Classical Conditioning I

Pavlov’s Discovery
Basic Procedure
Acquisition, Extinction,
And Spontaneous Recovery

Ivan Pavlov

- Russian Physiologist
- Nobel Prize in 1904 for work on the role of the nervous system in digestion
- First to systematically study reflexes that develop as a result of experience.
- We now call the process whereby such reflexes develop classical conditioning or, in honor of Pavlov, Pavlovian conditioning.

A Minor Operation

- Pavlov’s studies initially focused on the salivary reflex in the dog: place meat powder or weak acid in the dog’s mouth and the dog immediately salivates.
- To better observe salivation, Pavlov performed a minor operation in which one of the dog’s six salivary ducts was rerouted to exit to the outside surface of the dog’s cheek.
- There the salivary response could be measured and the saliva collected.
The Experimental Setup

- The diagram above shows a dog loosely restrained and ready to have its salivary responses recorded. Saliva drips onto the tambour and registers pneumatically on the kymograph at left.

Some Terms

- Neutral Stimulus
  - A stimulus that does not evoke the reflex to be conditioned
  - May evoke other reflexes, e.g., the “investigatory” or “what-is-it?” reflex
- Unconditioned Stimulus (UCS)
  - Evokes a reflex without the need for any prior experience with the stimulus.
- Unconditioned Response (UCR)
  - The reflex response evoked by the UCS
- Conditioned Stimulus (CS)
  - An originally neutral stimulus that now evokes a reflex response as a result of conditioning
- Conditioned Response (CR)
  - The reflex response produced by the CS through learning.

The Basic Procedure

- Ring a bell – does not produce salivation.
  - Bell is therefore a neutral stimulus with respect to salivation.
- Give the dog meat powder – dog immediately salivates.
  - Meat powder is therefore an unconditioned stimulus for salivation.
- Repeat pairing of bell and meat powder across several trials.
- Bell gradually acquires the ability to evoke salivation.
  - Bell has been converted into a conditioned stimulus that evokes salivation as the conditioned response.
Not Just Dogs Drooling

- Pavlov focused on dogs and salivation because salivation was a convenient response for him to study.
- But classical conditioning is not restricted to salivation. Many other responses can be classically conditioned, both naturally and in the laboratory.
- Perhaps the most common is the classical conditioning of emotional reactions.

Conditioned Eye-blinks

- A small hose delivers puffs of air to the eye (UCS) which evoke eye-blinks (UCR).
- After pairing tone + air-puff many times, the tone (CS) evokes a conditioned eye-blink (CR).

Acquisition – Galvanic Skin Response CR

- Neutral Stimulus paired with UCS over several trials.
- Graph at right shows change in GSR as a function of trials.
Pavlov’s Laboratory
- To gain tight control over extraneous stimuli, Pavlov had an entire laboratory building constructed with this in mind.
- The top and bottom floors each contained four experimental rooms.

Inside Pavlov’s Lab
- This photo shows a dog in the sound-isolated test room.
- From outside the room, the experimenter could present various stimuli to the dog by remote control.

The Experimenter’s Station
- Here we see one of Pavlov’s colleagues seated before an array of buttons and switches used to present the stimuli. There is also a device for measuring the production of saliva.
Extinction

- Used to eliminate a previously conditioned response.
- Procedure:
  - Repeatedly present the CS, but without the UCS.
  - Record the CR evoked by each CS presentation.
- Result
  - The response gradually weakens.
  - Eventually it fails to occur at all.

Spontaneous Recovery

- Occurs following a rest period after a response has been extinguished.
- The response partially recovers its former strength.
- This occurs spontaneously, without any intervention by the experimenter, thus the term "spontaneous recovery".
- Amount of recovery observed decreases with each succeeding extinction session.