



LEARNING

COGS 1018, Lecture 4
January 19th
WINTER 2018

THIS WEEK AND NEXT

- Biological backdrop of learning
- Classical conditioning
- Operant conditioning

CONSTRAINTS GUIDE LEARNING

- Learning is challenging
- Some behaviors are inborn and do not require learning
 - Simple reflexes, fixed-action patterns
- Born with certain biases that make learning some things easier
 - Critical periods: imprinting, bird song, human language
 - Preparedness



CONSTRAINTS THAT GUIDE LEARNING

Preparedness: certain associations are learned more readily than others (instinctive tendencies)

- Animals hardwired to approach desirable outcomes, retreat from undesirable outcomes

- Learning will happen more readily for certain cues-consequence combinations

- Tasted aversions learned very quickly

- Phobias related to the survival of "pre-technology man" are most common type (Seligman, 1971)



Stimulus	Paired with	Result
Sweet water	Nausea	Aversion
Bright/noisy water	Nausea	No Aversion
Sweet water	Shock	No Aversion
Bright/noisy water	Shock	Aversion

(Garcia, Hawkins, & Ruiniak, 1974)

NON-ASSOCIATIVE LEARNING

Non-associative learning: change in response to a stimulus that does not involve associating the presented stimulus with another stimulus or event such as a reward or punishment

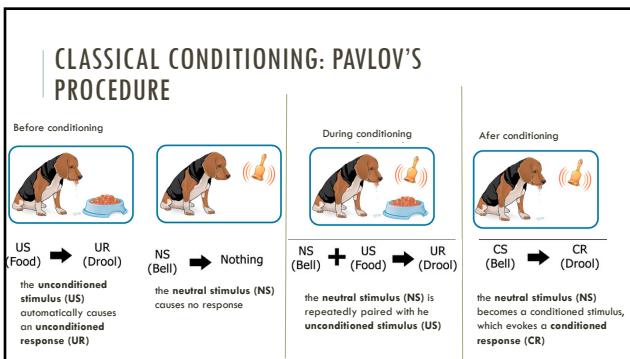
Habituation: a decrease in the strength of a stimulus to elicit a response after repeated presentations

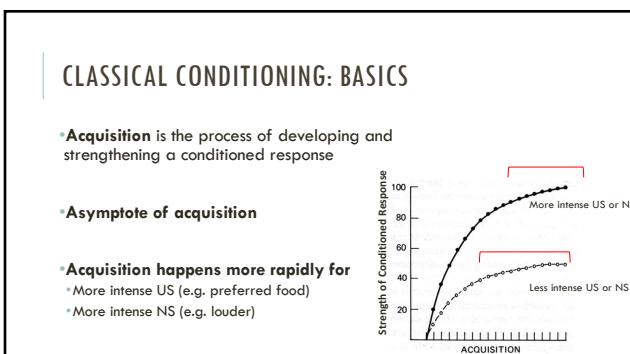


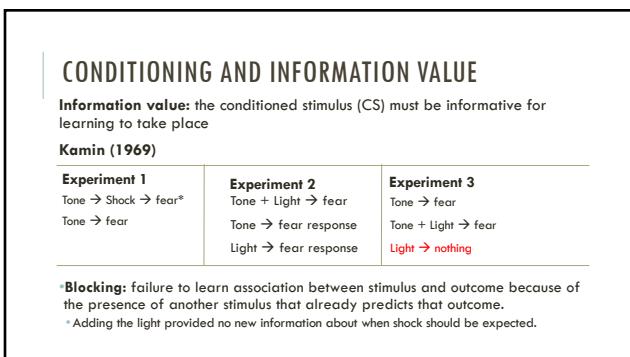
Sensitization: an increase in the strength of a stimulus to elicit a response after repeated presentations



CLASSICAL CONDITIONING







CONDITIONING AND INFORMATION VALUE

Information value: the conditioned stimulus (CS) must be informative for learning to take place

Rescorla (1967)

Co-occurrence: happening together

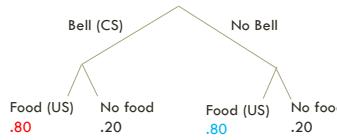
Contingency: happening *together* more often than independently

Group	Prop. US follows CS	Prob. US occurs by itself
1	.80	.80
2	.80	.40
3	.40	.00
4	.40	.00

*If it is information value that matters,
contingency should lead to conditioning,
but co-occurrence alone shouldn't*

CONDITIONING AND INFORMATION VALUE

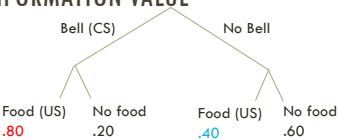
Rescorla (1967)



Higher co-occurrence: the bell was paired with food on many trials
low-contingency: the animal received food as often after the bell as after no bell

CONDITIONING AND INFORMATION VALUE

Rescorla (1967)



Higher co-occurrence: the bell was paired with food on many trials
contingency: bell + food happened *more* often than no bell + food

CONDITIONING AND INFORMATION VALUE

Rescorla (1967)

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graph TD
    A[Bell (CS)] --> B[Food (US)]
    A --> C[No food]
    B --> D[Food (US)]
    B --> E[No food]
    C --> F[Food (US)]
    C --> G[No food]
  
```

The tree starts at Bell (CS). It branches into Food (US) and No food. The Food (US) branch leads to Food (US) with probability .40 and No food with probability .60. The No food branch leads to Food (US) with probability .40 and No food with probability .60.

Group	Prop. US follows CS	Prob. US occurs by itself
1	.80	.80
2	.80	.40
3	.40	.40
4	.40	.00

Low co-occurrence: the bell was paired with food on fewer trials
No contingency bell + food happened as often as no bell + food

CONDITIONING AND INFORMATION VALUE

Rescorla (1967)

```

graph TD
    A[Bell (CS)] --> B[Food (US)]
    A --> C[No food]
    B --> D[Food (US)]
    B --> E[No food]
    C --> F[Food (US)]
    C --> G[No food]
  
```

The tree starts at Bell (CS). It branches into Food (US) and No food. The Food (US) branch leads to Food (US) with probability .40 and No food with probability .60. The No food branch leads to Food (US) with probability .00 and No food with probability 1.0.

Group	Prop. US follows CS	Prob. US occurs by itself
1	.80	.80
2	.80	.40
3	.40	.40
4	.40	.00

Low co-occurrence: the bell was paired with food on fewer trials
Contingency bell + food happened more often than no bell + food

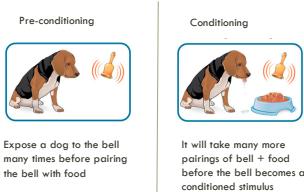
CONDITIONING AND INFORMATION VALUE

Rescorla (1967): Only is conditions where there was a *contingency* did the bell become a conditioned stimulus (CS). This demonstrated that it is not enough for a stimulus to be paired with an outcome, it must also provide information value in order to become a conditioned stimulus (CS)

Group	Prop. US follows CS	Prob. US occurs by itself
1	.80	.80
2	.80	.40
3	.40	.00
4	.40	.00

CONDITIONING AND INFORMATION VALUE

Latent inhibition: a familiar stimulus is much harder to condition than a novel stimulus



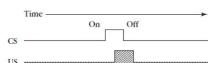
Expose a dog to the bell many times before pairing the bell with food

Conditioning

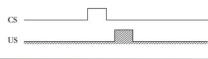
It will take many more pairings of bell + food before the bell becomes an conditioned stimulus

CLASSICAL CONDITIONING: TEMPORAL ARRANGEMENT

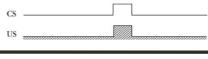
Delayed conditioning



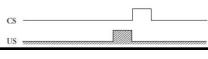
Trace conditioning



Simultaneous conditioning
NS and US completely overlap



Backward conditioning



CLASSICAL CONDITIONING

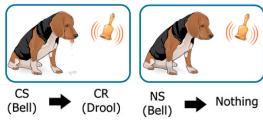
- **Little Albert**
 - **Generalization:** when similar stimuli evoke the same response as the conditioned stimulus
 - Evidence of phobias?
 - **Discrimination:** when only a specific (but not similar stimuli) evoke a conditioned response



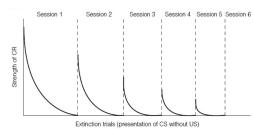
(Baynes & Watson, 1820)

CLASSICAL CONDITIONING: EXTINCTION

A conditioned response can be weakened and eliminated via extinction



Spontaneous recovery is the reappearance of a conditioned response after a rest period from extinction



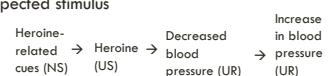
CLASSIC CONDITIONING AND DRUG OVERDOSE

Sometimes a conditioned stimulus (CS) elicits a behavior that is identical to the unconditioned response (UR), sometimes different

Preparatory-response theory: the purpose of the conditioned stimulus (CS) is to prepare the body for the unconditioned (US) in whatever way is most adaptive

CLASSIC CONDITIONING AND DRUG OVERDOSE

Compensatory response: an automatic response that is in a direction opposite to the effect of an expected stimulus



(E.g. Janis Joplin, Whitney Houston, Mitch Hedberg, Jimi Hendrix, Anna Nicole Smith, John Belushi, Cory Monteith..)

The same amount of drug that would produce a mild effect in a familiar environment can produce overdose in a novel environment

DISCUSSION

Chat with your neighbor and try to come up with an example of any of these that you have witnessed in real life:

- Habituation
- A neutral stimulus becoming a conditioned stimulus
- Latent Inhibition
- Generalization
- Discrimination
- Extinction
