

Psyc 587
Fall 2019

Chaining

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Behavior Chain

- ❖ Involves the performance of a specific series of discrete responses
- ❖ The performance of each behavior in the sequence changes the environment in such a way that it produces conditioned reinforcement for the preceding response and serves as an SD for the next response
- ❖ The responses within the chain must be performed in a specific sequence, usually in close temporal succession

Behavior Chain Example

- ❖ Microwaving food
- ❖ SD-> Response-> Conditioned reinforcement
- ❖ Time to heat up food (SD) -> approach microwave (R) -> standing in front of microwave (SR+)
- ❖ Standing in front of microwave (SD) -> pull handle (R)-> door is opened (SR+)
- ❖ Opened door (SD) -> place food inside (R) -> food is inside microwave (SR+) etc

Behavior chains with a limited hold

- ❖ Chain must be performed correctly and **within a certain time to produce reinforcement**
- ❖ Accuracy and proficiency
- ❖ Example: dialing a phone number

Chaining definition

A procedure for linking together a series of behaviors into a sequence or chain that results in completion of a more complex task

Why use chaining?

- ❖ To break down complex behaviors into their component parts to increase independence

Common Chaining Targets

Play and social skills

- ❖ Hand motions to songs (choral activities)
- ❖ Independent play activities (play stations)
- ❖ Picture activity schedules
- ❖ Board games

Self-help and life skills

- ❖ Hand washing
- ❖ Toothbrushing
- ❖ Dressing
- ❖ Cooking
- ❖ Vocational tasks
- ❖ Most adaptive living skills!

How to implement chaining

Steps

- ❖ Identify the goal
- ❖ Conduct a task analysis
- ❖ Assess current skill level
- ❖ Choose and implement a chaining procedure
 - ❖ Forward chaining
 - ❖ Backward chaining
 - ❖ Total task presentation

Goal

- ❖ Objective and measurable as usual
- ❖ Client will independently tie his shoes in 100% of naturally occurring opportunities, across one week.

Complete a task analysis of the target behavior

- ❖ Breaking down a complex skill into smaller, teachable units
 - ❖ many different possibilities depending on the client/context
 - ❖ Can always modify if needed
- ❖ Validate your TA by completing the task yourself/watching others/consulting with experts

Example TA

Steps for putting on pants

1. Hold pants by waistband
2. Lower pants and lift left leg
3. Put one leg into correct pant hole
4. Put other leg into correct pant hole
5. Pull pants up to knees
6. Stand and pull pants to waist

Example TA

Steps for putting on socks (while sitting)

1. Hold sock by edge with both hands
2. Push toes into sock
3. Lift foot and pull sock over heel
4. Pull sock up leg

Example TA

Steps for putting on a t-shirt

1. Pull shirt over head
2. Push one arm up through correct sleeve
3. Push other arm up through correct sleeve
4. Pull shirt down to waist

Example TA data sheet

Component Steps				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
% Independent				

Key:

0 = Completed Step Independently

1= Completed Step with Partial Physical / Gestural Cues

2 = Completed Step with Full Physical Guidance

3 = Could Not Complete Step

[illegible]

TA data sheet- getting a snack

[illegible]

TA data sheet- beginning play

Date													
Instructor													

Piggy Bank Toy

Opens piggy bank													
Takes coins out													
Closes piggy bank													
Puts coins in through slot													
# of Zeros													
% Independence													

Get baseline data

- ❖ Assess the learner's pre existing skills with each step of the TA
- ❖ Each step performed independently scored as correct (e.g., the client performed 0/6 steps of the TA independently)

Backward chaining

- ❖ Prompt client through entire TA until the target response, where we systematically fade the prompts for that response
- ❖ Begin teaching with the **LAST step**
- ❖ Reinforcement always comes at the end of the chain (in the naturally occurring location)
 - ❖ Prompts through all except final step = SR+
 - ❖ Prompts through all except final 2 steps = SR+
 - ❖ Prompts through all except final 3 steps = SR+

Example- drawing

- ❖ <https://www.relias.com/resource/chaining-and-task-analysis>
- ❖ Advantage- learner comes into contact with the terminal reinforcer for the chain on each trial

Forward chaining

- ❖ Behaviors in the TA taught in their **naturally occurring, sequential** order
- ❖ Begin with the **FIRST** step
- ❖ Reinforcement comes after completion of newest criterion step
 - ❖ Step 1 completed = SR+
 - ❖ Step 1 and 2 completed = SR+
 - ❖ Steps 1, 2, and 3 completed = SR+ etc.

Example-drawing

- ❖ How might you teach drawing a smiley face using forward chaining?
- ❖ Advantage- is intuitive and can be easily taught to parents and other professionals

What about the remaining steps of the chain?

- ❖ Drawing example: first step might be drawing a circle
 - ❖ What about the eyes, nose, mouth? A few options:
 - ❖ Teacher completed (teacher draws the remaining elements on the face)
 - ❖ Student completed (teacher manually assists the student to draw the remaining elements on the face)
 - ❖ Not completed (stop after client draws the circle)

Bancroft et al.(2011)

- ❖ Taught to build lego structures using forward chaining
- ❖ After client completed the training step:
 1. (TC) Teacher blocked the participant from further manipulating the blocks and completed the remaining steps of the structure in front of the participant. The participant was free to observe or not to observe the remaining steps.
 2. (SC) After reinforcement was delivered, the teacher manually guided the student to complete the remaining steps in the chain.
 3. (NC) Trial ended (the structure was not fully completed)

Results & Considerations

- ❖ Additional time spent demonstrating or manually guiding through untrained steps may not lead to more efficient skill acquisition for most clients- but may be helpful for those with good observational learning skills
- ❖ Will the learner tolerate physical prompting? Avoid SC
- ❖ How long can the learner sustain his attention? NC might be best

Total task presentation

- ❖ Client receives training on each step of the TA during every session
- ❖ Trainer assistance provided with any step the client is unable to perform independently
- ❖ Begin fading with **ANY** step the client is **beginning to show independence**

Practice Activity

Role-play

- ❖ Teaching a puzzle using backward chaining
- ❖ Drawing a stick figure using backward chaining

Chaining vs Shaping

Example in Cooper

❖ **Can forward chaining and shaping look the same?**

1. Touch glasses
2. Pick up glasses
3. Place glasses at eye level
4. Place glasses in proper position on face

Combining chaining and shaping examples

- ❖ **Toothbrushing:** chain steps together and use shaping to increase duration of independent brushing
- ❖ **Basketball:** chain steps to shooting the ball and use shaping to increase the distance from the hoop
- ❖ Complex chains eg offense chain, defense chain