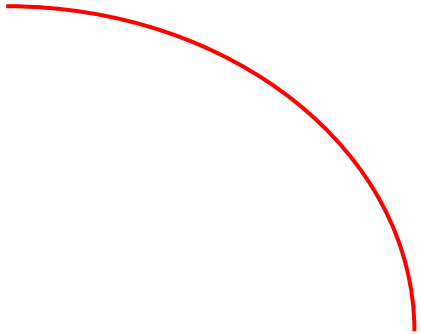
Some Basic Conditioning Phenomena

- **Acquisition**
- acquisition is the process of developing and strengthening a conditioned response

- through repeated pairings of neutral
- stimulus (NS) with an unconditioned stimulus (US).

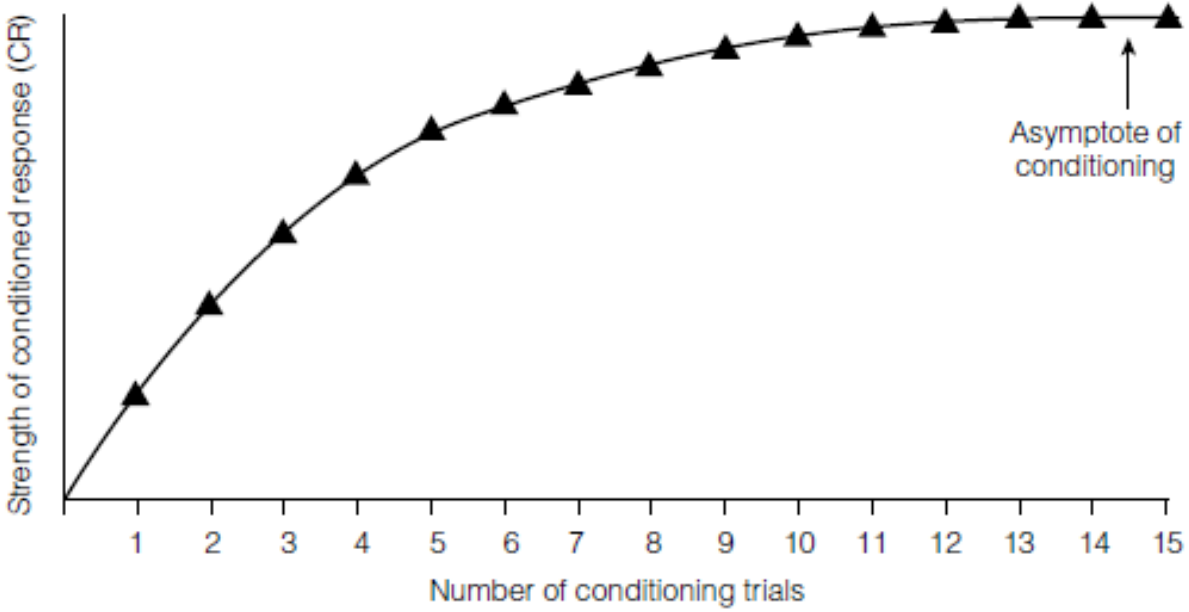
- In general, acquisition proceeds rapidly during early conditioning trials,



then gradually levels off

- The maximum amount of conditioning that can take place in a particular situation is known as the asymptote of conditioning

FIGURE 4.1 A typical acquisition curve in which strength of conditioning increases rapidly during the first few trials and then gradually levels off over subsequent trials.



- **The asymptote of conditioning, as well as the speed of conditioning, is dependent on several factors.**

1. more-intense USs produce stronger and more rapid conditioning than do less-intense USs.

- For example, we can obtain stronger conditioning of a salivary response when the US consists of a large amount of food or a highly preferred food than if it consists of a small amount or less preferred food.

Severe bite

Minor bite

2. Similarly, more-intense NSs result in stronger and more rapid conditioning than do less-intense NSs.

- For example, a loud metronome that has been paired with food produces a stronger response of salivation than a faint metronome that has been paired with food.

Extinction

- In a process known as extinction, a conditioned response can be weakened or eliminated
- When
- the conditioned stimulus (CS) is repeatedly presented in the absence of the US.
- The term extinction also applies to the procedure whereby this happens, namely, the repeated presentation of the CS in the absence of the US.

Metronome: Food → *Salivation*
NS US UR
Metronome → *Salivation*
CS CR

If we now continue to present the metronome by itself and never again pair it with food

(each presentation of the metronome being known as an "extinction trial")

Metronome → No salivation
"NS" —

the conditioned response of salivation will eventually die out—that is, the CR of salivation will have been **extinguished.**

- The process of extinction is the decrease in the strength of the CR, and the procedure of extinction is the means by which this is carried out, namely, the repeated presentation of the metronome without the food.

- In a similar manner, if a dog that once bit me never again bites me, my fear response to the dog should eventually extinguish.

- Unfortunately, some people who were once bitten by a dog continue to fear that dog as well as other dogs, in which case we might say that they have a **"PHOBIA"** about dogs.

- But if the person has never again been bitten by the dog, why is his or her fear so persistent?

- One reason is that people who fear dogs tend to avoid them, and to the extent that they avoid them, their fear response cannot be extinguished.

- this tendency to avoid a feared event is a major factor in the development and maintenance of a phobia, and treatment procedures for phobias are often based on preventing this avoidance response from occurring.

- Once a CR has been extinguished, one should not assume that the effects of conditioning have been completely eliminated.

- a response that has been extinguished can be reacquired quite rapidly when the CS (or NS) is again paired with the US.

- If we again pair the metronome with food following an extinction procedure, it may take only a few pairings before we achieve a fairly strong level of conditioning. Likewise, if I somehow manage to overcome my phobia of dogs, I might rapidly reacquire that phobia if I again have a frightening experience with dogs.

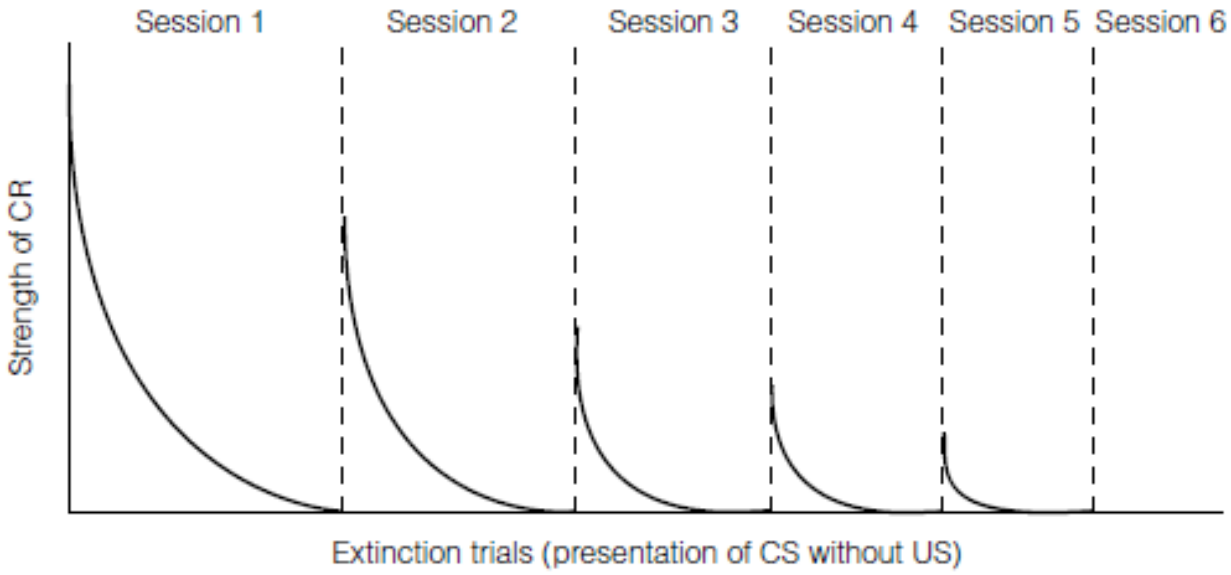
- As further evidence that extinction does not completely eliminate the effects of conditioning, an extinguished response can reappear even in the absence of further pairings between the CS and US.

- Suppose, for example, that we do extinguish a dog's conditioned salivary response to a metronome by repeatedly presenting the metronome without food
- By the end of the extinction session, the metronome no longer elicits salivation.
- However, if we come back the next morning and sound the metronome, the dog will very likely salivate.

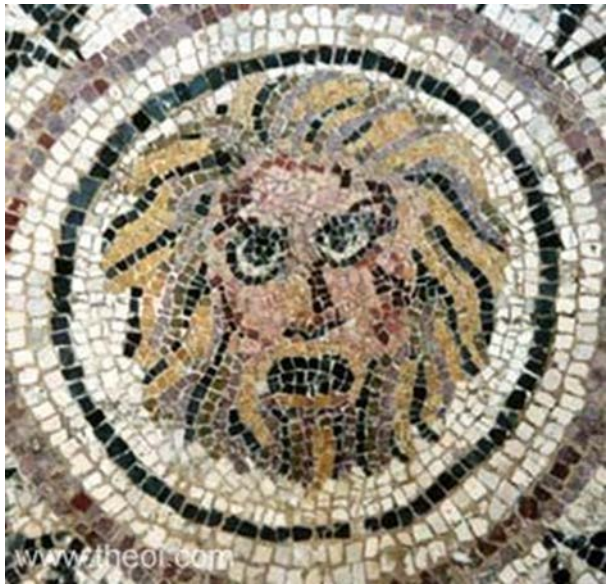
Spontaneous recovery

- **Spontaneous recovery** is the reappearance of a conditioned response following a rest period after extinction.
- Fortunately, spontaneous recovery does not last forever.
- In general, each time the response recovers it is somewhat weaker and is extinguished more quickly than before
- Therefore, after several extinction sessions, we should be able to sound the metronome at the start of the session and fi nd little or no salivation.

FIGURE 4.2 Hypothetical results illustrating a decline in spontaneous recovery across repeated sessions of extinction.



- The phenomenon of spontaneous recovery is particularly important to remember when attempting to extinguish a conditioned fear response.



- For example, we might arrange for a dog-phobic child to spend several hours with a dog.
- At the end of that time, the child's fear of the dog might seem to have been totally eliminated.
- Nevertheless, we should expect that the fear will at least partially recover the next time the child is confronted with a dog, and that several sessions of extinction may be needed before the fear is completely eliminated.

- Similarly, if you feel terribly anxious with a new date at the start of the evening but more at ease after a couple of hours, do not be disappointed if you again find yourself becoming quite anxious at the start of your next date.

- It may take several dates with that person before you feel comfortable right from the outset.

- Likewise, following a breakup, it may take a while before your feelings of attraction to the other person are finally extinguished, and even Then they may intermittently reappear for a considerable period of time

- To Pavlov (1927), the phenomenon of spontaneous recovery indicated that extinction is not simply a process of unlearning the conditioning that has taken place.

- Rather, extinction involves learning something new, namely, to inhibit the occurrence of the CR in the presence of the CS.

- For example, rather than unlearning the response of salivation to the metronome during extinction,
- the dog learns to inhibit the response of salivation to the metronome, with the connection between the metronome and salivation still remaining intact on some underlying level.
- Spontaneous recovery may therefore represent the partial weakening of this inhibition during the rest period between extinction sessions.

- **Disinhibition** is the sudden recovery of a response during an extinction procedure when a novel stimulus is introduced.

- For example, if we are in the process of extinguishing conditioning to a metronome but then present a novel humming noise in the background, the sound of the metronome may again elicit a considerable amount of salivation

Metronome: Food → *Salivation*
NS US UR
Metronome → *Salivation*
CS CR

Following repeated presentations of the metronome:

Metronome → *Weak salivation* (Partial extinction)
CS **CR**

(Presentation of the novel humming noise in background)

Novel humming noise { Metronome → *Salivation*
CS **CR**

Similarly, if your anxiety while giving a speech in class gradually fades, it may suddenly recover when a noisy ceiling fan starts up or someone walks in late.

Note that

- the phenomenon of disinhibition is similar to dishabituation
- in which the presentation of a novel stimulus results in the reappearance of a habituated response.
- To distinguish these concepts, it will help to remember that dishabituation involves the reappearance of a habituated response
- and disinhibition involves the recovery of a response that has become partially inhibited due to extinction

Stimulus Generalization and Discrimination

- Classical conditioning would not be very useful if it only enabled us to learn about relationships between particular stimuli

- For example, if we are bitten by a spider, it would not be very helpful for us to fear only that particular spider

- From an evolutionary perspective, it would be far more adaptive to learn to fear other spiders as well, particularly those spiders that look similar to the one that bit us.

- Fortunately, this is precisely what happens, through a process known as stimulus generalization.

- stimulus generalization is the tendency for a CR to occur in the presence of a stimulus that is similar to the CS.

- In general, the more similar the stimulus is to the original CS, the stronger the response.
- For example, if a dog is conditioned to salivate to a tone that has a pitch of 2,000 Hz, it will salivate to similar tones as well.
- But it will salivate more strongly to a 1,900-Hz tone or a 2,100-Hz tone than it will to a 1,000-Hz tone or a 3,000-Hz tone.
- In other words, tones that are most similar to the original CS will elicit the strongest response.

- Similarly, after being bitten by a dog, a child will probably fear not only that particular dog but other dogs as well. And the child is particularly likely to fear dogs that closely resemble the dog that bit him.

- However, generalization can also occur across nonphysical dimensions, particularly in humans who use language.

- Semantic generalization is the generalization of a conditioned response to verbal stimuli that are similar in meaning to the CS.

- For example, if humans are exposed to a conditioning procedure in which the sight of the word car is paired with shock, that word eventually becomes a CS that elicits a fear response.

- When participants are shown other words, generalization of the fear response is more likely to occur to those words that are similar in meaning to car,
- *Car* → *automobile or truck,*
- *Car* → *bar* or *tar.*
- *For this reason, words that have similar meaning for an individual—for example, Jennifer Lopez and J-Lo—are likely to generate the same conditioned emotional response.*

- The opposite of stimulus generalization is stimulus discrimination, the tendency for a response to be elicited more by one stimulus than another.

- For example, if the dog salivates in the presence of the 2,000-Hz tone but not in the presence of a 1,900-Hz tone,

- then we say that it is able to discriminate,
- has formed a discrimination, between the two stimuli

- Such discriminations can be deliberately trained through a procedure known as discrimination training.

- If we repeatedly present the dog with one type of trial in which a 2,000-Hz tone is always followed by food
- another type of trial in which a 1,900-Hz tone is never followed by food,
- the dog will soon learn to salivate in the presence of the 2,000-Hz tone and not in the presence of the 1,900-Hz tone.

2,000-Hz tone: Food → *Salivation*

NS US UR

1,900-Hz tone: No food

NS —

Test Phase

2,000-Hz tone → *Salivation*

CS+ CR

1,900-Hz tone → No salivation

CS– —

- As a result of training, the 2,000-Hz tone has become an excitatory CS (or CS+) because it predicts the presentation of food, and the 1,900- Hz tone has become an inhibitory CS (or CS–) because it predicts the absence of food.

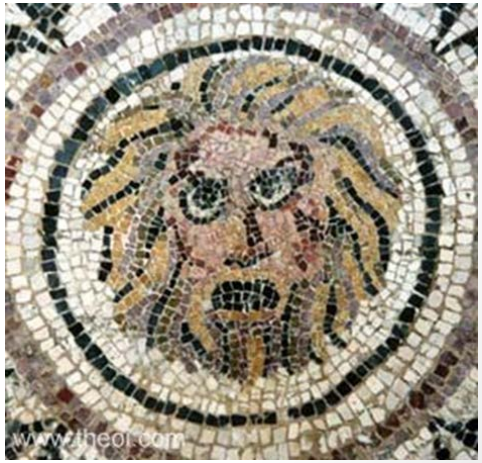
- discrimination training is a useful means for determining the sensory capacities of animals.

- For example, by presenting an animal with a CS+ tone and a CS− tone that are successively more and more similar, we can determine the animal's ability to discriminate between tones of different pitch.
- If it salivates to a CS+ of 2,000 Hz and does not salivate to a CS− of 1,950 Hz, then it has shown us that it can distinguish between the two.
- But if it salivates to both a CS+ of 2,000 Hz and a CS− of 1,950 Hz, then it cannot distinguish between the two.

- Generalization and discrimination play an important role in many aspects of human behavior.

- Phobias, for example, involve not only the classical conditioning of a fear response but also an overgeneralization of that fear response to inappropriate stimuli.

For example, a woman who has been through an abusive relationship may develop feelings of anxiety and apprehensiveness toward all men.



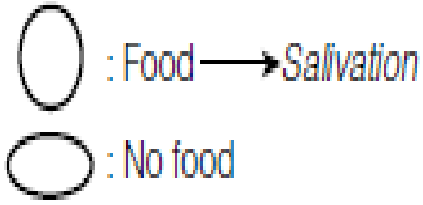
Eventually, however, through repeated interactions with men, this tendency will decrease and she will begin to adaptively discriminate between men who are potentially abusive and those who are not.

Discrimination Training and Experimental Neurosis

- Overgeneralization is not the only way that processes of discrimination versus generalization influence the development of psychological disorders.

- Pavlov (1927, 1928) reported an interesting discovery made by a colleague, Shenger-Krestovnikova, that arose during a discrimination training procedure.

- In this experiment, an image of a circle signaled the presentation of food and an ellipse signaled no food



- Following this, the ellipse was gradually made more circular, making it more difficult for the dog to determine when food was about to appear.