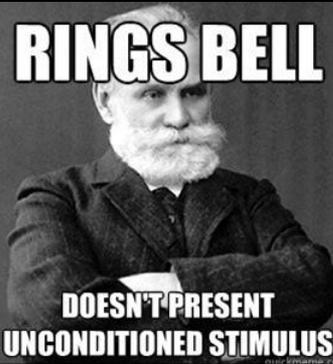


**LEARNING!**  
*"Classical Conditioning"*



**DOESN'T PRESENT  
UNCONDITIONED STIMULUS**

**PAVLOV'S DOG**



**WHY YOU NO HAVE SELF  
CONTROL**

**HMMM, PAVLOV... PAVLOV...  
PAVLOV...**



**... THAT NAME RINGS A  
BELL**

**NOT SURE IF CLASSICAL  
CONDITIONING**



**... OR INSTRUMENTAL**



# What is Learning?

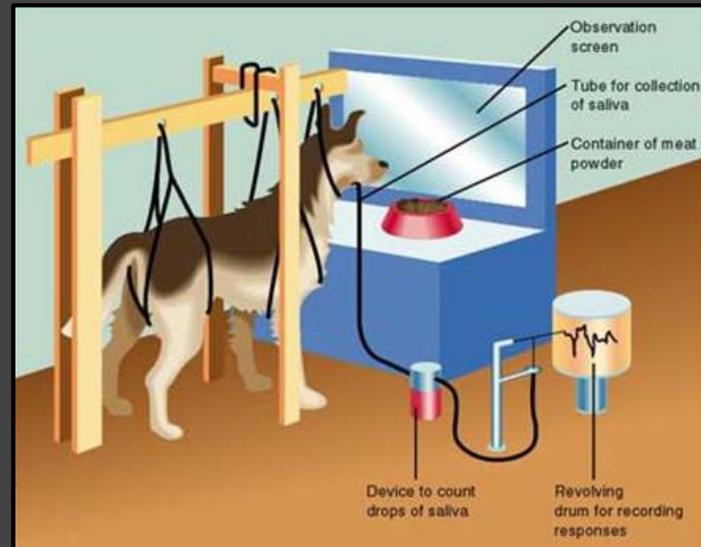
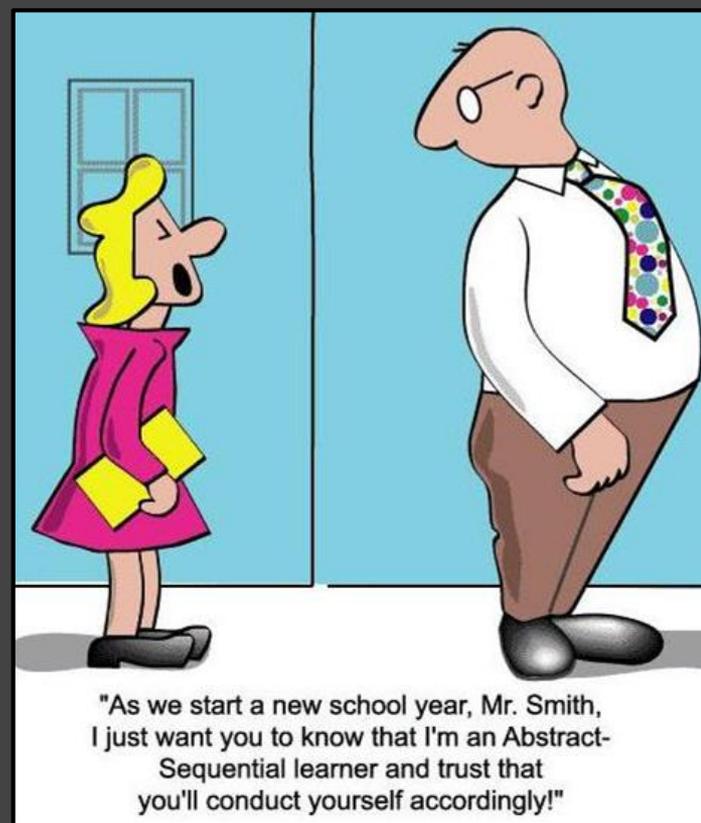
Most learning is...

## Associative Learning:

Realization that certain events occur together.

Learning: A relatively **durable change in behavior or knowledge** that is due to *experience*

- ★ Classical Conditioning
  - ★ Operant Conditioning
  - ★ Observational Learning
- (Latent, Abstract, Insight)



# What is Learning?

Isn't "learning" what we do in school?  
(Well, yes, but...)

**Behavior is the key here:**

## ● Unlearned Behavior:

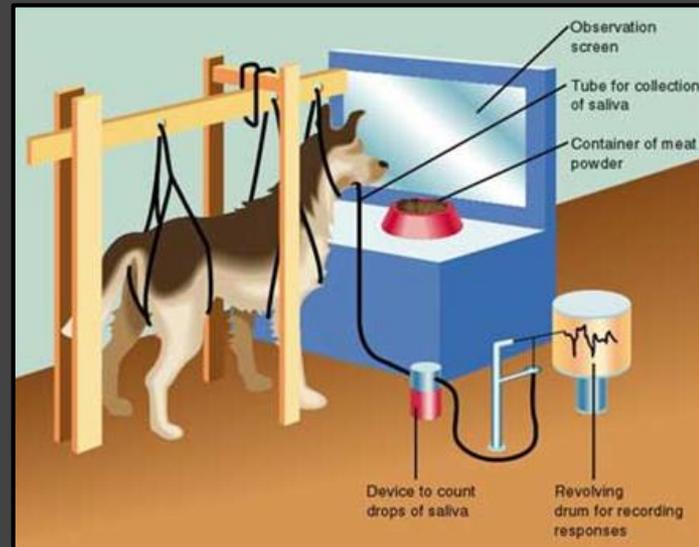
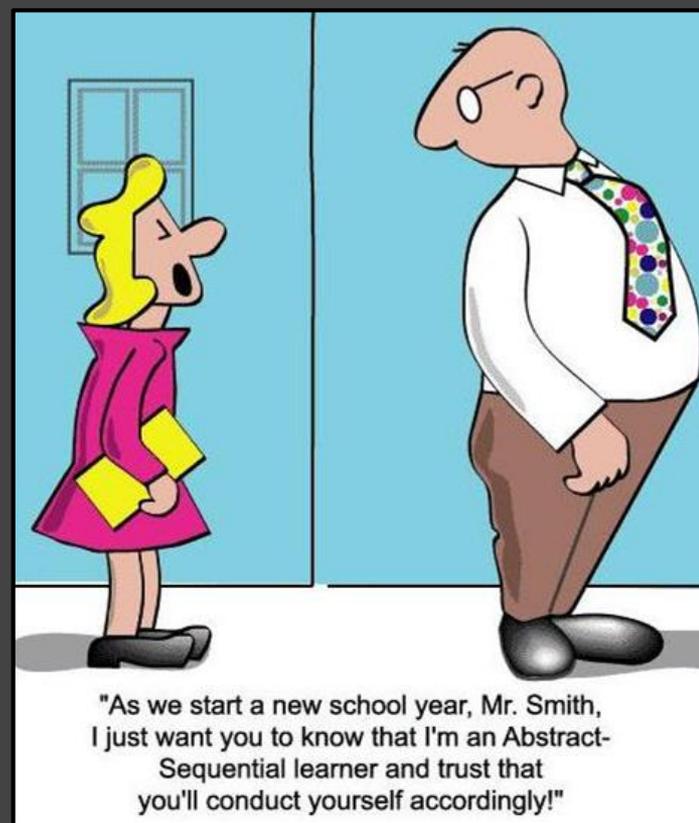
- Anything that is an **INSTINCT**
  - Instincts do not change with experience
  - Instincts are **universal** to a species
  - Instincts are **uniform in expression**

## ● Learned Behavior:

- Walking is a learned behavior. How?
- How is this different from instinct?

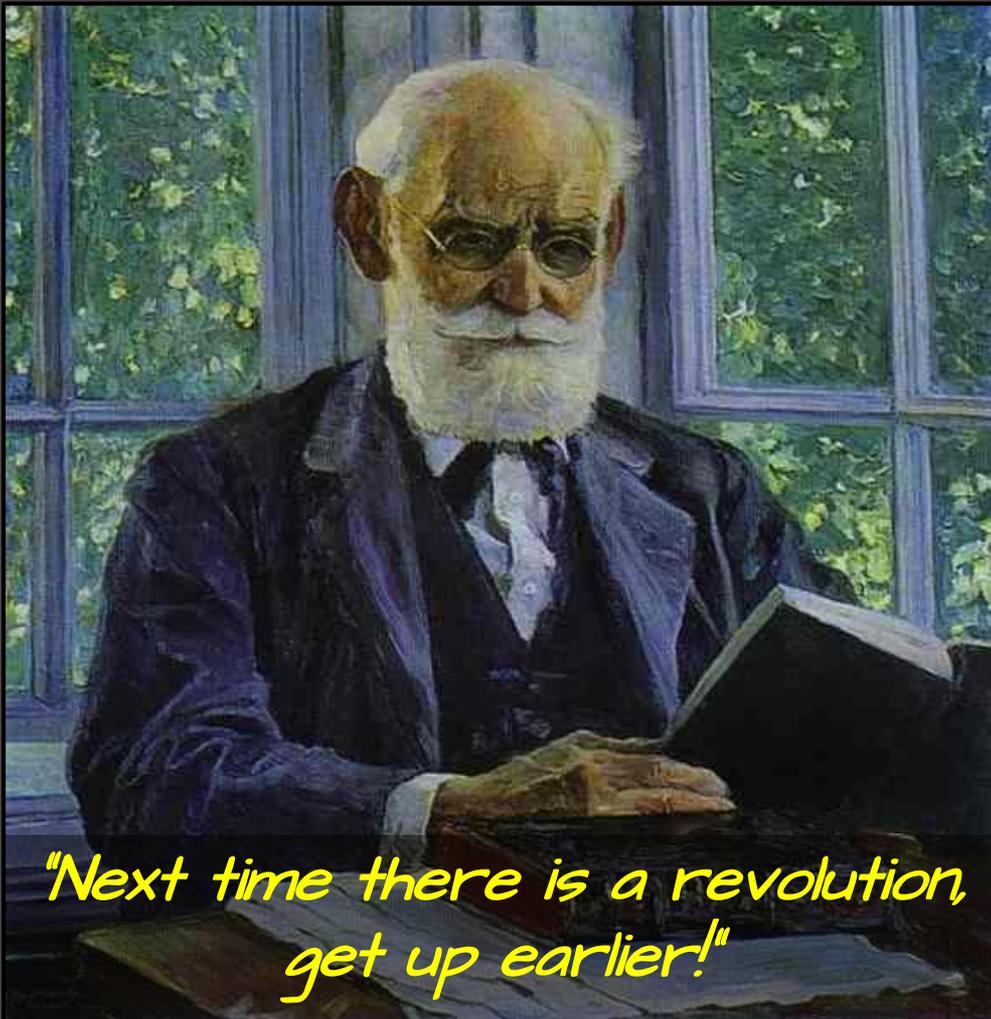
● Consider, now, the definition:

- **Learning**: A relatively **durable change in behavior or knowledge** that is due to **experience**
- We call this "Conditioning"
  - Learning an association between "things."



# Classical Conditioning

Ivan Pavlov developed the framework for CC:  
Learning to associate one stimulus with another, i.e.  
"Stimulus-to-Stimulus Learning"



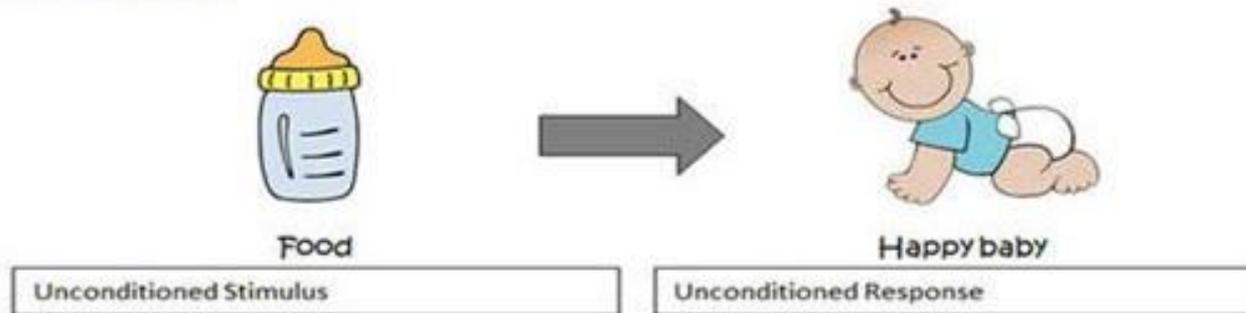
**BENSON, PLEASE  
ANSWER THAT BELL**



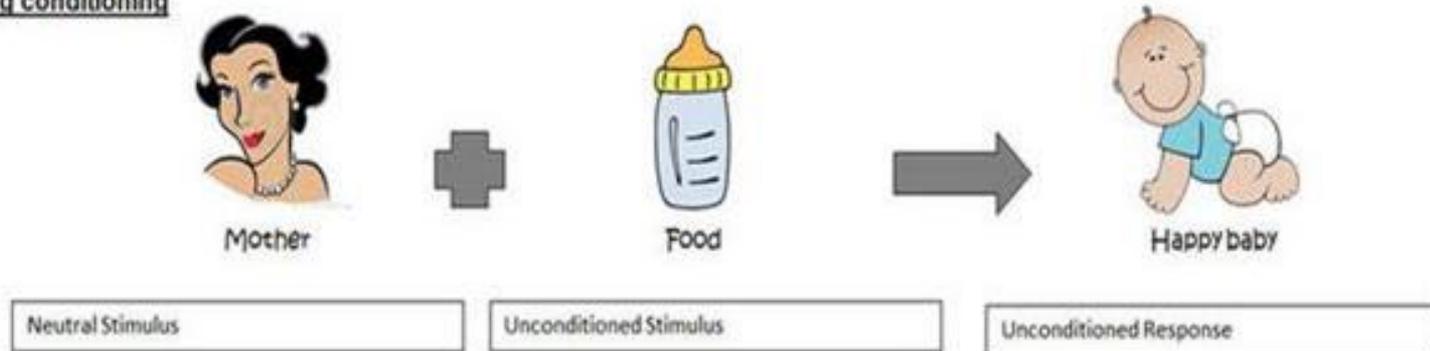


# Attachment by Classical Conditioning

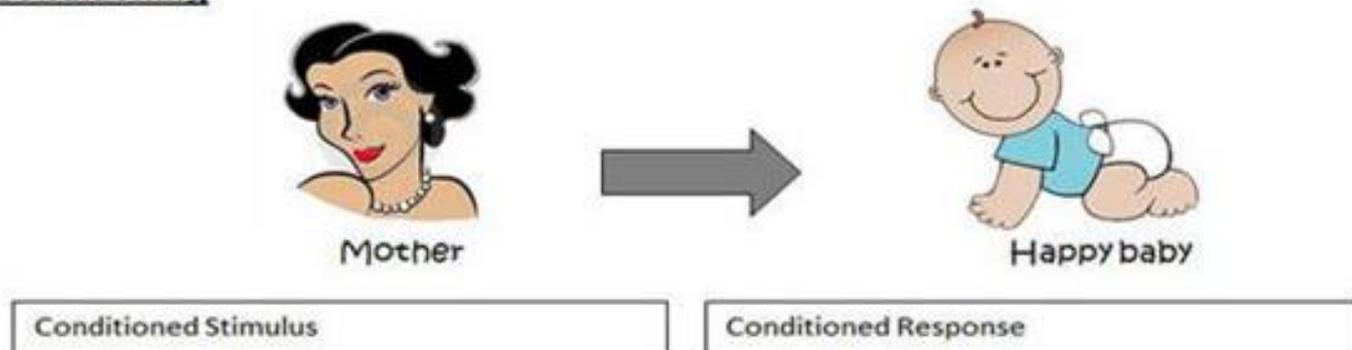
## 1. Before conditioning



## 2. During conditioning



## 3. After conditioning



2. During conditioning



Mother



Food



Happy baby

Neutral Stimulus

Unconditioned Stimulus

Unconditioned Response



### 3. After conditioning



Mother



Happy baby

Conditioned Stimulus

Conditioned Response



# *How is the fear of lightning a simple classical conditioning situation?*

At any one time, all around the world, there are 2,000 thunderstorms happening, producing over a 100 lightning strikes a second. That's over 8 million lightning bolts every day unleashing the power of 2 million tons of TNT.

**We associate 2 stimuli:**

**We see *lightning*... & then hear thunder.** (speed of light is faster than the speed of sound)

*Lightning* ... THUNDER

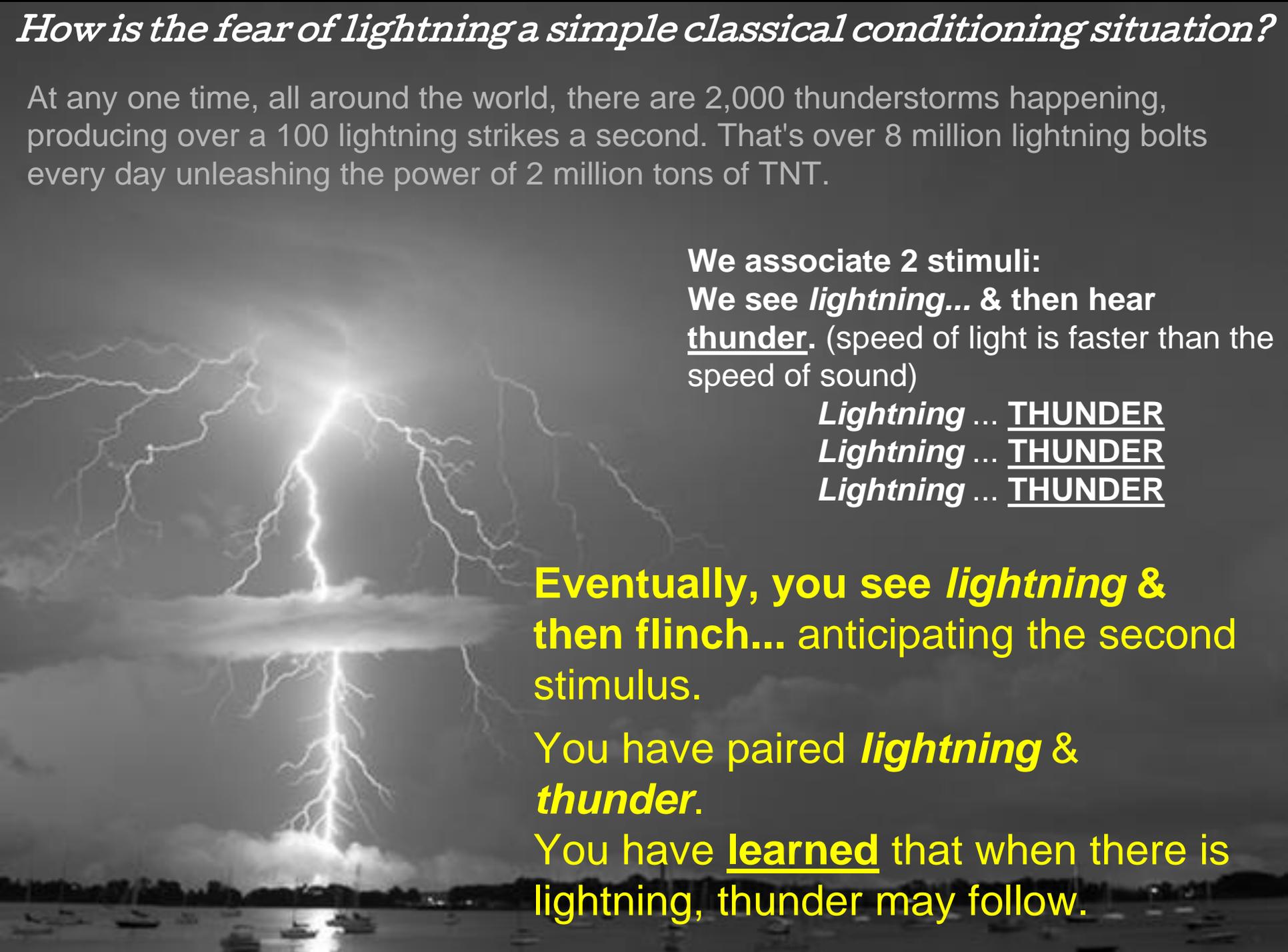
*Lightning* ... THUNDER

*Lightning* ... THUNDER

**Eventually, you see *lightning* & then flinch...** anticipating the second stimulus.

You have paired *lightning* & *thunder*.

You have learned that when there is lightning, thunder may follow.



We associate 2 stimuli:

We see lightning... & then hear thunder. (speed of light is faster than the speed of sound)

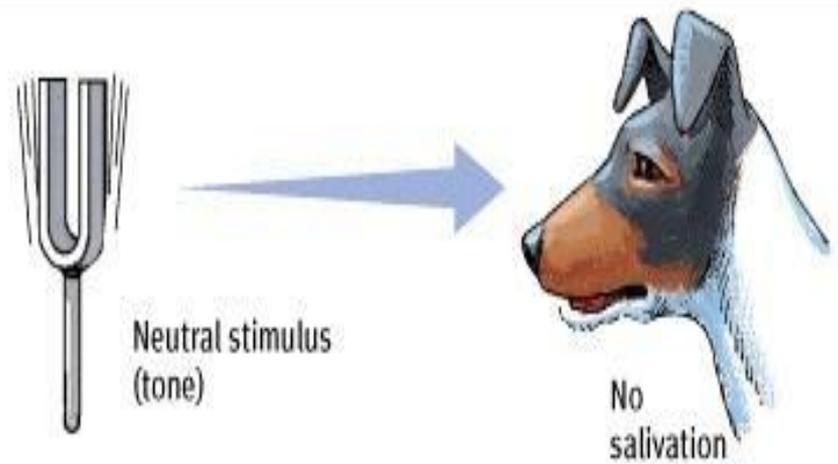
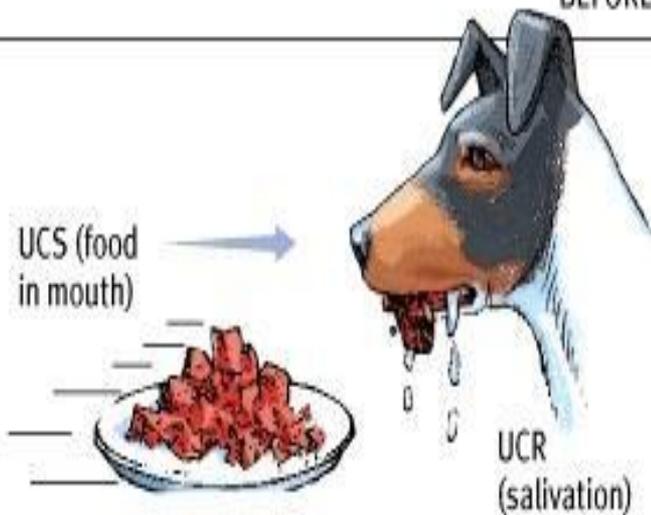
*Lightning* ... THUNDER

*Lightning* ... THUNDER

*Lightning* ... THUNDER

Eventually, you see lightning and then flinch... anticipating the second stimulus. You have paired lightning & thunder. And you have learned that when there is lightning, thunder may follow.

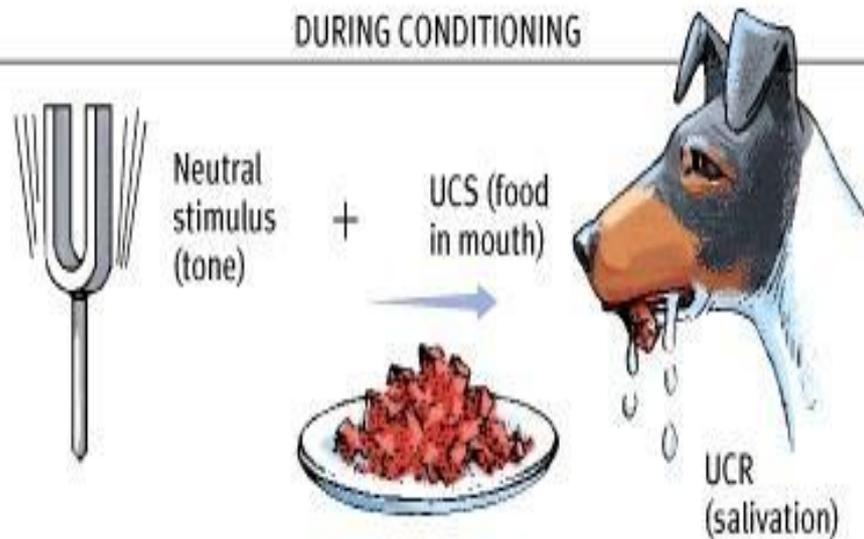
## BEFORE CONDITIONING



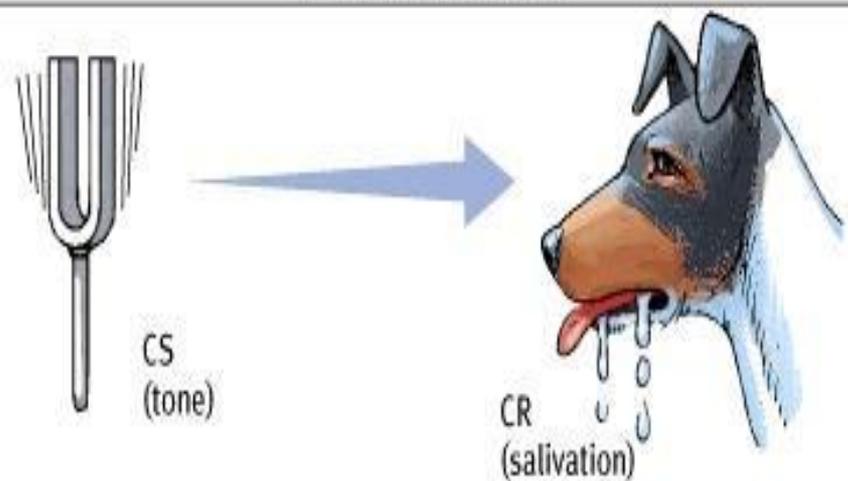
An unconditioned stimulus (UCS) produces an unconditioned response (UCR).

A neutral stimulus produces no salivation response.

## DURING CONDITIONING



## AFTER CONDITIONING



The unconditioned stimulus is repeatedly presented just after the neutral stimulus. The unconditioned stimulus continues to produce an unconditioned response.

The neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

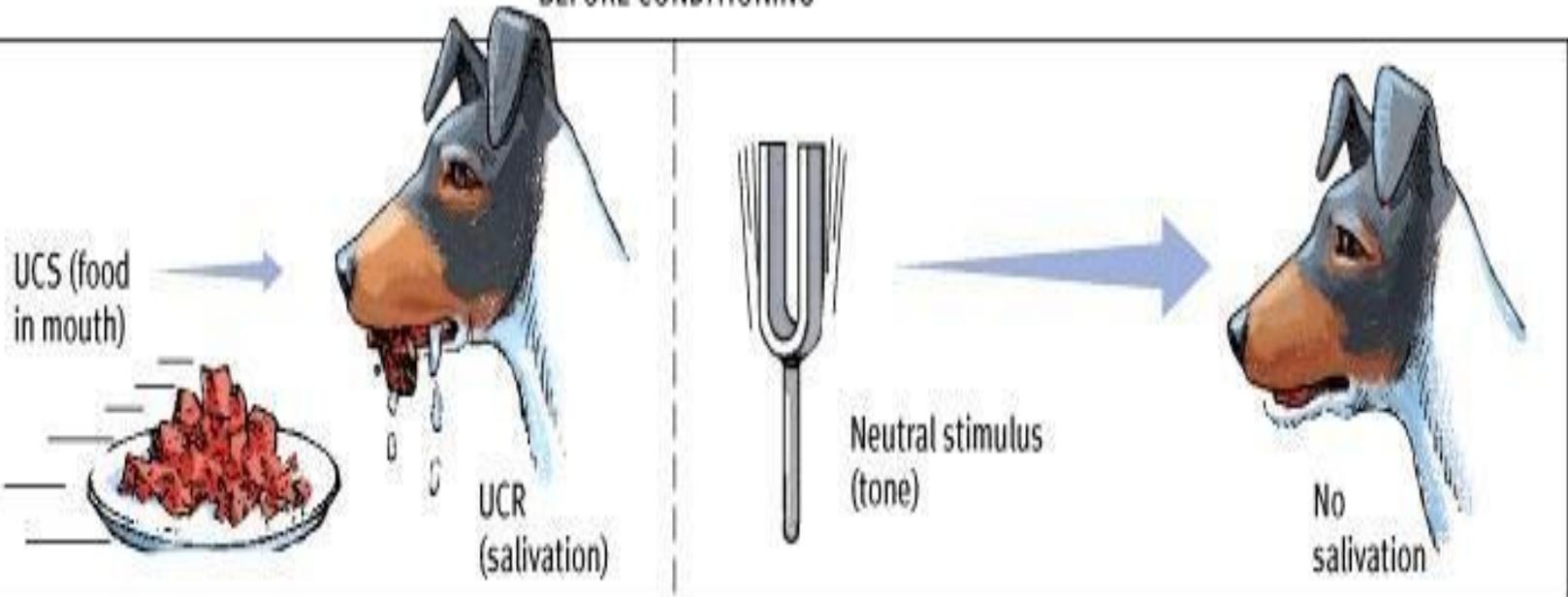
## Unconditioned Stimulus (UCS):

A *stimulus* that naturally & automatically triggers a response.

## Unconditioned Response (UCR):

The unlearned, naturally occurring *response* to the UCS.

BEFORE CONDITIONING



An unconditioned stimulus (UCS) produces an unconditioned response (UCR).

A neutral stimulus produces no salivation response.

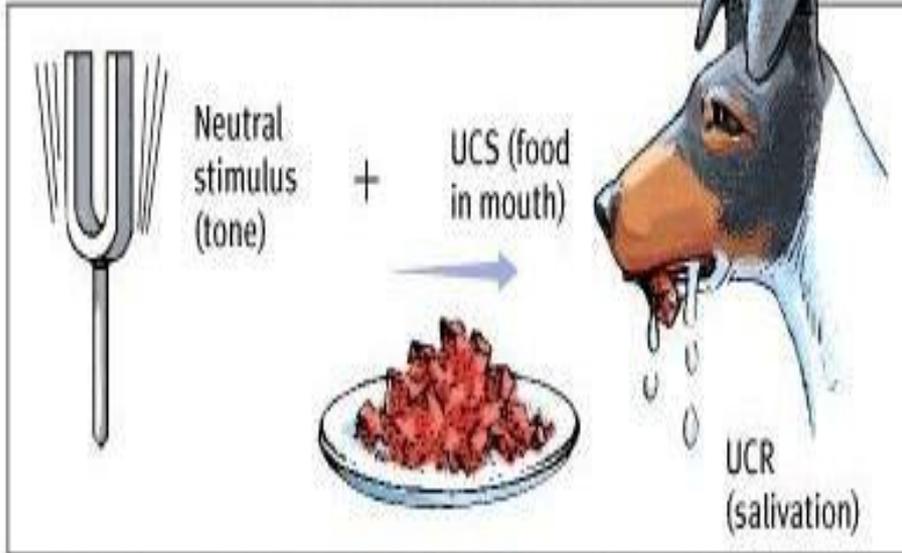
## Conditioned Stimulus (CS):

An originally irrelevant stimulus that, **after association with the UCS**, comes to *trigger a response*.

## Conditioned Response (CR):

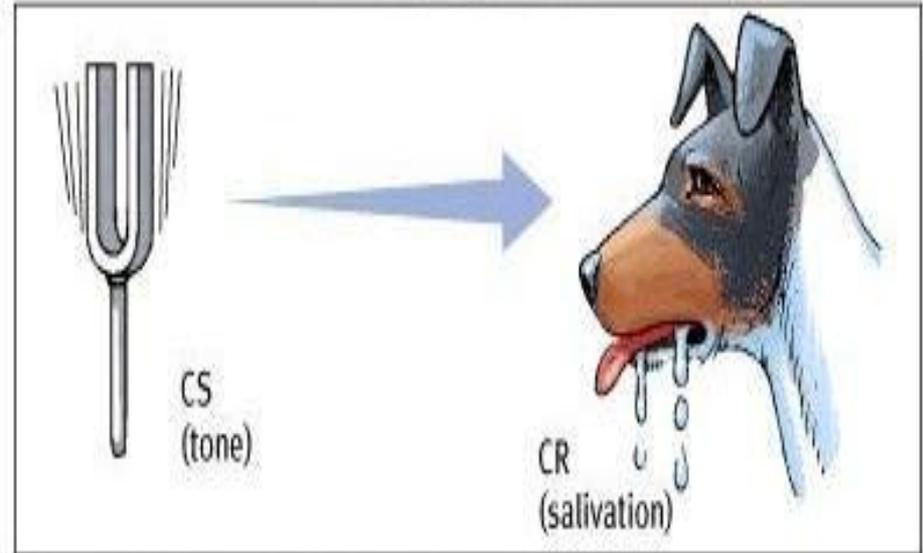
The **learned response** to a previously neutral stimulus.

DURING CONDITIONING



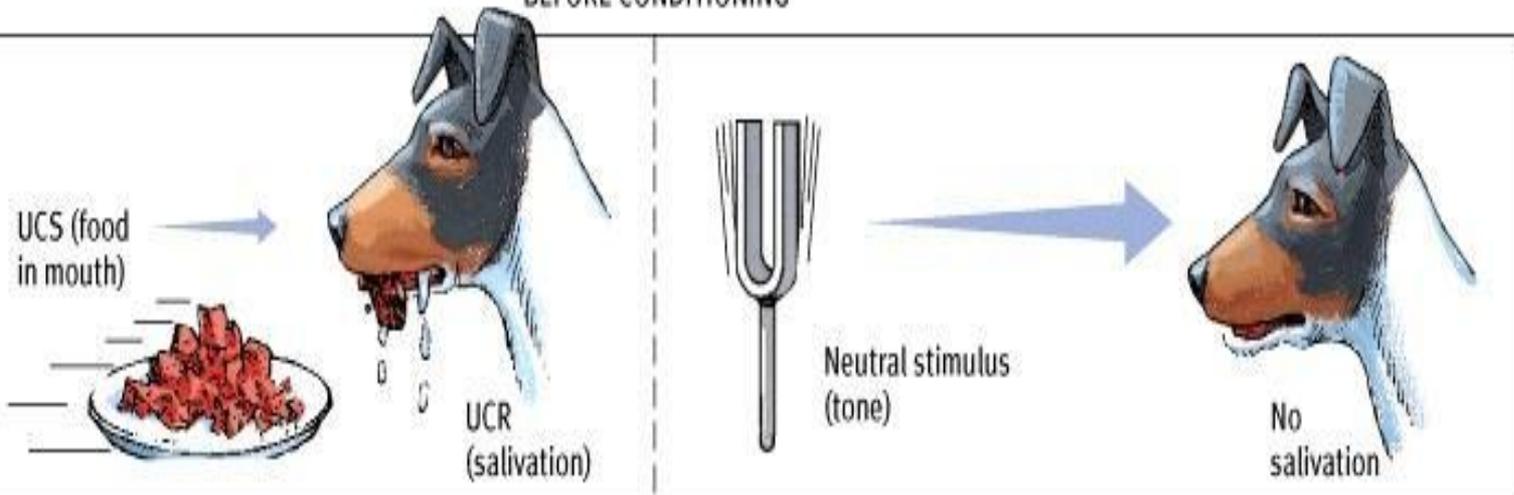
The unconditioned stimulus is repeatedly presented just after the neutral stimulus. The unconditioned stimulus continues to produce an unconditioned response.

AFTER CONDITIONING



The neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

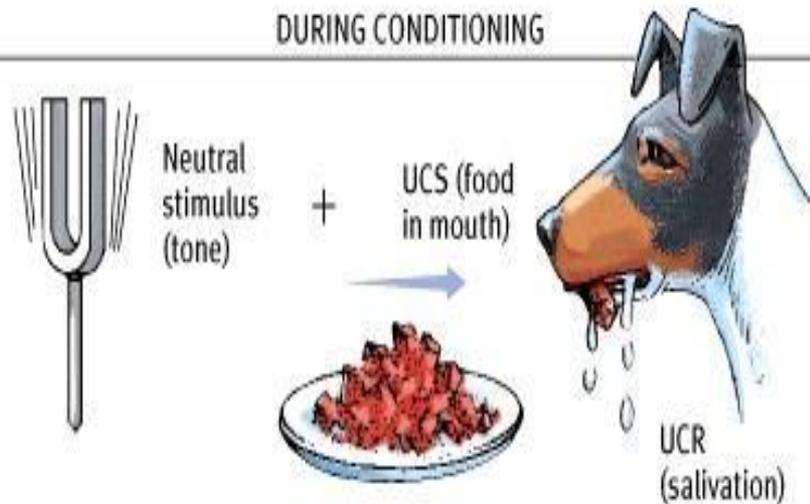
## BEFORE CONDITIONING



An unconditioned stimulus (UCS) produces an unconditioned response (UCR).

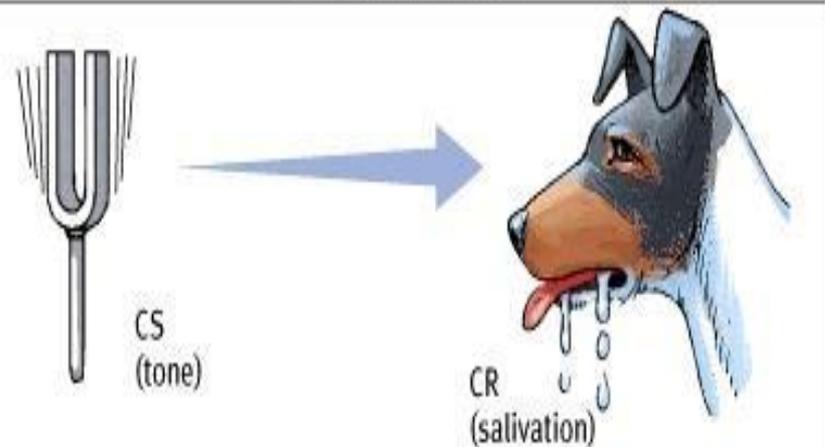
A neutral stimulus produces no salivation response.

## DURING CONDITIONING



The unconditioned stimulus is repeatedly presented just after the neutral stimulus. The unconditioned stimulus continues to produce an unconditioned response.

## AFTER CONDITIONING



The neutral stimulus alone now produces a conditioned response (CR), thereby becoming a conditioned stimulus (CS).

We associate 2 stimuli:

We see lightning... & then hear thunder. (speed of light is faster than the speed of sound)

*Lightning* ... THUNDER

*Lightning* ... THUNDER

*Lightning* ... THUNDER

UCS: ?

UCR: ?

NS: ?

CS: ?

CR: ?



*After repeated episodes....  
creating 'Conditioning':*

*Eventually, you see lightning & then flinch... anticipating the second stimulus. You have paired lightning & thunder.*

*And you have learned that when there is lightning, thunder may follow.*

UCS: Thunder

UCR: Fear

NS: Lightning

CS: Lightning

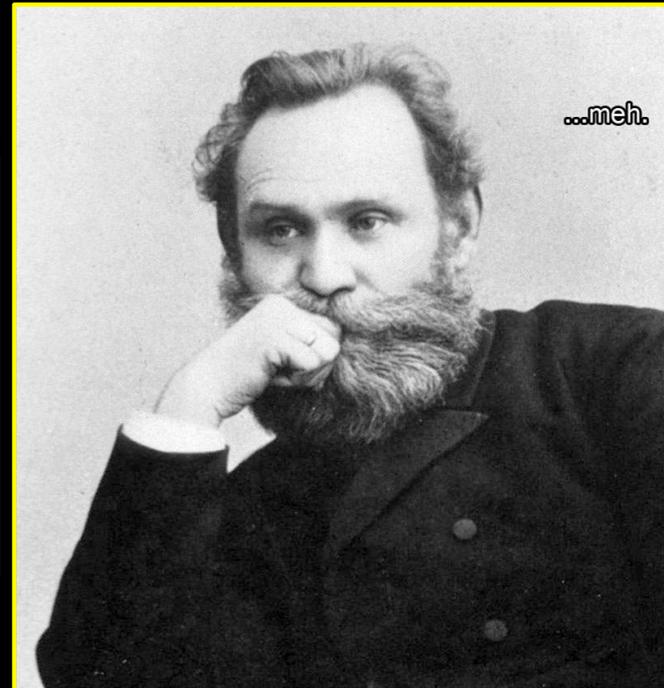
*Pairing UCS & CS =*

CR: Fear

# The Office - Classical Conditioning



*Pavlov... not so impressed.*



Jim asks, 'Do you want an altoid?'

Dwight reaches out his hand.

Computer tone

Computer tone

Dwight reaches out his hand.

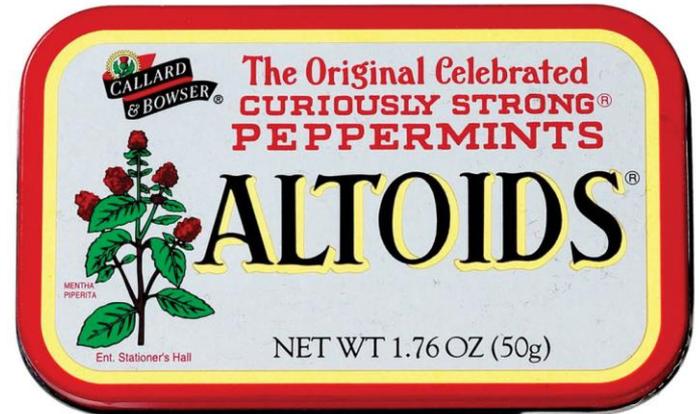
...UCS

...UCR

...NS

...CS

...CR



Seahawks lose =  
Sense of "loss" =  
**Red Balloon** =  
**Red Balloon** =  
Sense of "loss" =

...UCS  
...UCR  
...NS  
...CS  
...CR



Aaawwww man  
the Seahawks lose  
Again.



UCS -  
UCR -  
NS -  
CS -  
CR -

Jumping & Scaring the dog  
Dog is fearful  
Bell Sound  
Bell Sound  
Dog is fearful



BAYLOR  
UNIVERSITY



Bell = Scary

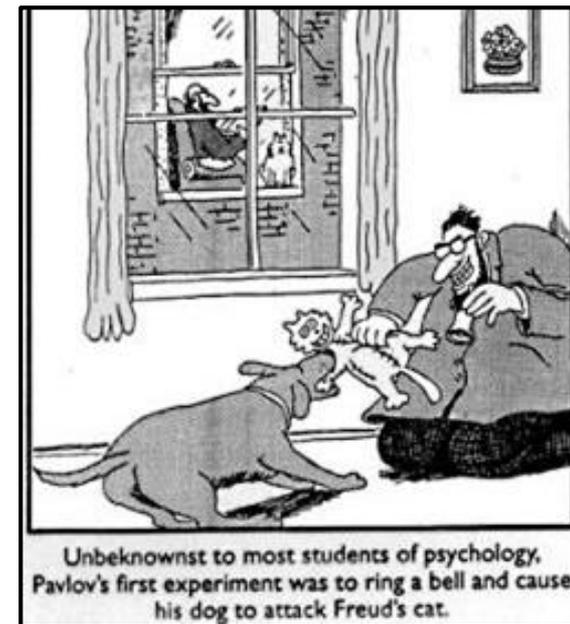
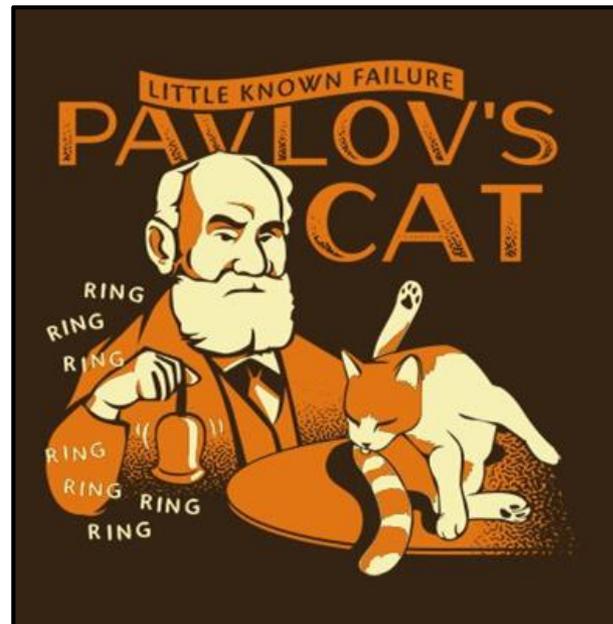
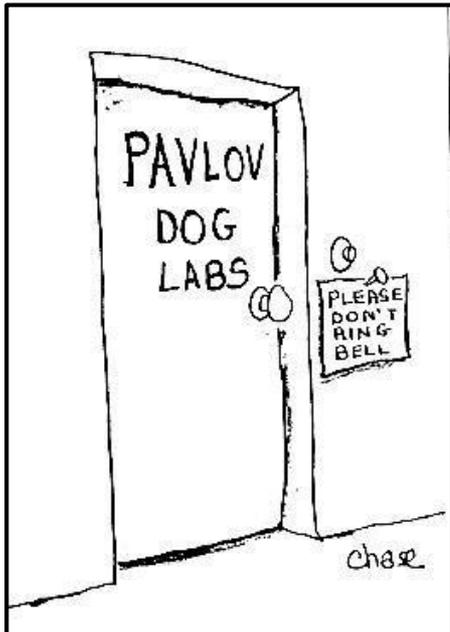


**After the bad car accident we had last year, I cringe and break into a sweat at the sound of squealing brakes.**

- **This is Classical conditioning. The cringing, which is an unconditioned response to pain or fear, was produced by the accident and its accompanying pain. That accident was probably preceded by the sound of squealing brakes, which became a conditioned stimulus for the conditioned response of cringing.**

**Pavlov discovered 5 critical terms that together make up classical conditioning:**  
**With your group members, figure what these are!**

- ★ Acquisition
- ★ Extinction
- ★ Spontaneous Recovery
- ★ Generalization
- ★ Discrimination



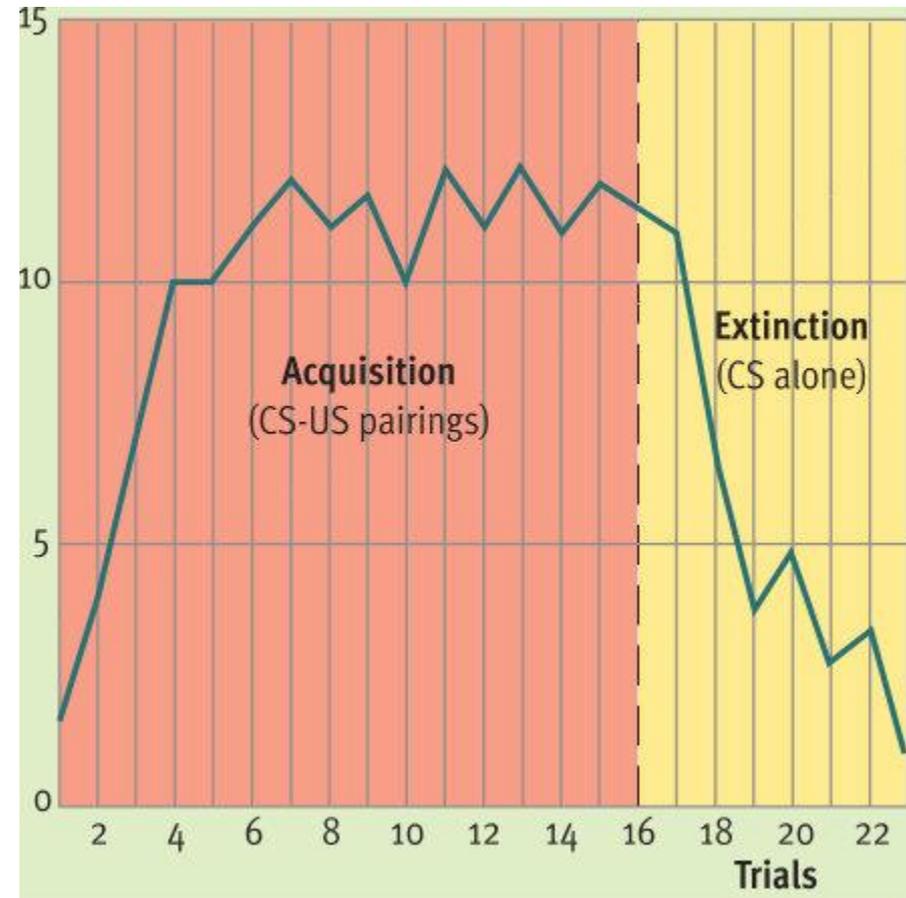
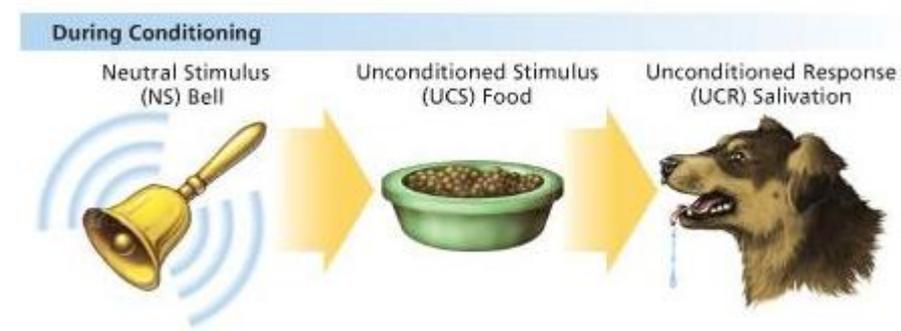
# Acquisition

The **initial** stage of learning.  
The phase where the **neutral stimulus** is associated with the **UCS**  
Therefore the **neutral stimulus** comes to elicit the **CR**, thus becoming the **CS**.

*Does timing matter?*

The **CS** should come **before** the **UCS**

They should be **very close together** in timing.



# Extinction

The **diminishing** of a **conditioned response**.

Will eventually happen when the **UCS** does not follow the **CS**.

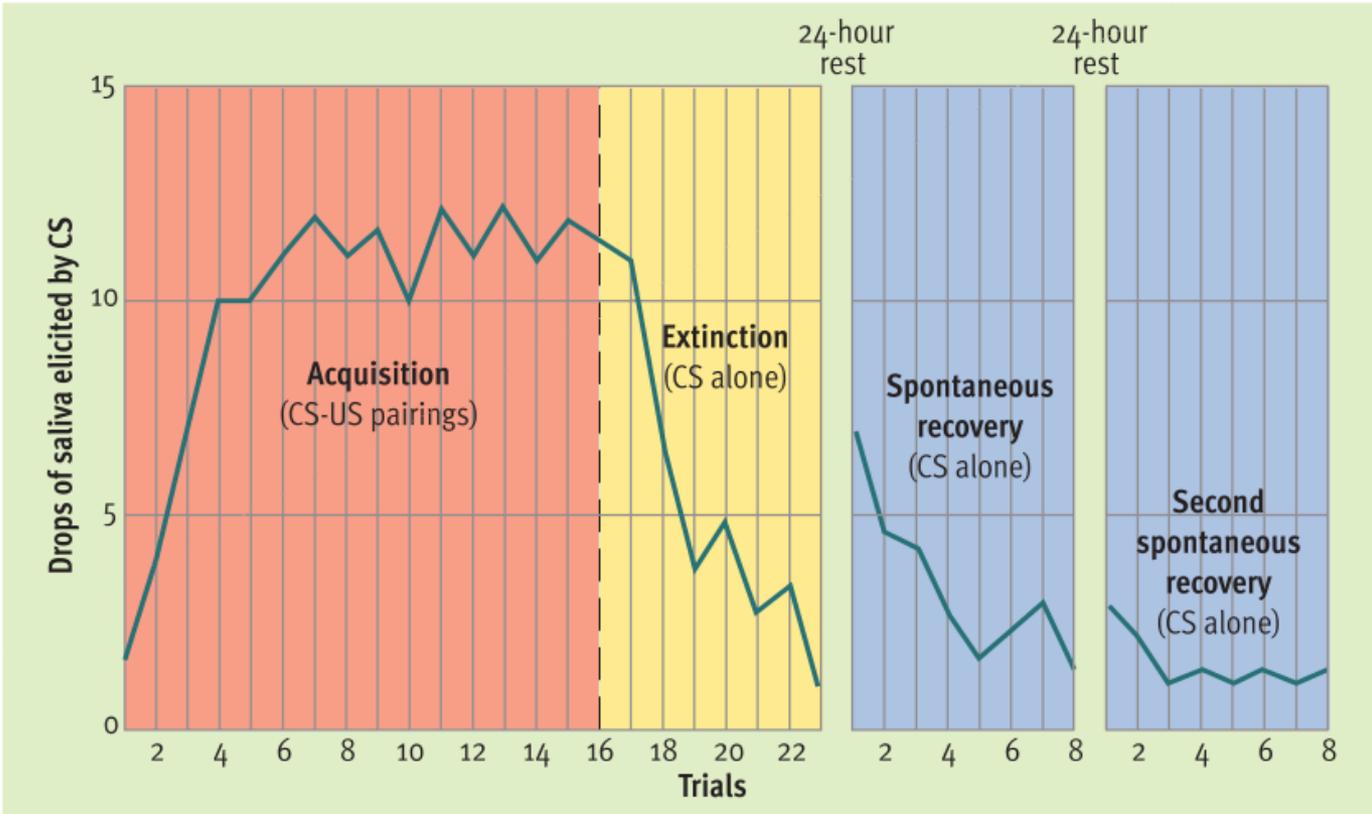
*Is extinction permanent?*



# Spontaneous Recovery

Reappearance. After a rest period, of an extinguished conditioned response, the *conditioned response returns*.

I'm planning to be **more spontaneous** in the future.



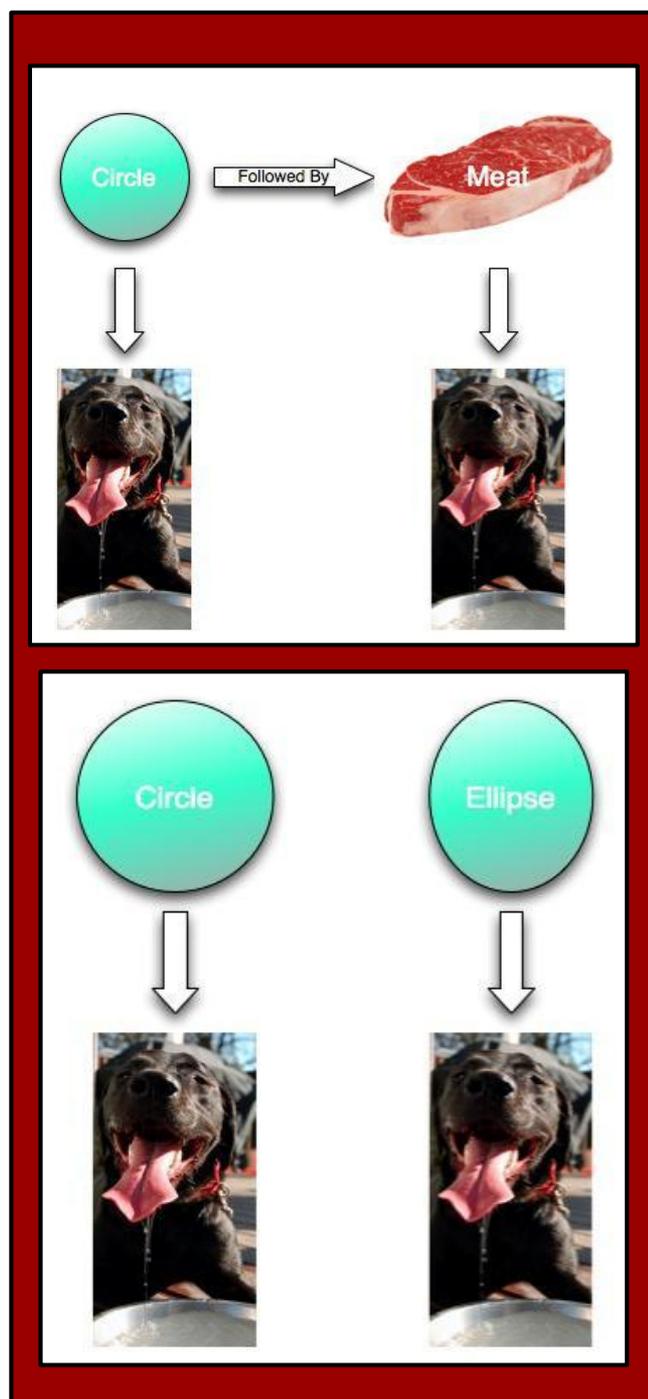
# Generalization

The tendency, once a response has been conditioned, for **stimuli similar to the CS** to **elicit similar responses**.

Stimulus generalization from a circle to an ellipse:  
Dogs also would salivate to *the sight of an ellipse*.

Thus, for these dogs, the CR of salivation to *the sight of a circle* showed stimulus generalization to the ellipse (Shenger-Krestovnika, 1921)

The classical conditioning theory of **phobic disorder** states that the **learned fear to a CS generalizes (transfers) to other stimuli**, with the greatest amount of transfer occurring to stimuli that are **most similar** to the CS.



# Discrimination

Learned ability to distinguish between a CS & other stimuli that does not signal UCS.

(Eventually, generalization can wear-off.)

In the circle/oval example, we eventually see **discrimination**:

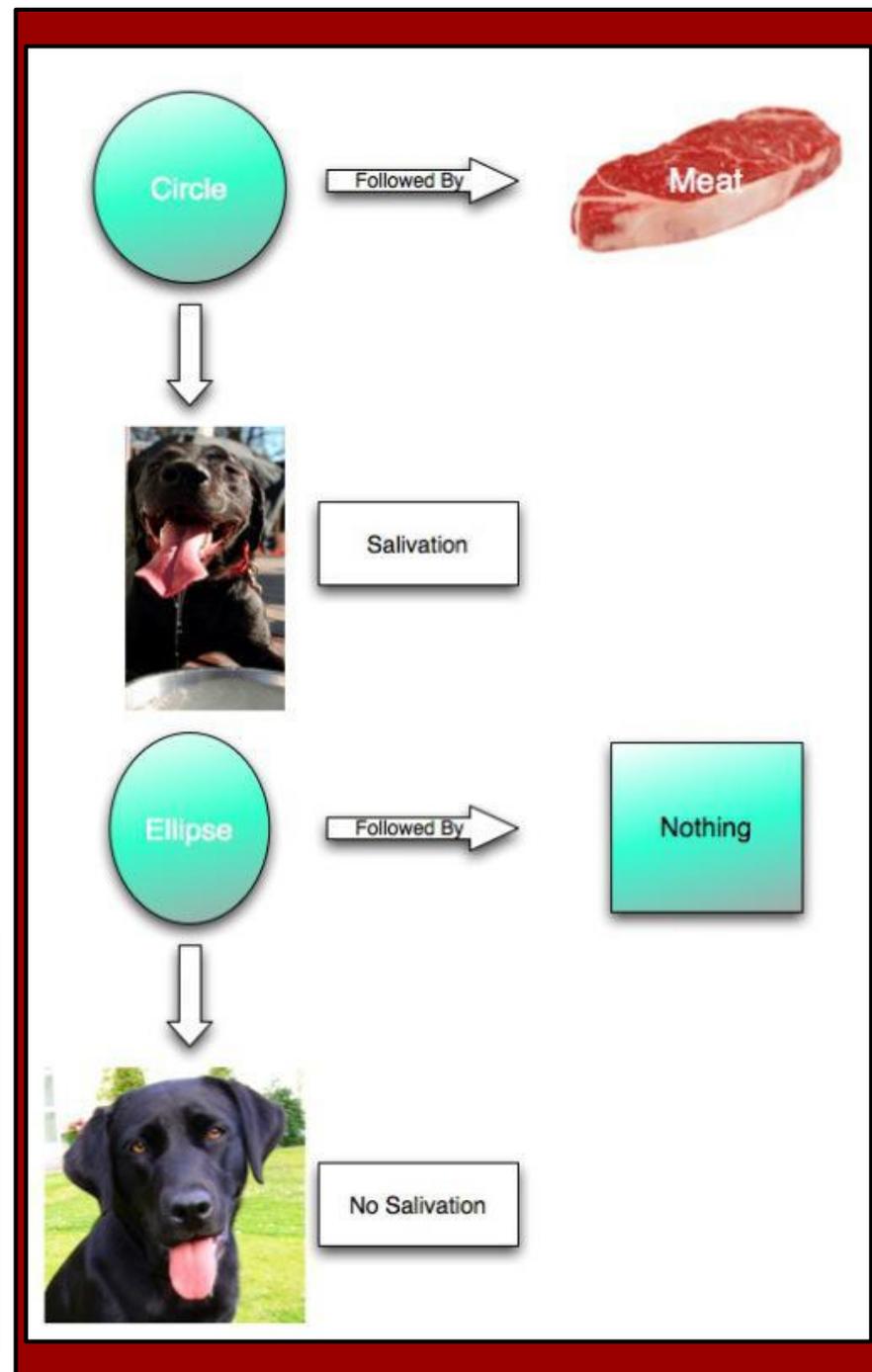
- If oval is never paired with meat...
- Dogs will only salivate for the circle.

Dogs were able to discriminate between the ellipse and the circle, and learned that they received meat only after seeing the circle (Shenger-Krestovnika, 1921)

## Classical conditioning theory of phobic disorder:

What will happen individuals learn to discriminate between a CS that is followed reliably by a fear-inducing UCS & stimuli that, although similar, are rarely or never followed by the UCS.

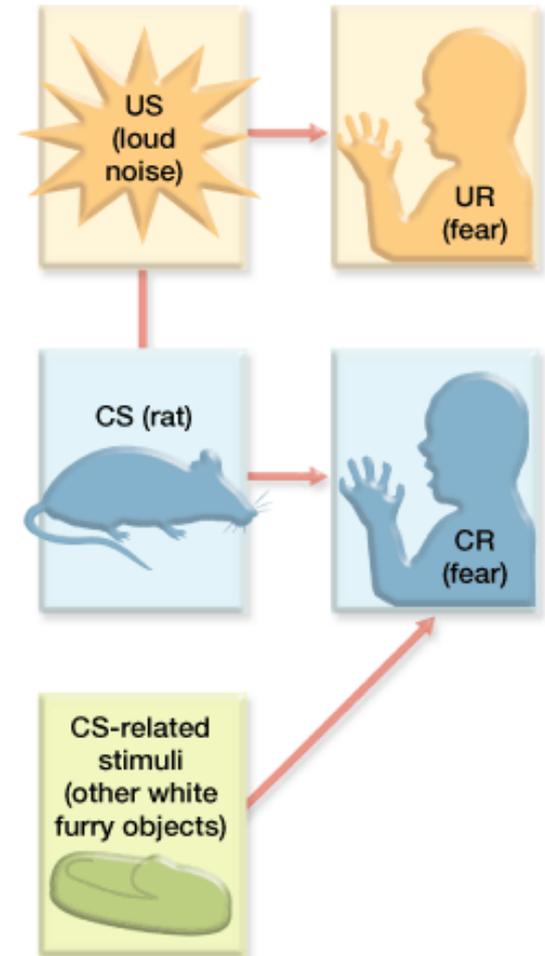
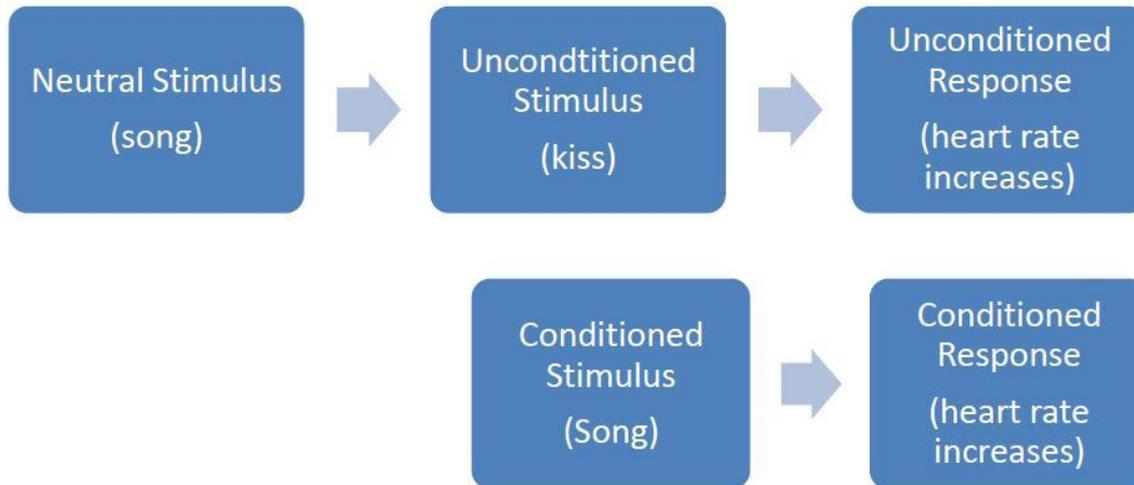
**For example, in the case of the dog that is fearful of all men because it has been treated cruelly by a particular man, it probably will learn to feel fear only to the man who abused it if most other men the dog meets treat it kindly.**



# Difference between Stimulus Generalization & Discrimination

How would you define *stimulus generalization* in your own words?

How would you define *stimulus discrimination* in your own words?



# John B. Watson - Classical Conditioning

Founder of **Behaviorism**.

Took Pavlov's ideas and put them to new & more rigorous tests.

## “Little Albert” & Generalization

Watson demonstrated that he could create **fear** in a child in response to a **neutral stimulus** (a rat).

Paired a rat with a fear-inducing stimulus (a loud noise), the child eventually became fearful of related stimuli = **Generalization**



Watson's Little Albert Study



CONDITIONED EMOTIONAL REACTIONS

JOHN B WATSON & ROSALIE RAYNER (1920)

[YouTube: Little Albert Footage](#)



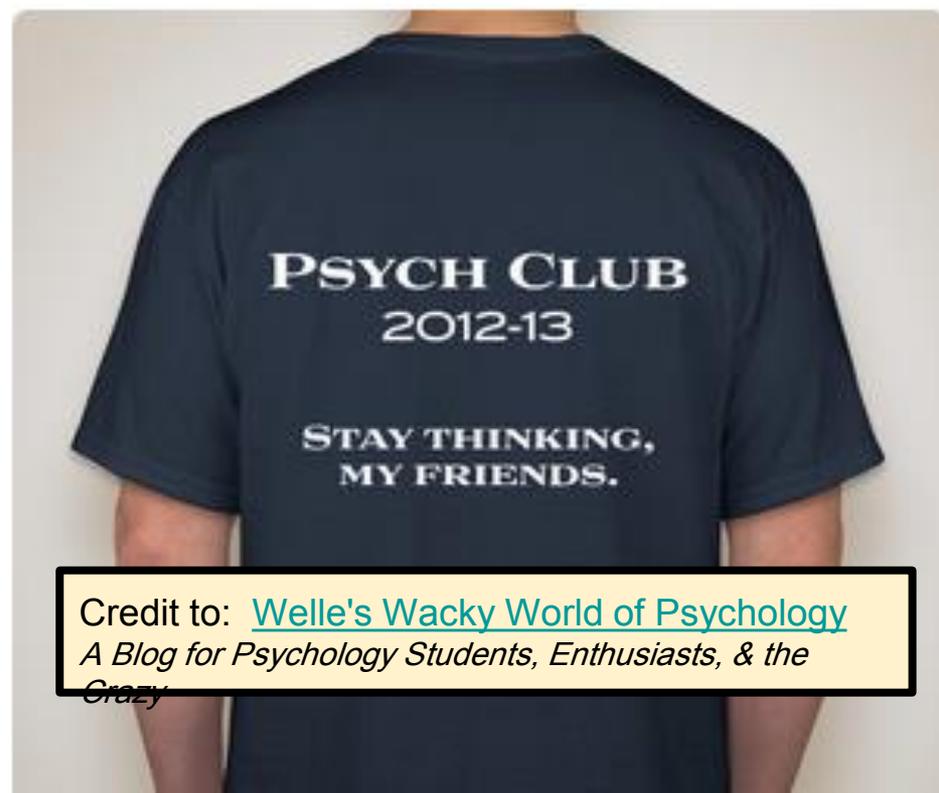
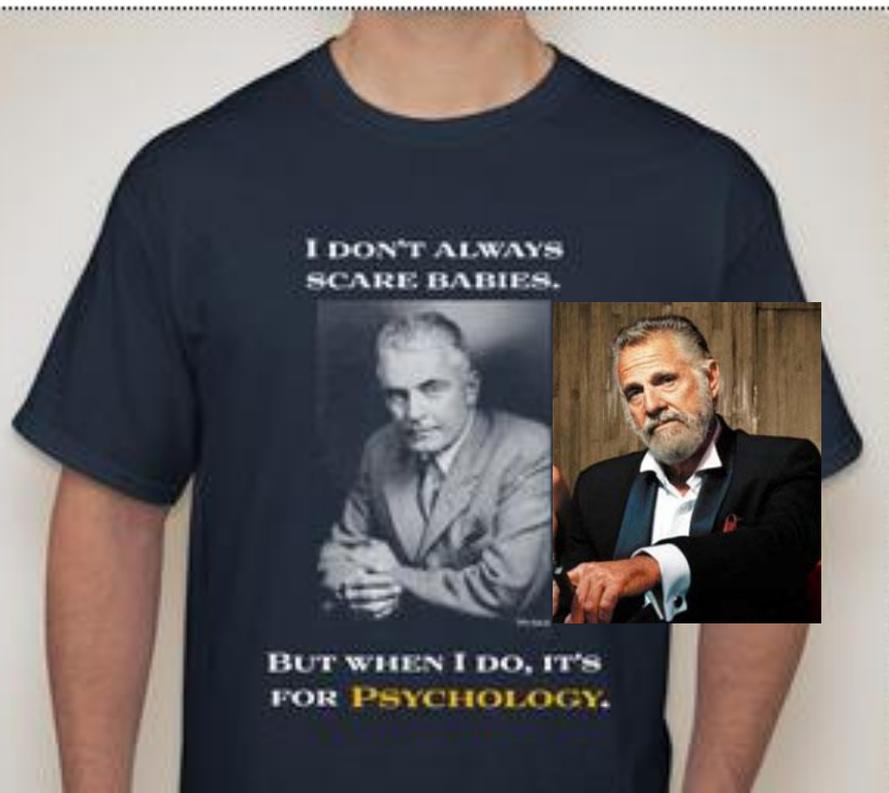
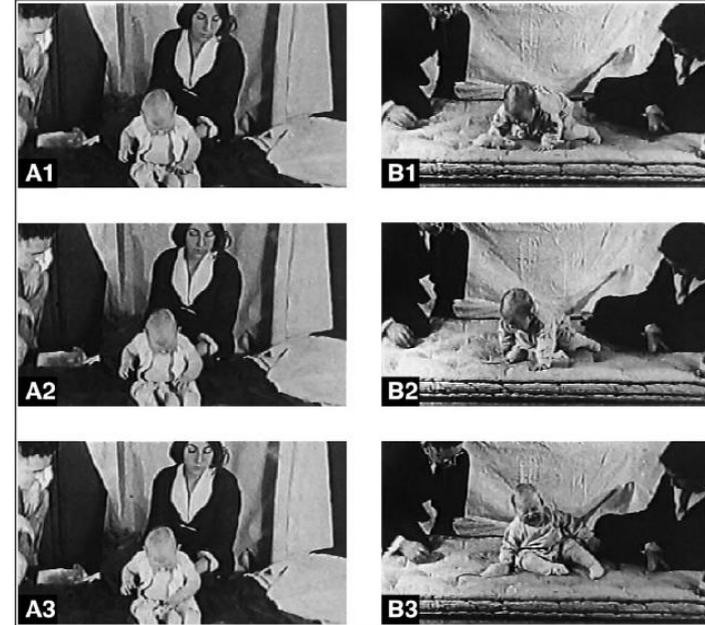
UCS - Loud Noise

UCR - Fear, crying, madness, misery

NS - Rat

CS - Rat

CR - Fear



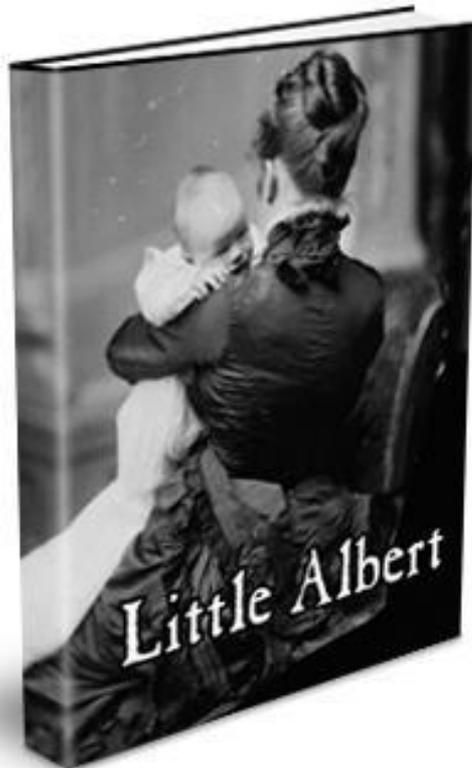
Credit to: [Welle's Wacky World of Psychology](#)  
A Blog for Psychology Students, Enthusiasts, & the Crazy

John B. Watson in his experiment with Little Albert, an 11 month old baby, studied *how emotions are learned*.

He presented a **white rat (NS)** & a **loud noise (UCS)** to Little Albert.

After several pairings, **Albert showed fear (CR) of the white rat**.

*Later, Albert generalized the fear to stimuli that were similar to CS, such as a beard.*



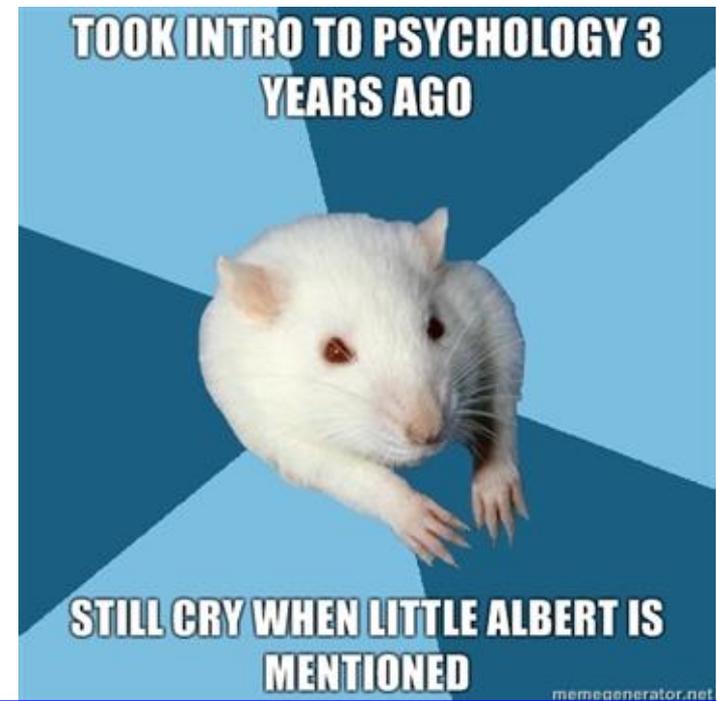
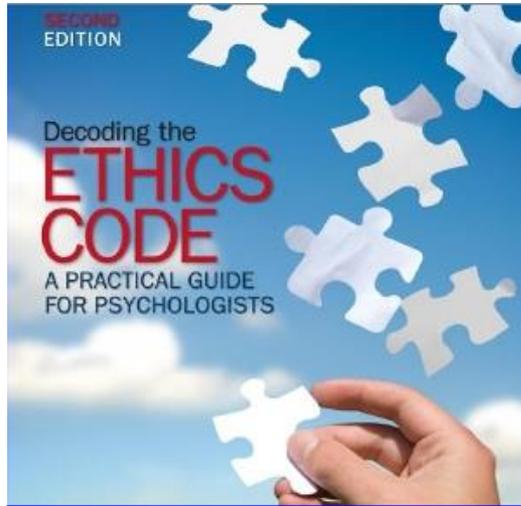
**Figure 6.8**

**The conditioning of Little Albert.** The diagram shows how Little Albert's fear response to a white rat was established. Albert's fear response to other white, furry objects illustrates generalization. In the photo, made from a 1919 film, John B. Watson's collaborator, Rosalie Rayner, is shown with Little Albert before he was conditioned to fear the rat.



# *After conditioning...*

*Is this study ethical?*

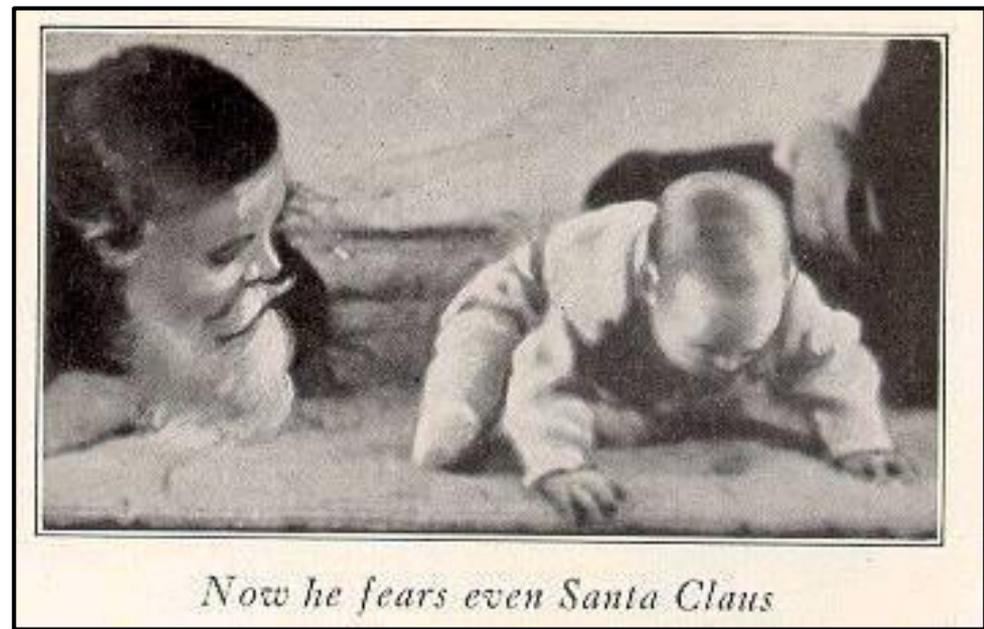
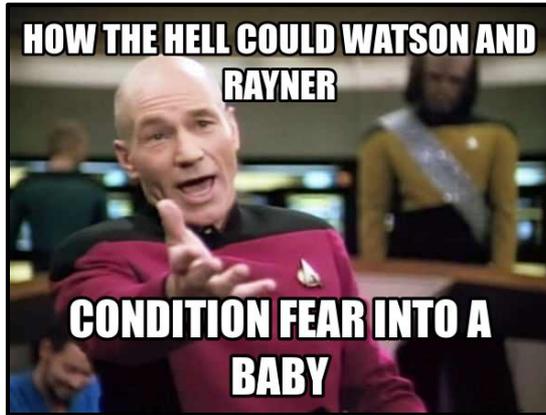


Standards set by the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (late 1970s):

Watson's experiment would **not** have been allowed for numerous reasons including its unethical context. It is now measured immoral to evoke reactions of fear in humans under laboratory circumstances, *except if the participant has given an informed approval to being purposely horrified as part of the experiment.*

*After conditioning...*

*Is this study ethical?*



Experiments should not cause human participants to suffer unnecessary distress or be physically harmed.

*Welfare* of human participants must always be the paramount consideration in any form of research, & this is especially true with specially protected groups such as children.

**“Albert” or Douglas Merritte died on May 10, 1925 of hydrocephalus** (developed in 1922). Condition was congenital (from birth).

**Hydrocephalus** (“water on the brain”): Abnormal accumulation of cerebrospinal fluid (CSF) in the ventricles, or cavities, of the brain.

May cause increased intracranial pressure inside the skull & **progressive enlargement of the head, convulsion, tunnel vision, & mental disability**.

“Little Albert” was a **very ill infant** who, perhaps because of the hydrocephalus he had had since birth, **could not see well &**, according to his relatives, **never learned to walk or talk**.

There is evidence that John B. Watson knew of this illness.



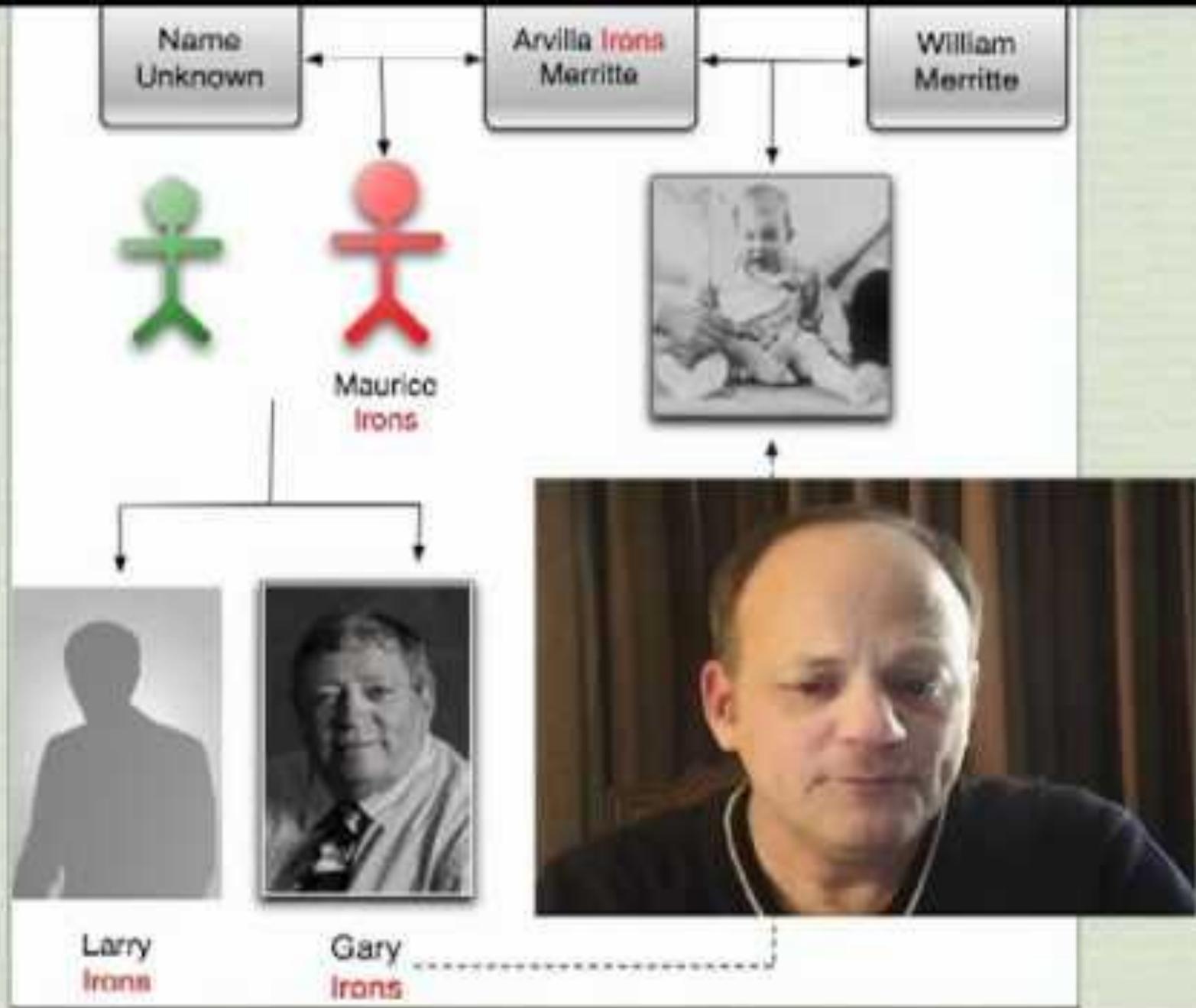
Watson & Rayner's (1920) *report reveals little evidence either that Albert developed a rat phobia or even that animals consistently evoked his fear* (or anxiety) during Watson and Rayner's experiment.

It may be useful for modern learning theorists to see how **the Albert study prompted subsequent research** [...] but it seems time, finally, to place the Watson and Rayner data in the category of “interesting but uninterpretable” results.

# YouTube: Finding Little Albert: A Secret History – BBC Four



# YOUTUBE Video: Little Albert has been found!

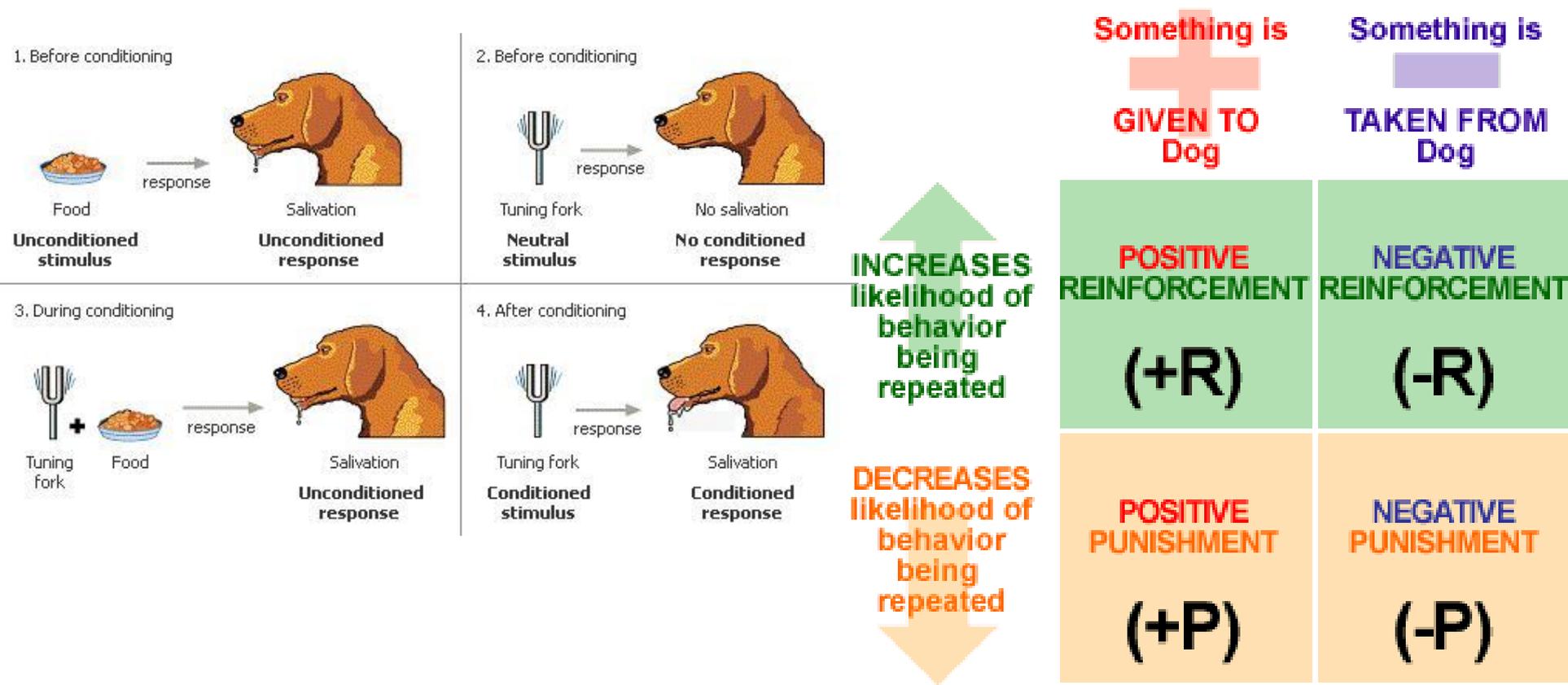


## Comparing Classical and Operant Conditioning: What's the Difference?

In summary, the processes of generalisation, discrimination, extinction, and spontaneous recovery occur in both classical and operant conditioning. Both types of conditioning depend on associative learning. In classical conditioning, an association is formed between two stimuli –for example, a tone and form, a white rat and a loud noise, a product and a celebrity. In operant conditioning, the association is established between a response and its consequences –studying hard and a high-test grade, or, in the world of rats, bar pressing and food.

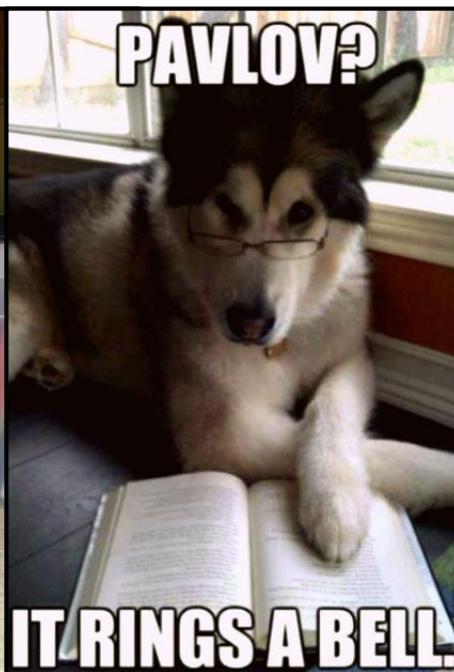
In classical conditioning, the focus is on what precedes the response. Pavlov focused on what led up to the salivation in his dogs, not on what happened after they salivated. In operant conditioning, the focus is on what follows the response. If a rat's bar pressing or your studying is followed by a reinforcer, that response is more likely to occur in the future.

Generally, in classical conditioning, the subject is passive and responds to the environment rather than acting on it. In operant conditioning, the subject is active and operates on the environment. Children *do* something to get their parents' attention or their praise.



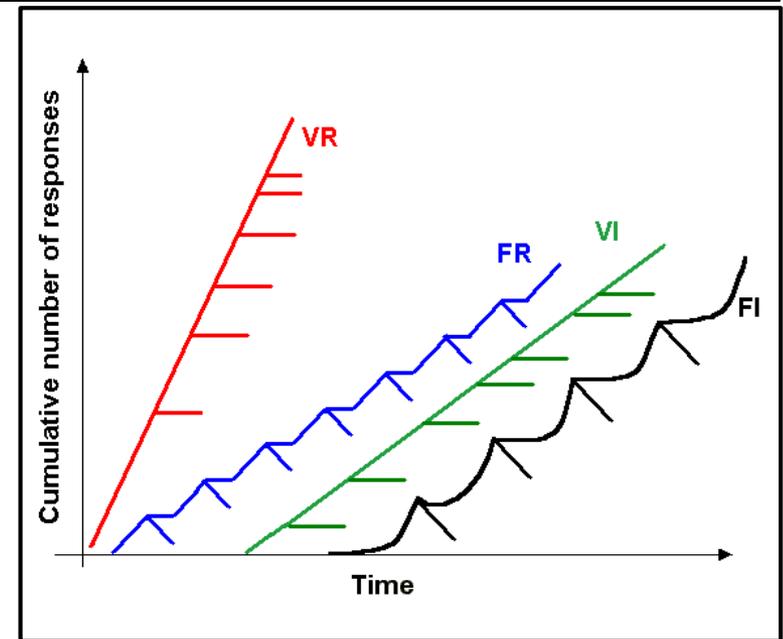
## Classical and Operant Conditioning Compared

Characteristics	Classical Conditioning	Operant Conditioning
Types of association	Between two stimuli	Between a response and its consequence
State of subject	Passive	Active
Focus of attention	On what precedes response	On what follows response
Types of response typically involved	Involuntary or reflexive response	Voluntary response
Bodily response typically involved	Internal responses: emotional and glandular reactions	External responses: muscular and skeletal movement and verbal responses
Range of responses	Relatively simple	Simple to highly complex
Responses learned	Emotional reactions: fear, likes, dislikes	Goal-oriented responses



## Reinforcement Schedule Compared

Schedule of Reinforcement	Response Rate	Pattern of Responses	Resistance to Extinction
Fixed-ratio schedule	Very high	Steady response with low ratio. Brief pause after each reinforcement with very high ratio.	The higher the ratio, the more resistance to extinction.
Variable-ratio schedule	Highest response rate	Constant response pattern, no pauses	Most resistance to extinction.
Fixed-interval schedule	Lowest response rate	Long pause after reinforcement, followed by gradual acceleration.	The longer the interval, the more resistance to extinction.
Variable-interval schedule	Moderate	Stable, uniform response.	More resistance to extinction than fixed-interval schedule with same average interval.



## The Effects of Reinforcement and Punishment

<b>Reinforcement</b> <b>(Increases or strengthens a behaviour)</b>	<b>Punishment</b> <b>(Decreases or suppresses a behaviour)</b>
<b>Adding a Positive (positive reinforcement)</b> Presenting food, money, praise, attention, or other rewards.	<b>Adding a Negative</b> Delivering a pain-producing or otherwise aversive stimulus, such as a spanking or an electric shock.
<b>Subtracting a Negative (negative reinforcement)</b> Removing or terminating some pain-producing or otherwise aversive stimulus, such as an electric shock.	<b>Subtracting a Positive</b> Removing some pleasant stimulus or taking away privileges such as TV watching or use of automobile.



**"Here at Tiny-Taught Preschool we're proud of our 'no spanking' policy."**