Exam 2 Results

- Top Score: 50
- Mean: 34.91
- Mode: 35
- Median: 35
- Standard Deviation: 5.73 \( (n = 436) \)
- To calculate your approximate grade on this exam, divide 50 by your score. (example: 36/50 = 72% = C-)
- To calculate your approximate grade to date, divide by 100 (example: 37/36 = 72/100 = 73% = C)

Learning

Chapter 7
Spring 2010
Psy 12000.003

How Do We Learn?

Classical Conditioning
- Pavlov’s Experiments
- Extending Pavlov’s Understanding
- Pavlov’s Legacy
Learning

Operant Conditioning
- Skinner’s Experiments
- Extending Skinner’s Understanding
- Skinner’s Legacy
- Contrasting Classical & Operant Conditioning

Learning

Learning by Observation
- Bandura’s Experiments
- Applications of Observational Learning

Definition
Learning is a relatively permanent change in an organism’s behavior due to experience.

Learning is more flexible in comparison to the genetically-programmed behaviors of Chinooks, for example.
To What Does Learning Apply?

- Information (for exams)
- Skills
  - Sports
  - Vocational
- Hobbies and Interests
  - Gambling
- Fears
- Rituals, behavioral predispositions (personality?)
- Beliefs
- Values
- Social behavior (how to behave among others)
- Attitudes, stereotypes, prejudices

How Do We Learn?

We learn by association. Our minds naturally connect events that occur in sequence.

2000 years ago, Aristotle suggested this law of association. Then 200 years ago Locke and Hume reiterated this law.

Stimulus-Stimulus Learning

Learning to associate one stimulus with another.
Stimulus-Stimulus Learning
Learning to associate one stimulus with another.

Two related events:
- Stimulus 1: Lightning
- Stimulus 2: Thunder

Result after repetition:
- Stimulus: We saw lightning
- Response: We were anticipating thunder

Response-Consequence Learning
Learning to associate a response with a consequence.

1. Response: Taking candy bar
2. Consequence: Receiving a candy bar
3. Behavior strengthened

Response-Consequence Learning
Learning to associate a response with a consequence.

Response: Picking candy bar
Consequence: Receiving a candy bar
Behavior strengthened
Ideas of classical conditioning originate from old philosophical theories. However, it was the Russian physiologist Ivan Pavlov who elucidated classical conditioning. His work provided a basis for later behaviorists like John Watson and B. F. Skinner.

Classical Conditioning

Ivan Pavlov (1849-1936)

Pavlov’s Experiments

Before conditioning, food (Unconditioned Stimulus, US) produces salivation (Unconditioned Response, UR). However, the tone (neutral stimulus) does not.

Pavlov’s Experiments

During conditioning, the neutral stimulus (tone) and the US (food) are paired, resulting in salivation (UR). After conditioning, the neutral stimulus (now Conditioned Stimulus, CS) elicits salivation (now Conditioned Response, CR).
Acquisition

Acquisition is the initial stage in classical conditioning in which an association between a neutral stimulus and an unconditioned stimulus takes place.

- In most cases, for conditioning to occur, the neutral stimulus needs to come before the unconditioned stimulus.
- The time in between the two stimuli should be about half a second.

Acquisition

The CS needs to come half a second before the US for acquisition to occur.

Extinction

When the US (food) does not follow the CS (tone), CR (salivation) begins to decrease and eventually causes extinction.
Spontaneous Recovery

After a rest period, an extinguished CR (salivation) spontaneously recovers, but if the CS (tone) persists alone, the CR becomes extinct again.

Stimulus Generalization

Tendency to respond to stimuli similar to the CS is called generalization. Pavlov conditioned the dog’s salivation (CR) by using miniature vibrators (CS) on the thigh. When he subsequently stimulated other parts of the dog’s body, salivation dropped.

Stimulus Discrimination

Discrimination is the learned ability to distinguish between a conditioned stimulus and other stimuli that do not signal an unconditioned stimulus.
Extending Pavlov’s Understanding

Pavlov and Watson considered consciousness, or mind, unfit for the scientific study of psychology. However, they underestimated the importance of cognitive processes and biological constraints.

Cognitive Processes

Early behaviorists believed that learned behaviors of various animals could be reduced to mindless mechanisms.

![Stimulus Response Diagram]

However, later behaviorists suggested that animals learn the predictability of a stimulus, meaning they learn expectancy or awareness of a stimulus (Rescorla, 1988).

Biological Predispositions

Pavlov and Watson believed that laws of learning were similar for all animals. Therefore, a pigeon and a person do not differ in their learning.

However, behaviorists later suggested that learning is constrained by an animal’s biology (i.e., Robert Bolles and “species-specific defense reactions”).
Garcia showed that the duration between the CS and the US may be long (hours), but yet result in conditioning. A biologically adaptive CS (taste) led to conditioning and not to others (light or sound).

Biological Predispositions

Even humans can develop classically to conditioned nausea.

Pavlov’s greatest contribution to psychology is isolating elementary behaviors from more complex ones through objective scientific procedures.
Alcoholics may be conditioned (aversively) by reversing their positive-associations with alcohol.

Through classical conditioning, a drug (plus its taste) that affects the immune response may cause the taste of the drug to invoke the immune response.

Watson used classical conditioning procedures to develop advertising campaigns for a number of organizations, including Maxwell House, making the “coffee break” an American custom.

See also: “Little Albert” experiment: [link]

Is this an example of Classical Conditioning?

“Clean scents may promote good behavior: Volunteers who completed a task in a clean-smelling room (sprayed with citrus Windex) reported more interest in participating in and donating to a charity organization than volunteers who were in a regular-smelling room. In addition, volunteers playing a trust game in a clean-smelling room were likelier to return more money to a hypothetical partner than volunteers in a regular-smelling room. These findings indicate that clean scents not only motivate clean behavior, but may also encourage virtuous actions.”

“The Smell of Virtue: Clean Scents Promote Reciprocity and Charity” Psychological Science, Feb. 4, 2010
Katie Liljenquist, Chen-Bo Zhong, and Adam D. Galinsky
Two Famous John Watson Quotes

- "Psychology as the behavioral views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. The behavioral, in his efforts to get a unitary scheme of animal response, recognizes no dividing line between man and brute. The behavior of man, with all of its refinement and complexity, forms only a part of the behaviorist's total scheme of investigation."

- "Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select — doctor, lawyer, artist, merchant-chief and, yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors. I am going beyond my facts and I admit it, but so have the advocates of the contrary and they have been doing it for many thousands of years." (1930)

Operant & Classical Conditioning

1. Classical conditioning forms associations between stimuli (CS and US). Operant conditioning, on the other hand, forms an association between behaviors and the resulting events.

- Classical conditioning involves respondent behavior that occurs as an automatic response to a certain stimulus. Operant conditioning involves operand behavior, a behavior that operates on the environment, producing rewarding or punishing stimuli.
Skinner’s Experiments

Skinner’s experiments extend Thorndike’s thinking, especially his law of effect. This law states that rewarded behavior is likely to occur again.

![Graph and Image]

Operant Chamber

Using Thorndike's law of effect as a starting point, Skinner developed the Operant chamber, or the Skinner box, to study operant conditioning.

![Image]

Operant Chamber

The operant chamber, or Skinner box, comes with a bar or key that an animal manipulates to obtain a reinforcer like food or water. The bar or key is connected to devices that record the animal’s response.
Shaping

*Shaping* is the operant conditioning procedure in which reinforcers guide behavior towards the desired target behavior through successive approximations.

A rat shaped to sniff mines. A manatee shaped to discriminate objects of different shapes, colors and sizes.

Types of Reinforcers

Any event that strengthens the behavior it follows. A heat lamp positively reinforces a meerkat’s behavior in the cold.

Learning to Bar Press: Shaping through Successive Approximations
Rewards & Punishments

- **Add or Give**
  - Positive Reinforcement
  - (Positive) Punishment

- **Take Away or Remove**
  - Negative Punishment (i.e., time-out)
  - Negative Reinforcement

Primary & Secondary Reinforcers

- **Primary Reinforcer**: An innately reinforcing stimulus like food or drink.

- **Conditioned Reinforcer**: A learned reinforcer that gets its reinforcing power through association with the primary reinforcer.

Immediate & Delayed Reinforcers

- **Immediate Reinforcer**: A reinforcer that occurs instantly after a behavior. A rat gets a food pellet for a bar press.

- **Delayed Reinforcer**: A reinforcer that is delayed in time for a certain behavior. A paycheck that comes at the end of a week.

We may be inclined to engage in small immediate reinforcers (watching TV) rather than large delayed reinforcers (getting an A in a course) which require consistent study.
Reinforcement Schedules

1. **Continuous Reinforcement**: Reinforces the desired response each time it occurs.

2. **Partial Reinforcement**: Reinforces a response only part of the time. Though this results in slower acquisition in the beginning, it shows greater resistance to extinction later on.

Immediate Smaller Pay, or Delayed Larger Pay?

- Many chose to accept an immediate smaller amount after participating in an experiment for money.
- Yet, most of those who received the smaller amount (in the form of a check) did not cash that check until after those who chose the larger delayed amount received their check!


Ratio Schedules

- **Fixed-ratio schedule**: Reinforces a response only after a specified number of responses. e.g., piecework pay.

- **Variable-ratio schedule**: Reinforces a response after an unpredictable number of responses. This is hard to extinguish because of the unpredictability. (e.g., behaviors like gambling, fishing.)
Interval Schedules

- **Fixed-interval schedule**: Reinforces a response only after a specified time has elapsed. (e.g., preparing for an exam only when the exam draws close.)

- **Variable-interval schedule**: Reinforces a response at unpredictable time intervals, which produces slow, steady responses. (e.g., pop quiz.)

Schedules of Reinforcement

Punishment

An aversive event that decreases the behavior it follows.

<table>
<thead>
<tr>
<th>Type of Punisher</th>
<th>Description</th>
<th>Possible Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Administer an aversive stimulus</td>
<td>Spanking; a parking ticket</td>
</tr>
<tr>
<td>Negative</td>
<td>Withdraw a desirable stimulus</td>
<td>Time-out from privileges (such as time with friends); revoked driver’s license</td>
</tr>
</tbody>
</table>
Punishment

Although there may be some justification for occasional punishment (Larzelere & Baumrind, 2002), it usually leads to negative effects.

1. Results in unwanted fears.
2. Conveys no information to the organism as to what to do (just, what not to do).
3. Justifies pain to others.
4. Causes unwanted behaviors to reappear in its absence.
5. Causes aggression towards the agent.
6. Causes one unwanted behavior to appear in place of another.

Extending Skinner’s Understanding

Skinner believed in inner thought processes and biological underpinnings, but did not feel it was necessary to consider them seriously in psychology (because they were unobservable).

Many psychologists criticize him for discounting them.

Cognition & Operant Conditioning

Evidence of cognitive processes during operant learning comes from rats during a maze exploration in which they navigate the maze without an obvious reward. Rats seem to develop cognitive maps, or mental representations, of the layout of the maze (environment).
Latent Learning

Such cognitive maps are based on latent learning, which becomes apparent when an incentive is given (Tolman & Honzik, 1930).

Motivation

Intrinsic Motivation: The desire to perform a behavior for its own sake.

Extrinsic Motivation: The desire to perform a behavior due to promised rewards or threats of punishments.

Gestalt Perspective vs. Radical Behaviorism

The rat is positively reinforced whenever it presses the bar in the presence of the + lighted circle.

To which lighted circle does the rat respond most strongly?
Biological Predisposition

Biological constraints predispose organisms to learn associations that are naturally adaptive. Breland and Breland (1961) showed that animals drift towards their biologically predisposed instinctive behaviors.

Skinner’s Legacy

Skinner argued that behaviors were shaped by external influences instead of inner thoughts and feelings. Critics argued that Skinner dehumanized people by neglecting their free will. He wrote two influential popular books: *Beyond Freedom and Dignity*, and *Walden Two*.

Applications of Operant Conditioning

Skinner introduced the concept of teaching machines that shape learning in small steps and provide reinforcements for correct rewards.
Applications of Operant Conditioning

Reinforcement principles can enhance athletic performance.

In Sports

Applications of Operant Conditioning

Reinforcers affect productivity. Many companies now allow employees to share profits and participate in company ownership.

At work

Applications of Operant Conditioning

In children, reinforcing good behavior increases the occurrence of these behaviors. Ignoring unwanted behavior decreases their occurrence (time-out).

Still, ignoring has other negative consequences that make it aversive, not just removing positive attention.
Operant vs. Classical Conditioning

<table>
<thead>
<tr>
<th>Classical Conditioning</th>
<th>Operant Conditioning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Voluntary, automatic.</td>
</tr>
<tr>
<td>Acquisition</td>
<td>Associating events, CS, followed by US.</td>
</tr>
<tr>
<td>Extinction</td>
<td>CR decreases when CS is repeatedly presented alone.</td>
</tr>
<tr>
<td>Cognitive processes</td>
<td>Operants develop expectation that CS signals the arrival of US.</td>
</tr>
<tr>
<td>Biological predispositions</td>
<td>Natural predispositions constrain what stimuli and responses can easily be associated.</td>
</tr>
</tbody>
</table>

Higher animals, especially humans, learn through observing and imitating others.

The monkey on the right imitates the monkey on the left in touching the pictures in a certain order to obtain a reward.

Mirror Neurons

Neuroscientists discovered mirror neurons in the brains of animals and humans that are active during observational learning.
Imitation Onset

Learning by observation begins early in life. This 14-month-old child imitates the adult on TV in pulling a toy apart.

Bandura's Experiments

Bandura's Bobo doll study (1961) indicated that individuals (children) learn through imitating others who receive rewards and punishments.

Applications of Observational Learning

Unfortunately, Bandura’s studies show that antisocial models (family, neighborhood or TV), if reinforced, may have antisocial effects.
Positive Observational Learning

Fortunately, prosocial (positive, helpful) models may have prosocial effects.

Television and Observational Learning

Gentile et al., (2004) shows that children in elementary school who are exposed to violent television, videos, and video games express increased aggression.

Modeling Violence

Research shows that viewing reinforced media violence leads to an increased expression of aggression.