PSYC1022: The Psychology of Addiction

Topic 5: Associative learning (I)

Dr. Helena Pacitti

Outline

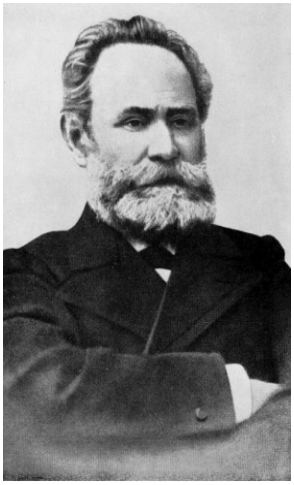
- Pavlovian (classical) conditioning
  - Background
  - Experimental procedures
    - Appetitive learning
    - Aversive learning
  - Hebb's rule
  - Rescorla: US representation

1

Pavlovian (classical) conditioning

Pavlovian conditioning: a set of principles by which organisms can learn that event A predicts event B, and how this knowledge is translated into a change in behaviour that helps them prepare for event B.

- Learned preparations make organisms more adapted to their environment.



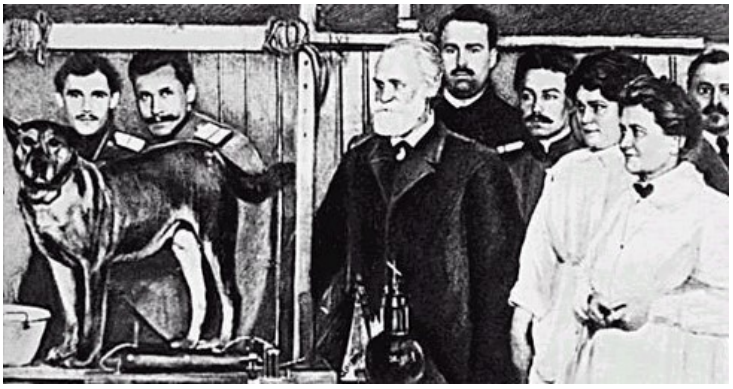
Ivan Petrovich Pavlov (1849-1936)

2

Pavlovian conditioning

Pavlov was a physiologist studying the reflex by which dogs' stomach secretions are produced when presented with food.

- Over a period of time the dogs would begin to salivate when the experimenter approached
- Appeared that the dog's salivation reflex had been modified through experience/learning to predict food when the experimenter approached



3

Unconditioned Stimuli & Responses

FOOD

Unconditioned Stimulus (US)

- Food automatically elicits a response in the dog. No conditioning is required (*unconditioned* stimulus)

SALIVATION

Unconditioned Response (UR)

- Salivation occurs automatically (involuntary reflex) in response to the food. No conditioning is required (*unconditioned* response)

4

Conditioned Stimuli & Responses

EXPERIMENTER

Conditioned Stimulus (CS)

- Over time, experimenter comes to elicit a response in the dog. Conditioning is required (*conditioned* stimulus)

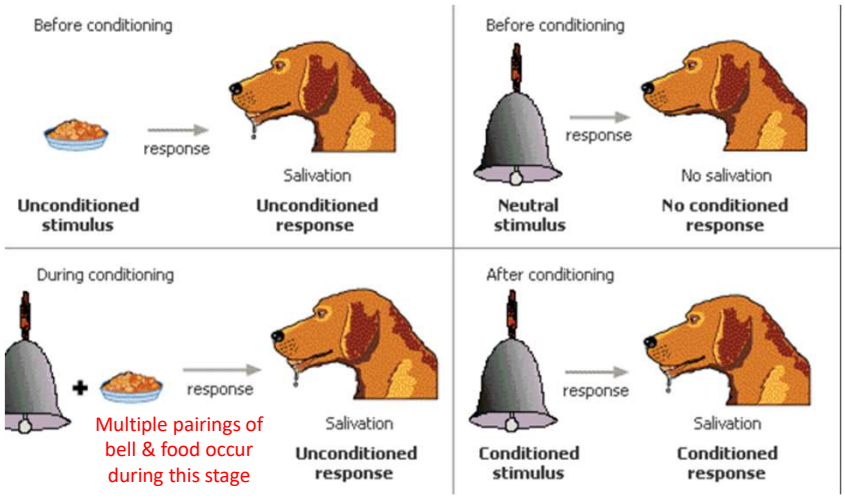
SALIVATION

Conditioned Response (CR)

- Salivation occurs in response to the experimenter. Conditioning is required (*conditioned* response)

5

Classical Conditioning: Appetitive Procedure

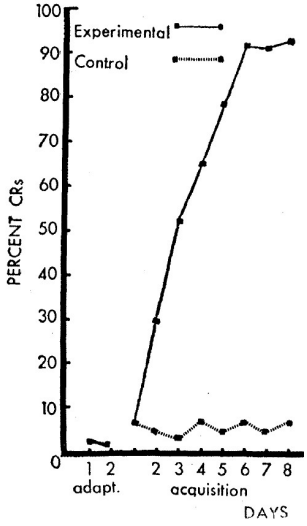


6

Pavlovian conditioning: Aversive Procedure

Gormezano et al (1962): air puff (US) delivered to the eyes of rabbits, which causes an eye-blink (UR).

- Experimental group: Noise (CS) → Air Puff (US)
- Control group: Noise (CS), Air Puff (US)
- 8 days of conditioning. At test, % of times in which the eye blink CR occurred in response to the noise CS.
- Experimental group: percentage CRs increased from zero to 100% by the end of training.
- Control group: showed no increase in percentage CRs to the CS.
- Defensive reflexes can be learned through Pavlovian conditioning.



7

Key terms in Pavlovian conditioning

Unconditioned Stimulus (US): anything which automatically elicits a response in an organism

- Food, air puff, electric shock, loud noise

Unconditioned Response (UR): an involuntary, reflexive response that is elicited (caused) by an unconditioned stimulus

- Salivation, eye blink, startle

Conditioned Stimulus (CS): a previously neutral stimulus which has been repeatedly paired with an unconditioned stimulus. *Does not* elicit a response in an organism *unless* conditioning takes place

- Bell, experimenter, noise

Conditioned Response (CR): a response which is elicited by the presence of a conditioned stimulus

- Salivation (in presence of bell), eye blink (in presence of noise)

8

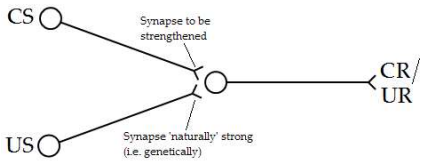
Pavlovian conditioning

Pavlov argued that the ability of cells encoding USs (e.g. food) to activate cells encoding URs (e.g. salivation) was hard wired at birth by strong synapses.

- Contrast to cells encoding CSs which only have non-function synapses with UR cells
  - But, these synapses can be modified through learning/conditioning.
- If the CS cell is reliably active close in time to the US cell (i.e. during conditioning: bell + food), then this cellular co-activation results in a strengthening of the CS synapse
  - CS can now elicit the UR.

Donald Hebb: Hebb's rule 'Cells that fire together, wire together'

- CS comes to elicit the salivary reflex directly
  - does not evoke any kind of cognitive expectancy or belief on the part of the animal.

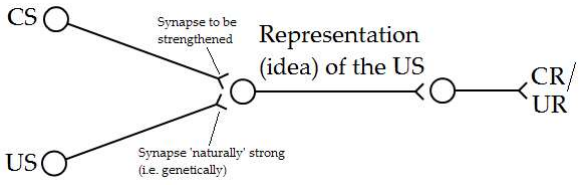


9

Pavlovian conditioning: US representation

Pavlov and Hebb's idea that CSs come to elicit reflexes directly has been revised to the model below. Here, CSs come to elicit a representation (idea/expectancy) of the US, which in turn elicits UR.

- Robert Rescorla: trained rats on a Pavlovian conditioning schedule until they showed a CR.
- The food US was then devalued by making the rat feel sick after eating it.
- Next, the rat was presented with the CS; it elicited *no* CR
  - indicates that the CS had retrieved an idea of the food as having low value, hence no CR occurred
  - if the CS elicited the CR directly (without retrieving an idea of food) the CR should have been unaffected by devaluation.



10