Rationalism vs Empiricism

What's at stake?

Why is this a Research issue?

Why has this not been resolved all these years?

What does it mean nowadays to be a R or an E?
Ivan Petrovich Pavlov

Born Moscow 1849

trained as a physiologist: studied circulation of the blood then Digestion for 18 years; received NOBEL Prize for this. 1904.

Not Classical Conditioning which he worked on until the end of his life.
Associationism Realized

- Up to 1890 Associationism was Philosophy—talk talk talk..
- Note that Anatomist -Physiologists had no particular theory of the brain.. they were labeling it.
- Darwin and Evolution was setting the stage for mechanistic explanation of “intelligent behavior”
- Variation & Selection served as principles to take raw material and make complex organisms
- Chains of reflexes--> Newborn infant endowed with a set of reflexes-- these are chained together to more and more complex reflexes and are associated with more complex stimuli.
- But what process forms the GLUE?
Serendipity

- Recall Pavlov was studying the “digestive system”
- Meat was put in the mouth of the dog to initiate the Saliva reflex.
- They would collect samples to chemically study... but..
- White lab coats produced Saliva BEFORE they put meat in mouth..
- 
- hmmm
Studying digestion
Terminology

A. Unconditioned Stimulus (US)
An event that consistently and automatically elicits an unconditioned response

B. Unconditioned Response (UR)
An action that the unconditioned stimulus automatically elicited

C. Conditioned Stimulus (CS)
Initially a neutral stimulus. After repeated pairings with the unconditioned stimulus, the CS elicits the same response as the US.

D. Conditioned Response (CR)
The response elicited by the conditioned stimulus due to the training.
Connections: Links etc.

Stimulus Substitution?

CS --> UCS

UCR --> CR??
Control variables

Some of the Control variables in a classical conditioning experiment include:

ISI (Interstimulus interval)

ITI (Inter Trial Interval)

Type (Quality) of CS (e.g., pitch of a tone or color of a light)

Type (Quality) of UCS (e.g., food, puff of air to eye, or electric shock to feet)

Intensity (strength) of the CS and UCS (e.g., mild shock or moderate shock)

Total number of CS-UCS pairings (trials)

The temporal relationship between the CS and UCS (e.g., delay, simultaneous, trace, or backward)

The relationship or correlation between a CS and UCS (e.g., positive correlation, negative correlation or no correlation)
Human conditioning.

Typical Paradigm..

Pavlovian conditioning is happening all the time..

Fear,

Digust

Love
FIGURE 2.7 Common CS-US Arrangements Used in Classical Conditioning Experiments.
FIGURE 2.8 The Percentage of Trials on which a CR Occurs as a Function of the Length of the CS-US Interval. Note that conditioning is poor when either backward (-50 msec) or simultaneous (0 msec) pairings occur. Maximal conditioning results when the CS-US interval is approximately 200 msec. After Smith, et al., 1969. ©1969 by the American Psychological Assn. Reprinted with permission.
Development of a Conditioned Reflex

Trial 1

CS  US  Drops of Saliva

Trial 10

CS  US  Drops of Saliva

Trial 20

CS  US  Drops of Saliva
FIGURE 3.3  Reinforcement history and the extinction of a conditioned salivary response.

Source: Adapted from Wagner et al., 1964, p. 396.
The statistical nature of associative learning

Ubiquity of Associations!

FIGURE 2.16 Conditioning Orders. Stages in (A) the higher order conditioning procedure, and (B) the sensory preconditioning paradigm.
What's learned?
Form of the Response

- Stimulus Substitution. The CR should be in form and kind like the UR. So the Saliva—chemically should be related to UR—but seemed different when Pavlov tested it...

- Leads to different representational theories of what is learned in Classical Conditioning

- What is the nature of the CR?
S-S vs. S-R Models of Conditioning

- **S-S Learning = Stimulus-Stimulus**
  - The CS becomes directly associated with the **US**
  - Therefore, the CS comes to elicit a response that is similar or possible unrelated to the US

- **S-R Learning = Stimulus-Response**
  - The CS becomes directly associated with the **UR**
  - Therefore, the CS comes to elicit the exact SAME response as the UR
Evidence in support of the stimulus (S-R) substitution hypothesis

- Jenkins & Moore (1973) study:
  - Autoshaping in pigeons
  - One group had CS(light)-->US(grain)
    - Photos showed pigeons trying to “eat” the lit key (open beak and closed eyes) when they pecked
  - 2nd group had CS(light)-->US(water)
    - Photos showed pigeons trying to “drink” the lit key (closed beak and open eyes) when they pecked
S-R: Jenkins & Moore (1973)
Left = Water    Right = Grain
Evidence against the stimulus substitution hypothesis

• Any study in which the elicited CR is different from the UCR
  e.g., when a tone is paired with shock, rats will jump to the UCS (shock), but the CR is typically freezing

  e.g., when a light is paired with food, rats will rear to the light (CR) but the UCR is approach to the food dispenser
Preparatory Response Model

- Kimble’s (1961, 1967) theory proposed that the CR is a response that serves to prepare the organism for the upcoming UCS.
  - e.g., following acquisition of CRs in eyeblink conditioning, the CR eyeblink may actually prepare the person for the upcoming airpuff such that the eye would be partially closed when the airpuff occurs.
Compensatory-Response Model

- The compensatory-response model is one version of preparatory-response theory

- In this model of classical conditioning, the compensatory after-effects to a US are what come to be elicited by the CS

- Based on the opponent-process theory of emotion / motivation
Opponent-Process Theory of Emotion (Solomon & Corbit, 1974)

● Emotional events elicit two competing processes:
  – The primary- or A-process that is immediately elicited by the event
    • e.g., taking an exam elicits an unpleasant A-state
  – An opponent- or B-process that is the opposite of the A-process and counteracts it
    • e.g., the pain during the exam (A-state) creates a pleasant relief response (B-state) following the exam
Watson
and little Albert
Associationism at work...

Fear and avoidance

Watson joined the J. Walter Thompson Advertising Agency on Madison Avenue. 1930.

Soon these types of ads appeared.
Erasing Phobias

- Flooding (imaging) “battle fatigue”
- Desensitization snakes are just like...
Thorndike and the Law of Effect

- Thorndike and Darwinian Theory.
- Analogies.
- Responses-- going to the grocery store, singing a song, running a marathon, running for president, playing tennis, cooking “coq au vin” etc...
- What's the UCS?
Principles:

- Need:
- Diversity of Responses
- Selectional Principles
- Change in Probability of Response.
Causality Detection

- associationism == causality?