

Learning



Learning and reinforcement

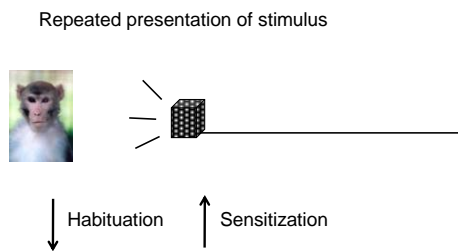
Learning

A long-lasting change in behavior, or potential to change behavior, that results from experience

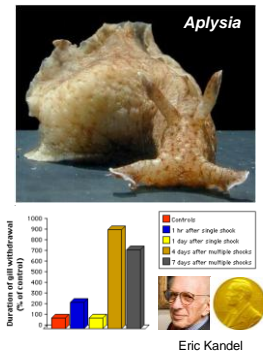
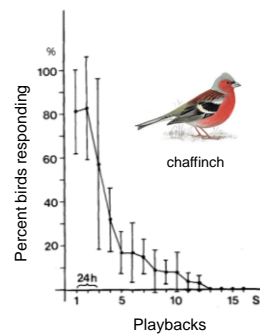
Reinforcement

Anything that affects the probability that a particular behavior will occur

Simple learning



Habituation and sensitization



Classical conditioning

food (US) → salivation (UR)
 food (US) + tone (CS) → salivation (UR)
 tone (CS) → salivation (CR)

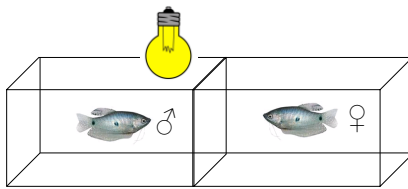


Classical conditioning

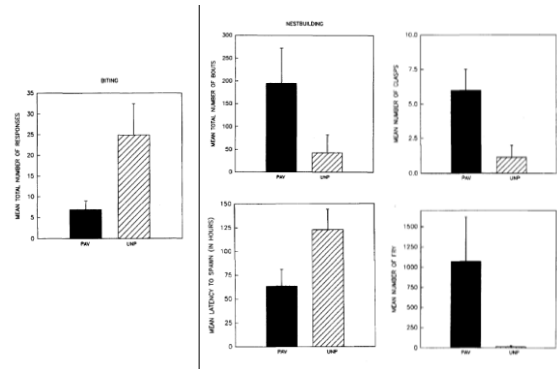
Is there any adaptive significance of classical conditioning?



Classical conditioning



Classical conditioning



Classical conditioning

How might classical conditioning work in nature?

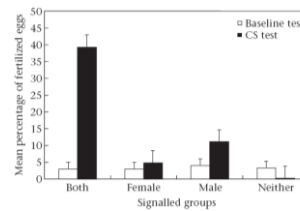
Courtship behavior by female (US) → Courtship (UR)

Courtship behavior by female (US) + sex-recognition cue (CS) → Courtship (UR)

Sex-recognition cue (CS) → Courtship (CR)



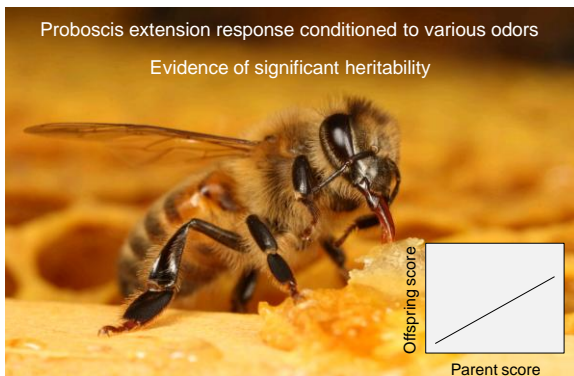
Classical conditioning



Heritability of conditioned response

Proboscis extension response conditioned to various odors

Evidence of significant heritability

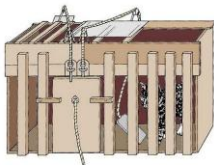


Gene × environment interactions



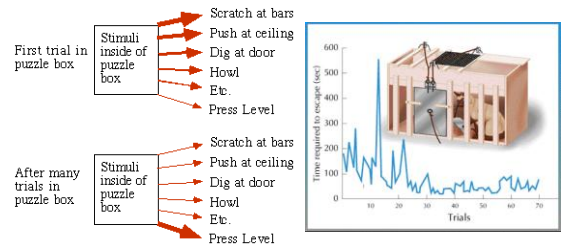
Tryon Maze Dull and Bright rats

Operant conditioning



Thorndike

Laws of effect and exercise



Operant conditioning

Operant conditioning = association between behavior and its consequences



B.F. Skinner

Operant conditioning

Positive reinforcement



Negative reinforcement



Increase likelihood that behavior will occur

Operant conditioning

Response cost



"Punishment"



Decrease likelihood that behavior will occur

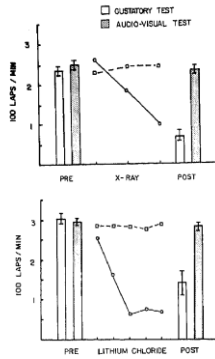
What factors affect conditioning?

1. Contiguity
2. Relevance

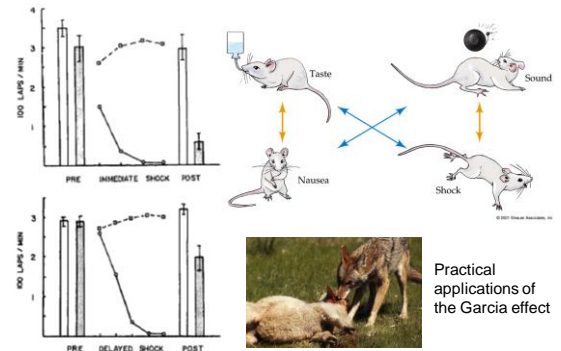


John Garcia

The “Garcia effect”



The “Garcia effect”



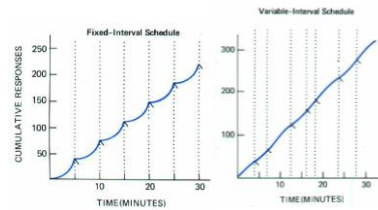
Practical applications of the Garcia effect

Schedules of reinforcement

1. Fixed (also continuous)
2. Variable
3. Ratio schedules
4. Interval schedules

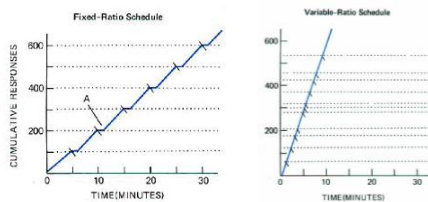


Operant conditioning



What produces the characteristic “scallop” effect in the FI schedule?

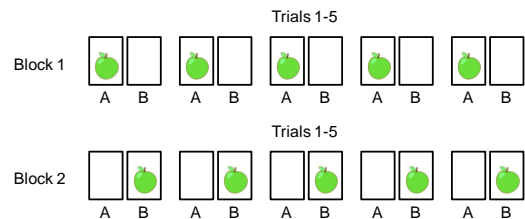
Operant conditioning



Why the “stair-step” pattern?



Learning sets

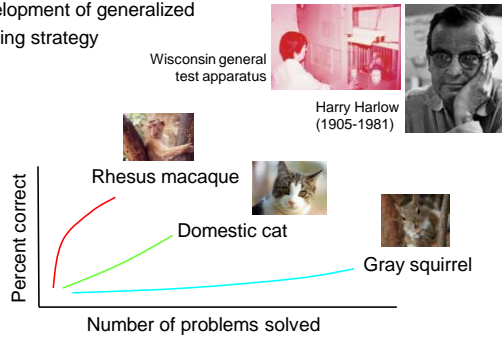


Where should monkey look first?
Now where should monkey look?



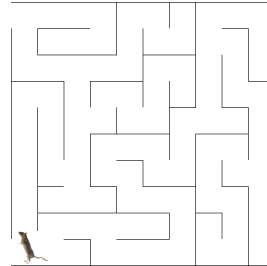
Learning sets

Development of generalized learning strategy



Latent learning

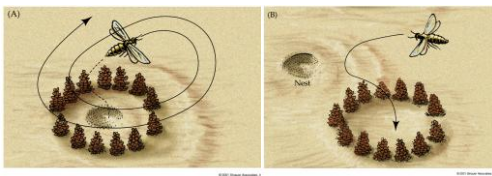
Reinforcement not evident



Latent learning



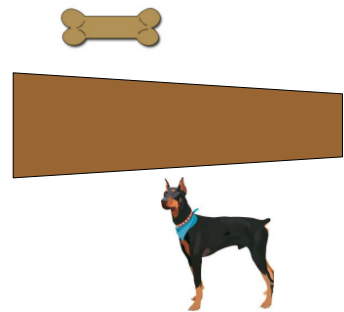
Tinbergen observed bee's circular flight as it departed burrow



Latent learning



Wolfgang Kohler



Insight learning

Learning by applying previous knowledge



Social learning



Local enhancement: presence attracts others

Social facilitation: presence facilitates learning



Social learning

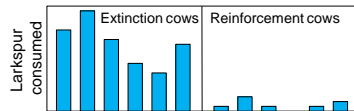


Two groups of cows conditioned to avoid larkspur by pairing with LiCl



Reinforced in one group, extinct in the other

Both paired with naïve cows



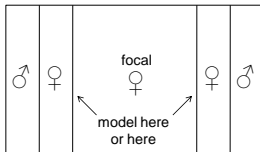
Social learning

Copying versus imitation



Social learning

Mate choice copying in guppies

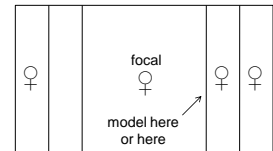


Focal female chose male near model 17 of 20 times

Mate choice copying

Alternative explanations?

A1: Focal female wants to school with groups of fish.

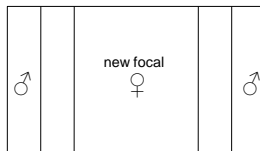


Replaced end males with females, and focal female showed no preference for 2 fish vs. 1 fish (10 of 20 trials)

Mate choice copying

Alternative explanations?

A1: Focal female cues on behavior or physiological changes of chosen male.



Removed focal and model female, replaced with new female. She had no preference for primed male.

Why copy mate choice of others?

May allow less discriminating, younger animals to make better choices



Social learning

Classic example in humans = Bandura's "Bobo" experiments

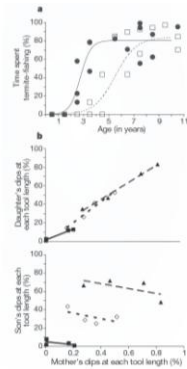


Social learning

Can be vertical or horizontal



Sex differences in tool-use imitation in chimpanzees



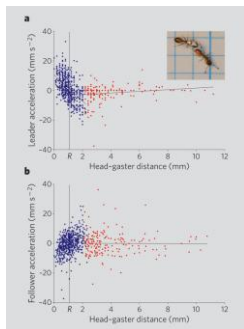
Teaching

A working definition of teaching



Tandem running in *Temnothorax* ants

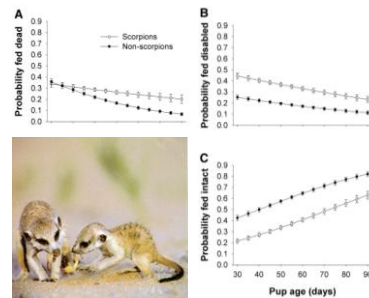
Teaching



R = distance of antennal reach

Teaching prey capture

Meerkats present toxic prey to young



Teaching prey capture

Experimental playback of pup begging calls

