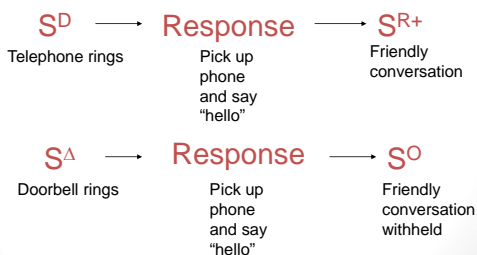


## Stimulus Control

## What is stimulus control?

- Occurs when the rate, latency, duration, or amplitude of a response is altered in the presence of an antecedent stimulus
- Is acquired when responses are reinforced only in the presence of a *discriminative stimulus* ( $S^D$ )
- And not in the presence of other stimuli
  - Known as *stimulus deltas* ( $S^\Delta$ )

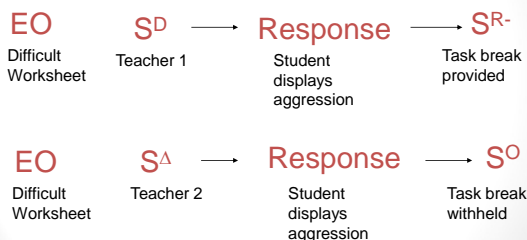
## The Development of Stimulus Control



## Comparison of Stimulus Control and Motivating Operations

- Similarities
  - Both events occur before the behavior of interest
  - Both events have evocative functions
- Motivating operation is something that changes the value of a stimulus as a reinforcer
  - Establishing operation (EO) makes the reinforcer more valuable
  - Abolishing operation (AO) makes the reinforcer less valuable

## MOs and Stimulus Control



## Stimulus Generalization and Discrimination

- Stimulus Generalization
  - Occurs when stimuli that share similar physical characteristics with the controlling stimulus evoke the same behavior as the controlling stimulus
- Stimulus Discrimination
  - Occurs when new stimuli that are similar to the controlling stimulus but do not evoke the same response as the controlling stimulus

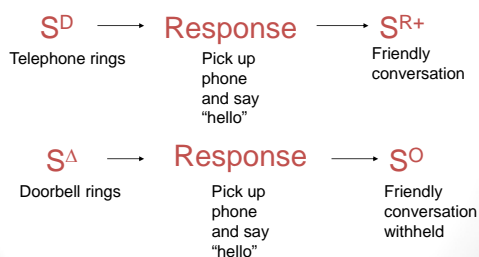
## Stimulus Control and Stimulus Generalization are a Continuum



## Stimulus Discrimination Training

- Requires one behavior
- Two antecedent stimulus conditions
  1.  $S^D$  Responses that occur in the presence of  $S^D$  are reinforced - Behavior increases
  2.  $S^\Delta$  Responses that occur in the presence of the  $S^\Delta$  are not reinforced – Behavior decreases  
Note: Reduced reinforcement quality or quantity will also decrease behavior.

## The Development of Stimulus Control



## Concept Formation

- In ABA, is not a hypothetical construct or mental process
- Complex example of stimulus control that requires:
  1. Stimulus generalization within a class of stimuli
  2. Stimulus discrimination between classes of stimuli

## Example: Concept of Red

- Stimulus generalization across all red objects
  - Light red to dark red
  - Different objects (car, ball, pencil)
- Stimulus discrimination between red and other colors
  - Red ball vs. yellow ball
  - Red dress vs. blue dress

## Teaching Concepts

- Requires discrimination training
  - Antecedent stimuli representative of a group of stimuli that share a common relationship are presented with stimuli from other stimulus classes
- Ultimately, the common stimuli form a stimulus class

## Types of Stimulus Classes

- Feature stimulus class
  - Stimuli share common physical forms (i.e., topographical structures)
  - Stimuli share common relative relationship (i.e., spatial arrangements)
  - Developed through stimulus generalization
- Arbitrary stimulus class
  - Do not share a common stimulus feature
  - Limited number of stimuli
  - Developed using stimulus equivalence

## Stimulus Equivalence

- The emergence of accurate responding to untrained and nonreinforced stimulus-stimulus relations following the reinforcement of responses to some other trained stimulus-stimulus relations.
- Useful for teaching complex verbal relations
  - Reading
  - Language arts
  - Mathematics

## Factors Affecting Stimulus Control

- Consistent use of reinforcers contingent upon correct responding in the presence of the  $S^D$  is critical.
- Also important are:
  - Pre-attending skills
  - Stimulus salience
  - Masking and overshadowing

## Pre-attending

- Is a prerequisite skill for stimulus control
  - Looking at instructional materials
  - Looking at teacher when responses are modeled
  - Listening to oral instructions
  - Sitting quietly for short periods of time
- These may need to be taught before stimulus control procedures are implemented

## Stimulus Salience

- Is the prominence of the stimulus within the environment
- Increased saliency facilitates efficiency of instruction

## Masking and Overshadowing

- Increase or decrease salience of stimuli
- Competing stimuli may block the evocative function of an  $S^D$
- To limit the negative effects:
  - Rearrange the environment
  - Make instructional stimuli more intense
  - Consistently reinforce behavior in the presence of instructionally-relevant stimuli

## Using Prompts

- Can be very important
- Are supplementary antecedent stimuli used to cause a correct response in the presence of an  $S^D$
- Two types:
  - Response prompts operate directly on the response
  - Stimulus prompts operate directly on the antecedent task stimuli

## Response Prompts

- Verbal instructions
  - Vocal
  - Non-vocal (e.g., written)
- Modeling
  - A demonstration of the desired behavior
- Physical Guidance
  - Partially physically guide the student's movements

Intrusiveness increases



## Stimulus Prompts

- Movement cues
  - Pointing, tapping, touching, looking at
- Position cues
  - Place one stimulus closer to the student
- Redundance
  - Stimulus or response dimensions are paired with correct choice

## Transfer of Stimulus Control

- Prompts should be used only during acquisition
- Transfer stimulus control from prompt to naturally-existing stimuli by using fading
- Want the transfer to be fast

## Transferring from Response Prompts

- Most-to-least prompts
  - Physically guide participant through entire performance
  - Gradually reduce amount of physical assistance
    - Modeling
    - Verbal instruction
    - Natural stimulus

## Graduated Guidance

- Immediately fade physical prompts
- Follow participant closely with hands
- Gradually increase distance between hands and participant

## Least-to-Most Prompts

- Provide participant with an opportunity to perform the response with the least amount of assistance on each trial
- Participant receives greater degrees of assistance with each successive trial without a correct response

## Time Delay

- Varying the time interval between presentation of a natural stimulus and the presentation of a response prompt
  - Constant time delay
    - Begin with a 0-sec delay
    - Then use a fixed delay (e.g., 3 sec)
  - Progressive time delay
    - Begin with a 0-sec delay
    - Gradually and systematically increase delay

## Stimulus Fading

- Highlight a physical dimension of a stimulus, then gradually fade the exaggerated dimension
- Superimposing one stimulus on top of another and gradually fade it

## Stimulus Shape Transformations

- Use an initial stimulus shape that will prompt a correct response
- This shape is gradually changed to form the natural stimulus, while maintaining correct responding

## Summary

- Stimulus control is very important in changing behavior.
- Need to be systematic about how you will do it
- Monitoring of behavior is critical for success
- Provide good reinforcers