What is Learning? Two Answers.

- A Change in Behavior
  - Or the capacity to behave
  - That is relatively enduring
  - And not primarily developmental.

- A Change in the Mind
  - Manifest as a new information-processing capability
  - That is presumably stored in the brain
  - And inferred from behavior.

What is Behaviorism?

- The theory that human or animal activity can be understood through studying *behavior alone*, without reference to “mental” qualities, such as knowledge, desires, or goals.
- Two Kinds of Behaviorism
  - Classical Conditioning
  - Operant Conditioning
Pavlov: Classical Conditioning

- Conditioning Means Learning (in Behaviorism)
- Classical Conditioning is Stimulus Substitution
  - Unconditioned Stimulus (food) produces an Unconditioned Response (salivation)
  - Conditioned Stimulus (bell) produces a Conditioned Response (salivation)
- Stimulus Generalization (to other similar bells)
- Stimulus Discrimination (but not all bells)
- Classical Conditioning Explains Only Simple Behavior, Such as Emotional Reactions

John B. Watson

- Pushed Behaviorism as the Only Legitimate Form of Psychology
  – circa 1920
- Little Albert
  – Learned to fear a white rat when paired with a loud noise
  – His fear generalized to a rabbit, dog, and fur coat
- Watson Believed Strongly in the Effects of Experience (Nurture) on Development
  – “Give me a dozen healthy infants”
- Watson Inspired Skinner

Edward L. Thorndike

- Another Behaviorist
- One of the First Educational Psychologists
- Believed in the Advancement of Education and Psychology Through Scientific Research
Thorndike’s Experiment

- **Trial and Error Learning**
  - Puzzle box: Can the cat escape?
  - Yes, but only by accident (at first)
- **Thorndike’s Law of Effect**
  - A behavior is more likely to recur if followed by a “satisfying state of affairs”
- **Thorndike’s Cat’s Behavior was More Sophisticated than Pavlov’s Dogs’**

B. F. Skinner

- **Introduced A Different Paradigm**
  - Not classical conditioning
  - But similar to Thorndike’s theory
- **Operant Conditioning Is Intended to Explain All Behavior, Including Complex Behavior**
  - All behavior is the product of reinforcement histories
  - What did you do today?
- **Operants** are emitted behaviors, some of which are reinforced

More Skinner

- **Not Welcome: Mental Talk**
  - Such as think, believe, plan, goal, feeling
- **Behavior is Determined, Not Chosen**
  - Therefore, freedom is an illusion
  - So is dignity (virtue)
  - If behavior is programmed, then why not try to create a Utopian society?
  - Walden II
- **Skinner’s Theory had an Enduring Impact**
  - On Education
  - On Child-Rearing
Operant Conditioning in Schools

• Encouraging Good Behavior
  – Stickers
  – Smiley Faces
  – Praise
  – Aren’t these reinforcements at least partly manipulative? (means to an end)

• Discouraging Bad Behavior
  – Extinction: “Just ignore him”
  – Withholding reinforcement

Reinforcement and Punishment

• Reinforcement Increases the Likelihood that Behavior Will Be Repeated
  – Reinforcement is identified only by its effects
  – Want a hamburger? A hug?

• Punishment Decreases Likelihood

• Positive and Negative Refer to Adding or Subtracting a Consequence
  – What is negative reinforcement?

Reinforcement Schedules

• Continuous Reinforcement is Best for Starting a New Behavior
  – Reinforce every time the behavior occurs

• Variable Ratio Reinforcement is Best for Making Behavior Robust
  – Resistant to extinction once reinforcement is withdrawn
  – Slot machines, fishing
  – For education: Don’t reward every time
Complex Behavior

- Use Successive Approximations (Shaping)
  - Gradually raise expectations
- Widely Used in Animal Training
  - Whales and dolphins in Sea World
- For Humans: Behavior Modification
  - Reinforcement, M&Ms, token economies
  - Sometimes useful with behavior disorders
- Can Reinforcement Backfire?
  - Magic Markers and the Good Player Award
  - Be careful if intrinsic motivation is already present

One Application to Education: Programmed Learning

- Skinner’s “Teaching Machines”
  - Machine “tutors” helped shape the learner
  - Used a program of small steps
  - Now obsolete
- Computer-Assisted Instruction
  - Many more capabilities now, of course
  - Sometimes computers present material in a Skinnerian format

What’s Wrong With Behaviorism?

- Noam Chomsky’s Critique of Skinner’s Book, “Verbal Behavior”
  - Language can’t be learned only through reinforcement
  - The brain must be a built-in (innate) language capability
- Donald Norman’s Critique of Skinner’s Work
  - Was operant conditioning a half-century distraction?
Why Use a Cognitive (Thinking) Approach?

- Behaviorism Does Not Address All the Important Goals of Education
  - It Neglects Important Learning Outcomes
    - Understanding, Interest, Curiosity, Confidence
  - It Neglects Certain Aspects of the Learner
    - Beliefs, Motivation, Values, Goals
- It’s Best to Investigate the Mind as a Real Entity, Not Treat it as an Illusion
- Is There a Metaphor We Can Use?