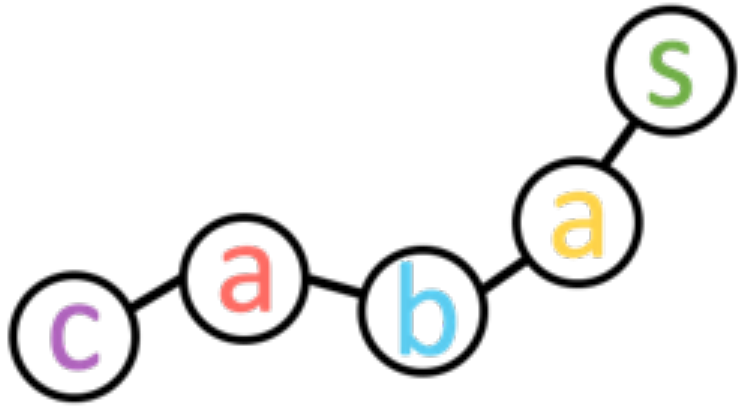
Developing New Behavior

touchstone
applied behavior analysis

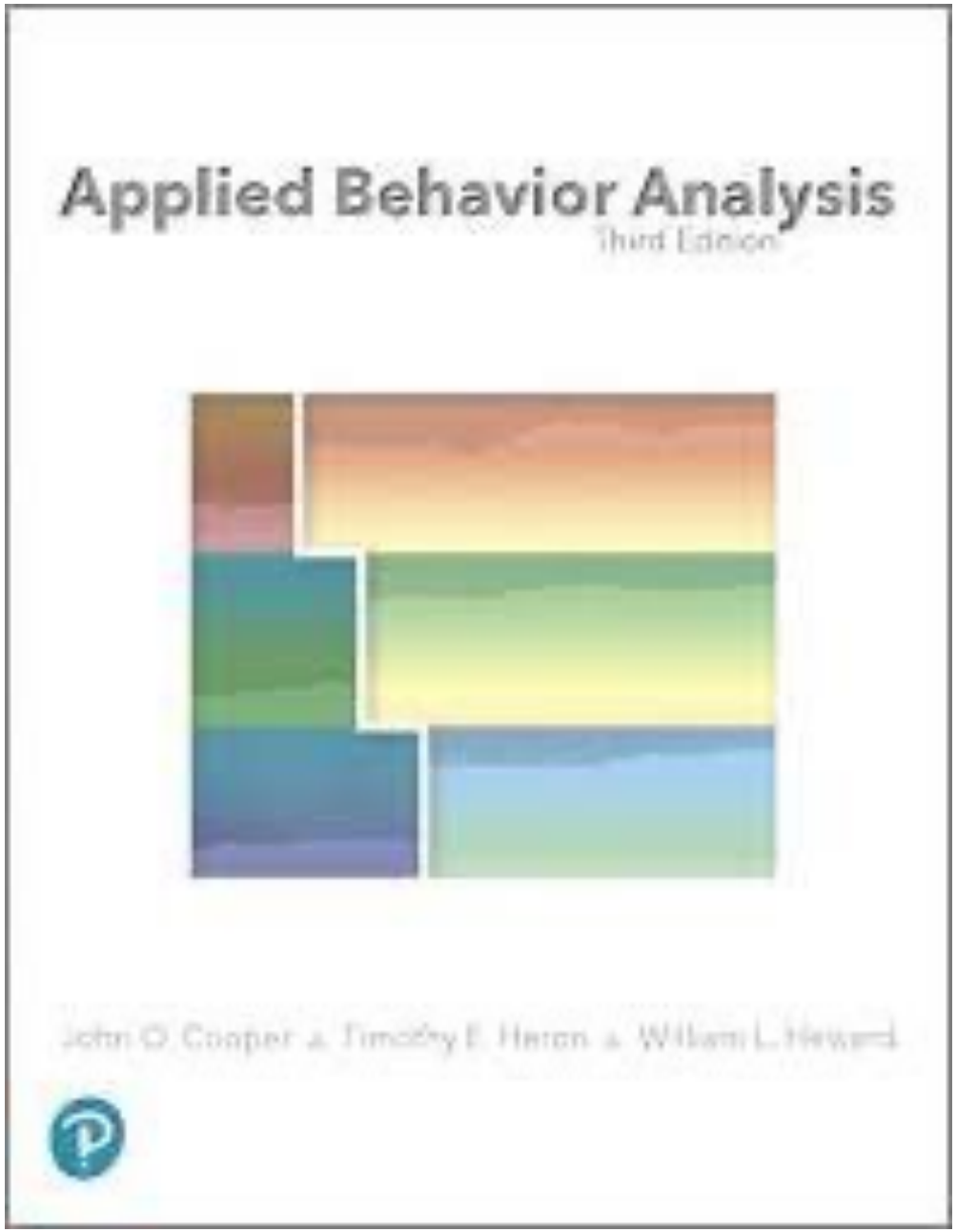
Verbal Behavior About the Science (Content Expertise)
Developing New Behavior (or alternative) quiz to 90% mastery criterion from the list of acceptable readings attached to this rank. Supervisor specify alternative unit: _____

Teacher I: Module 10



Chapter 18- Imitation, Chapter 19-Shaping, Chapter 20-Chaining (Cooper et al., 2007)

Chapter 19-Equivalence-based Instruction,
Chapter 20- Engineering Emergent Learning with Nonequivalence Relations,
Chapter 21- Imitation, Modeling, & Observational Learning,
Chapter 22-Shaping, &
Chapter 23-Chaining
(Cooper et al., 20)



Chapter 19: Shaping

Cooper, Heron, and Heward
Applied Behavior Analysis, Second Edition

What is Shaping?

- A process in which one
  - Systematically and differentially reinforces
  - Successive approximations to a terminal behavior
- Used to help learners acquire new behaviors

Differential Reinforcement

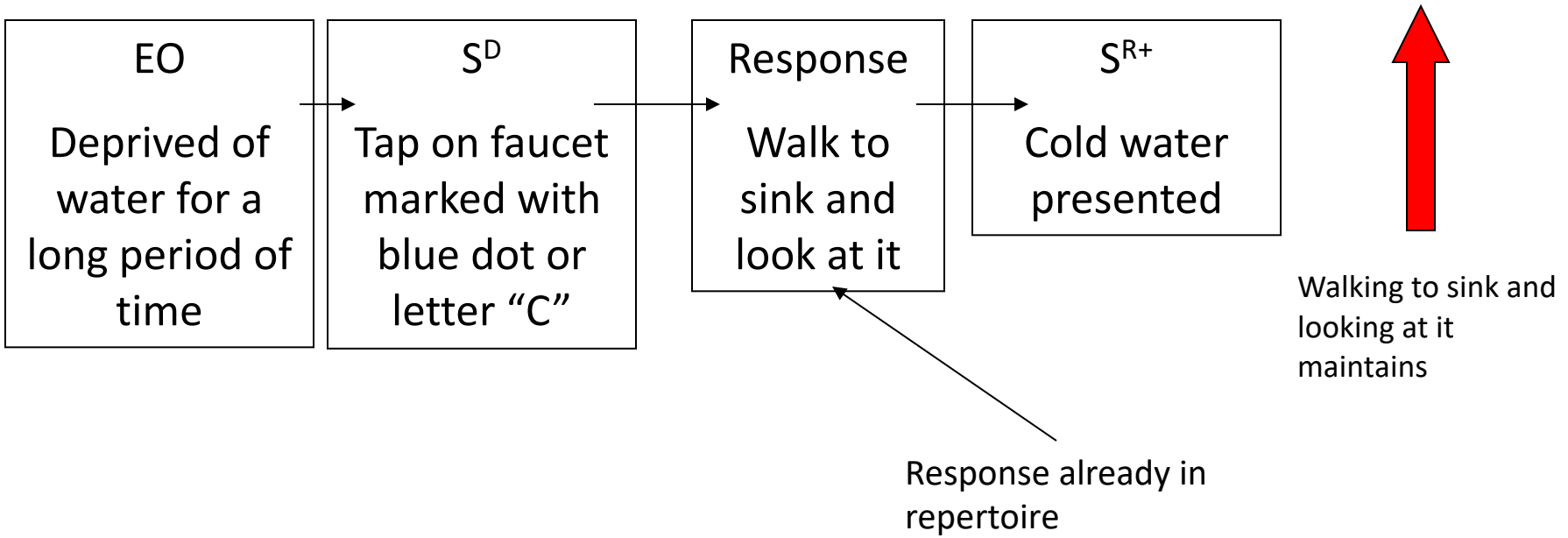
- Some members of a response class are reinforced (responses that are successively closer to the terminal behavior)
- Other members of that response class (responses that are not closer to the terminal behavior)

Response Differentiation

- Involves two components:
  - Differentially reinforce behaviors that resemble the terminal behavior
  - Carefully changing the criterion for reinforcement
- Result
  - Increase in behaviors successively closer to terminal behavior
  - Decrease in behaviors that are not successively closer to terminal behavior

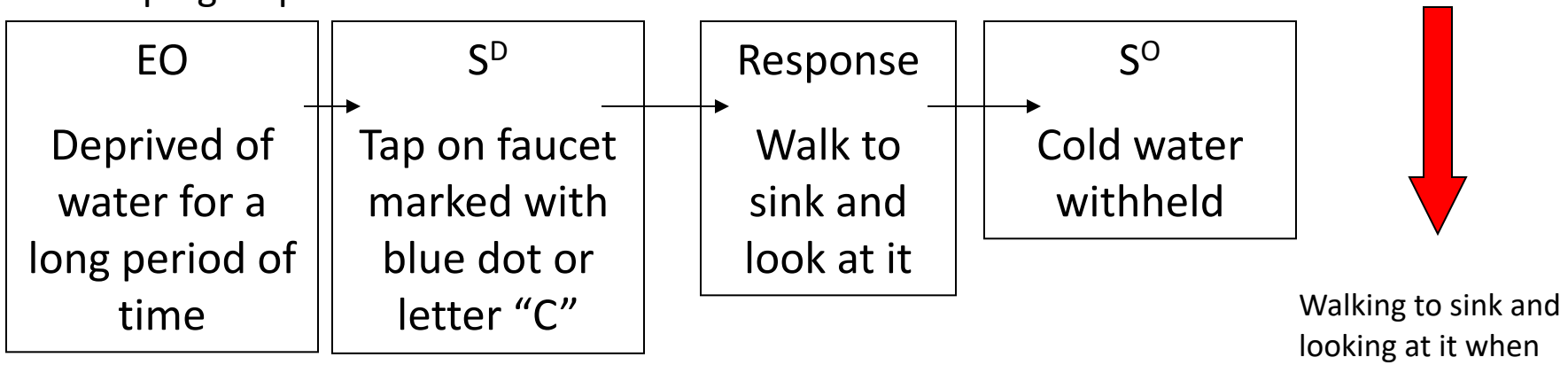
Shaping Diagrammed

- Assume we want to teach a child to turn on the cold water tap in order to get a drink of water.
- Assume the child already walks to sink and looks at it when he/she is thirsty.
- Shaping might proceed like this:

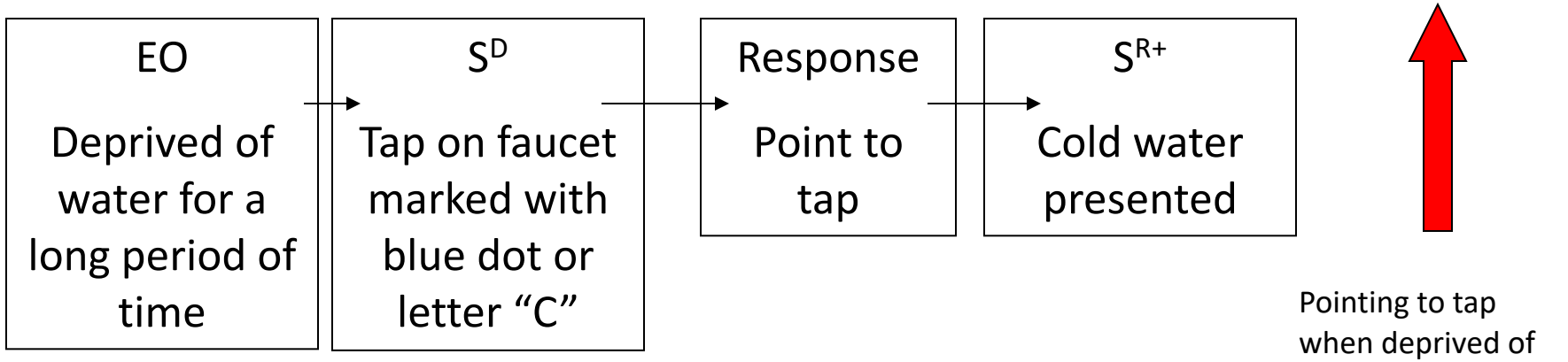


Shaping Diagrammed

- Shaping step 1:



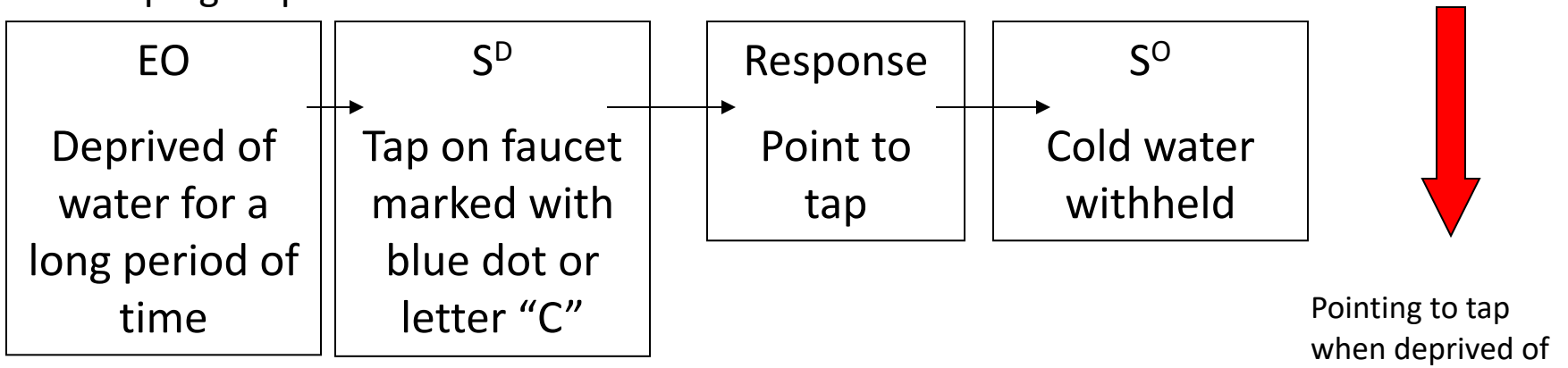
Walking to sink and looking at it when deprived of water decreases



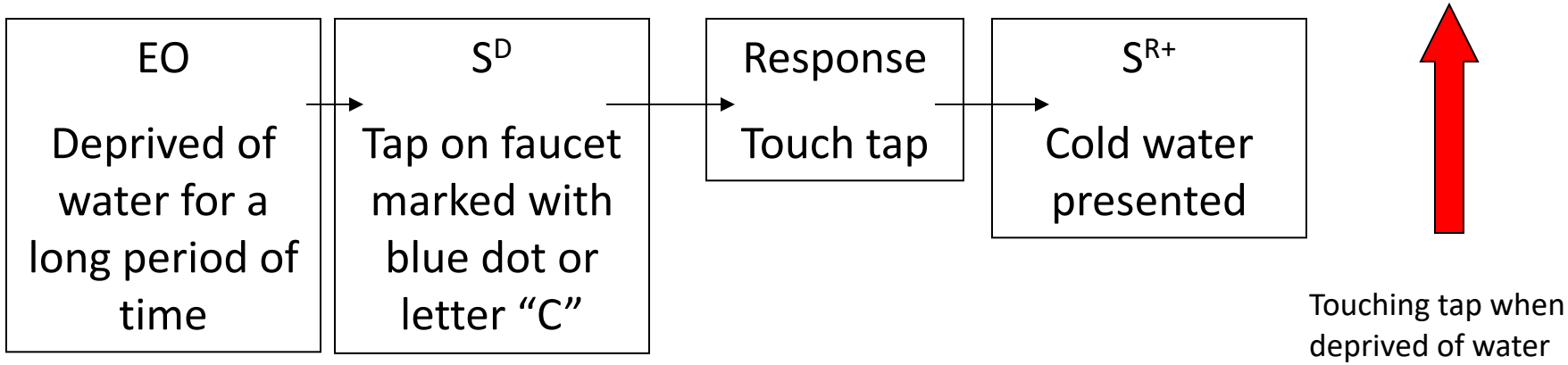
Pointing to tap when deprived of water increases

Shaping Diagrammed

- Shaping step 2:



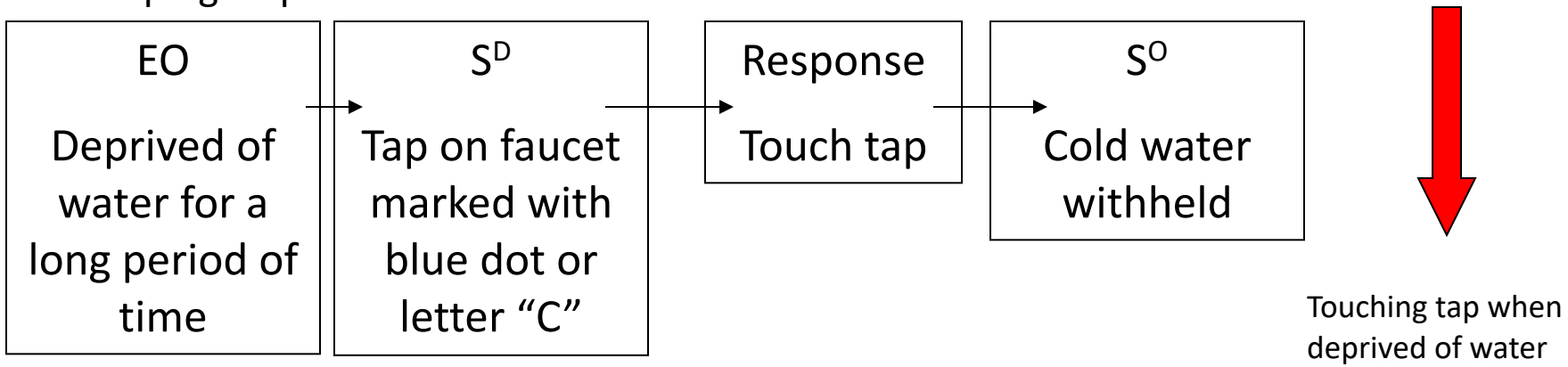
Pointing to tap when deprived of water decreases



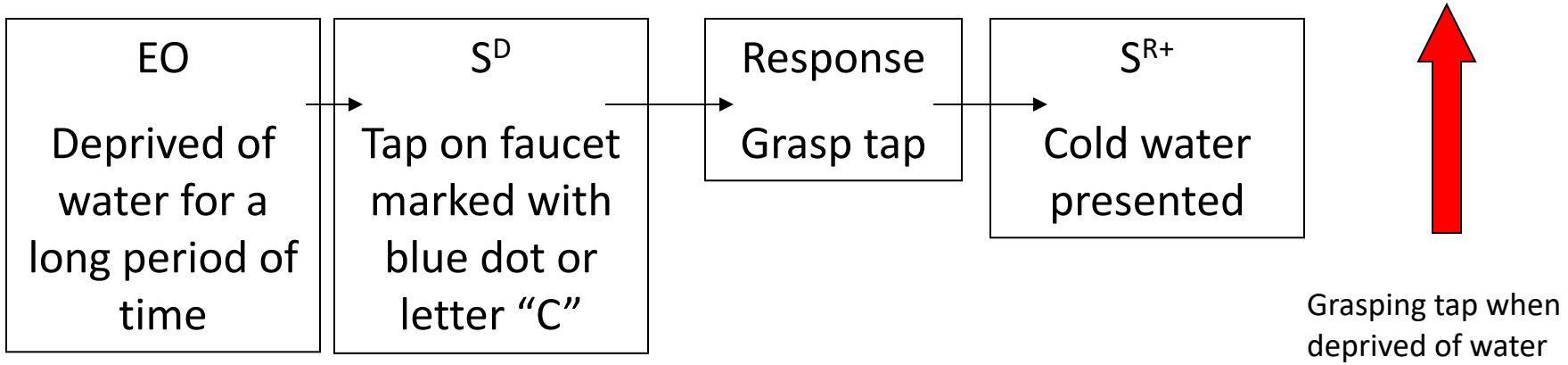
Touching tap when deprived of water increases

Shaping Diagrammed

- Shaping step 3:



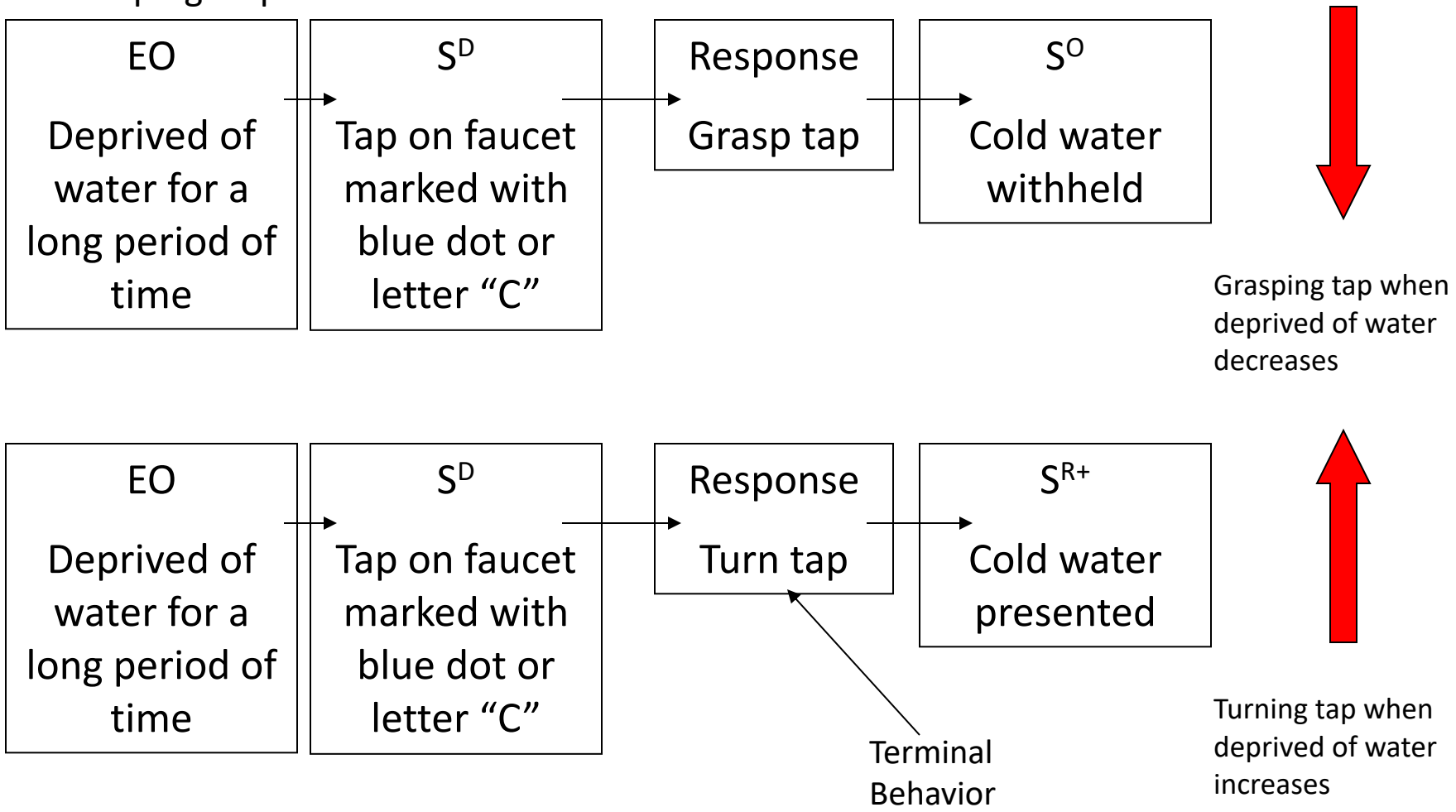
Touching tap when deprived of water decreases



Grasping tap when deprived of water increases

Shaping Diagrammed

- Shaping step 4:



Dimensions of Behavior that can be Shaped

- Topography
  - Form of the behavior
- Frequency
  - Number of responses per unit of time
- Latency
  - Time between onset of antecedent stimulus and the occurrence of the behavior
- Duration
  - Total elapsed time for the occurrence of the behavior
- Amplitude
  - Magnitude

Successive Approximations

- An intermediate behavior
  - Prerequisite for terminal behavior or
  - Higher order member of the same response topography

Shaping Across and Within Response Topographies

- Across response topographies
  - Topography of behavior changes during shaping
  - Behaviors are still members of the same response class
- Within response topographies
  - Topography of behavior remains constant
  - Another measurable dimension of behavior is changed (e.g., duration of the behavior)

Positive Aspects of Shaping

- Teaches new behaviors
- A positive approach to teaching
- Can be combined with other procedures, such as chaining

Limitations of Shaping

- Can be time consuming
- Progress is not always linear and may be erratic
- Requires a skillful trainer, who can recognize subtly closer approximations
- Can be misapplied (problem or harmful behaviors can be accidentally shaped)

Shaping vs. Fading

- Both change behavior gradually
  - Shaping via changing response requirements
  - Fading by changing antecedent stimuli

Increasing Efficiency of Shaping

- Combine with a discriminative stimulus (e.g., a prompt)
  - Verbal cues
  - Physical guidance
  - Models

Guidelines for Implementing Shaping

- Consider nature of behavior to be learned and resources available
  - How far away is current performance from terminal behavior?
    - This might influence how long shaping will take
  - What is the availability of staff and other resources?
    - Remember, this is a labor intensive procedure

Guidelines for Implementing Shaping

- Select the Terminal Behavior
  - The ultimate criterion for selecting a behavior for change:
    - How will the behavior change contribute to the learner's independence in gaining reinforcement?
  - Define the terminal behavior precisely
    - Then you'll know when the behavior has occurred

Guidelines for Implementing Shaping

- Determine Criteria for Success
  - How accurate, fast, long, or intensely should the behavior be performed? Under what conditions should it be performed?
  - Establish norms by
    - Consulting literature
    - Observing similar peer group

Guidelines for Implementing Shaping

- Analyze the Response Class
  - Identify the approximations that might be emitted during training
    - Trainer is in a better position to “stay ahead of his/her subject”
  - Can be done by:
    - Consulting experts in the field
    - Use published literature
    - Use videotape of peers to analyze components of a behavior
    - Perform the target behavior yourself

Guidelines for Implementing Shaping

- Identify the First Behavior to Reinforce
  - Behavior should already occur at some level
  - Behavior should be a member of the targeted response class

Guidelines for Implementing Shaping

- Eliminate Interfering Stimuli
  - Eliminate distractions during training
- Proceed in Gradual Stages
  - Be prepared for decrements in performance when you increase criteria

Guidelines for Implementing Shaping

- Limit the Number of Approximations at Each Level
  - Lest the behavior become too firmly established
- Continue Reinforcement When the Terminal Behavior is Achieved
  - The behavior will be lost if the terminal response is not reinforced

Chapter 20: Chaining

Cooper, Heron, and Heward
Applied Behavior Analysis, Second Edition

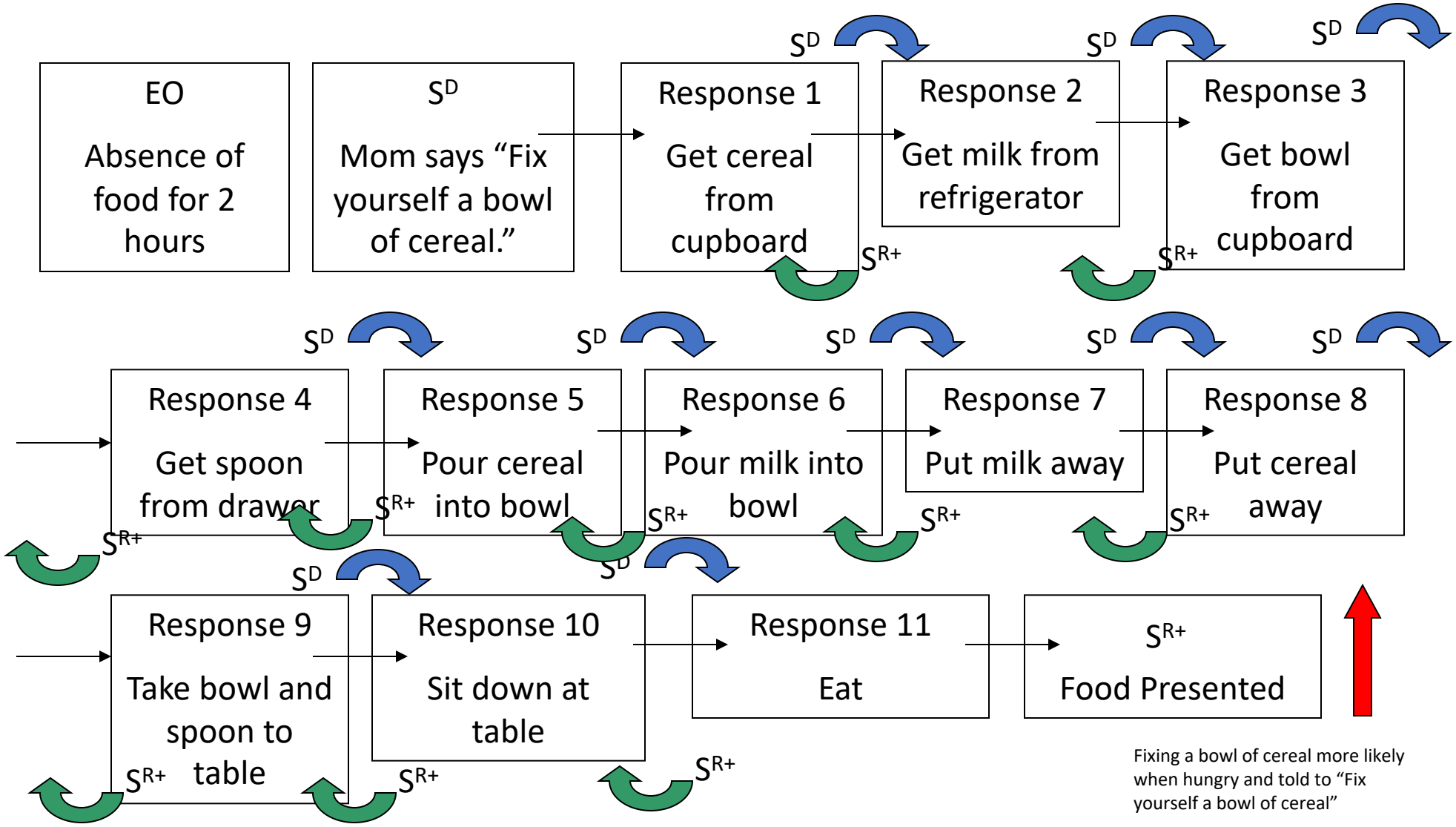
Definition of a Behavior Chain

- A specific sequence of discrete responses
- Each associated with a particular stimulus condition
- When components are linked together, they form a chain that produces a terminal outcome

Components in Chain Serve Dual Functions

- Each response in the chain serves as a conditioned reinforcer for the response that produced it
- Each response in the chain serves as a discriminative stimulus for the next response in the chain
- (Exceptions: the first and last responses in the chain)

Diagram of Response Chain



Behavior Chains and Limited Hold

- A sequence of behaviors that must be performed correctly *and* within a specified time to produce reinforcement
- Emphasizes both accuracy and proficiency

Characteristics of Behavior Chains

- A series of discrete responses
- Performance of behavior changes the environment such that it produces conditioned reinforcement for previous response and serves as S^D for next response
- Behaviors must occur in sequence and in close temporal succession

Rationale for Chaining

- Teaches complex skills that allow individuals to function more independently
- A way to add new behaviors to an existing behavioral repertoire
- Can easily be combined with other procedures (prompting, instructions, reinforcement)

Task Analysis

- Breaking a complex skill or series of behaviors into smaller, teachble units
- The product of a task analysis is a series of sequentially ordered steps

Constructing a Task Analysis

- Notes:
  - Sequence one individual may use to perform skill may not be the same as another individual
  - Must be individualized according to
    - Age
    - Skill level
    - Disability
    - Prior experience
  - Some task analyses have a limited number of steps, but these steps may be broken down into subtasks

Constructing a Task Analysis

- Methods
  - Observe a competent individual perform the task
  - Consult with experts or persons skilled in performing the task
  - Perform the task yourself
- Can refine it as you use it, if necessary

Assessing Mastery Levels

- Single-opportunity Method
  - Give cue to begin task
  - Record learner performance with + or - for each step
  - Assessment stops as soon as a step is performed incorrectly
  - Remaining steps are scored with a -

Assessing Mastery Levels

- Multiple-opportunity Method
  - Give cue to begin task
  - Record learner performance with + or - for each step
  - If a step is performed incorrectly, the trainer completes that step for the learner
  - learner continues to next step
  - Do NOT co-mingle teaching with assessment

Single vs. Multiple Method?

- Single-opportunity Method
  - More conservative
  - Gives less information
  - Quicker to conduct
  - Reduces likelihood of learning taking place during assessment
- Multiple
  - Takes more time to complete
  - Provides trainer with more information
  - May make training more efficient by allowing trainer to eliminate instruction on already-learned steps

Behavior Chaining Procedures

- Forward Chaining
  - Training begins the link with the first behavior in the sequence
  - Training only occurs on the steps previously mastered and current step (no training on steps after that)
    - Advantages
      - Can be used to link smaller chains to larger ones
      - Relatively easy

Behavior Chaining Procedures

- Total-task Chaining
  - Training is provided for every behavior in the sequence during every training session
  - Trainer assistance (prompting) is provided on every step

Behavior Chaining Procedures

- Backward Chaining
  - Training begins the link with the last behavior in the sequence
  - Trainer performs all by last step until learner masters last step
  - Then trainer performs all but last two steps until learner masters last two steps, and so on…
    - Advantages
      - Natural reinforcement is produced immediately upon the learner's response
      - Learner contacts these natural contingencies of reinforcement on every learning trial

Behavior Chaining Procedures

- Backward Chaining with Leap Aheads
  - Follows same procedures as backward chaining, but not every step in the task analysis is trained
  - Other steps are probed
  - If some steps are in learner's repertoire, they are not taught
  - The learner is still required to perform those steps, however

Which procedure to use?

- No data to indicate one is more effective than another
- Choose total-task chaining if
  - Learner knows many of the tasks but needs to learn how to do them in sequence
  - Has an imitative repertoire
  - Has moderate to severe disabilities
  - Task is not long or complex

Behavior Chain Interruption Strategy (BCIS)

- Chain is interrupted at a predetermined step so that another behavior can be emitted
- Interruption may cause some distress
  - It momentarily blocks access to reinforcement
- This is somewhat desirable because it creates motivation to learn the new behavior in the chain
  - As long as it is not so distressful that it causes emotional responding or self-injurious behavior

Behavior Chain Interruptioin Strategy (BCIS)

- Collect baseline data
- Direct person to start chain
- At predetermined point, restrict learner's ability to complete next step
- Prompt learner to engage in new targeted step
- Then allow the individual to proceed with the chain

Breaking Inappropriate Chains

- Determine initial S^D and
  - Substitute an alternative, or
  - Extend chain and build in time delays within the chain
- Examine potential sources of difficulty in the chain

Breaking Inappropriate Chains

- Examining potential sources of difficulty
  - Re-examine S^Ds and responses
    - Is sequence arbitrary? Would rearranging sequence help?
  - Determine whether similar S^Ds cue different responses
    - If so, can the sequence be rearranged to separate the two similar S^Ds?

Breaking Inappropriate Chains

- Examining potential sources of difficulty
  - Analyze the job setting to identify relevant and irrelevant S^Ds
    - Do you need to implement discrimination training so that the learner can discriminate the relevant from irrelevant S^Ds?
  - Determine whether S^Ds in the job setting differ from training S^Ds
    - May need to conduct some training in job setting

Breaking Inappropriate Chains

- Examining potential sources of difficulty
  - Identify presence of novel stimuli in the environment
    - Discrimination training might be necessary to teach the learner to ignore novel, irrelevant stimuli

Factors Affecting Performance

- Completeness of the task analysis
  - More complete, detailed task analyses tend to produce better learning
    - Time developing task analyses is well spent
    - Be ready/willing to modify it after it is constructed
- Length/complexity of chain
  - Longer chains take more time to learn

Factors Affecting Performance

- Schedule of reinforcement
  - Must use appropriate schedule (Ch. 13)
  - Consider number of responses in chain when determining the schedule
- Extinction
  - Responses performed further from the reinforcer may become less likely
  - This interrupts the S^D relation and can result in withering performance of the chain
  - Lesson: adjust reinforcement schedule accordingly (use intermittent schedules)

Factors Affecting Performance

- Stimulus variation
  - Introduce all variations of the stimulus items to be encountered later to increase generalization of the chain
- Response variation
  - Varied responses may be needed to deal with stimulus variation
  - This may require some retraining of responses