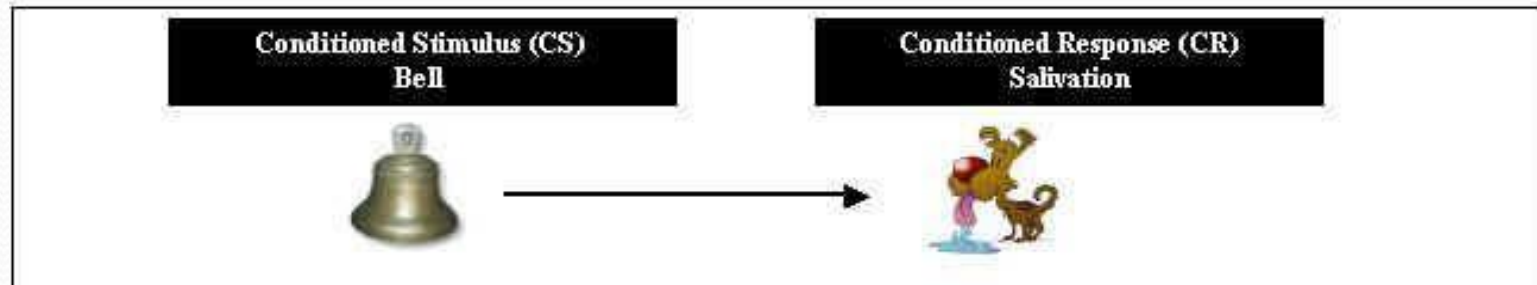
Before Conditioning



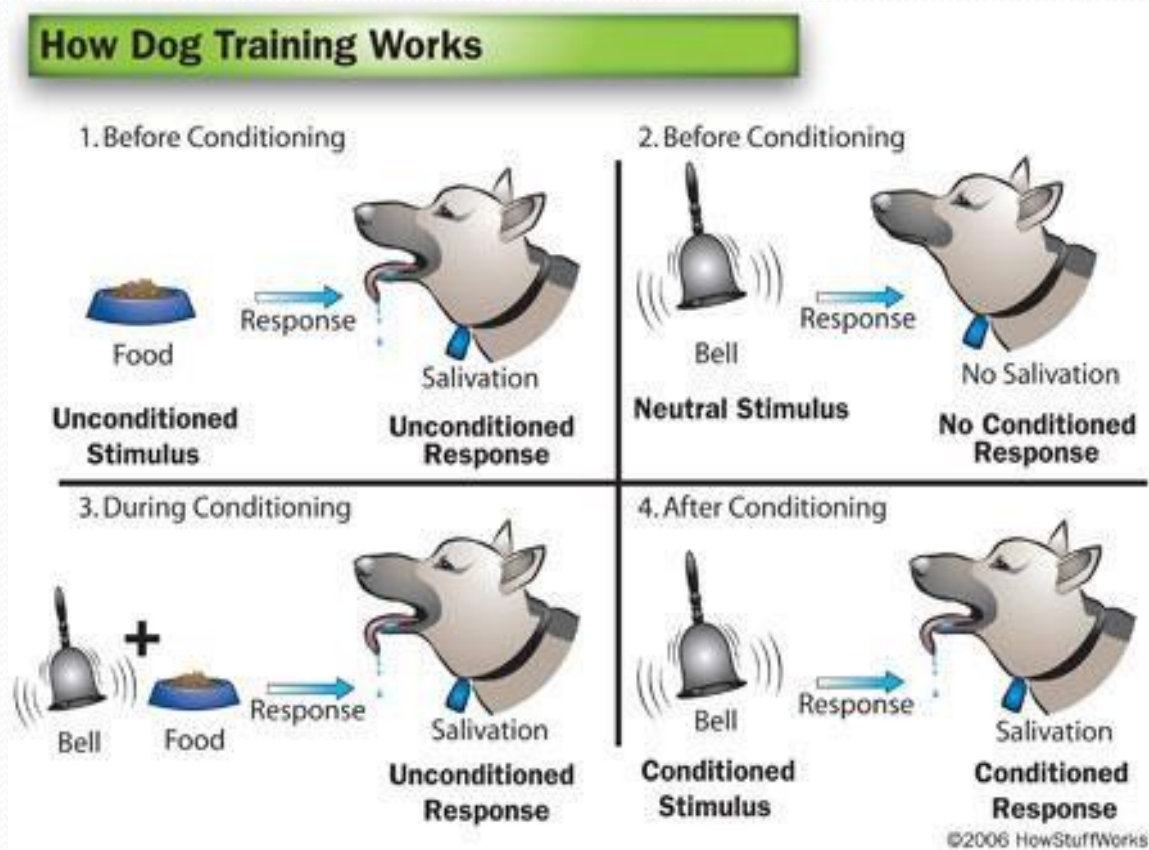
During Conditioning



After Conditioning



Another example...



Key Processes in Classical Conditioning

Pavlov distinguished several key processes that are involved in classical conditioning. These are known as:

- Acquisition, extinction, stimulus, generalisation, stimulus discrimination and spontaneous recovery.

Acquisition

- Each paired presentation of the CS with UCS is referred to as a trial.
- Acquisition is the overall process during which the organism learns to associate 2 events.
- The rate of learning is often very fast in the early stages of the acquisition phase.
- Timing of the CS and UCS pairing is critical.
- Pavlov found that a very short time between presentations of the 2 stimuli was most effective.
- Acquisition is more rapid when the CS occurs and remains present until the UCS is presented.
- The end of the acquisition stage is said to occur when the CS alone produces the CR.

Extinction

- A conditioned stimulusresponse association can fade over time or disappear altogether.
- Extinction is the gradual decrease in the strength or rate of a CR that occurs when the UCS is no longer presented.
- Extinction is said to have occurred when a CR no longer occurs following presentation of the CS.
- E.g. Pavlov's dogs eventually ceased salivating (CR) in

response to the bell (CS) presented alone after a number of trials in which the food (UCS) did not follow the sound of the bell).

- There is some variation between individuals in the rate at which extinction of the same conditioned response will occur.
- There is also considerable variation between the rates at which different response will be extinguished.

Spontaneous Recovery

- Extinction of a CR is not always permanent.
- In CC, spontaneous recovery is the reappearance of a CR when the CS is presented, following a rest period after the CR appears to have been extinguished.
- Spontaneous recovery does not always occur and when it does it is often short-lived.
- Furthermore the CR tends to be weaker than it was originally.

Stimulus Generalisation

- Pavlov observed that his dogs salivated to other noises that sounded like a bell.
- This is known as **stimulus generalisation** which is the tendency for another stimulus to produce a response that is similar to the CR.
- The greater the similarity between stimuli, the greater the possibility that a generalisation will occur.
- E.g. is a stimulus generalisation to the sounds of a bell occurred with one of Pavlov's dogs, the dog might also salivate in response to the ringing of the front-door bell.
- However, the amount of saliva produced by the dog would tend to be less than the amount produced by the original bell to which the dog was conditioned.

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Stimulus Discrimination

- Stimulus discrimination occurs when a person or animal responds to the CS only, but not to any other stimulus that is similar to the CS.
- E.g. in a CC experiment, stimulus discrimination would be observed when a dog salivated *only* in response to the sound of the 'experimental bell', and not in response to any other similar sound such as a door bell.
- For more info on CC, click the link to this website
<http://sun.science.wayne.edu/~wpoff/cor/mem/conditnl.html>

- There is plenty of info and diagrams and an online quiz.

they appear to be reflexive.

- CC behaviours are like



Classical Conditioning of Behaviour

- Behaviours that have been classically conditioned may occur so automatically that

reflexes in that they occur involuntarily, but they are unlike reflexes in that they are learned.

- A **conditioned reflex** is an automatic response

that occurs as the result of previous experience.

- A conditioned reflex involves little conscious

thought or awareness on the part of the learner.

- E.g. listening for thunder when you see lightning.

Conditioned Emotional Response

- An emotional reaction such as fear of a specific stimulus is learned through CC.
- A *conditioned emotional response* is an emotional reaction that usually occurs when the autonomic nervous system produces a response to a stimulus that did not previously trigger that response.
- E.g. fearing the sound of the dentist's drill.



Watson's 'Little Albert' experiment

- American psychologist John B. Watson and his graduate student, Rosalie Rayner first used CC to elicit an emotional response.
- Aim to test the notion that fears can be acquired through CC.
- The research participant was Albert B. (Little Albert), the 11 moth old son of a woman who worked at the same clinic as Watson.



How was Little Albert conditioned to hate the rat?

- They placed him on a mattress in a room where a white lab rat (CS) was within reaching distance.
 - Albert showed no initial fear of it and played with it.
- They then struck a hammer on a steel bar behind Albert (loud

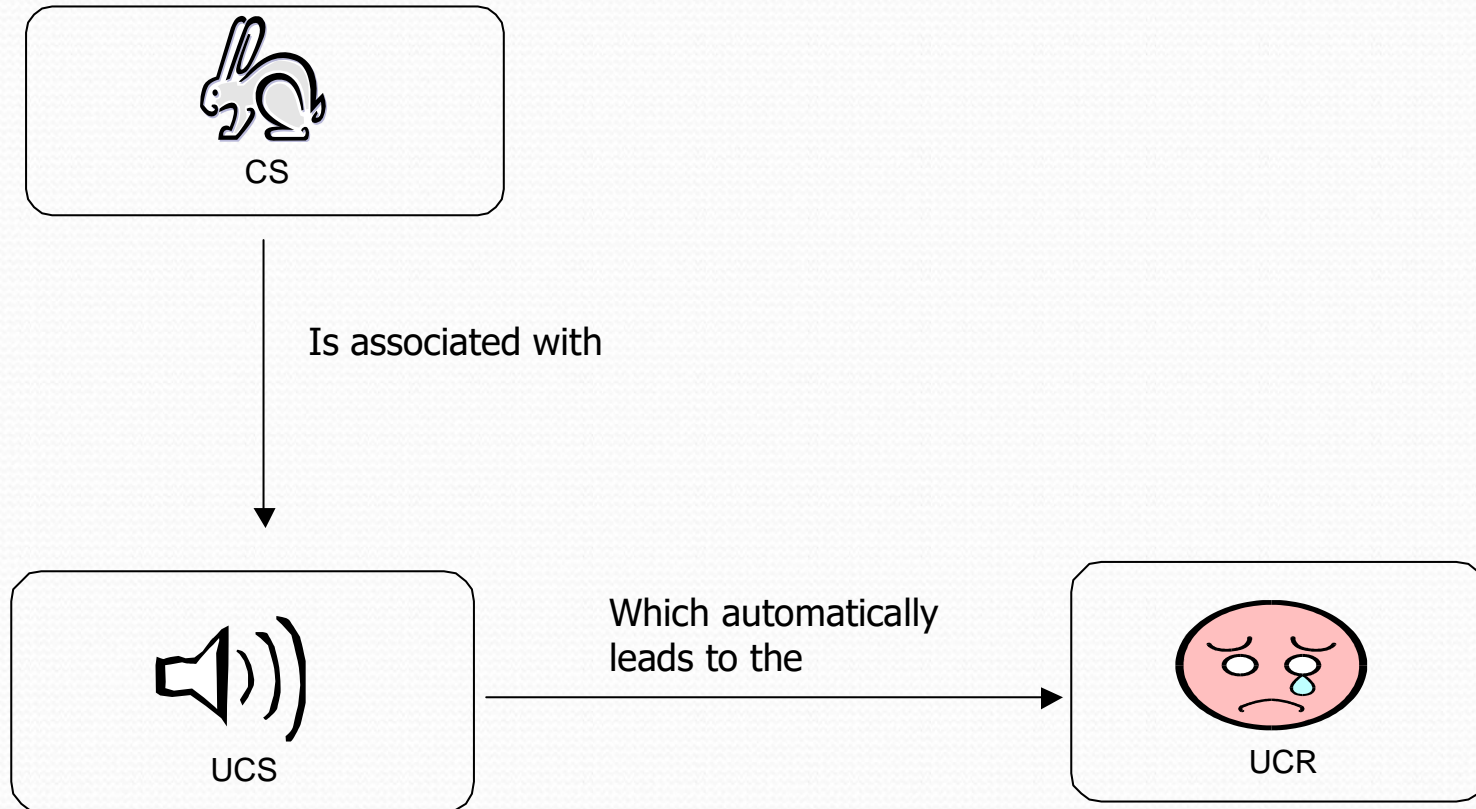
noise, UCS) and Albert began to cry.

- For the next 17 days Watson and Rayner began a series of fearconditioning experiments.

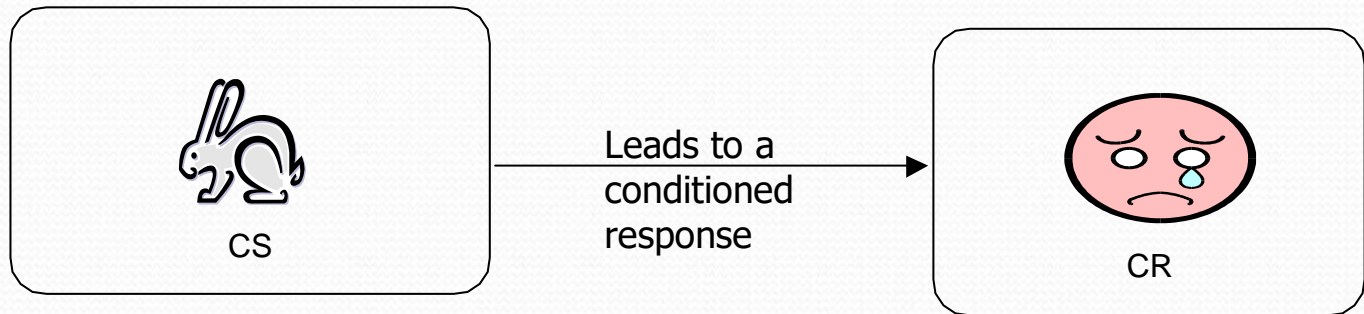
- They also conducted tests to find out if Albert's fear response could be generalised.

- Albert also seemed to fear a white rabbit, a dog and a seal skin coat.

During Conditioning (Association & Acquisition)



After Conditioning



Ethical considerations?

- Albert's mother left her job and Watson and Rayner reported that they were denied the opportunity to remove the conditioned emotional responses.
- This has been disputed, as it is believed they were aware of Albert's departure a month in advance.
- Some believe Albert's mother may not have been fully aware of the experimental condition and effect on her son.
- *Informed consent* is not mentioned in Watson original article, so a judgement cannot

be made about this ethical issue.

- Also possible that Albert was vulnerable to psychological harm as a result of the experiments.
- Yet Albert was subjected to severe anxiety and distress & the experimenters made not attempt to end the experiment and attend to his distress in an appropriate way.

SECRET

Albert after the experiments?

- Some psychologists have suggested that Albert's conditioned fears might have disappeared over time, however it is reasonable to assume that Albert was not only emotionally traumatised by the experimental procedures to which he was subjected, but was also likely to have suffered some kind of lasting psychological harm.
- Experiments using any human participant in this way would be considered unethical today and would not be permitted.



Check your progress

- What are the key components of classical conditioning?
- Explain the theory proposed by Ivan Pavlov?
- Explain the process involved in classical conditioning?