



Differential Reinforcement & Antecedent Control  
(Using Prompting and Shaping to Teach Behaviors)

SPCD 519

Stimulus Control



What is it?  
What role does it play in teaching academic and social (behavioral) skills?



**Stimulus Control**

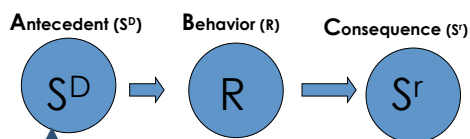
Learning to pay attention to and respond differentially to things in the environment (stimuli) that

- give us info about what behavior is probably going to work in this situation (i.e., get our needs met),
- the context under which it will be effective (i.e., when the behavior will “work”), and
- what we will likely get for it (reinforcement).

(CSJSJU.edu)

## Stimulus control

- “Bringing responses a *learner already knows* under the control of the appropriate cue or signal” (Alberto & Troutman, 2013, p. 294).
- Much of teaching both academic and social skills involves establishing stimulus control.
  - We want students to perform academically and socially without constant prompting.



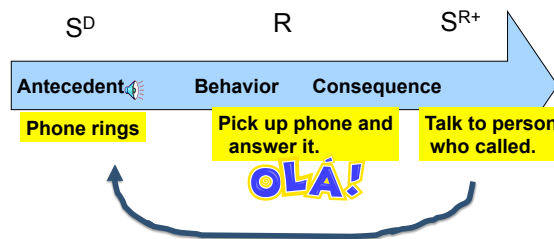
**Operant behavior:** the relationship between the antecedent and the behavior is learned

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## Discriminative Stimulus (S<sup>D</sup>)

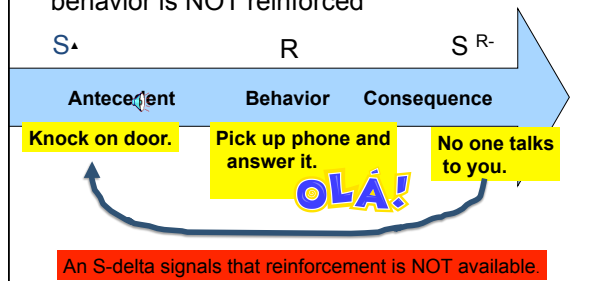
- Is an antecedent stimulus that **occasions** a behavior. It:
  - Comes before a response
  - Signals that a response will probably be reinforced—*occasions* the behavior

## Stimulus control example



## S-delta (S<sup>Δ</sup>)

- Any antecedent stimulus present when the behavior is NOT reinforced



- A large part of teaching is teaching students to discriminate between Sds and S-Deltas.

- Stimulus Discrimination** - Ability to tell the difference between two events or stimuli and change your response accordingly

- E.g., See red light, I stop the car.  
See green light, I accelerate.

- Simple discrimination training** – teaching a student to differentiate one thing from another and respond accordingly



- A = A; A ≠ B



Use **Differential Reinforcement** to bring a behavior under stimulus control (to teach stimulus discrimination)

- Reinforce the target behavior when it occurs in the presence of the S<sup>D</sup> **AND**
- Don't reinforce the target behavior when it occurs in the absence of the S<sup>D</sup> or in the presence of the S-delta.

**Discrimination training using differential reinforcement**

| Antecedent  | Behavior             | Consequence                       |
|---|----------------------|-----------------------------------|
|  (S <sup>D</sup> ) | Student says, "dog." | Teacher says, "Yes! Good talking" |
|  (S <sup>+</sup> ) | Student says, "dog." | Teacher says, "No – try again."   |

**Discrimination training using differential reinforcement**

| Antecedent                 | Behavior            | Consequence                   |
|----------------------------|---------------------|-------------------------------|
| 2<br>x 5 (S <sup>D</sup> ) | Student says, "10." | Correct!                      |
| 2<br>x 5 (S <sup>+</sup> ) | Student says, "6."  | Teacher says, "No, try again" |

Prompts: How to *initially* get an individual to exhibit the desired behavior in the presence of the S<sup>D</sup>



**Prompts** – behavior of another person **or** a type of stimulus that “increases the likelihood that a person will engage in a correct behavior at the correct time”

- delivered **with or after** presentation of the S<sup>D</sup>
- are used to reduce errors when individuals are acquiring new skills, but are then faded as the new skill becomes more fluent

Types of prompts:

**Verbal Prompt**

- **Response** – assistance by another person to increase likelihood that correct behavior will occur in the presence of the S<sup>D</sup>

**Gesture**

**Model**

**Partial Physical**

**Full Physical**

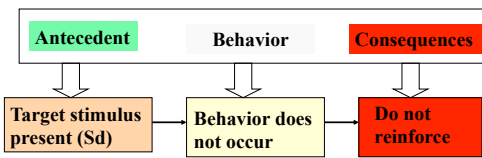


**Another Type of Prompt**

- **Stimulus prompts** – a change in in some aspect of the S<sup>D</sup> that makes a correct discrimination more likely
  - Also must fade these prompts

cat      rat      **bat**      sat

**Prompting Process**

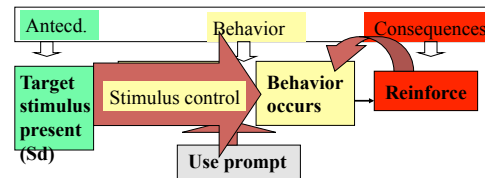


If behavior does not occur, then

- there is no behavior to reinforce
- no stimulus control can be established
- no learning of the target behavior can occur

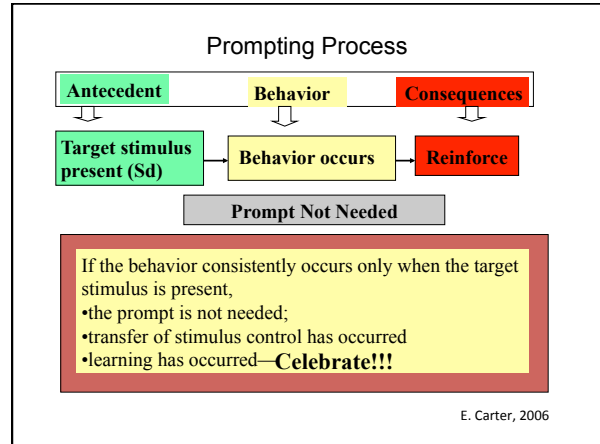
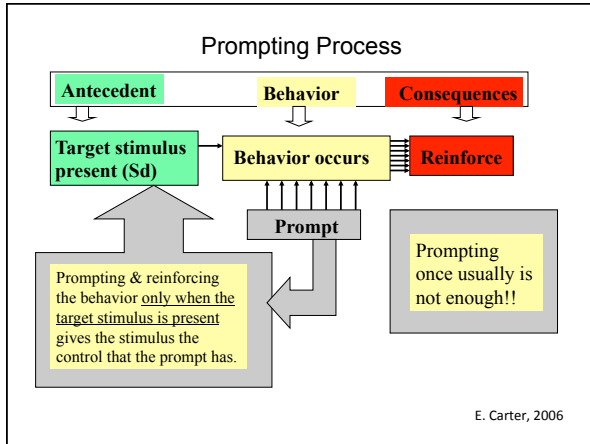
E. Carter, 2006

**Prompting Process**



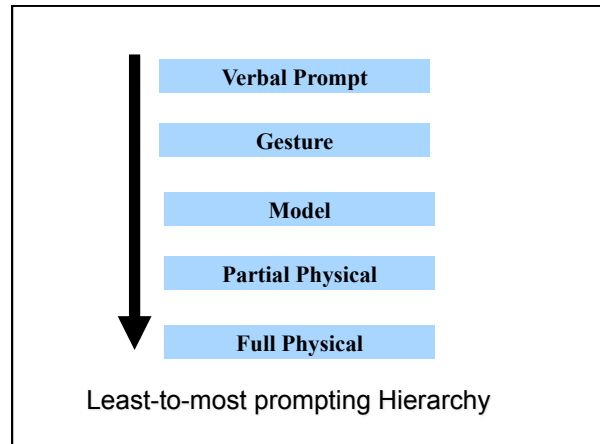
The prompt is used to get the behavior to occur.  
 Behavior is reinforced when the target stimulus is present.  
 This allows target stimulus to get control of behavior.

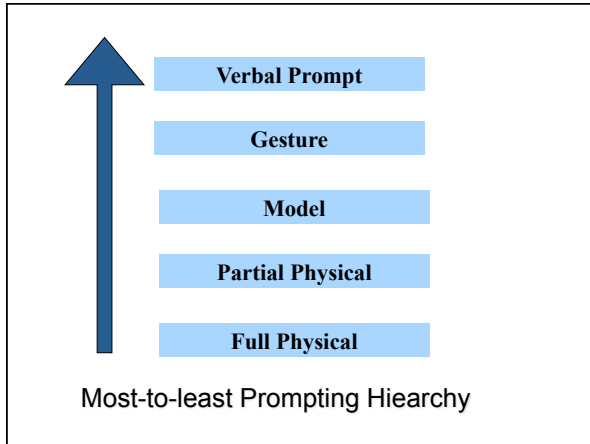
E. Carter, 2006



**Transferring Stimulus Control**

- **Transfer of stimulus control from prompt to S<sup>D</sup>-**
  - eliminating the prompt (**fading**) to get the behavior under the stimulus control of the natural (relevant) S<sup>D</sup>
  - used to get the behavior to occur in the presence of the S<sup>D</sup> *without* prompts
  - helps avoid prompt dependency
- **How do you eventually remove prompts?**
  - By using prompting hierarchies or some form of Time delay






**Graduated Guidance**

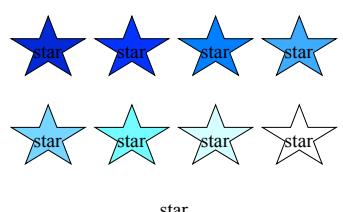
Reduce prompt (gradually) from full physical guidance to “shadowing”

Time Delay is a procedure to fade prompts

- **Constant (fixed) Time Delay**
- **Gradual/Progressive/Increasing Time Delay**



**Stimulus fading:** changing one or more dimensions of the stimulus prompt



star

**FIGURE 4.10** Fading levels for a picture cue

|  |  |
|--|--|
|  |  |
|  |  |
|  |  |

Note: Reprinted from Teaching Sight Words to the Moderately and Severely Mentally Retarded by D. M. Browder, 1981, unpublished doctoral dissertation, University of Virginia. Reprinted by permission.

**Stimulus shaping:** distractor stimuli initially very different from the natural stimulus on one or more dimensions; over time, are changed to be more like the natural stimulus, requiring the student to make increasingly fine discriminations between the two

|   |   |   |   |
|---|---|---|---|
| b | w | s | z |
| w | a | b | c |
| t | b | r | p |
| d | t | p | b |

### How to Teach with Prompts

1. Choose the prompt most appropriate for the student and the task.
2. Get the student's attention.
3. Always start the learning situation by presenting the  $S^D$  (natural cue).
4. Prompt the correct response.
5. Reinforce the correct behavior.
6. Fade prompts as soon as possible (transfer stimulus control)
7. Continue to reinforce unprompted correct responses.

### Factors that affect the $S^D$ 's Control Over a Behavior:

- The *potency* of the  $S^D$  and/or  $S^{R+}$
- The *reliability* of the  $S^D$  in predicting  $S^{R+}$
- The *immediacy* of the  $S^{R+}$  that the  $S^D$  predicts
- The *cost* of attaining the  $S^{R+}$  that the  $S^D$  predicts

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### Stimulus Overselectivity

**is focusing on one aspect of an object or environment while ignoring other aspects (not seeing the stimulus as a whole)**

Looks like:

- Doesn't know which characteristic to focus on
  - Learns to pay attention to irrelevant stimuli (e.g., background color of word card) or to only one aspect of the stimulus (e.g., first letter of a word)
- To correct for this consider how can **you make the  $S^D$  more salient** so that student will be more likely to make correct response.



## Teaching Concepts

(stimulus classes)

- Teach examples and nonexamples using differential reinforcement
  - Some individuals require systematic, explicit instruction and using examples/nonexamples is helpful for them
- Use descriptions/rules to teach concepts
  - Requires some level of verbal skills
- Teach using stimulus equivalence
  - A=B, B=C, A=C

## Teaching Complex Behaviors: Chaining

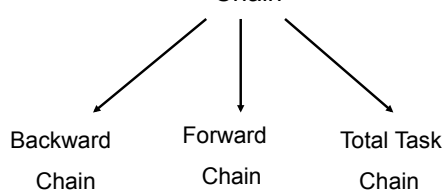


Chain - A complex behavior consisting of two or more component behaviors that occur together in a sequence; sometimes called *stimulus-response* chains

Link - each component behavior or subskill within a behavioral or instructional sequence

## TASK ANALYSIS

Stimulus-Response  
Chain



- **Backward Chaining** - *Last* component of chain is taught/reinforced first, then next-to-last, and so on, until entire chain is learned (e.g., learning to use computer to access the internet, JABA, 40(1) pp. 185-189)
- **Forward Chaining** - *First* component of chain is taught first; then next step and so on until entire chain is learned

### Total Task (Concurrent) Presentation

- Trainer **prompts** the learner through **all** steps in the chain, then gradually fades prompts, until individual completes entire chain independently



Assigned Date \_\_\_\_\_ Due Date \_\_\_\_\_ Time Available \_\_\_\_\_ days

1. Go to library and select book. (1 day)

2. Count chapters or pages in book and determine the number of chapters or pages that should be read daily (e.g., 13 chapters or 208 pages). Adjust according to your reading rate and the number of days available. For example, if you can read 1 chapter per day you will need 13 days. If you can read 16 pages a day, you will need 13 days to read the book.

3. Brainstorm book report outline. (1 day)

4. Organize outline from brainstorming activity. (1 day)

5. Fill in details on outline. (1 day)

6. Write draft book report using outline. (2 days)

7. Proof and revise first draft of book report. (2 days)

8. Write final version and proof carefully. (2 days)

Total number of nights necessary to complete assignment—20

|        | Sun | Mon                           | Tues   | Wed               | Thurs                          | Fri                                 | Sat                     |
|--------|-----|-------------------------------|--|-------------------|--------------------------------|-------------------------------------|-------------------------|
| Week 1 |     | Go to library and select book | Count pages and chapters and figure out how much to read daily | Read              | Read                           | Read                                | Read                    |
| Week 2 |     | Read                          | Read   | Read              | Read                           | Read                                | Read                    |
| Week 3 |     | Read                          | Read   | Read              | Brainstorm book report outline | Organize outline from brainstorming | Fill in outline details |
| Week 4 |     | Write first draft             | Write first draft  | Write first draft | Write final draft              | Edit and proof final version        | Proof final version     |

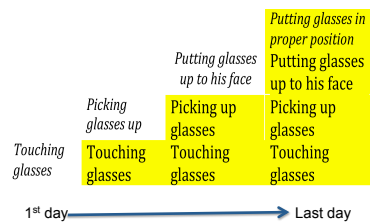
QUESTION: is shaping appropriate for all behaviors?

**Shaping:** Differential reinforcement of successive approximations of a target behavior (that is not currently in the individual's behavioral repertoire), until the target behavior is exhibited.

Reinforce slight changes in *some dimension of the behavior* until the behavior gradually approaches the target



### Example of Shaping (Cooper et al., 2007)



- **FADING**
  - Used to bring an already learned behavior under control of a different stimulus
  - Target behavior doesn't change – antecedent stimulus varies
  - Teacher manipulates the antecedent stimulus
  - Is a stimulus control procedure
- **SHAPING**
  - Used to teach a new behavior
  - Target behavior does change
  - Teacher manipulates the consequences
  - Is not a stimulus control procedure

## How to Use Shaping

- Define target behavior (end behavior) precisely
- Identify an appropriate starting point/behavior
- Choose proper size and duration of time on steps (pace)
- Choose a reinforcer
- Combine use of discriminative stimuli with shaping
- Differentially reinforce successive approximations

## Shaping Practice

Work in pairs to

- Determine a target behavior for one of your students and identify an appropriate starting point
- Decide on the size and duration of time on steps (pace)
- Specify the discriminative stimulus
- Choose a reinforcer and decide how you will use differential reinforcement during the shaping process

## Coming up: Week 8



- **Learning** strategies that use consequences to INCREASE behaviors
- **Read** Chapter 8 in your text
- **Turn in** Take-home Quiz 1
  - Download from the class website, complete, and turn in a hard copy.