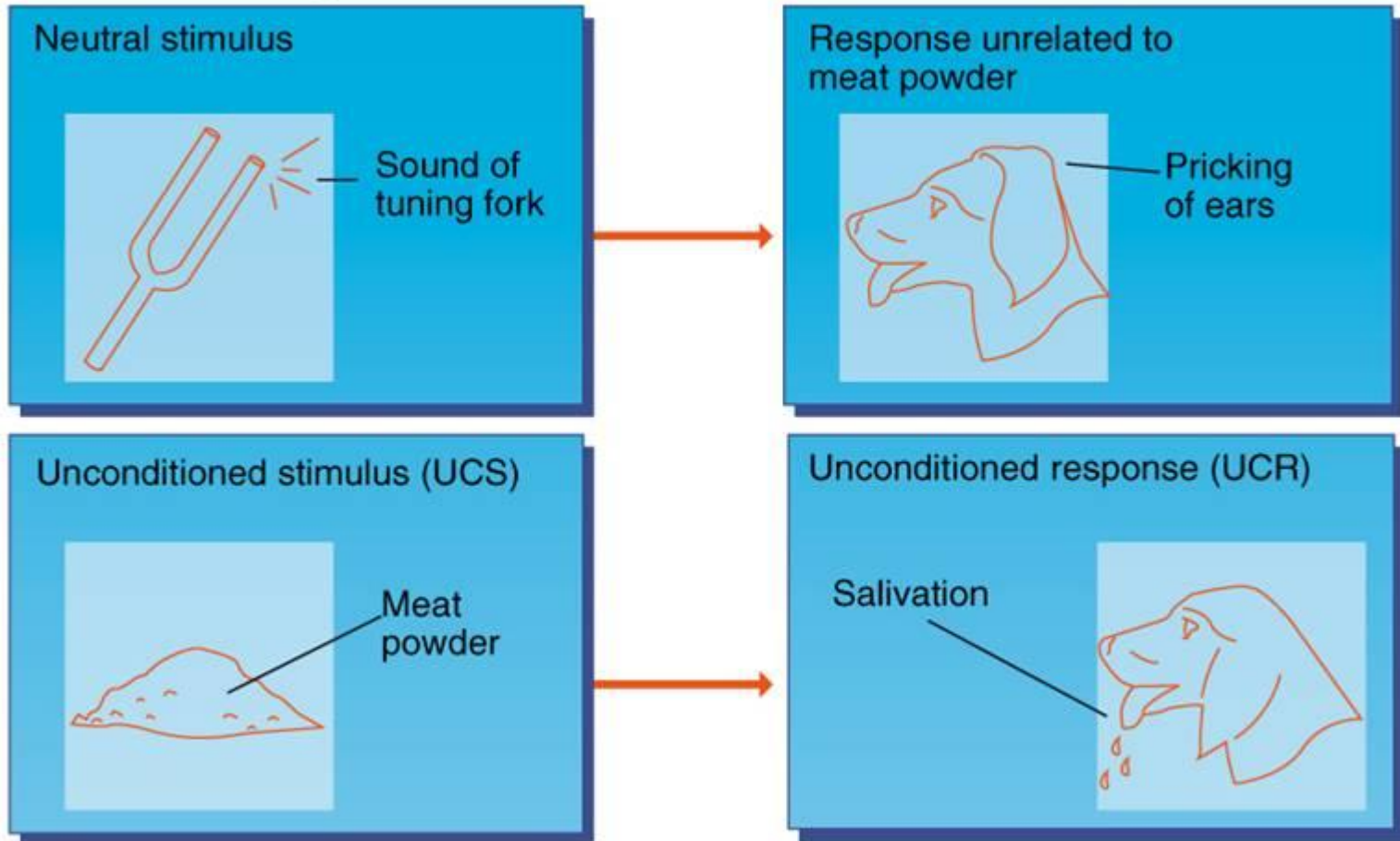# Lecture 5 – Learning

Defn: a lasting change in behavior or mental processes due to experience

- Outline of today's lecture:
  - Four types of learning discussed:
    - Classical conditioning
    - Operant conditioning
    - Cognitive learning
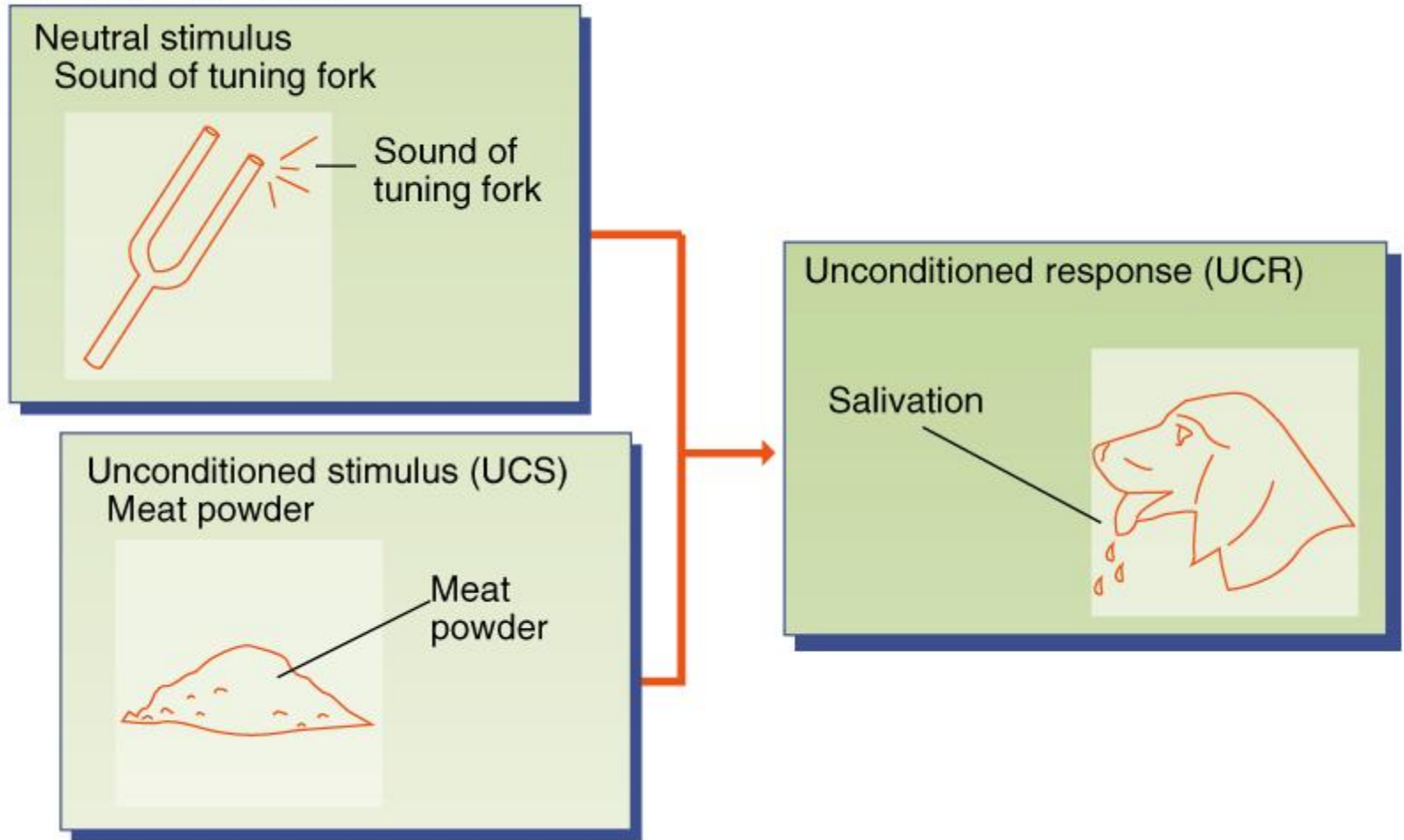   - Social cognitive (observational) learning
    - Insight learning

Classical Conditioning

- a basic type of learning in which two stimuli became associated so that a previously neutral stimulus acquires the power to elicit the same reflexive response that originally was produced only by the other stimulus.

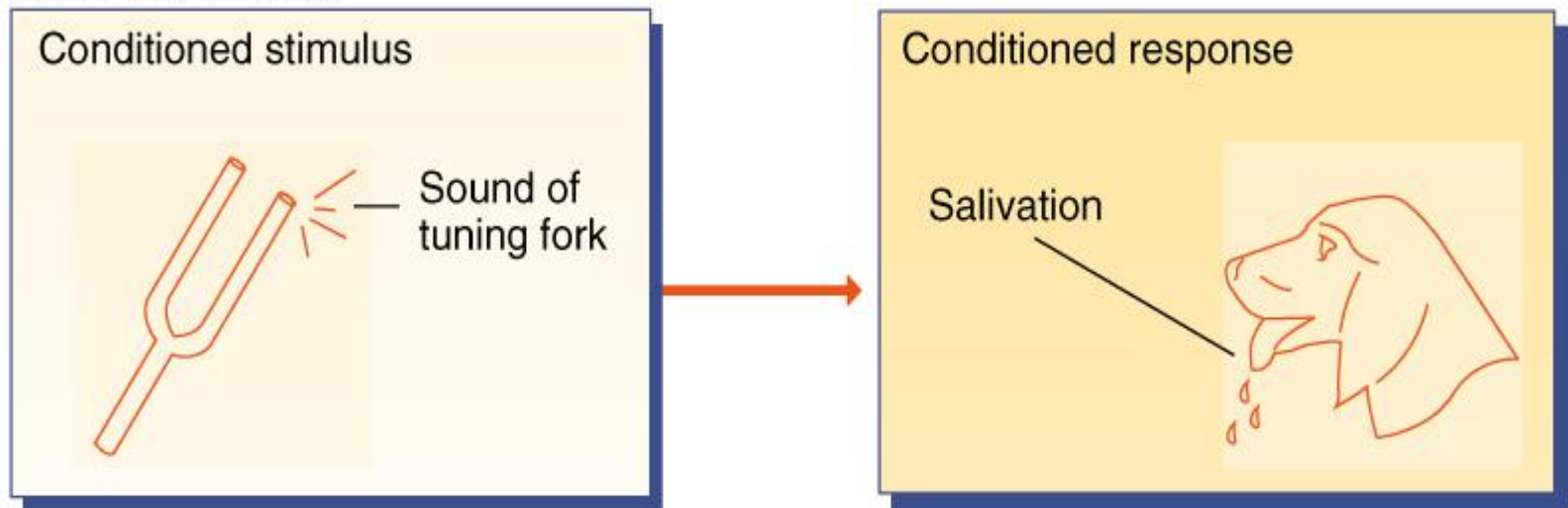- Pavlov's pioneering research on salivating dogs.

a. Before conditioning

Neutral stimulus — Sound of tuning fork

Response unrelated to meat powder — Pricking of ears

Unconditioned stimulus (UCS) — Meat powder

Unconditioned response (UCR) — Salivation

b. During conditioning

Neutral stimulus
Sound of tuning fork

Sound of tuning fork

Unconditioned stimulus (UCS)
Meat powder

Meat powder

Unconditioned response (UCR)

Salivation

4

c. After conditioning

Conditioned stimulus

Sound of tuning fork

Conditioned response

Salivation

Stimulus Generalization and Discrimination

- **Stimulus Generalization**
  - Occurs after conditioning, when other stimuli similar to the CS may also trigger a CR
  - Case of Little Albert

- **Stimulus Discrimination**
  - Occurs when a CR occurs to only the CS but not to other stimulus.

Little Albert (Watson & Rayner, 1920)

- Watson & Rayner conditioned Little Albert (~1 yo) to be fearful of white rat.
  - How did they do it?
- The fear was generalized to other furry objects (e.g., dog, rabbit, etc).
- Significance of the research
  - Showed that our emotional responses can be acquired through classical conditioning.
  - Ethical concern of the research

Classical Conditioning

- **What to look out in order for classical conditioning to be effectively acquired?**
  - **Timing and order** are critical. The CS (bell) must be followed immediately by an UCS (food) and preferably remains throughout the administration of the UCS.
  - **Intensity**. Stronger UCS leads to faster conditioning.
  - **Frequency**. More pairing of CS-UCS, stronger the CR.

- **What would happen if the UCS never again follows the CS?**
  - Unlearning takes place. **Extinction** occurs so that the CR decreases in frequency and eventually disappears.
  - However, beware of **spontaneous recovery** (the reappearance of a CR after it has apparently been extinguished).

Biological Preparedness and classical conditioning

- Two assumptions of classical conditioning:
  - The time intervals between CS and UCS has to be relatively short.
  - Any formerly neutral stimulus could be conditioned to elicit any involuntary response.

- Rats learned some CS-UCS associations faster than others (Garcia, 1966):
  - Food-illness associations more easily formed (learned taste aversion).
  - Light and sound more easily paired with electric shock.

- Animals are biologically "pre-wired" to associate particular stimulus with particular consequence (biological preparedness).
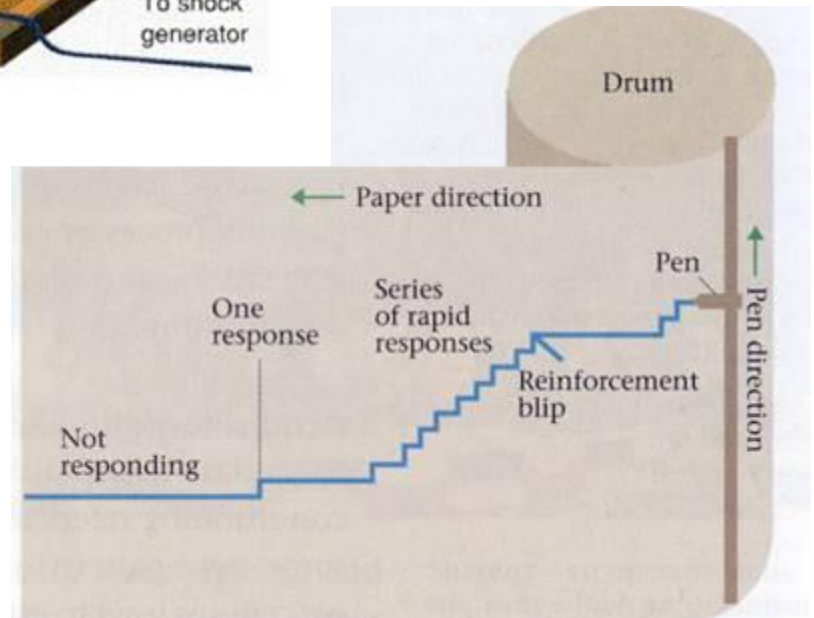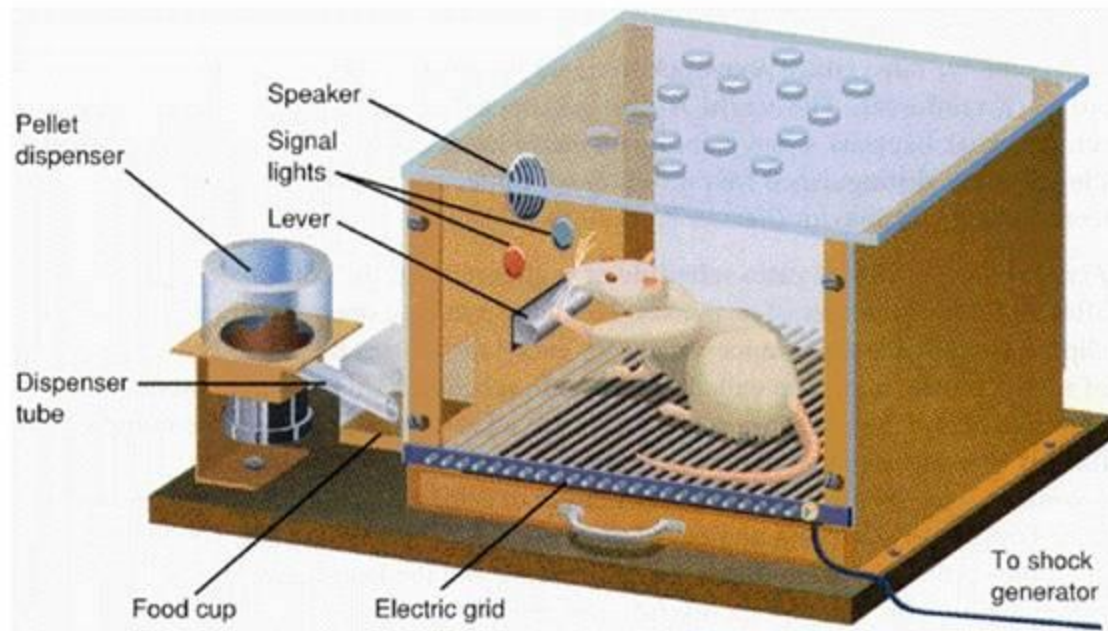
Operant Conditioning

- Operant Conditioning
  - learning is based on the consequences of responding.

- Reinforcement
  - the process by which a stimulus increases the probability that a preceding behavior will be repeated

Skinner Box and Cumulative Recorder

Pellet dispenser

Speaker

Signal lights

Lever

Dispenser tube

Food cup

Electric grid

To shock generator

Drum

← Paper direction

Pen

One response

Series of rapid responses

Reinforcement blip

Pen direction

Not responding

A cumulative recorder

Types of reinforcers in operant conditioning

- Primary Reinforcer
  - One that is non-learned and inherently reinforcing because it satisfies biological needs
  - E.g., food, water, warmth, sex.
- Conditioned (Secondary) Reinforcer
  - a learned reinforcer; often gains its reinforcing properties because of its association with a primary reinforcer (e.g., money, praise).
  - Institutions implement behavior modification program that makes use of secondary reinforcers such as weekend pass or coupons (in exchange of certain privileges) to emit desirable behaviors in patients or inmates.

Positive Reinforcers, Negative Reinforcers, and Punishment

- **Positive Reinforcer**
  - added to the environment that brings about an increase in a preceding response
- **Negative Reinforcer**
  - unpleasant stimulus whose removal leads to an increase in the probability that a preceding response will occur again in the future
- **Punishment**
  - unpleasant or painful stimuli that decrease the probability that a preceding behavior will occur again
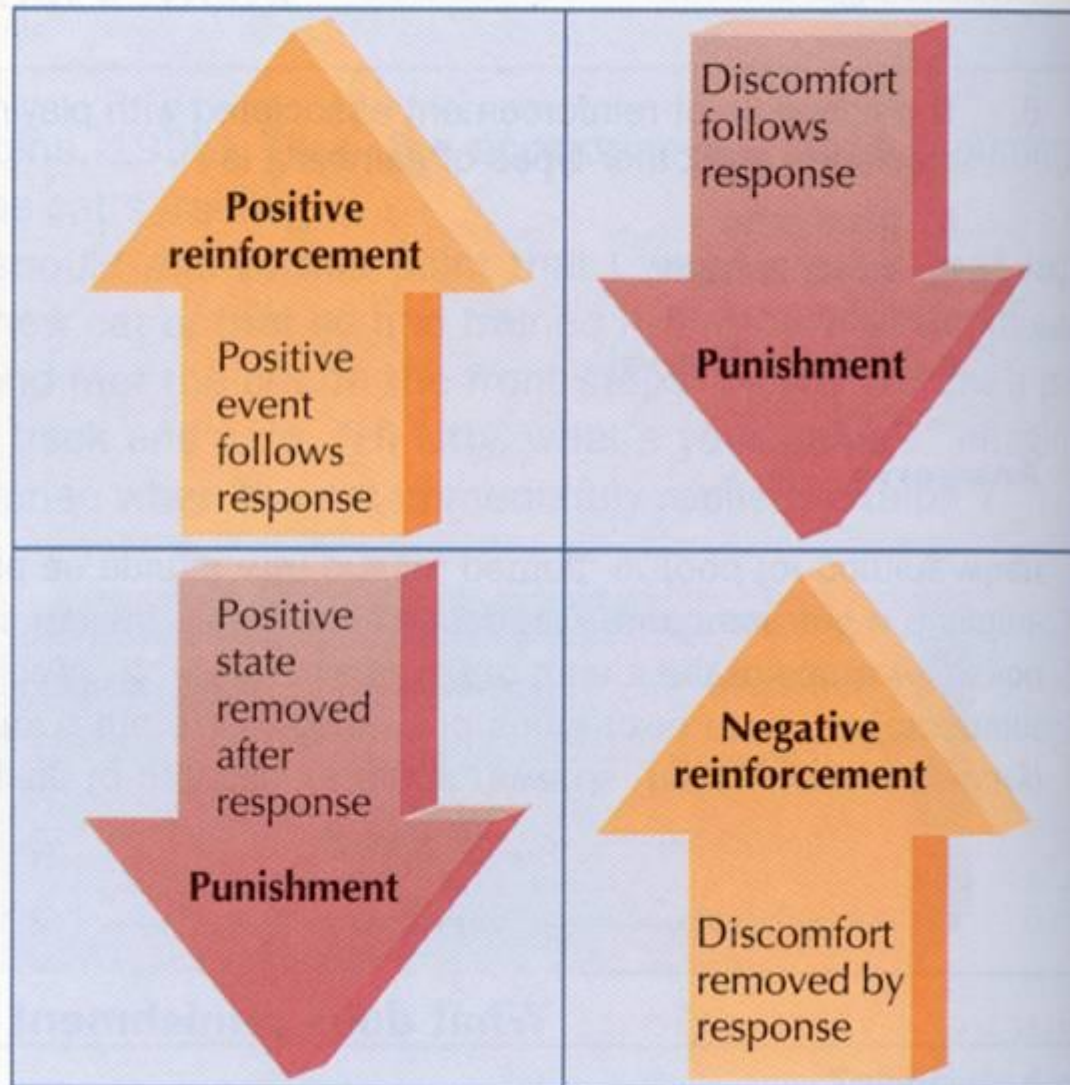- **Note the difference between punishment and negative reinforcer**

Type of Event

Positive | Aversive

After a Response, Event Is: Presented / Removed

Positive reinforcement — Positive event follows response

Punishment — Discomfort follows response

Punishment — Positive state removed after response

Negative reinforcement — Discomfort removed by response

Schedules of Reinforcement

■ **Continuous Reinforcement**
 – behavior that is reinforced every time it occurs
 – Learning occurs more rapidly

■ **Partial Reinforcement**
 – behavior that is reinforced some but not all of the time
 – Maintains response longer than continuous reinforcement before extinction.

Schedules of Reinforcement

- **Fixed-Ratio Schedule**
  - reinforcement is given only after a certain number of responses are made (e.g., every 6th bar-pressing brings reinforcement)
  - Produce a very high response rate.
  - E.g., worker paid on a piecework basis, tuition payment.
- **Variable-Ratio Schedule**
  - reinforcement occurs after a varying number of responses rather than after a fixed number
  - Greater resistance to extinction since reinforcement is less predictable
  - E.g., slot-machine, sales commissioning

Schedules of Reinforcement

- **Fixed-Interval Schedule**
  - Provides reinforcement for a response only if a fixed time period has elapsed.
  - Response slow down after reinforcement yields.
  - E.g., student's study behavior in between exams.

- **Variable-Interval Schedule**
  - time between reinforcements varies around some average interval rather than being fixed.
  - Produces steady rate of response that is resistant to extinction.
  - E.g., the announcement that 3 surprise quiz will be given in a 12-week semester.

Cognitive learning

- Emphasizes the role of expectancies in learning.
- Latent Learning
  - learning that is not immediately demonstrated until reinforcement is provided
 - Tolman's classic expt shows evidence of cognitive map in rats.
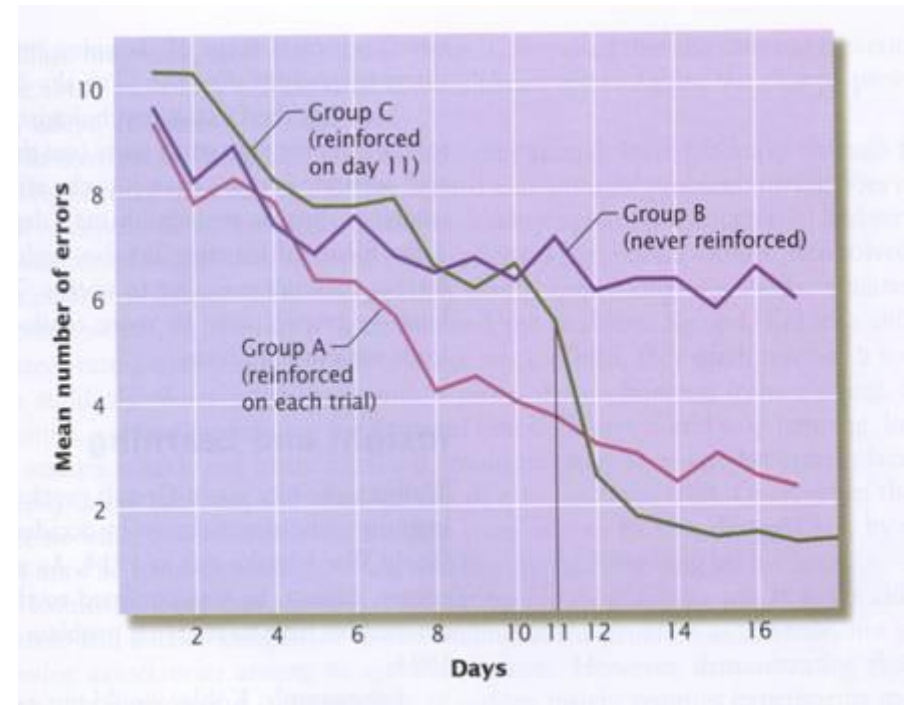
Social cognitive/Observational Learning

- Also known as modeling:
  - learning through observing the behavior of another person (a "model") and the consequences that follow.
  - Albert Bandura's classic study in aggression showing how children are more likely to hit at a Bobo doll after watching violent programs on TV.
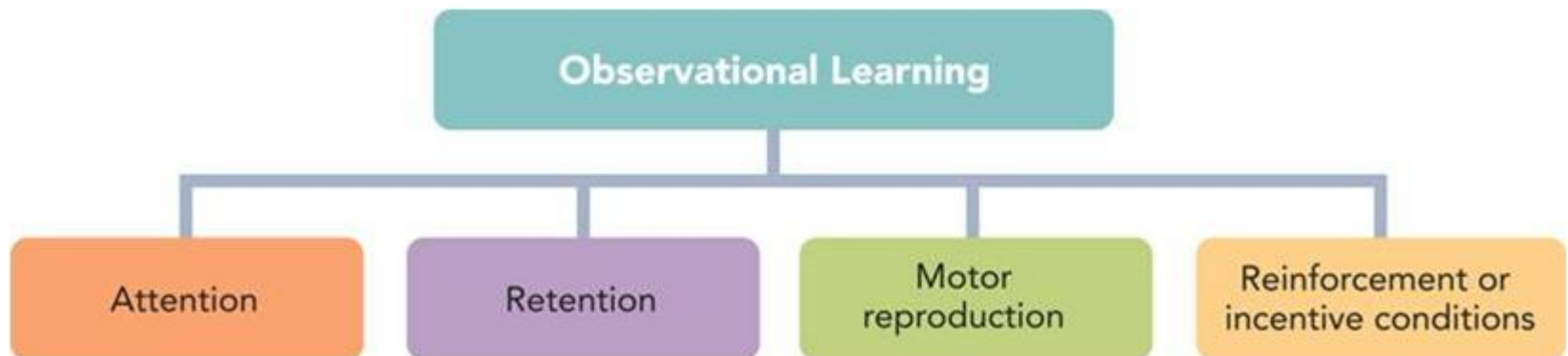
End of Lecture on Learning.
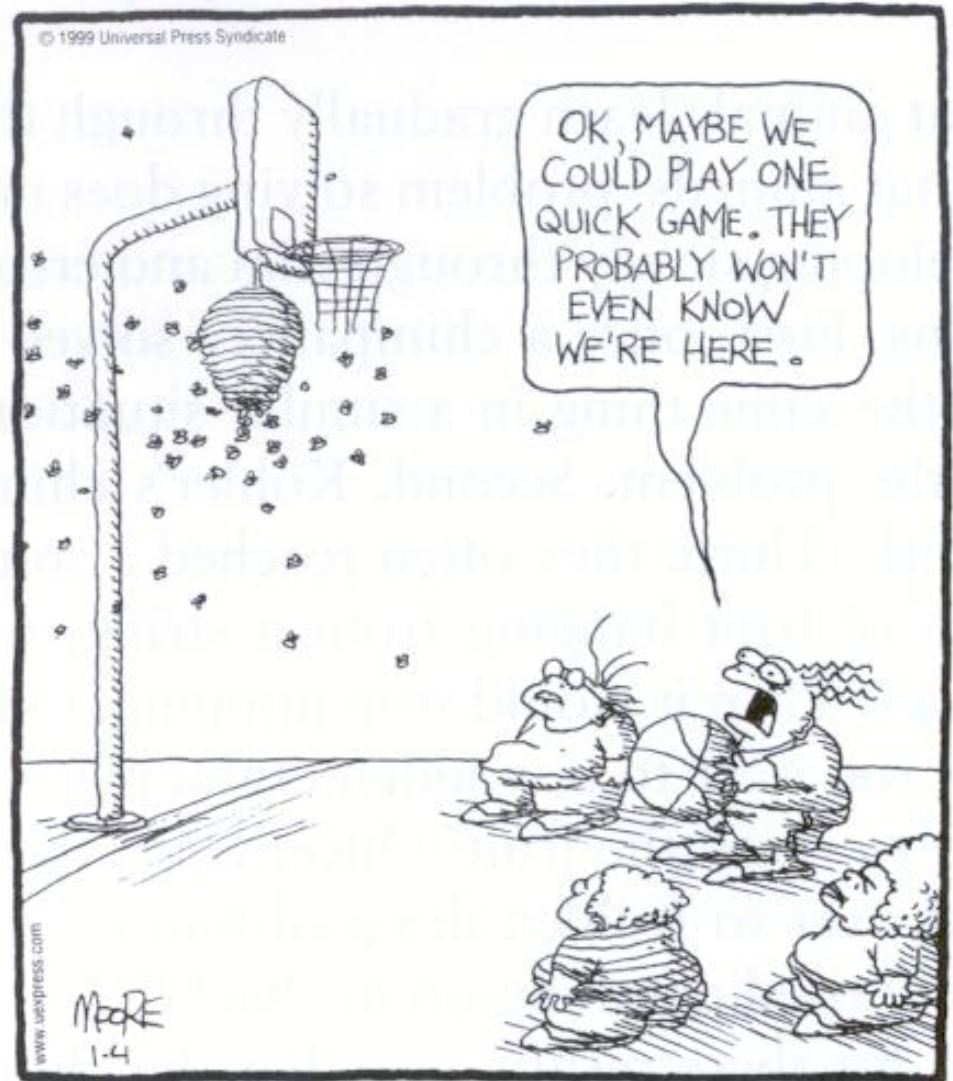
In spite of the power of observational learning, some people just have to learn things the hard way.