

Lecture 11

Book: Behavior Modification – What it is and How to do it

Chapter 11: Getting a New Sequence of Behaviors to Occur with Behavioral Chaining

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Summary

Behavioral chaining: A behavioral chain, also called a stimulus-response chain is a consistent sequence of stimuli and responses that occur closely to each other in time and in which the last response is typically followed by reinforcement. In a behavioral chain, each response produces a stimulus that serves as a discriminatory stimulus for the next response. The stimulus response connections are the “links” that hold the chain together. If any response is so weak that it fails to be evoked by the discriminatory stimulus preceding it, the next discriminatory stimulus will not be produced and the rest of the chain will not occur. The chain will be broken at the point of its weakest link. The only way to repair the chain is to strengthen the weak stimulus-response connection by means of an effective training procedure.

Not all behavioral sequences are behavioral chains: Many behavioral sequences that we perform in everyday life are behavioral chains. However, not all behavioral sequences are behavioral chains. Studying for an exam, writing an exam and attending the next class to get a grade represent a sequence of behavior that a college student performs. But this general sequence consists of a variety of activities like reading, memorizing, writing etc. with many breaks in the action. It is not made up of a consistent series of stimuli and responses that occur closely in time and for which each stimulus (except the last) is a discriminatory stimulus for the next response.

Methods for teaching a behavioral chain: The three major methods of teaching a behavioral chain are the total-task presentation method, the backward chaining method and the forward chaining method. With the ‘total task presentation method’, an individual attempts all of the steps from the beginning to the end of the chain on each trial and continues with total task trials until that person learns the chain. Prompting is provided at each step as needed, and a reinforcer follows the correct completion of the last step. With the ‘backward chaining method’, the last step is taught first, then the next-to-last step is taught and linked to the last step, then the third-from-last step is taught and linked to the last two steps, and so on, progressing backward from the beginning of the chain. Backward chaining gradually constructs the chain in a reverse order from that in which the chain is performed. It has been used in numerous programs including

various dressing, grooming, work, and verbal behaviors to individuals with developmental disabilities. The 'forward chaining method' teaches the initial step of the sequence first, then teaches and links together the first and last steps, then the first three steps, and so on until the entire chain is acquired.

Factors influencing the effectiveness of chaining:

1. The task analysis: For maximum effectiveness of a behavioral chaining, the behavioral sequence must be broken down into manageable components, and the proper order of the components must be maintained. The process of breaking down a task into smaller steps of component responses to facilitate training is called a task analysis e.g. pedestrian skills for walking safely through traffic. The components should be simple enough to be learned without difficulty. For e.g. if we want a child to learn proper tooth brushing, it would be a mistake to consider the task to be learned as putting tooth paste on the brush, brushing, and rinsing. For the child to master the chain, each of these components should be subdivided into smaller components. The components should also be selected so that there is a clear cut stimulus signaling the completion of each component. These stimuli will then become conditioned reinforcers for the responses preceding them and discriminatory stimuli for the subsequent responses in the chain. After completing our task analysis, review each of the controlling stimuli or discriminatory stimuli for each response in the sequence. Ideally, each discriminatory stimuli should be clearly distinct from the other discriminatory stimuli. Having similar stimuli control different responses increases the chances for the learner's error and confusion.
2. Independent use of prompts by learners: Many individuals can use prompts independently to guide the mastery of a chain of behaviors. For learners able to read, a written task might effectively prompt them to appropriately complete behavior chains. If the learners are unable to read, a series of picture prompts might guide them. Another strategy involves teaching self instruction. Individuals with developmental disabilities have been taught to recite self instructions to prompt correct completion of vocational tasks, completion of math problems correctly and sorting letters into boxes correctly.
3. A preliminary modeling trial: In some cases such as with persons with developmental disabilities or young children, it may be desirable to model the entire sequence while verbally describing the performance of each step. If only one sample of the training task is available, the task must be disassembled after the modeling trial and the components rearranged for the learner to perform the task. Otherwise, the learner can be taught using alternative samples of the task.
4. Training the behavioral chain: training should start with a request to begin work and to complete steps of the task. The step or steps to begin depend on whether you use total-task presentation, backward chaining, or forward chaining. If at any step the learner stops responding or appears distracted, you should first provide a pacing prompt such as

“what’s next?” or “carry on”. If the learner performs a response incorrectly or fails to begin responding at any step within a reasonable period of time, we should proceed with error correction. Provide the necessary instruction or physical guidance to help the learner perform that step correctly. After an error is corrected, go on to the next step.

5. Ample social and other reinforcers: Sometimes a natural reinforcer that follows the completion of a chain will be sufficient to maintain it. When teaching behavioral chains to persons with developmental disabilities or young children, however, it is often desirable to immediately praise the correct completion of each step during early training trials. In addition, providing a primary or unconditioned reinforcer (such as an edible) contingent upon successful completion of the last step in the chain is often desirable. As the learner becomes more skillful in performing the steps, praise and other reinforcers can be gradually eliminated.
6. Assistance at individual steps: Depending on the details of the task analysis, providing some additional instruction or physical assistance in correcting errors may be necessary. Across successive trials, this extra assistance should be faded as quickly as possible. Not providing assistance to the point of creating a dependency in the learner is important.

Pitfalls of behavioral chaining: Relatively simple undesirable responses are often established inadvertently in the administration of positive reinforcement by the unwary, as are chains with one or more undesirable components. A behavioral chain that has some components that are functional in producing the reinforcer and at least one component that is not is called an adventitious chain. A common kind of undesirable adventitious chaining occurs when an inappropriate and non functional response precedes one or more appropriate responses that are reinforced; both the inappropriate and appropriate responses are thereby strengthened. Furthermore, some seemingly sound behavior modification procedures can promote undesirable chaining if the behavior modifier is not careful.

Guidelines for the effective use of behavioral chaining:

1. Do a task analysis. Identify the units of chain that are simple enough for the learner to learn without great difficulty.
2. Consider strategies (e.g. pictures) for independent use of prompts by learners.
3. If necessary, do a preliminary modeling trial.
4. Teach the units in the proper sequence.
5. To expedite learning, use a fading procedure to decrease extra help that the learner may need to perform some of the steps.
6. When using backward or forward chaining, make sure that on each trial, the individual performs the entire set of components learned up to that point.
7. Early in training, use ample reinforcement for correct performance of individual steps. Gradually decrease this reinforcement as the learner becomes more skillful.
8. The more effective the reinforcement given at the end of a chain, the more stable is the chain of responses. This does not mean that once a chain is developed, it must be

reinforced each time it occurs in order to be maintained. After a chain has been taught, it can be viewed as a single response, which could, if desired, be put on any intermittent reinforcement schedule.