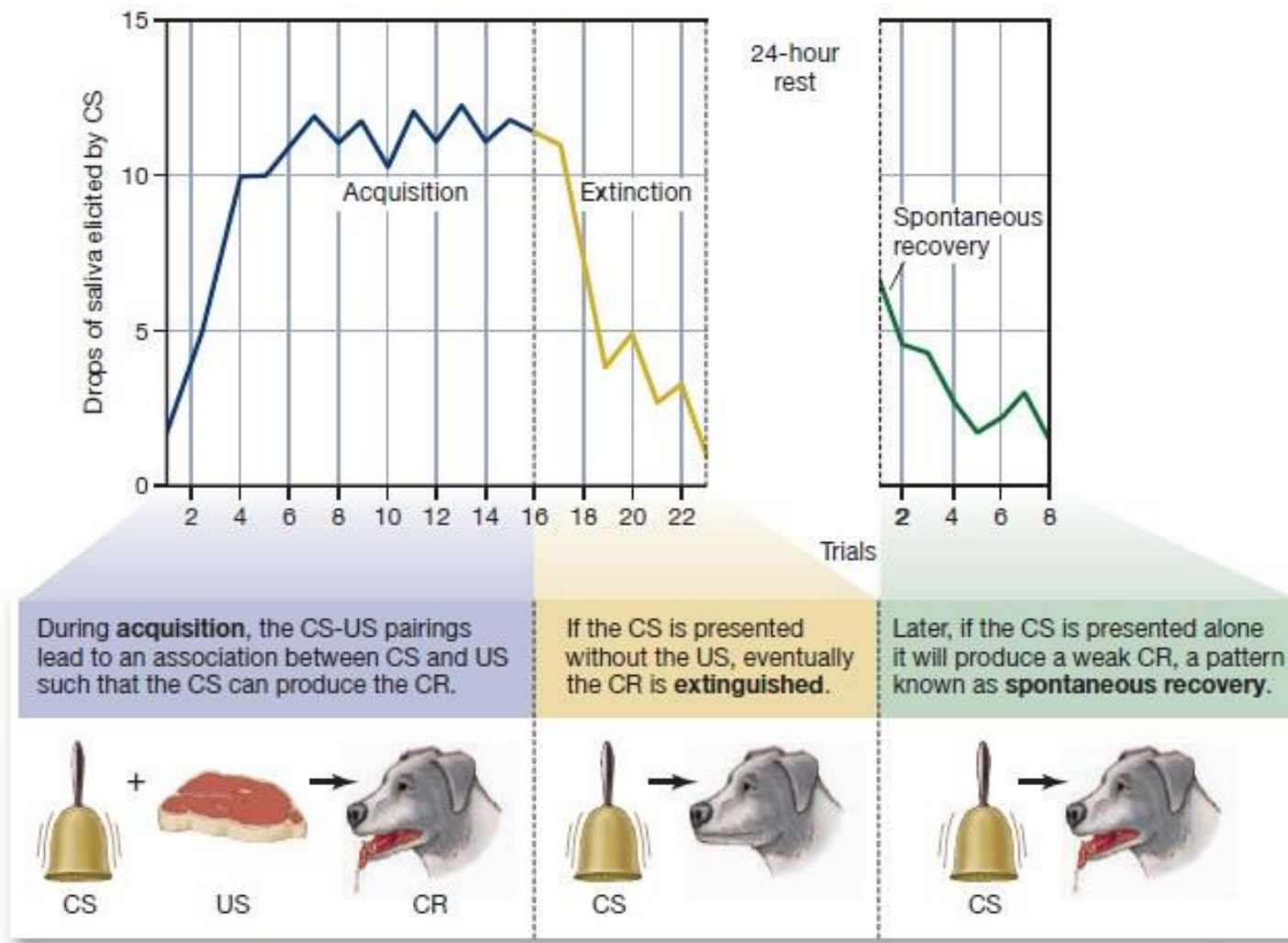


Lecture 6

Learning outcome of behaviour

Thursday
18/8/2022



In most conditioning paradigms, extinction is _____ than the original acquisition of the conditioned response.

7.8 Extinction of a classically conditioned response The figure shows the decrease in the amount of saliva secreted (the CR) with increasing number of extinction trials—that is, trials on which the CS is presented without the US. However, if the animal then spends a little time away from the conditioning apparatus, the CR will reappear the next time the animal encounters the CS—a pattern known as spontaneous recovery.

- Military dogs sniffing bombs
 - Washing hands before a meal
 - Submitting projects within deadline
-
- How do we learn new behaviours?

operant conditioning

The process whereby organisms learn to make or to refrain from making certain responses in order to obtain or avoid certain outcomes.



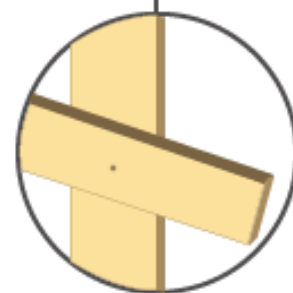
A pulley supporting the string which attaches to the bolt.



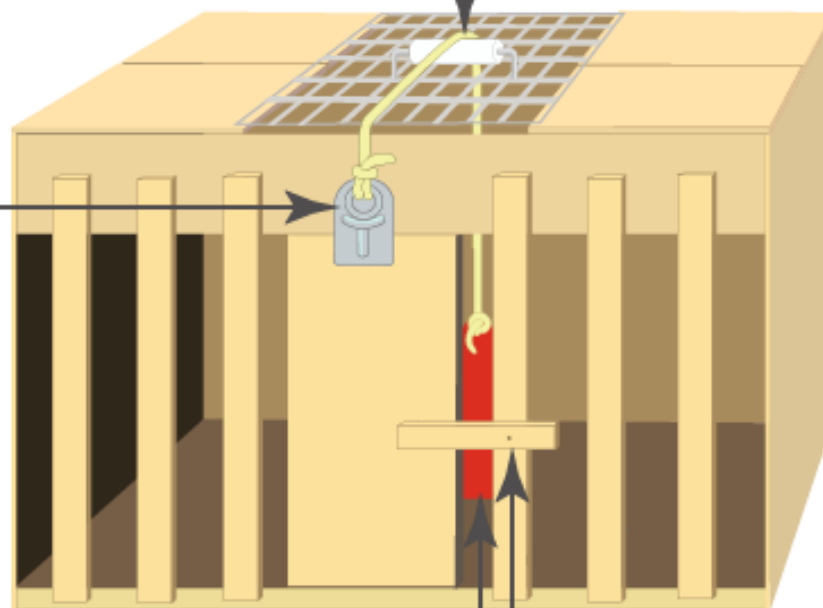
The bolt inserted in a ring holding the gate on the top.



The string with a tag for attracting the animal into pulling it, to lift the bolt from the ring.

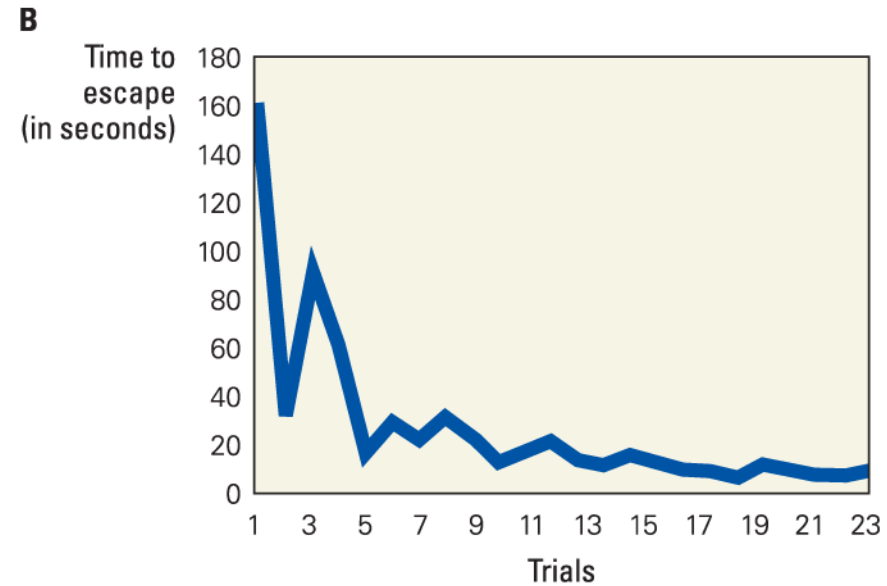
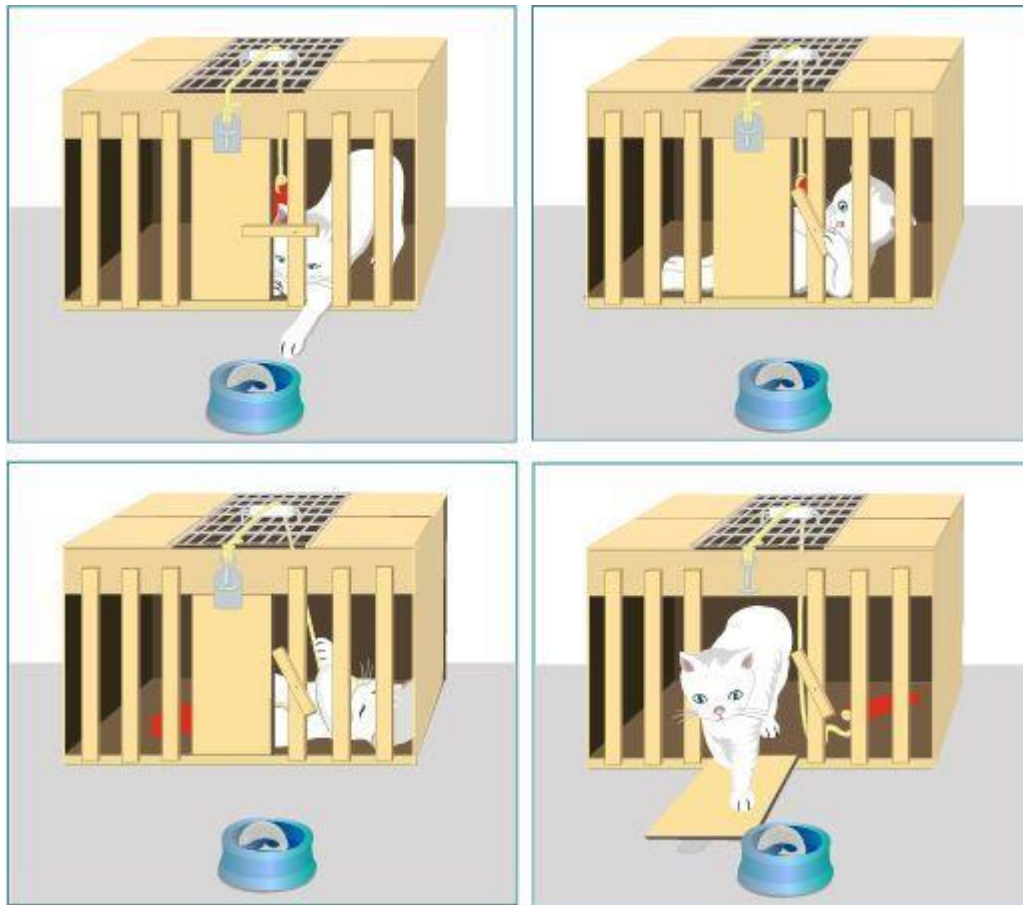


A rotational bar holding the gate on one side.



Operant or Instrumental conditioning

- The learning is called “operant” because the organism “operates” or is “instrumental” in taking an action for an outcome to occur.



Edward Thorndike's cat puzzle box experiment

Breakdown of Behavioral Processes

- In the presence of a particular stimulus, called the **discriminative stimulus (S^D)**, a particular response (R) may lead to a particular outcome (O)
- Operant conditioning can be formulated as a three-part association
 - **Discriminative stimulus $S^D \rightarrow$ Response R \rightarrow Outcome O**
- S^D is the puzzle box
- R is the sequence of movements needed to open the door,
- O is the escape
- The $S^D \rightarrow$ R association is strengthened when R is followed by a desirable outcome O

- In old apartment buildings of Mumbai, whenever someone flushes the toilet, the shower water becomes scalding hot, making Raghu flinch. Now he flinches whenever he's in the shower and hears the noise of flushing.

classical conditioning

CS – toilet flushing sound

US – hot water

CR - flinching

Context dependent classical conditioning

CS – toilet flushing sound while taking a shower

US – hot water

CR - flinching

Since retiring, Col. Singh spends a lot of time sitting on his back porch, watching the birds and whistling. One day, he scatters crumbs, and birds come and eat them. The next day, he sits and whistles and strews crumbs, and the birds return. After a few days, as soon as Col. Singh sits outside and starts whistling, the birds arrive.

Whistling is the discriminative stimulus (SD),
birds arriving is the learned response (R),
and birds eating the crumbs is the outcome (O).

The birds do not get the crumbs (O) unless SD is present and they make response R, so this is operant conditioning.

- Kabir's dog Snoopy is afraid of thunder. Snoopy has learned that lightning always precedes thunder, so whenever Snoopy sees lightning, he runs and hides under the bed

classical conditioning

CS = lightning,

US = thunder,

CR = hiding

- Ashwin has accepted a new job close to home, and now he can walk to work. On the first morning, there are clouds in the sky. It starts to rain and Ashwin gets wet while walking to work. The next morning, there are again clouds in the sky. Ashwin brings his umbrella along, just in case, and does not get wet. Ashwin carries his umbrella to work on days the sky looks cloudy.

Presence of clouds is the discriminative stimulus (SD),
bringing the umbrella is the learned response (R),
and staying dry is the outcome (O).

The outcome (O) does not occur unless SD was present and Ashwin brought his umbrella (R), so this is operant conditioning.

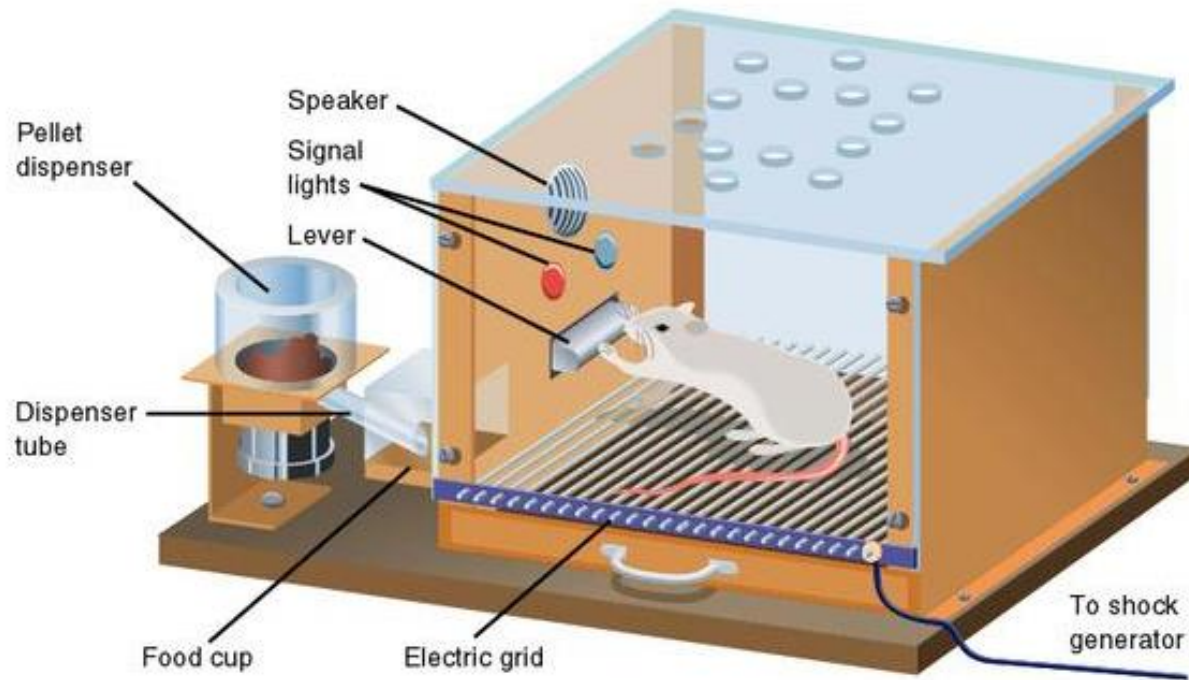
- In all examples discussed so far, there is an SD (discriminating stimulus)
- What if there is no SD?

Skinner's box

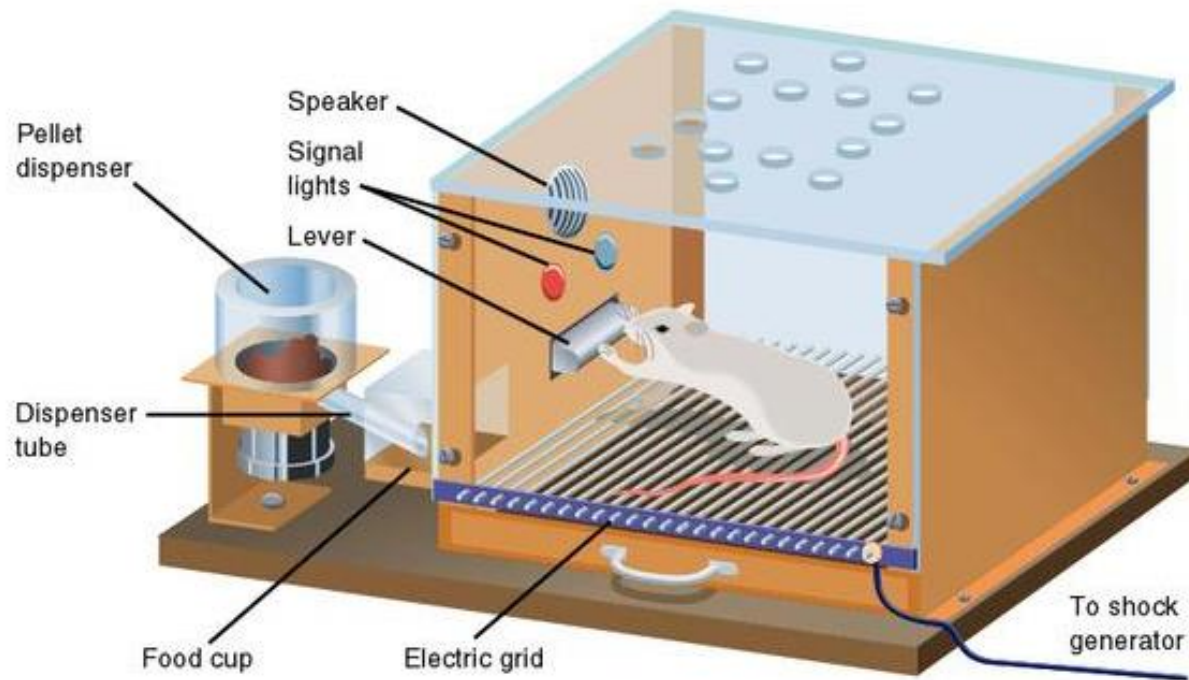
free-operant paradigm

An operant conditioning paradigm in which the animal can operate the apparatus as it chooses in order to obtain reinforcement (or avoid punishment).

lever presses (R) → food (O)



Skinner's box



Real life examples?

Exam hall

free-operant paradigm

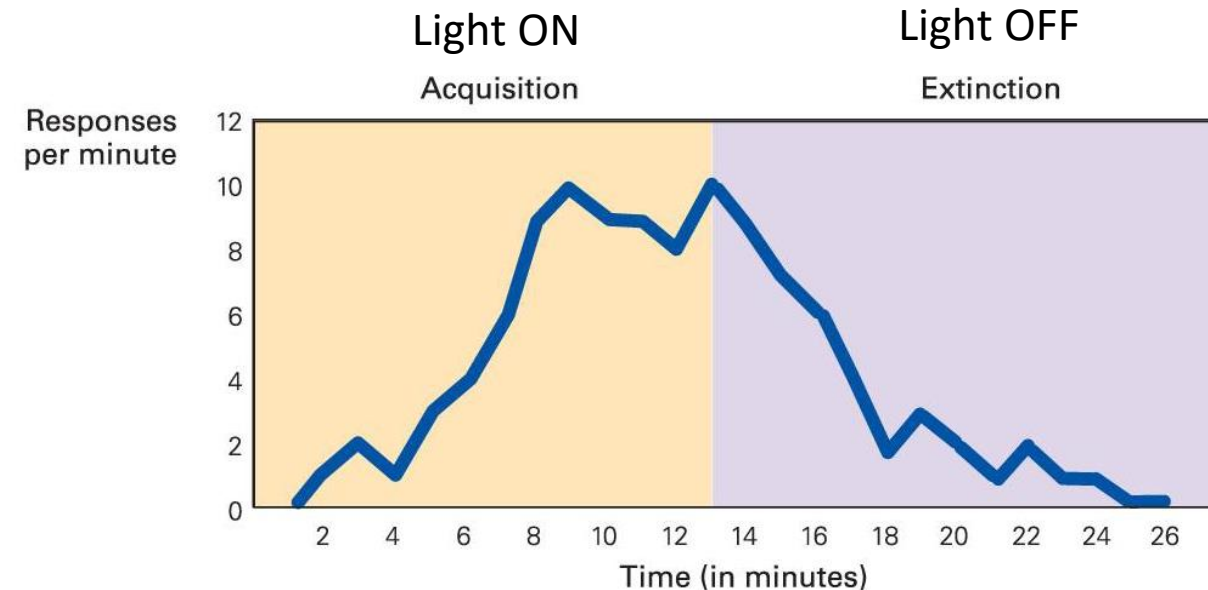
An operant conditioning paradigm in which the animal can operate the apparatus as it chooses in order to obtain reinforcement (or avoid punishment).

lever presses (R) \rightarrow food (O)

Discriminating stimulus \rightarrow light

Light ON (SD) \rightarrow lever presses (R) \rightarrow food (O)

Light OFF (SD) \rightarrow lever presses (R) \rightarrow no food (O)



S (starting whistle) → R (dive) → O (good start in the race)

R (dive) → S (starting whistle) → O (?)

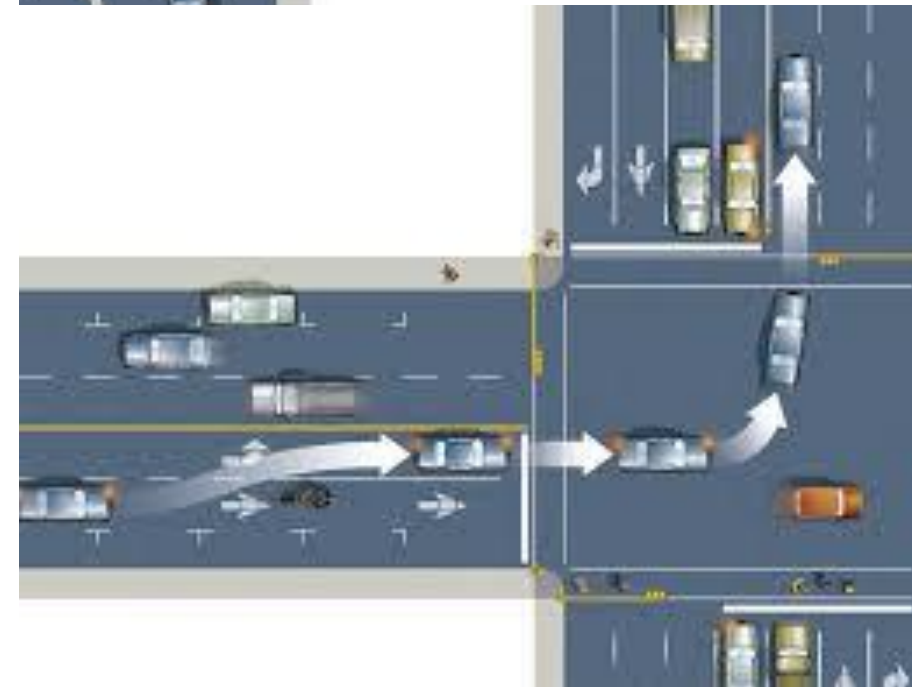
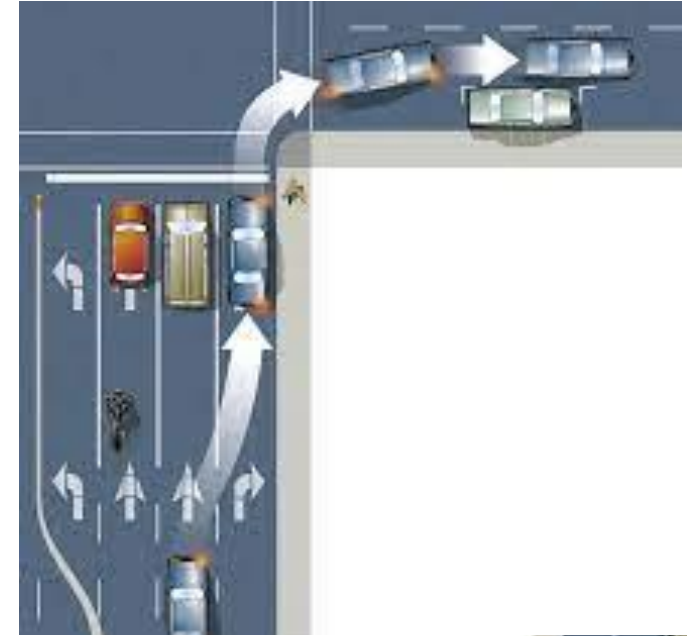
Strong $S \rightarrow R$ association

Automatic response (R) in the presence of SD

Strong operant conditioning can cause errors

Example?

Left side (India) vs right side (US) driving



Shaping Behaviour

Service dog helps a blind man cross a busy city street.
How are these dogs trained?



Go to end of road → stop → wait for a green traffic light → check for oncoming cars → use zebra crossing to walk across

By reinforcing (rewarding) behaviour

More examples?

Disciplining children at home – HW then play

Teaching autistic children to speak

What is a reinforcer?

- Possible reinforcers in real life?
- Reinforcement can be positive or negative
 - Positive reinforcement → increase frequency of a particular behaviour (reinforce)
 - Negative reinforcement → decrease frequency a particular behaviour (punish)

Primary Reinforcers

- Food, water, sleep, comfortable temperatures, and sex
- Innate biological need to survive and thrive.
- Behaviours that provide access to these things or conditions are repeated
- Not all reinforcers are equal in value – only if you are hungry, food is a reinforcer.
- If you are hungry but not thirsty water loses its reinforcement power → conditional reinforcement

If you were expecting an alcoholic drink but were offered a cold drink, the value of reward decreases → negative contrast

Secondary reinforcers

- Money → food, water, shelter, etc.
- Tokens → prisons, psychiatric hospitals, children

Operant + classical conditioning

S (odor of bomb) → R (sniff and hold) → O (click sound) → food

S (no odor of bomb) → R (sniff and hold) → O (no clicker) → no food

S (no odor of bomb) → R (no sniff and hold) → O (clicker) → food

Some click sounds are rewarded with food while some are not?

Reward seeking behaviour lasts longer

Animals are kept partially hungry to perform the behaviour



Punishers?

- Social/parental disapproval
 - Rejection
 - Monetary fines
 - Pain
 - Serving jail time
-
- Punishment produces the opposite effect of reinforcement (T/F)?

Punishment can lead to variable behavior

- Discriminative stimuli for punishment can encourage cheating...example?
 - Police absent → speeding → no punishment
 - Police present → speeding → punishment (fine)
 - Police present → speeding suppressed (avoid punishment)
 - Speeding behaviour is not altered
- Concurrent reinforcement can undermine the punishment
 - Thrill of breaking rules and driving fast near a policeman
- Initial intensity matters
 - Police present → speeding → punishment (very heavy fine)
 - Higher probability of reducing speeding behavior

Instead reinforce (desired behaviour) slow driving – give incentives for slow/careful driving

Other examples?

Reinforcing good behaviour in children instead of punishment

Appreciate doing homework or good behaviour in class



कर्म करो
फल की चिंता मत करो

Karm karo fal ki chinta mat karo

	Classical Conditioning	Operant Conditioning
Basic Idea	Organism associate events	Organisms associate behaviors and resulting events
Response	Involuntary, automatic	Voluntary, operates on environment
Acquisition	Associating events, NS is paired with US and becomes CS NS - Neutral stimulus	Associating response with a consequence (reinforcer or Punisher)
Extinction	CR decreases when CS is repeatedly presented alone	responding decreases when reinforcement stops
Spontaneous Recovery	The reappearance, after a resting period, of an extinguished CR	the reappearance, after a resting period, of an extinguished response
Generalization	the tendency to respond to stimuli rather than to the Cs	organism's response to similar stimuli is also reinforced
Discrimination	the Learned ability to distinguish between the Cs and other stimuli that do not signal a US	organism learns that certain responses, but not others, will be reinforced