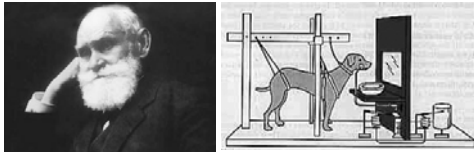


RESPONDENT (CLASSICAL) CONDITIONING

Classical conditioning is based on the principle that certain stimuli automatically *elicit* a certain response with no prior learning experience.

RESPONDENT (CLASSICAL) CONDITIONING

Based on the work of Pavlov



RESPONDENT (CLASSICAL) CONDITIONING

Unconditioned stimulus (US): a stimulus which elicits a response without prior learning

Unconditioned response (UR): a response elicited by a US.

Unconditioned reflex: US-UR relationships such as:

- food and salivation,
- genital stimulation and sexual arousal,
- high temperatures and sweating,
- low temperatures and shivering,
- nasal irritation and sneezing,
- burns and hand withdrawal,
- and a number of infant reflexes, such as: stroking the cheek and head turning, touching the lips and sucking, object in the hand and grasping, etc.

RESPONDENT (CLASSICAL) CONDITIONING

- Neutral stimulus: any stimulus which does not elicit a certain response, and through classical conditioning, becomes a conditioned stimulus.

RESPONDENT (CLASSICAL) CONDITIONING

- Respondent conditioning occurs when a neutral stimulus is followed closely in time by a US which elicits a UR.
- Through this pairing of a neutral stimulus with a US, the neutral stimulus will acquire the ability to elicit the UR.
- When the neutral stimulus has attained the capacity to elicit the response, it is now called a conditioned stimulus (CS) and the response is called a conditioned response (CR).

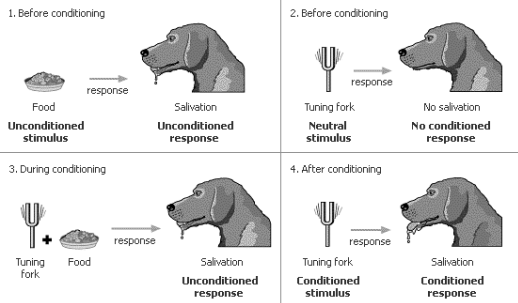
Standard Pairing (Trace Conditioning)

US → UR
 Food → salivation

Neutral stimulus + US → UR
 Bell + Food → Salivation

CS → CR
 Bell → Salivation

Standard Pairing (Trace Conditioning)



When Pavlov's Dog Begs ...



Standard Pairing (Trace Conditioning)

In standard pairing, the CS precedes the US by a short interval (as little as .5 seconds) and overlaps into the presentation of the US

Factors Influencing Respondent Conditioning:

- The greater the number of pairings of a CS with a US, the greater the ability of the CS to elicit the CR.
- Stronger conditioning occurs if the CS precedes the US by half a second, rather than by a longer time or rather than following the CS.
- A CS acquires greater ability to elicit a CR if the CS is always paired with a given US than if it is only occasionally paired with the US.

Factors Influencing Respondent Conditioning:

- When several neutral stimuli precede a US, the stimulus that is most consistently associated with the US is the one most likely to become a strong CS.
- Respondent conditioning will develop more quickly and strongly when the CS or US or both are intense rather than weak.

Delay Conditioning

- ♦ The CS precedes the US by a significant period and stops right before the US.
- ♦ For example, the dog first hears the sound of the can opener (originally the neutral stimulus) and then is fed the dog food (US). Over time, the dog will salivate when it hears the sound of the can opener.

Temporal Conditioning

- ♦ The US is presented repeatedly at a consistent time interval.
- ♦ Eventually, time itself begins to act as the CS.

Temporal Conditioning

- ♦ For example, if zoo animals are fed at noon each day, they come to anticipate feeding time.
- ♦ At noon, the animals may begin to salivate or pace their cage even if there are no other cues that feeding is imminent.
- ♦ Time is the CS eliciting the CR of the animals anticipatory behavior.

Simultaneous Conditioning

- ◆ The neutral stimulus and the US completely overlap.
- ◆ For example, the tone is sounded at exactly the same time the food is presented.
- ◆ No “conditioning” or learning actually takes place.

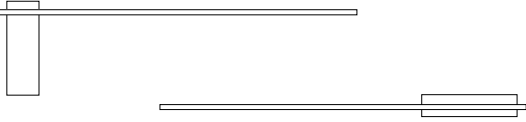
Backward Conditioning

- US first then CS → UR
- CS -/> CR


- No response to CS. No conditioning occurs.

Pseudo-Conditioning

- Occurs accidentally
- A neutral stimulus that was not deliberately paired with either the US or the CS comes to elicit the CR.
- For example, Pavlov’s dog salivates when the light to the room is first turned on.
- May be caused by either inadvertent pairing or heightened arousal




- ◆ Closeness in time between the CS and neutral stimulus, or contiguity, is not sufficient for learning.
- ◆ Contingency between the US and CS is required for conditioning to occur.



Higher Order Conditioning

- ◆ A deliberate process in which a conditioned stimulus (CS) is paired with another neutral stimulus, until eventually the new neutral stimulus also becomes a CS.
- ◆ $NS + CS_1 \rightarrow CR$
- ◆ $CS_2 + CS_1 \rightarrow CR$



Higher Order Conditioning

- ◆ Once CS_2 elicits the CR, *second order conditioning* has been accomplished.
- ◆ *Third order conditioning* occurs when a third neutral stimulus is paired with the other CS's.
- ◆ Conditioning beyond the third level is unsuccessful.

Overshadowing:

- When two or more CSs are presented with a single US, the strength of conditioning to each CS depends on their relative intensity.
- CS1 (e.g. bright light) + CS2 (e.g. dim light) + US → UR
- CS1 + CS2 → CR
- However, when presented individually, CS1 will produce a stronger CR than CS2 because it was a more salient stimulus.

Overshadowing:

- Salience: the intensity of the subjective intensity of the stimulus (not the objective intensity)

Blocking:

- When the effect of prior pairing of one stimulus with a US stops the US being associated with other subsequently presented stimuli.
- Example:
Training session 1 Training session 2 Test Session
CS1 + US CS1 + CS2 + US CS2 only
- The result will be that when tested individually, there will be a strong conditioning to CS1 but little or no conditioning to CS2.

Respondent Stimulus Generalization

- ◆ The subject automatically generalizes from a CS to other similar neutral stimuli.
- ◆ For example Watson's "poor Little Albert" conditioned to fear white rats also automatically became fearful of other furry white things such as a Santa mask.

Respondent Stimulus Discrimination

- ◆ The subject learns to discriminate between two similar neutral stimuli because one has been paired with the US (e.g., a tone at 500 Hz) while the other has not (e.g., a tone at 100 Hz).

Respondent Stimulus Discrimination

- ◆ If the discriminations are made too difficult, such as discriminating between a 450 Hz tone and a 500 Hz tone, *experimental neurosis* may result. For example, a dog may become agitated, and then no longer be able to successfully discriminate the original discrimination it had mastered.

Habituation

- ♦ The subject becomes accustomed to and less responsive to the US after repeated exposure.
- ♦ When the subject has habituated, the US no longer elicits the UR.
- ♦ For example, you live near the railroad tracks. After some time, you are no longer startled by the loud noise of the passing trains.
- ♦ Habituation *always* involves the US not the CS.

Ways to “undo” classical conditioning:

- ♦ Note--these are very important points when it comes to treatment.
- ♦ **Respondent extinction:** presenting a CS while withholding the US; after a number of such presentations, the CS loses its ability to elicit the CR.
- ♦ Note that repeated presentations of the US without the CS do not result in extinction; this is because the CS never loses its signaling value.

Respondent extinction...

- ♦ During extinction trials, following a rest period, if the CS is presented, the CR often briefly reappears. This is known as *spontaneous recovery*.

Ways to “undo” classical conditioning:

- ♦ **Counterconditioning:** conditioning a new response to the CS at the same time the former CS is being extinguished; a CS will lose its ability to elicit a CR if that CS is paired with a stimulus that elicits a response that is *incompatible* with the CR. (Remember this point when we talk about systematic desensitization.)

Respondent Conditioning and Emotions

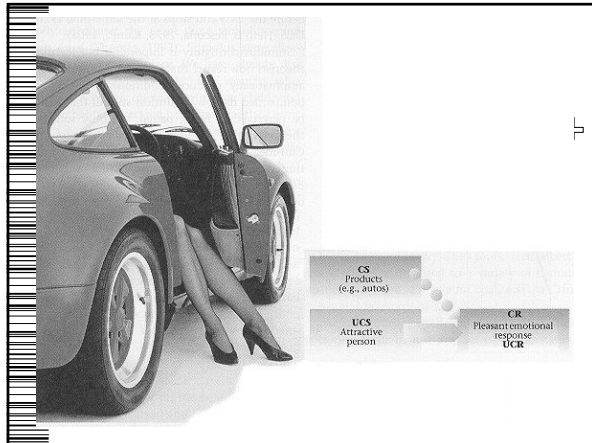
Respondent conditioning is most involved in the “feelings” component of our emotions, or those features of the autonomic nervous system, such as breathing, heart beat, glandular functioning, arousal, etc. These are the physiological components of emotions.

Often, these responses are easiest viewed in infants.

- ♦ E.g. Loud sounds elicit crying, grasping, catching one’s breath labeled as fear
- ♦ Restricting movement elicits screaming, crying, body stiffening labeled as anger.
- ♦ Rocking, gentle tickling elicit cooing and smiling labeled as joy.

Respondent Conditioning and Emotions continued...

- ♦ John B. Watson & Rosalie Rayner (1920) The Little Albert experiments demonstrated classically conditioning an autonomic fear response.
- ♦ Other aspects of our emotions, such as our actions, awareness, etc. are more under the control of operant conditioning (to be discussed more at a later lecture).



Applications of Respondent Conditioning:

- ♦ Aversion therapy was developed as an attempt to counteract the power of undesirable reinforcers, such as alcohol, overeating, cigarettes, drugs, sexual perversions, or anything else that tends to harmful or subject to overindulgence.

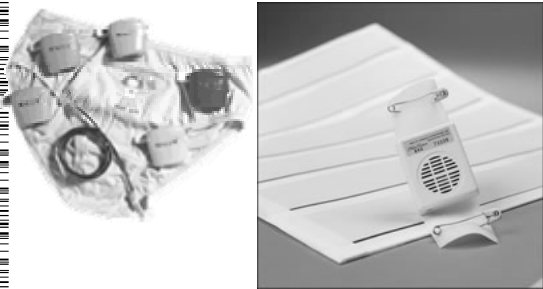
Applications of Respondent Conditioning:

- ◆ Aversion therapy involves pairing an undesirable reinforcer with an aversive event, such as pairing alcohol with a drug to induce nausea.
- ◆ Limited use of aversion therapy due to ethical issues and limited long-term effects.

Applications of Respondent Conditioning:

- ◆ Another application: bell and pad method of treating nocturnal enuresis.
- For most individuals the sensation of a full bladder while asleep is an unconditioned stimulus that will bring about the unconditioned response of waking up so they can void their bladder.

Applications of Respondent Conditioning:



Treatment of Enuresis with Respondent Conditioning:

Non-enuretic:
US → UR
Full bladder Wake up

Treatment of Enuresis with Respondent Conditioning:

For a bed-wetter, this stimulus-response association is not naturally-occurring, causing them to sleep through the cues of a full bladder and wet the bed.

Bed-wetter:
Full bladder --/→ Wake up

Treatment of Enuresis with Respondent Conditioning:

Therefore, one of the treatments of childhood enuresis involves conditioning this stimulus-response pair by pairing the initially-neutral stimulus of a sensation of a full bladder with a stimulus which more reliably and naturally causes the response of waking up, i.e. the loud noise of an alarm.

Treatment of Enuresis with Respondent Conditioning:

Conditioning:
Initially neutral stimulus + US → UR
Full bladder + alarm → waking up

Treatment of Enuresis with Respondent Conditioning:

After conditioning:
CS → CR
Full bladder waking up

Another Application of Respondent Conditioning

Systematic Desensitization:

Treatment for phobias and panic disorders.
