Basic Principles of Psychology for Educators (PSY2012)

Lecture 6
Learning

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Lecture Outline

- What is Learning?
- Classical Conditioning
  - Conditioned Emotional Response
  - Stimulus Generalization
  - Stimulus Discrimination
  - Higher Order Conditioning
- Operant Conditioning
  - Reinforcement (+ve/-ve)
  - Punishment (+ve/-ve)
  - Shaping / Successive Approximation
- Observational Learning

What is Learning?

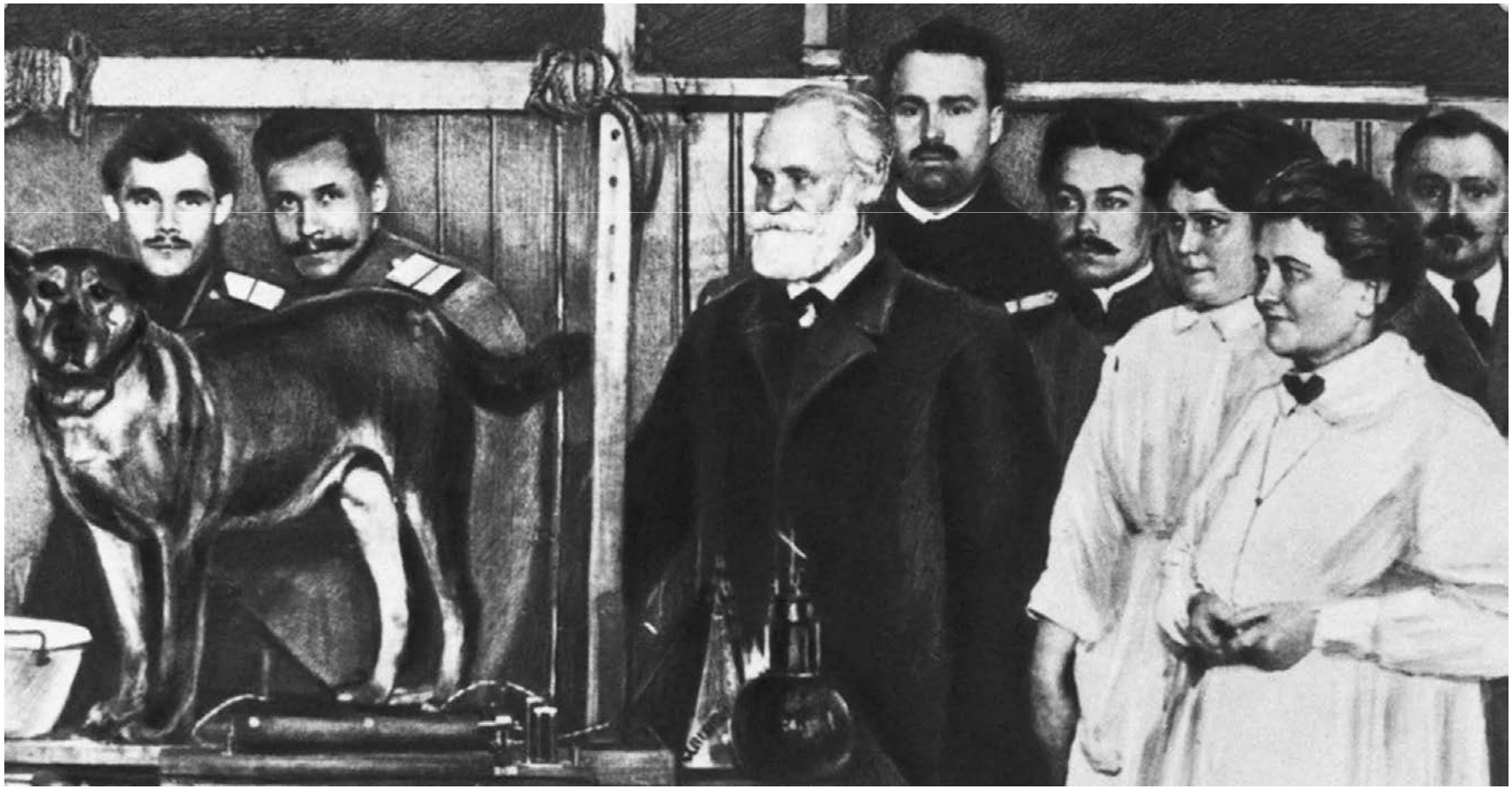
- My nephew Alex is learning to tie his shoes.
- The mother of an 8-year-old boy insists that her son take on some household chores, for which he earns a small weekly allowance. The allowance, when saved for 2 or 3 weeks, enables the boy to purchase small toys of his own choosing. As a result, he develops an appreciation for the value of money.
- A toddler is overly affectionate with a neighborhood dog, and the dog responds by biting the toddler's hand. After this incident, the child cries and runs quickly to his mother every time he sees a dog.

What is Learning?

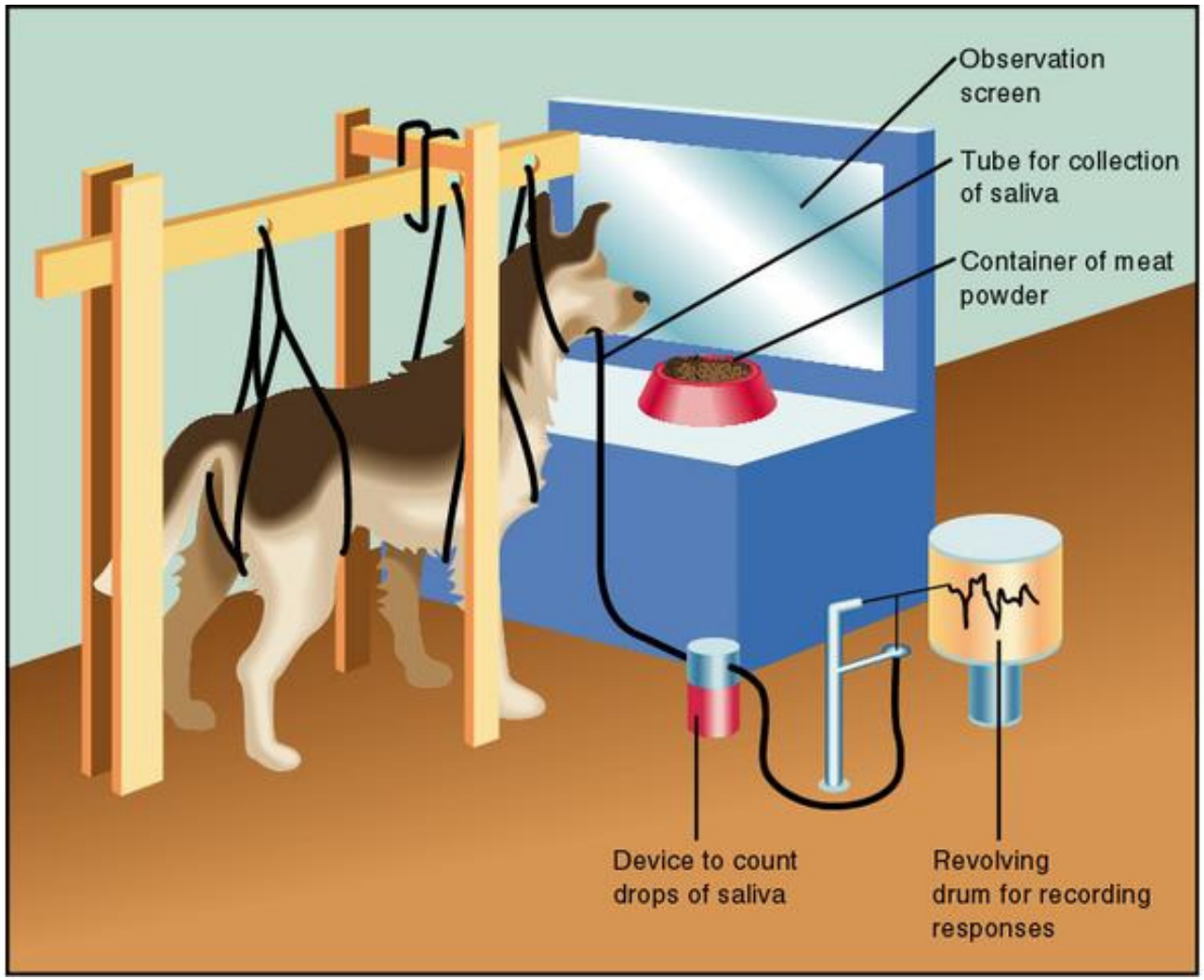
- Learning is
  - relatively permanent change in behavior
  - brought about by experience or practice
  - any kind of change in the way an organism *behaves* is learning
    - "Behavior is any activity of the organism that can be either directly or indirectly observed"

Classical Conditioning

- Ivan Pavlov

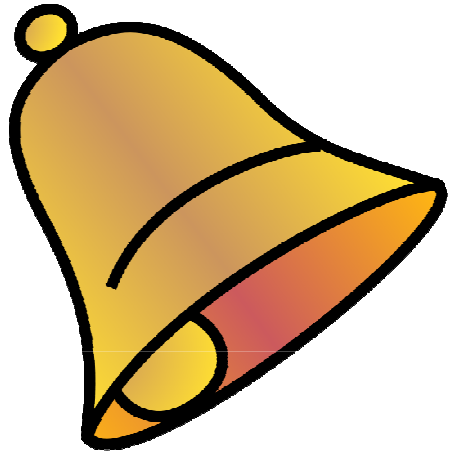


Pavlov's Laboratory



Basic Procedures of Classical Conditioning

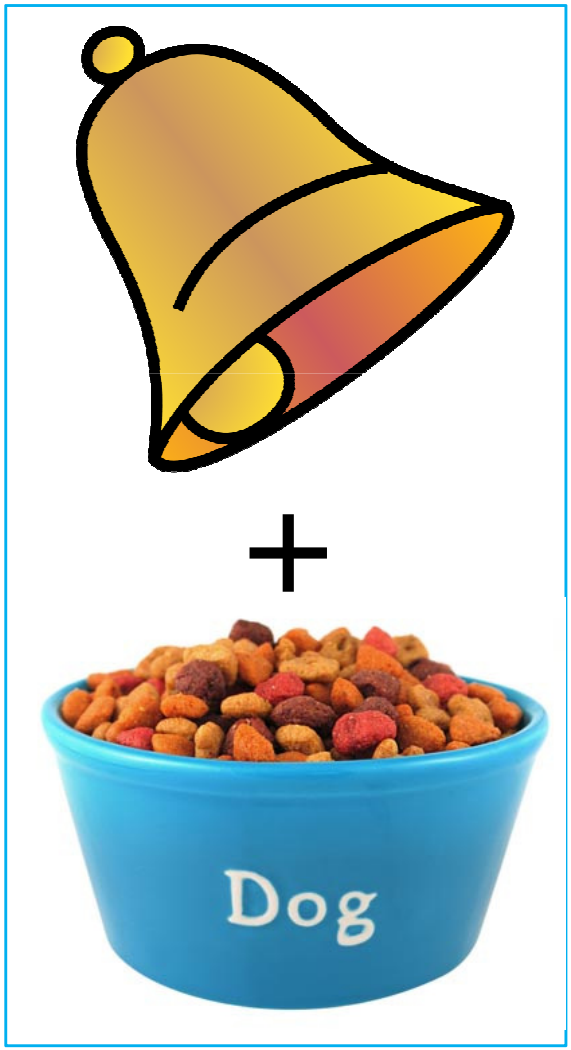
Before Conditioning



Neutral Orienting Reflex

Salivation

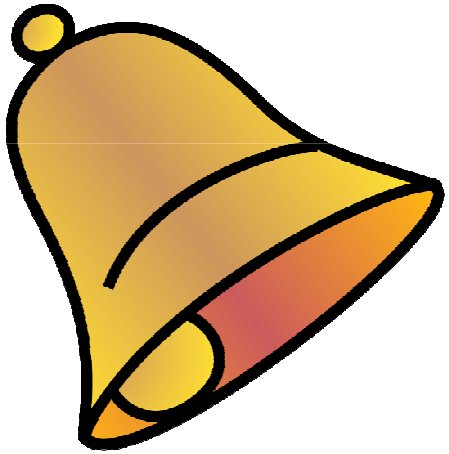
During Conditioning



Neutral Orienting Reflex

Salivation

After Conditioning



Salivation

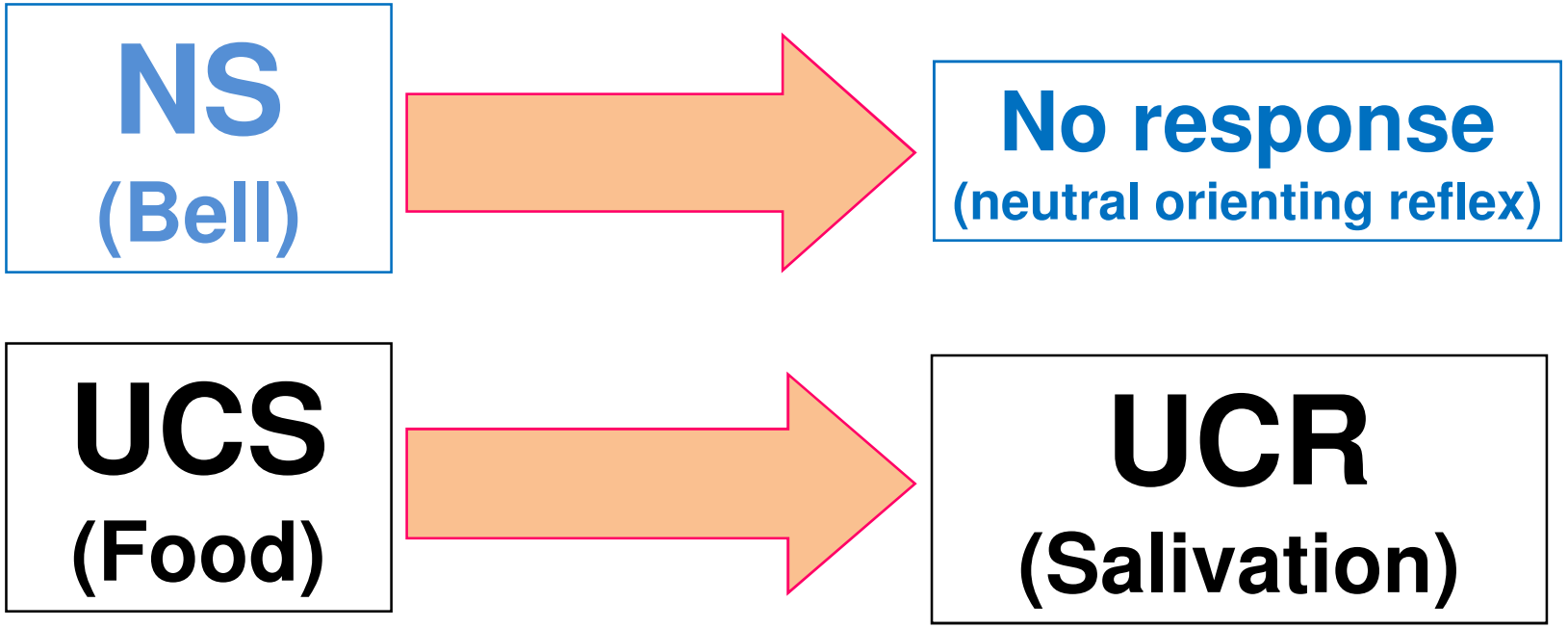
Classical Conditioning Concepts

Unconditioned = “unlearned” / “naturally occurring”

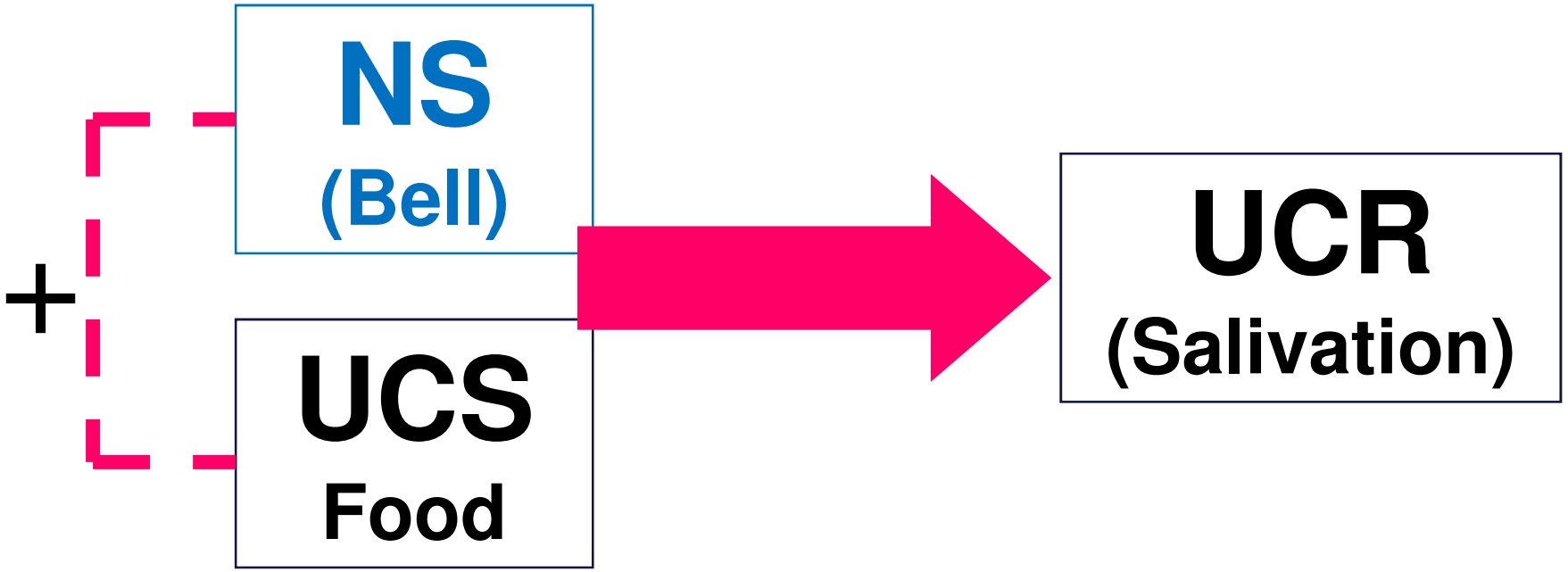
- Unconditioned stimulus (UCS)
  - Naturally occurring stimulus
  - Leads to an involuntary response
- Unconditioned response (UCR)
  - Involuntary response to naturally occurring stimulus
- Conditioned stimulus (CS)
  - Stimulus is able to produce learned reflex response
  - Paired with the original unconditioned stimulus
  - Neutral stimulus (NS)
    - Becomes conditioned stimulus when paired with an unconditioned stimulus
- Conditioned response (CR)
  - Learned reflex response to a conditioned stimulus.
  - Sometimes called conditioned reflex

Conditioned = “learned”

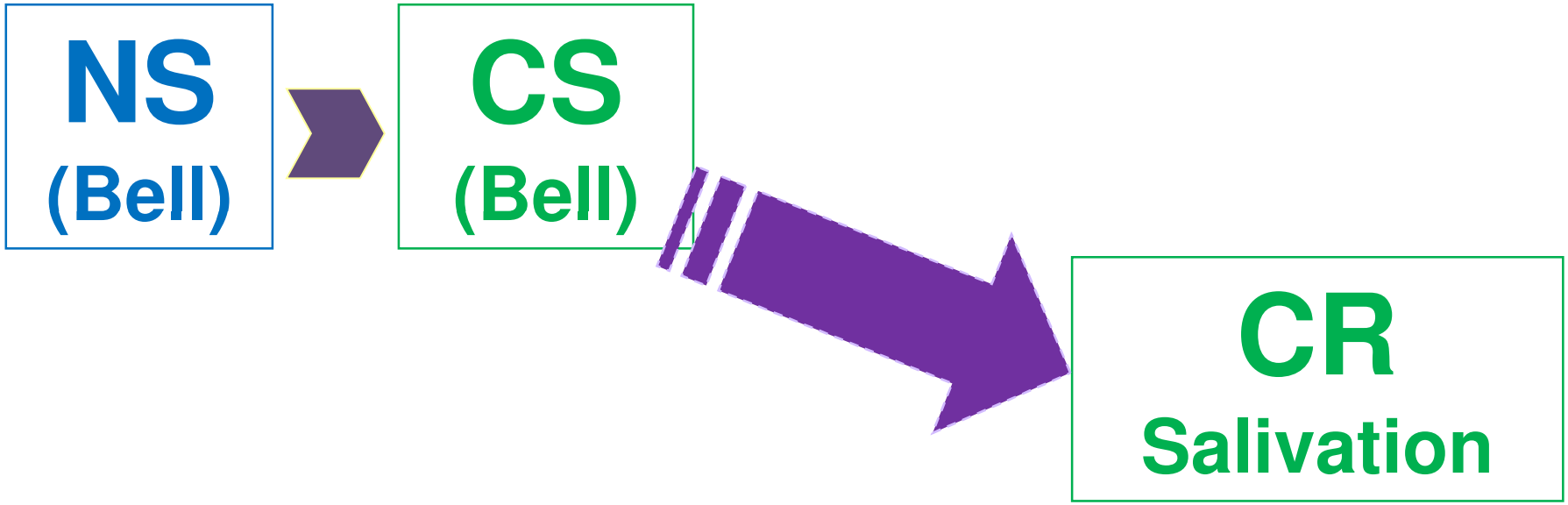
Before Conditioning



During Conditioning



After Conditioning



Before conditioning:

Food → Salivation

UCS → UCR

Bell → No salivation

NS → --- (neutral orienting reflex)

During conditioning:

Bell : Food → Salivation

NS UCS → UR

After conditioning:

Bell → Salivation

CS → CR

Classical Conditioning Principles

- CS must come before UCS
- CS and UCS must come very close together in time
  - Ideally, only several seconds apart
- Neutral stimulus must be paired repeatedly with UCS before conditioning takes place
- CS is usually a stimulus that is distinctive from other competing stimuli

Conditioned Emotional Response

- Emotional response classically conditioned to occur to learned stimuli
- Examples:
  - Fear of dogs
  - Emotional reaction to seeing an attractive person, baby animals, etc.
  - May lead to phobias – irrational fear responses

How phobias can be developed through classical conditioning?

UCS

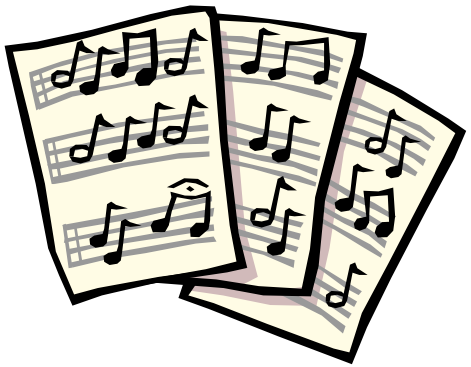
UCR

How phobias can be developed through classical conditioning?

UCS

+

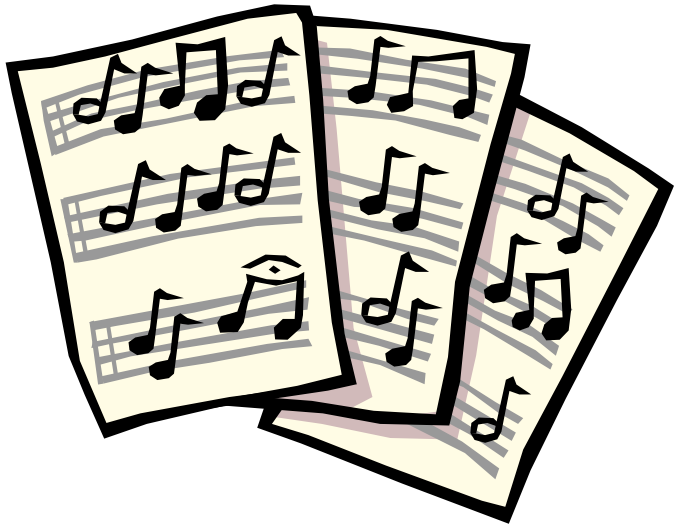
Mozart symphony (NS)



UCR

How phobias can be developed through classical conditioning?

Mozart symphony (CS)



CR

Why Tommy doesn't like going to school?

Before conditioning:

Being bullied → Upset
UCS → UCR

School → No bad feeling
NS → ---

During conditioning:

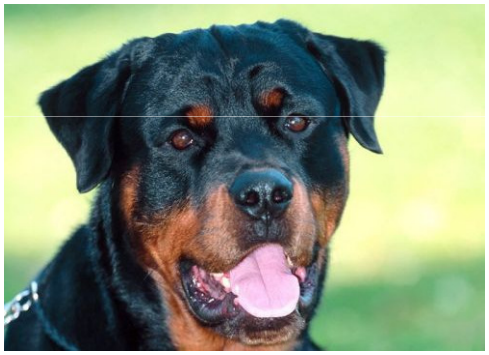
School: Being bullied → Upset
NS UCS → UCR

After conditioning:

School → Upset
CS → CR

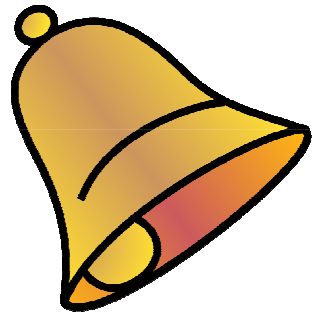
Classical Condition Phenomena: Stimulus Generalization

- Stimulus Generalization
  - The tendency for a CR to occur in the presence of a stimulus that is similar to the CS



Classical Conditioning Phenomena: Stimulus Discrimination

- Stimulus Discrimination
  - The tendency for a response to be elicited by one stimulus and not another.

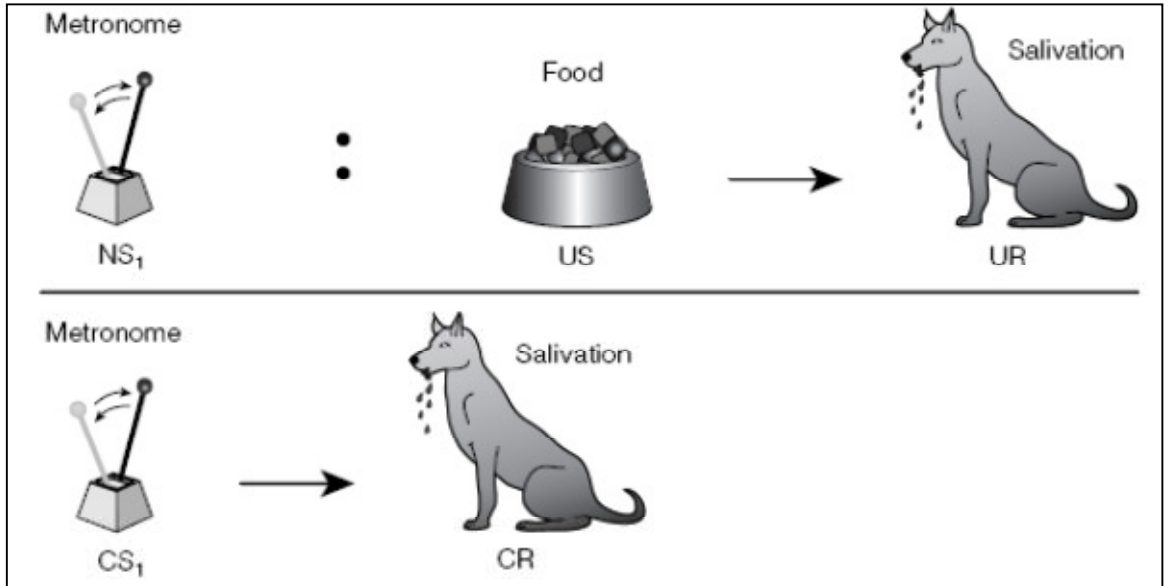


Salivation

NO Salivation

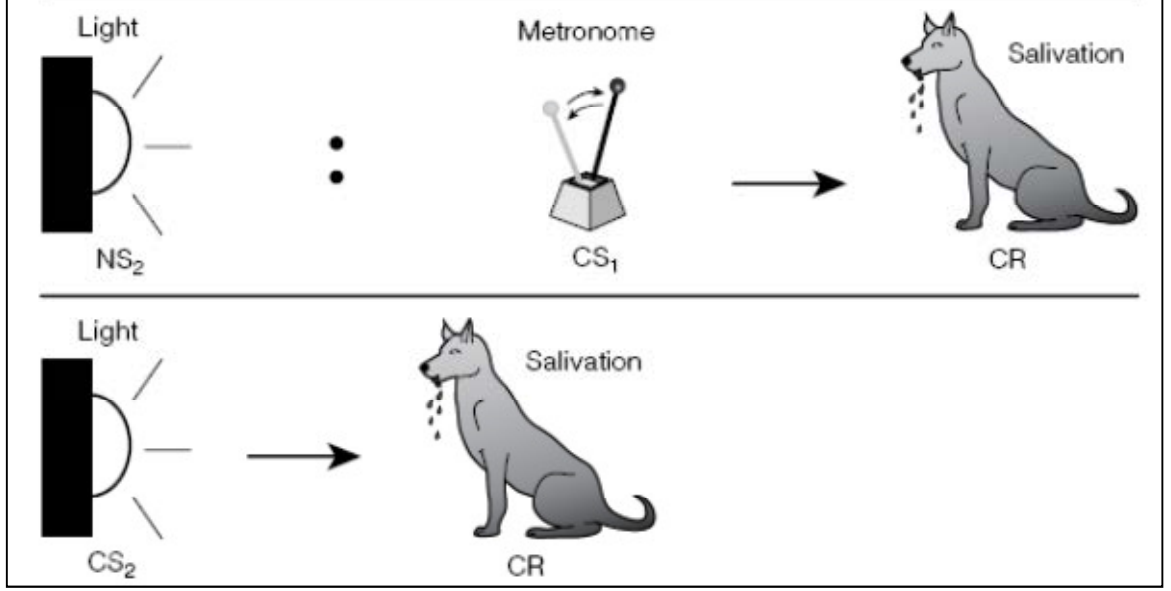
Higher-order Conditioning

First-order conditioning



Second-order conditioning

- Strong conditioned stimulus is paired with a neutral stimulus
- Neutral stimulus to become a second conditioned stimulus

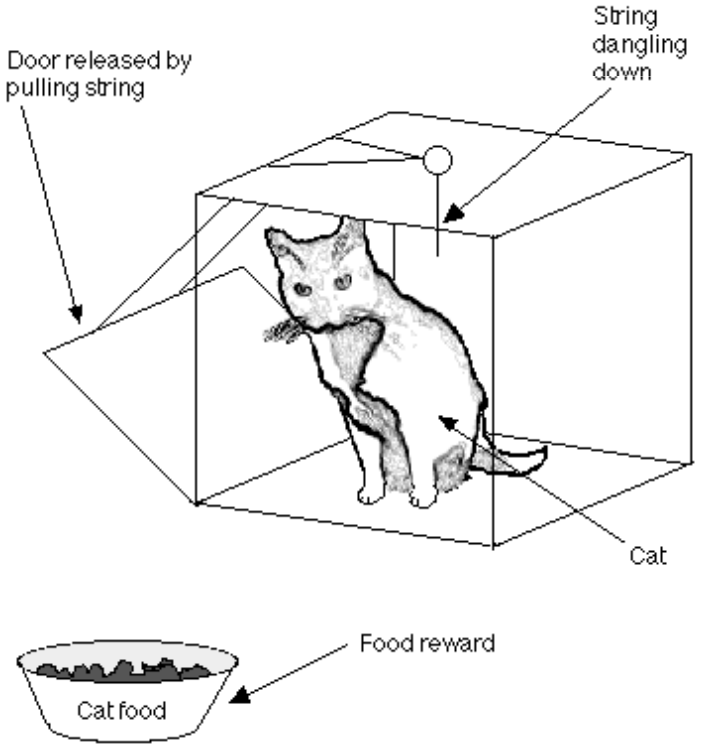


Operant Conditioning

- Thorndike's Law of Effect:
  - tendency to do certain behaviors is *strengthened* if they are followed by a reward; tendency to do behaviors that are not rewarded will be *weakened*

If a response is followed by a pleasurable consequence, it will be repeated

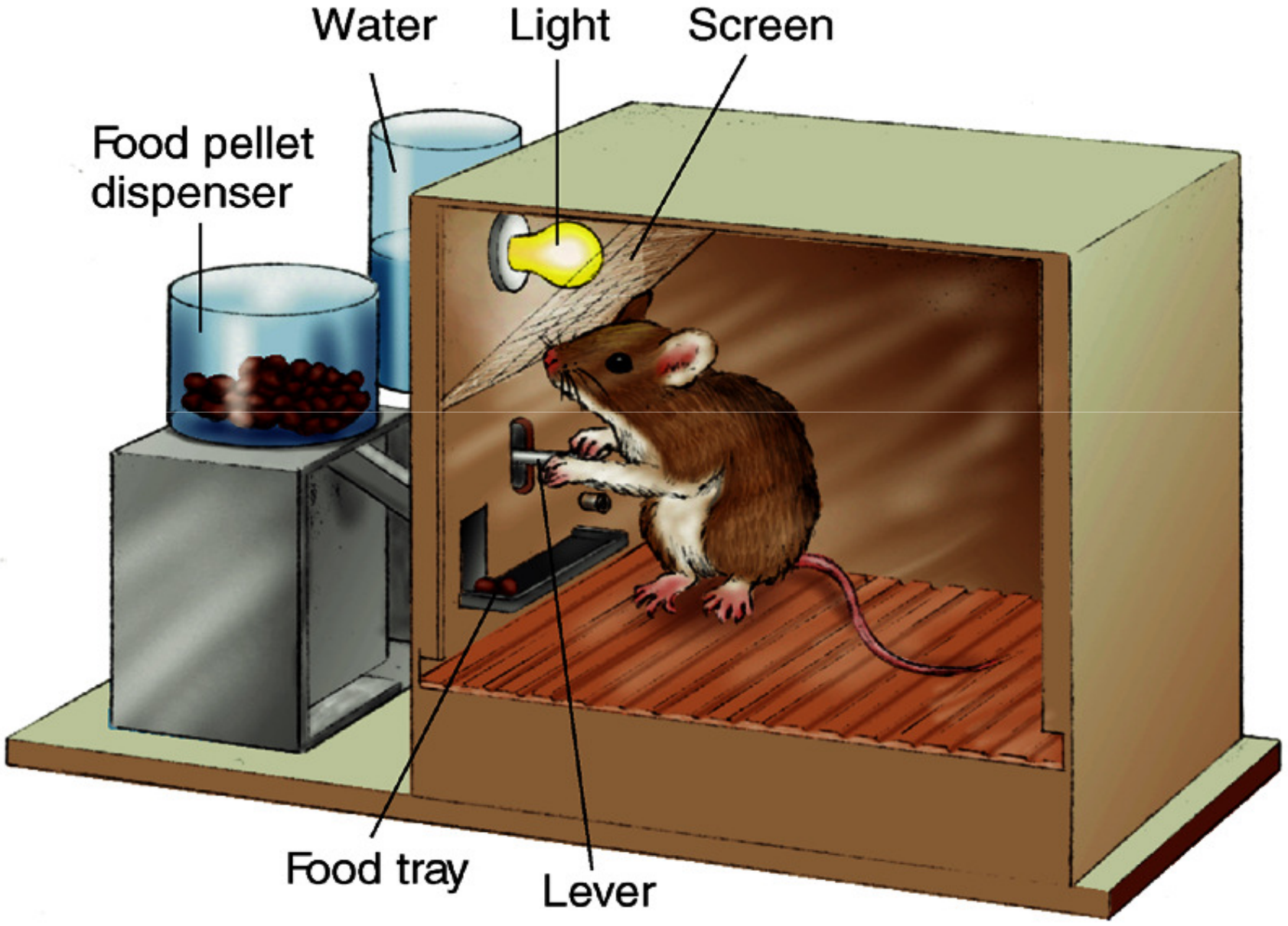
If followed by an unpleasant consequence, it will tend not to be repeated



Operant Conditioning

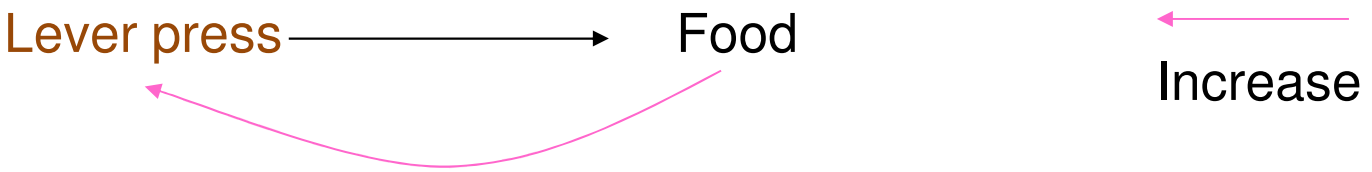
- B. F. Skinner
- Stressed the study of only observable, measurable behavior
- The association between our own response and what follows it, its consequences
- Voluntary behavior used to operate on the environment
- Focus on the effects of the consequences of behavior

Skinner Box



3 basic components of the operant conditioning process

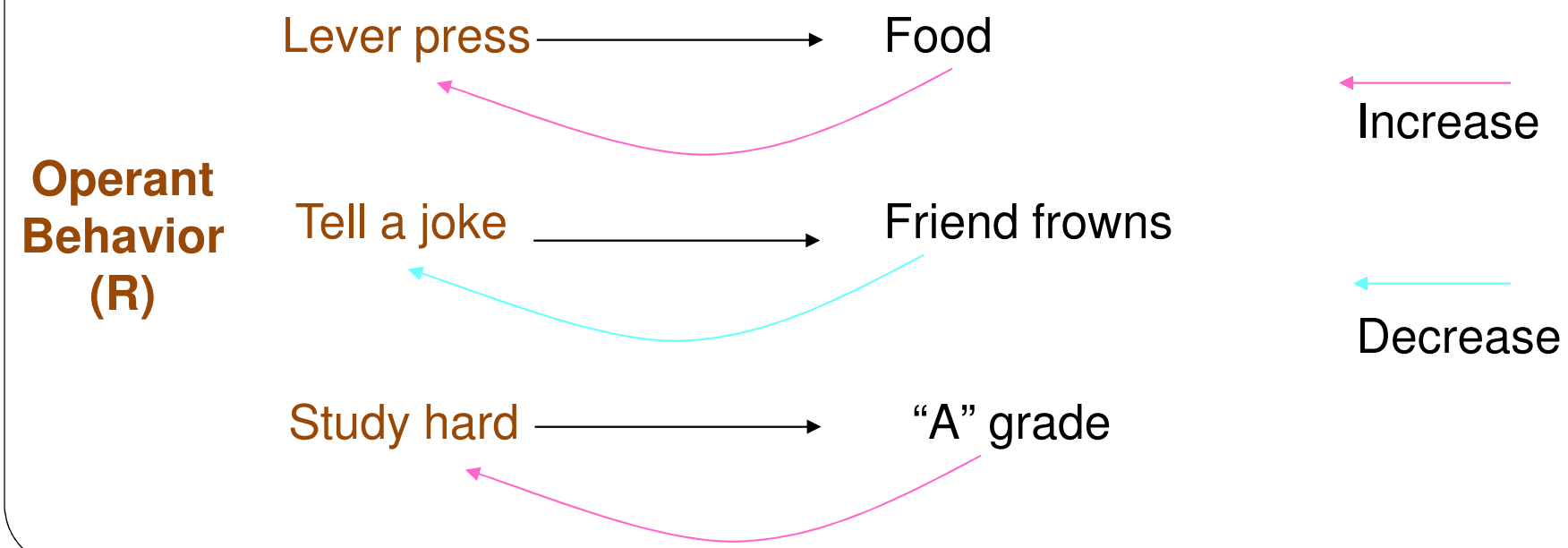
- A response (operant behavior) that produces a certain consequence
- The consequence that serves to either increase (reinforcer) or decrease (punisher) the probability of the response that preceded it



- A discriminative stimulus that precedes the response and signals that a certain consequence is now available

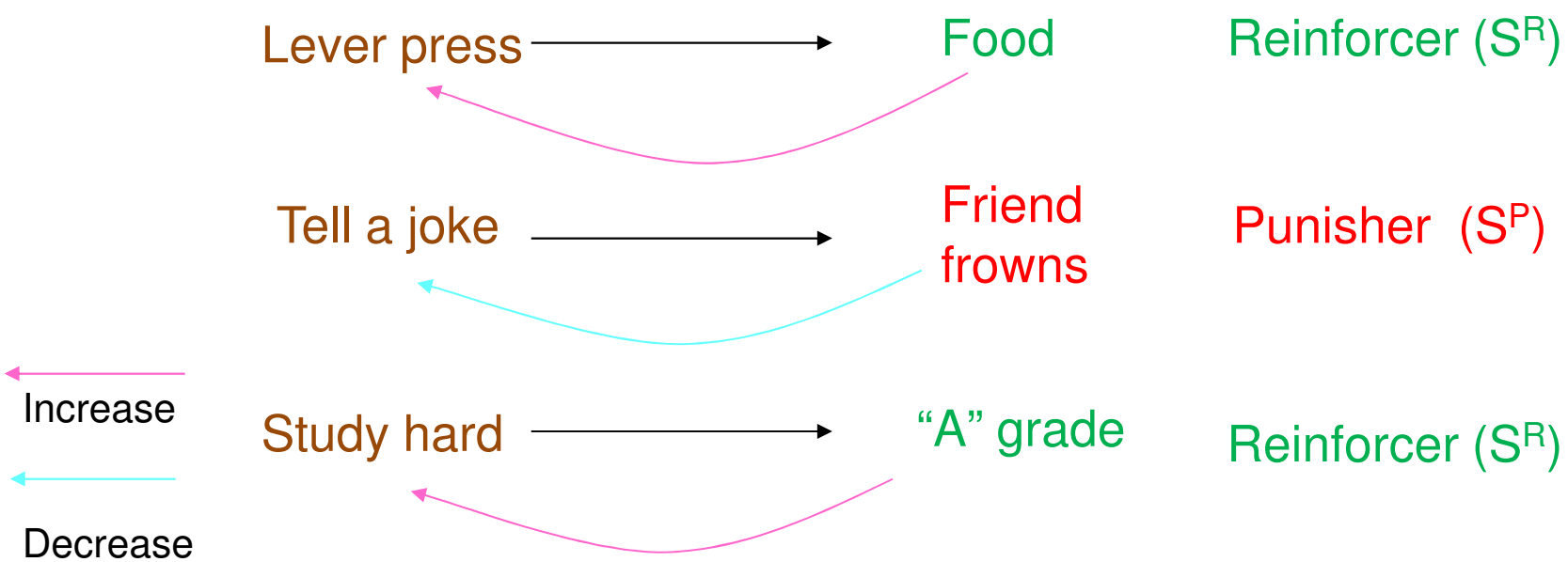
Operant Behavior

- A class of emitted responses that result in certain consequences
- The consequences in turn affect the future probability or strength of those responses

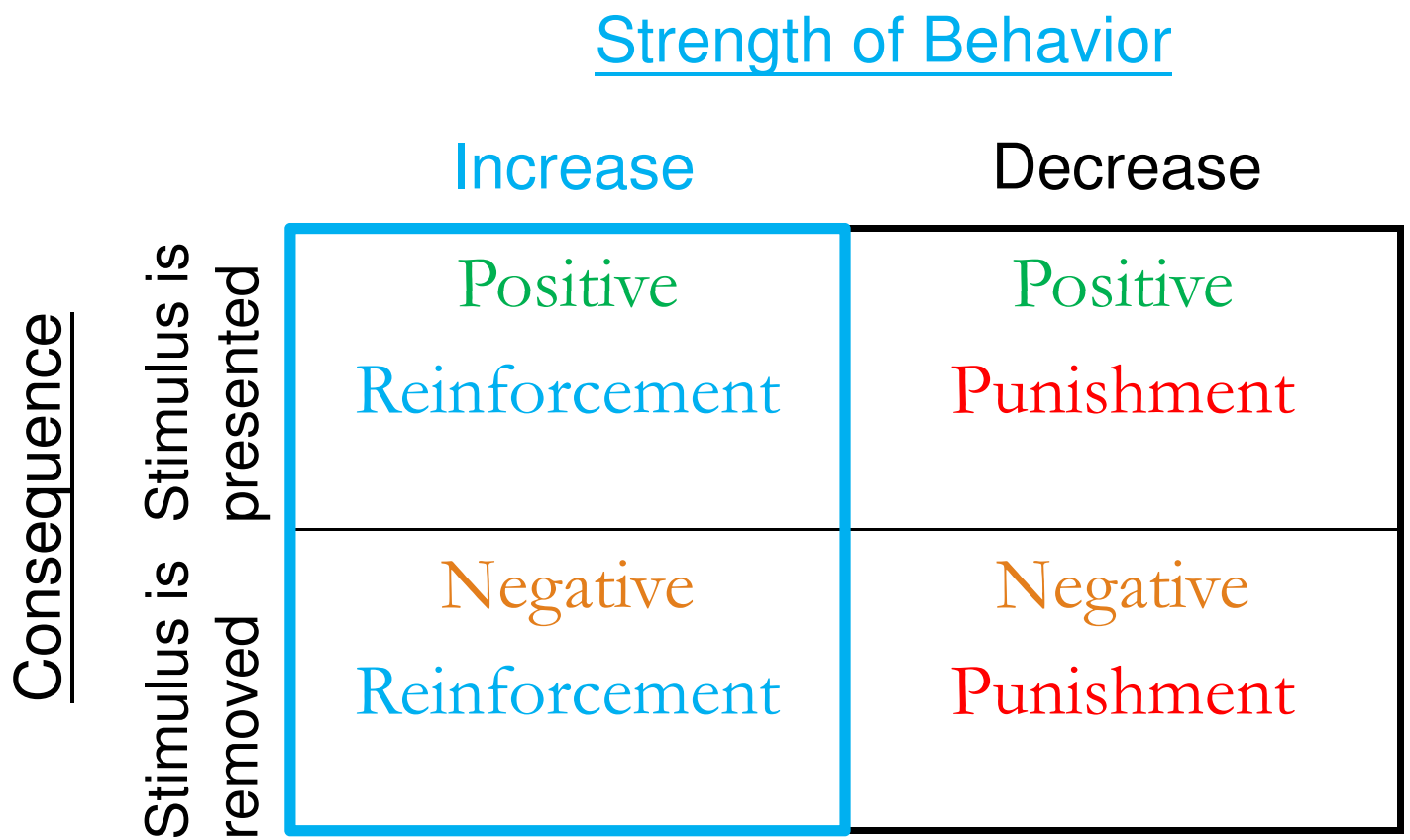


Operant Consequence

- Reinforcers
  - Events that follow a behavior *and*
  - The future probability of that behavior **increases**
- Punishers
  - Events that follow a behavior *and*
  - The future probability of that behavior **decreases**



4 Types of Operant Contingencies



Positive Reinforcement

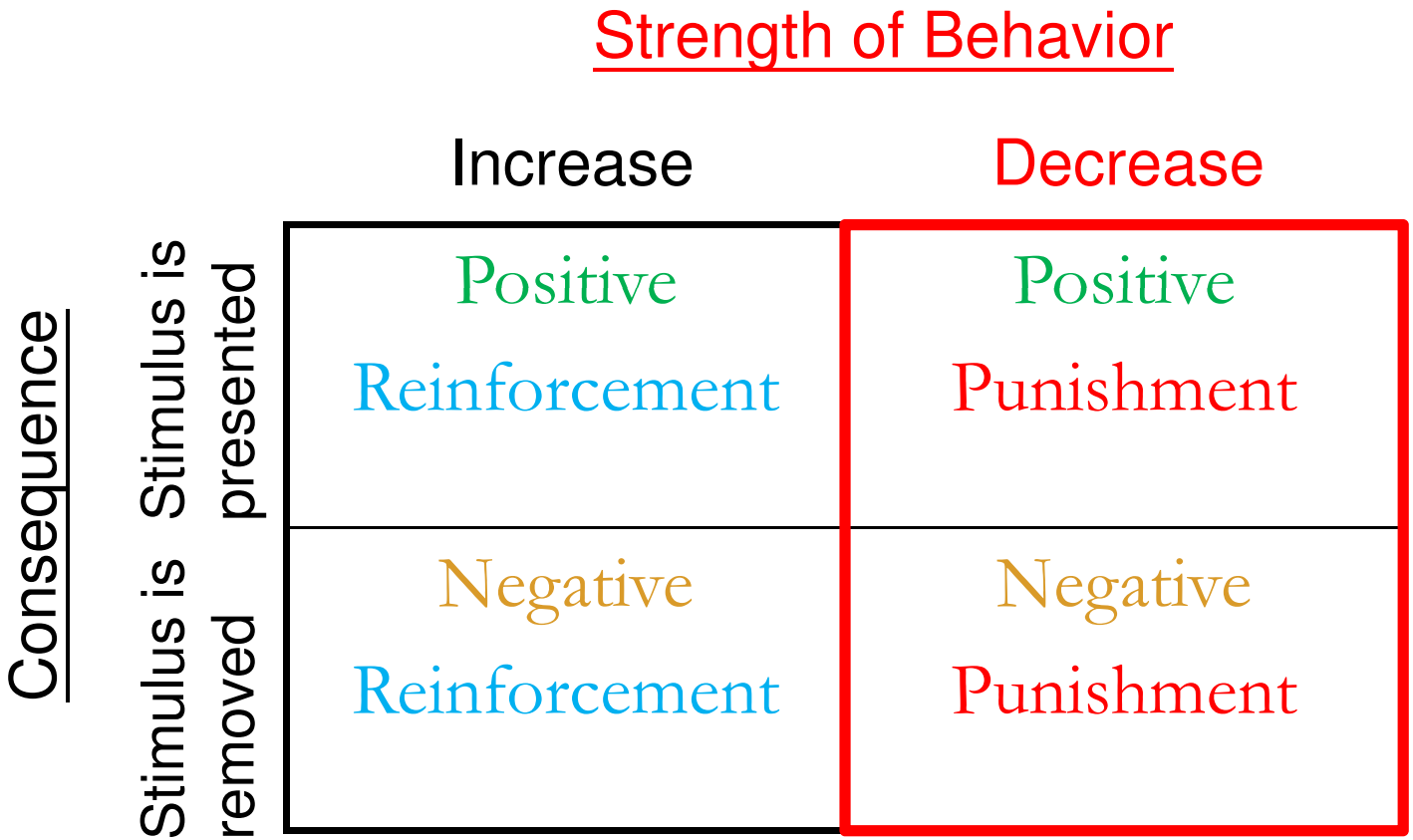
- In positive reinforcement, a behavior is followed by the appearance of, or an increase in the intensity of, a stimulus
- Turn on TV → See the show
  R → S^{R+}
  Smile at person → The person smiles at you
  R → S^{R+}
  Study hard → "A" grade
  R → S^{R+}
  Compliment partner → Receive a kiss
  R → S^{R+}
- Primary reinforcer
  - Reinforcer that meets a basic biological need (e.g., hunger, thirst, touch)
- Secondary reinforcer
  - Reinforcer associated with a primary reinforcer (e.g., praise, tokens, gold stars)

Negative Reinforcement

- In negative reinforcement, a behavior is strengthen by the removal of, or a decrease in the intensity of, a stimulus.

- Open umbrella → Escape rain
  R → S^{R-}
  Claim illness → Avoid writing an exam
  R → S^{R-}
  Take aspirin → Eliminate headache
  R → S^{R-}

4 Types of Operant Contingencies



Positive Punishment

- The presentation of a stimulus following a response, which then leads to a decrease in the future strength of that response

Argue with the boss → Get poor appraisal

R → S^{P+}

Swat at the bee → Get stung

R → S^{P+}

Negative Punishment

- The removal of a stimulus following a response, which then leads to a decrease in the future strength of that response

Argue with the boss → Lose job
R → S^P

Tease sister → Reduced pocket money
R → S^P

3 basic components of the operant conditioning process

- A response (operant behavior) that produces a certain consequence
- The consequence that serves to either increase (reinforcer) or decrease (punisher) the probability of the response that preceded it
- A discriminative stimulus that precedes the response and signals that a certain consequence is now available

Discriminative Stimulus (Operant Antecedent)

- A stimulus in the presence of which responses are reinforced and in the absence of which they are not reinforced.

Bell: Lever Press → Food

S^D R S^{R+}

Susan: Tell her a joke → Susan laughs

S^D R S^{R+}

The "ABC" Contingency in Operant Conditioning

Antecedent	**Behavior**		**Consequence**
Bell:	Lever press	→	Food
S^D	R		S^{R+}
Susan:	Tell her a joke	→	Susan laughs
S^D	R		S^{R+}

table 4.1 Comparing Two Kinds of Conditioning

OPERANT CONDITIONING	CLASSICAL CONDITIONING
End result is an increase in the rate of an already occurring response.	End result is the creation of a new response to a stimulus that did not normally produce that response.
Responses are voluntary.	Responses are involuntary and reflexive.
Consequences are important in forming an association.	Antecedent stimuli are important in forming an association.
Reinforcement should be immediate.	CS must occur immediately before the UCS.
An expectancy develops for reinforcement to follow a correct response.	An expectancy develops for UCS to follow CS.

Operant Conditioning Concepts

- Shaping
  - Small steps toward goal behavior are reinforced until goal behavior is met
    - First, reward behaviors that are *close to* the desired behavior
    - Then, reward only behaviors that are *even closer* to the desired behavior
- Successive approximations
  - The steps in behavior leading to a particular goal behavior

Applying Operant Conditioning

- Behavior modification
  - Use of conditioning techniques to create changes in behavior
- Token economy
  - Desired behavior is rewarded with tokens that can be exchanged for desired items or privileges
- Time-out
  - Organism is being "removed" from opportunity to obtain positive reinforcement
- Applied behavior analysis (ABA)
  - Uses shaping-skills broken into small steps
  - Prompts are removed over time

Observational Learning

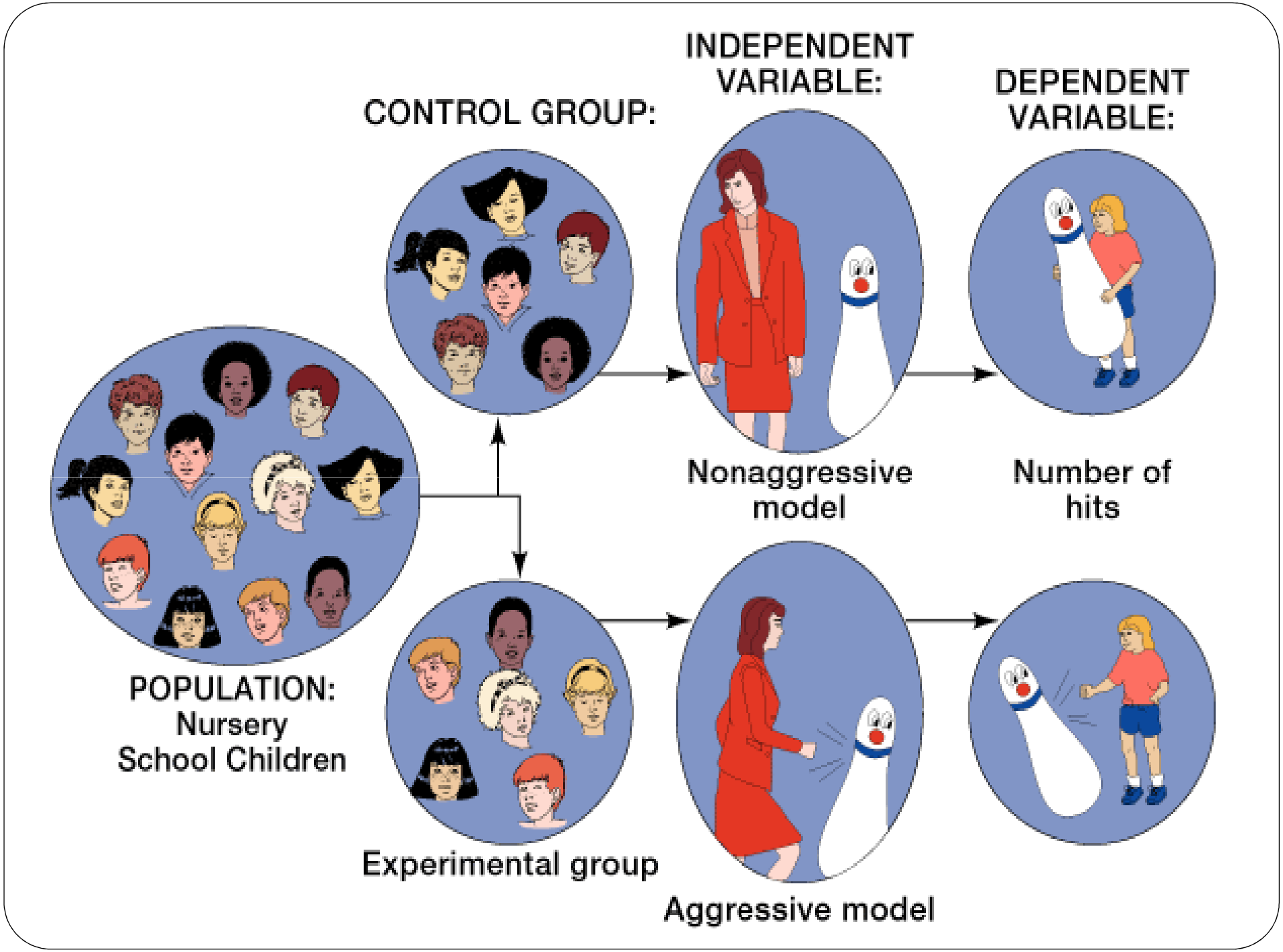
- Learning new behavior by watching a *model* perform the behavior

- Bandura (1961)
  - Children observed and later spontaneously imitated observed aggressive behavior

- Learning/performance distinction
  - Learning can take place without actual performance of the learned behavior

The BoBo Doll Experiment

http://www.youtube.com/watch?v=hHHdovKHDNU


INDEPENDENT VARIABLE:
DEPENDENT VARIABLE:
CONTROL GROUP:
Nonaggressive model
Number of hits
POPULATION: Nursery School Children
Experimental group
Aggressive model

4 Elements of Observational Learning

- Attention
  - To learn through observation learner must first attend to the model
- Memory
  - Learner must be able to retain memory of what was done
  - e.g., remembering steps in preparing a dish seen on a cooking show
- Imitation
  - Learner must be capable of reproducing actions of the model
- Motivation
  - Learner must have the desire to perform the action

Applying Psychology to Everyday Life

- Toilet Training a Cat

  Use operant principles

  - Shaping
    - Transition from litter box to toilet is done in stages
  - Positive reinforcement