

Chaining

by Capella Partnered with CARD

WHAT'S COVERED

This lesson will explore chaining by defining and discussing the following					
1	Chaining and Lloos				
ı. 0					
2.	lask Analysis				
3.	Forward Chaining				
4.	Backward Chaining				
5.	Total Task Presentation and Review				

6. Comparison

1. Chaining and Uses

Chaining is a procedure that is used to teach behaviors that occur in sequences of two or more steps. It is used whenever two or more behaviors are combined to form a complex skill, known as a **behavior chain**.

The completion of one behavior acts as the SP for the next response.

☆ EXAMPLE For instance, you can't zip up your jacket without having put it on first! The jacket being put on serves as the S^D for zipping it up.

Behavior chains can be made for one skill or an entire routine.

⇐ EXAMPLE You can use it for putting on a jacket or for an entire routine of getting dressed (underwear all the way to jacket).

We need to determine all of the steps involved in the skill in order to know what the patient must do and when to do it.

Chaining procedures are procedures used to teach a person to engage in a complex behavior composed of a chain of behaviors. There are a multitude of complex behaviors that involve many component behaviors that occur in a sequence.

☆ EXAMPLE Putting on a shirt involves a chain of behaviors, such as picking up the shirt, putting your head through the big hole, and putting your arms through the smaller holes. Each of these components is a response. The next step in the chain cannot be done until the previous steps have been done.

⇐ EXAMPLE Another example of such a behavior chain might be making a sandwich. Many different steps are required to make a sandwich.

Conversely, a behavior that does not occur in sequences of two or more steps is saying the word "No." There is only one step in this behavior: You simply say "No."

Many of the very early skills taught to young patients with ASD are relatively simple and do not require chaining. Most basic motor responses (jumping in place, high fives, arms up, etc.), some basic words, handing over communication cards, simple toy play (basic cause-and-effect toys, etc.), and so on, do not generally need to be broken down into sequences of component steps.

Many more complex skills, however, are usefully broken down into their component parts, so each part can be taught separately and more easily. Chaining is the method that is used for this process. The first step in using chaining to teach a skill is to obtain a task analysis of the skill.

TERM TO KNOW

Chaining

A procedure used to teach a behavior chain

Behavior Chain

Complex behavior composed of many single responses that occur in a specific sequence

2. Task Analysis

Before we give a complete example of a chain, it is important to understand what a task analysis is. The combined components or sequence of responses in putting on a shirt is the chain. We use a **task analysis** to determine what these components are, which involves breaking down a complex behavior into a sequence of components.

⇐ EXAMPLE This is a simple task analysis for making a meal:

Task Analysis: Making a Meal

- 1. Choose a meal.
- 2. Find a recipe.
- 3. Check for ingredients.
- 4. Make a grocery list.
- 5. Go shopping.
- 6. Cook the meal.

 \Rightarrow EXAMPLE Here is another example of a task analysis, this time for washing your hands:

Task Analysis: Wash Your Hands

- 1. Turn on water.
- 2. Wet hands.
- 3. Pump soap onto hands.

- 4. Rub hands for 5 seconds.
- 5. Rinse hands for 5 seconds.
- 6. Turn water off.
- 7. Get towel.
- 8. Dry hands for 5 seconds.

Video Transcription

Very good.

Are you lunch passer?

I think, yes.

So you can start getting lunches.



Remember, a chain is a sequence of $S^{D}s$ and responses in which each response in the sequence produces the next S^{D} .

⇐ EXAMPLE

Step	SD	R	Explanation
1	Shirt flat on bed	Pick up shirt	In doing our task analysis of putting on a shirt, we determine that this is the first $S^{\rm D}$ and response in the chain.
2	Shirt in hands	Scrunch shirt	In doing our task analysis, we determine that this is the second S ^D and response in the chain. Remember the definition of a chain is a sequence of S ^D s and responses in which each response in the chain produces the next S ^D . In this example, we can see that the previous response in the chain, picking up the shirt produced the S ^D for this step in the chain, having the shirt in hand.
3	Scrunched shirt in hands	Put head through collar	In doing our task analysis, we determine that this is the third S ^D and response in the chain. We can see that the previous response in the chain, scrunching the shirt, produced the S ^D for this step in the chain, having the scrunched shirt in hand.
4	Shirt on over head	Put arms in sleeves	In doing our task analysis, we determine that this is the fourth S ^D and response in the chain. We can see that the previous response in the chain, putting the head through the collar, produced the S ^D for this step in the chain, having the shirt on over the head.
5	Head and arms in shirt	Pull shirt down	This is the last S ^D and response in the chain. When the patient has learned all of the steps in the chain and can do these steps in order, this is what their chain of behaviors will be.

When do we use chaining? When we want to combine two or more simple behaviors or responses into a more

complex sequence.

Let's take a look at several everyday examples of using chaining.

↔ EXAMPLE Putting on a shirt: In the previous example, we looked at a task analysis for putting on a shirt that specified all of the steps involved in the chain. We saw how we combined several simple behaviors or responses into a sequence or chain. We would say that we use chaining to teach our patients to put on shirts.

☆ EXAMPLE Brushing teeth: If we were to do a task analysis of this chain, we would specify component responses such as getting your toothbrush out of the medicine cabinet, getting toothpaste, opening toothpaste, putting toothpaste on the brush, closing the toothpaste tube, putting away the toothpaste, wetting the toothbrush, etc. We would use chaining to teach a patient to brush their teeth.

☆ EXAMPLE Putting together a puzzle: Putting in one puzzle piece would be a simple behavior or response. Putting together an entire puzzle would be a chain of responses. We would use chaining to teach patients to complete puzzles.

☆ EXAMPLE Saying the blend, "Ma." To teach the patient to say the blend, "Ma," we would use chaining. This would involve teaching the patient to combine two simple behaviors, saying the sound, "Mm," and saying the sound, "Ah," into the blend, "Ma."

There are three possible methods to establish a chain of behaviors or responses:

- 1. Forward Chaining
- 2. Backward Chaining
- 3. Total Task Presentation

We'll now talk about how to use each of these types of chaining to combine simple behaviors into a more complex sequence.

E TERM TO KNOW

Task Analysis

Breaking down a complex behavior into a sequence of components

3. Forward Chaining

Chaining can be implemented in three primary ways: forward, backward, and total task chaining. The names of these procedures refer to the part of the chain that is being taught first.

Forward chaining is a technique that moves a patient from the first step to the last. Each step must be mastered before the next step in the skill series is added.

In forward chaining, the first step of the chain is taught first, and the remaining steps of the chain are either completed by the behavior technician or the behavior technician prompts the patient through them without expecting them to complete the chain independently.

↔ EXAMPLE In the previous example of washing hands, the first step of turning on the water is the one the patient is required to complete. Then, the behavior technician completes or prompts the patient through the remaining steps two through eight.

In forward chaining:

- In a sequence of S^Ds and responses, the first response is taught first.
- Then, the second response is taught.
- Then, the two are performed independently in order.
- Then, the third response is taught and performed in sequence with the first and second responses.
- And so on until all the behaviors in the chain are performed independently.

☆ EXAMPLE Let's revisit the example from above. A patient, Hannah, needs to put on her shirt. Use shaping or prompting/fading to teach Hannah to perform the first response in the chain independently (pick up the shirt off of the bed). Prompt all the later responses in the chain. When Hannah can perform the first response independently, teach the second (scrunch shirt) until Hannah can perform the first and second response in sequence independently.

Below are all of the steps in the chain for the skill set for "Hannah puts on a shirt." Once Hannah has learned the chain, this is what the chain will look like.

Step	SD	R			
1	Shirt flat on bed	Pick up shirt			
2	Shirt in hands	Scrunch shirt			
3	Scrunched shirt in hands	Put head through collar			
4	Shirt on over head	Put arms in sleeves			
5	Head and arms in shirt	Pull shirt down			
0					

STEP BY STEP

Step 1: Hannah picks up a shirt.

In this example, we are using forward chaining to teach Hannah to put on a shirt. Therefore, the first thing we do is teach Hannah to perform the first response in the chain independently: to pick up a shirt when the shirt is lying flat on the bed.

- *Reinforce:* Right now, our goal is for Hannah to perform this step independently, so we will prompt her to pick up the shirt, either with a vocal directive prompt, a point prompt, or a physical prompt and reinforce her just for doing this step. Across successive trials of putting on her shirt, we will fade our prompts until Hannah is able to pick up the shirt independently.
- *Prompt:* Then we will prompt her to complete the remaining steps in the chain. We do not wait until we have finished prompting her with the last step to reinforce her behavior. Since our only target is the first step, we must reinforce her behavior immediately for completing the first step.

Step 2. Hannah scrunches the shirt

Once Hannah can pick up the shirt when it is lying on the bed independently, Step 2 is to teach Hannah to

perform the first two steps in the chain in order, independently.

- *Reinforce:* Right now, our goal is for Hannah to perform the first two steps in the chain in order independently, so we will prompt her to scrunch the shirt, either with a vocal directive prompt, a point prompt, or a physical prompt and reinforce her for completing these two steps. Across successive trials of putting on her shirt, we will fade our prompts until Hannah is able to scrunch the shirt independently
- Prompt: Then we prompt all remaining steps in the chain.

Step 3: Hannah puts head through collar.

Once Hannah can pick up the shirt when it lying on the bed and scrunch it up, the next step is to have her put her head through the collar independently.

- *Reinforce:* At first, we'll need to prompt Hannah to put her head through the collar, either with a vocal directive prompt, a point prompt, or a physical prompt and reinforce her for completing these three steps. Across successive trials of putting on her shirt, we will fade our prompts until Hannah is able to put her head through her collar independently.
- *Prompt:* Then we prompt all remaining steps in the chain.

Step 4: Hannah puts arms in sleeves.

Now we are targeting teaching Hannah to do the fourth step independently. When she can do all four steps in the sequence independently, we'll go on to the final step.

Step 5: Hannah pulls shirt down.

Now we are teaching Hannah to do the final step in the chain independently. When Hannah can complete all five steps independently, this chain is considered mastered.

Video Transcription

OK. We're going to practice dialing your mom's phone number on your phone, OK?

Yeah.

All right. So go ahead and open up your phone. OK. So go ahead and dial that one in. OK. Go ahead, pick it up. You going to call her? Go ahead. Great job.

OK. Great job. We're going to practice it again, OK? But I want you to type in the first number by yourself. Great job. Go ahead and dial.

OK. We're going to do it this time again, but this time you're going to do the first three numbers, OK? Great job, bud.

The information in this section was sourced from Malott et al. (2000).

TERM TO KNOW

Forward Chaining

This technique moves a patient from the first step to the last. Each step must be mastered before the next step in the skill series is added.

4. Backward Chaining

We have learned the first method for teaching a chain, forward chaining. Now we'll learn about the second method for teaching a chain, **backward chaining**. Instead of starting by establishing the first link in the chain, and then the second and so on, when using backward chaining, we go in the opposite direction.

Backward chaining uses the same basic approach as forward chaining but in reverse order. That is, you start with the last step in the chain rather than the first. The behavior technician can either prompt the patient through the entire sequence, without opportunities for independent responding, until they get to the final step (and then teach that step), or the behavior technician can initiate the teaching interaction by going straight to the last step.

This technique is used to give the patient quicker access to reinforcement.

HINT

The patient does not literally complete the chain backwards, rather they are only required to complete the last step in the sequence when they get there.

 \Rightarrow EXAMPLE In the washing hands example, the patient would be required to complete the task of drying hands for fives seconds once they go to this step.

In backward chaining:

- In a sequence of S^Ds and responses, the last response is taught first, then the second to the last, then the two are performed independently in order.
- Then the third to the last response is taught and performed in sequence with the last two responses.
- And so on until all the behaviors in the chain are performed independently.

☆ EXAMPLE Let's refer to our previous example where Hannah needs to put on a shirt to explain forward chaining. We use prompting and fading to teach Hannah to pull the shirt down and put her arms in the sleeves. We prompt all the earlier responses in the chain. When Hannah can perform the last two responses independently, in sequence, we begin to teach the third to the last response and so on.

Again, this is our final goal: for Hannah to perform all of the steps of the chain, in order, where we reinforce only after all steps have been performed independently.

Step	SD	R
1	Shirt flat on bed	Pick up shirt
2	Shirt in hands	Scrunch shirt
3	Scrunched shirt in hands	Put head through collar
4	Shirt on over head	Put arms in sleeves

🛞 STEP BY STEP

5

Step 1: Hannah pulls down shirt.

In this example, we are using backward chaining to teach Hannah to put on a shirt. Therefore, the first thing we do is teach Hannah to perform the last response in the chain, independently.

- *Reinforce:* As soon as Hannah performs the last step, we reinforce the behavior. We will start by prompting her to pull her shirt down and then fade our prompt so that she learns to pull down her shirt on her own.
- *Prompt:* Using backward chaining we may prompt Hannah through all the previous steps before having her pull down the shirt, or we may just skip these steps and just pull her shirt up.

Step 2: Hannah puts arms in sleeves.

Once Hannah has learned to perform the last step of the chain, pulling the shirt down, independently, we target teaching her to perform the last two steps in order, independently.

- *Reinforce:* As soon as Hannah performs the last two steps, we reinforce. When working on this step, she will initially need prompting to put her arms in the sleeves. Across trials this prompt must be faded.
- *Prompt:* Again, we may prompt Hannah through all the previous steps before having her put her arms in the sleeves, or we may just skip these steps by pulling her shirt up and helping her take her arms out of the sleeves.

Step 3: Hannah puts head through collar.

Now that Hannah can perform the last two steps of the chain, putting her arms in the sleeves, and pulling the shirt down, independently, we target teaching her to perform the last three steps in order, independently. Our current target is teaching Hannah to put her head through her collar independently. Step 4 and 5 have already been mastered, so we would then expect Hannah to be able to do both independently.

• *Reinforce:* As soon as Hannah performs the last three steps, we reinforce. When working on this step, she will initially need prompting to put her head through the collar. This prompt will then need to be faded so that she is performing the three steps independently.

Step 4. Hannah scrunches shirt.

Now that Hannah can perform the last three steps of the chain, we target teaching her to perform the last four steps in order, independently.

Our current target is teaching Hannah to scrunch her shirt independently. Steps 3 through 5 have already been mastered, so we would expect Hannah to be able to do all three tasks independently.

• *Response:* When Hannah finishes performing the last four steps, we reinforce. When working on this step, she will initially need prompting to scrunch her shirt. This prompt will then need to be faded so that she is performing the four steps independently.

Step 5: Hannah picks up shirt.

We are now going to teach the last step in the chain, which is the first step in putting on the shirt because,

again, with backward chaining, we work backwards.

Our current target is for Hannah to independently pick up the shirt and then do all the remaining steps in the chain independently.

• *Reinforce:* Now we'll reinforce when Hannah has completed all steps of the chain. Initially, she will need prompting with picking up the shirt, and this prompt will need to be faded so that eventually Hannah is only reinforced when she performs all steps in the chain independently.

Video Transcription

Yeah, let's make the bed up. You're starting here. You can just pull it up. Pretty good. Let's pull this down a little bit. You got it. I think we're done.

OK, are you ready to practice making your bed?

Yeah.

OK, go ahead and get started. OK, good job. Remember, maybe straighten that out a little bit more right there, and then pull the pillow down. Yep, put it down right here. There you go.

Hey, can you go ahead and get your bed made up? Hey. That's looking pretty good. Let's pull this up just a little bit more. And can you reach over there and pull that up a little bit more? You got it. Nice job.

E TERM TO KNOW

Backward Chaining

This process focuses on the patient completing the last step in the sequence. This technique is used to give the patient quicker access to reinforcement.

5. Total Task Presentation and Review

We have learned the first two methods for teaching a chain, forward chaining and backward chaining. Now we'll learn about the third method for teaching a chain, **total task presentation**, a procedure used to teach all of the steps of the behavior chain during each presentation of the learning task.

When teaching a behavior chain with the total task method, the behavior technician targets all of the steps in the chain each time the task is presented and provides prompts throughout the sequence.

☆ EXAMPLE Let's consider the washing hands example. Each step in the chain is targeted each time the task is presented to the patient – from turning on the water all the way through drying hands for five seconds. The behavior technician will provide prompts (depending on what type is written in the behavior plan) as needed throughout the task sequence.

Going back to the example with Hannah, for total task presentation, we would guide Hannah through all steps of putting on her shirt. Each time we go through the entire chain, she will need less and less guidance with each step.



Total task presentation is different from forward chaining in that when using forward chaining, the patient masters one step in the chain before moving to the next. In total task presentation, the patient is given the opportunity to do each step in the chain independently and if they come to a step they can't do, they are prompted and then they go on to the next step.

Video Transcription

Now you can dry the clothes. Of course.

[SQUEAKING DOOR]

All right. Good job, girl.

I got these two. All right kids, grab your book bag and your lunchbox please.

Moving right along, my dear. Good job.

Yeah, so far so good.

Nice!

[BEEPING]

Awesome! We've got one more machine. OK?

E TERM TO KNOW

Total Task Presentation

A procedure used to teach all of the steps of the behavior chain during each presentation of the learning task. The behavior technician provides prompts throughout the sequence.

6. Comparison

Now that we have learned about all three methods of chaining, let's review which methods we use most commonly. Which method of chaining should you use? Your BCBA will advise you which of these to use:

- Forward Chaining
- Backward Chaining
- Total Task Presentation

In teaching most skills (except vocal imitation), backward chaining or total task presentation is more often used. If we do use chaining to teach vocal imitation, we'll use either forward or backward chaining, depending on the patient's performance and needs.

The decision whether to use forward chaining or backward chaining depends completely on the challenges

the patient is experiencing in saying specific blends or words.

⇐ EXAMPLE Target: The blend "ba."

Forward chaining would be used when the patient is having a problem with the first part of the blend/word; for example, the patient says "a" in response to, "Say ba."

- Trial 1: Say b.
- Trial 2: Say b.
- Trial 3: Say b.
- Trial 4: Say ba.

Backward chaining would be used when the patient is having a problem with the last part of the blend/word. For instance, the patient says, "b" in response to, "Say ba."

- Trial 1: Say a.
- Trial 2: Say a.
- Trial 3: Say a.
- Trial 4: Say ba.

Visual supports can be a very helpful way of supporting individuals with autism spectrum disorder. They can be used in chaining programs by printing out pictures of each of the steps and then looking at each of these pictures prior to completing each step in the program.

However, visual supports are beneficial with many aspects of skill acquisition in addition to even managing challenging behavior. These can be useful when using:

- Premack principle (show a picture of what they must do first and then a picture of the reward)
- transitioning (pictures of each activity that need to be completed that day)
- preference assessments
- videos of skills you are teaching (especially for more complex skills like social skills)
- token boards (showing pictures of reward choices)
- and more!

😭 🛛 BIG IDEA

As much as possible use visual supports to enhance your teaching and increase the likelihood of your patient's success!

SUMMARY

In this lesson, you learned about **chaining**, a procedure that is used to teach behaviors that occur in sequences of two or more steps. It is used whenever two or more behaviors are combined to form a complex skill, known as a behavior chain. The completion of one behavior acts as the S^D for the next response, and behavior chains can be made for one skill or an entire routine. You also learned about **task analysis**, which involves breaking down a complex behavior into a sequence of components. Lastly, you learned that there are three possible methods to establish a chain of behaviors or responses: **forward chaining**, a technique that moves a patient from the first step to the last; **backward chaining**, which focuses on the patient completing the last step in the sequence; and**total**

task presentation, a procedure used to teach all of the steps of the behavior chain during each presentation of the learning task. Finally, when **comparing** the different methods and deciding which one to use, reach out to your BCBA.

TERMS TO KNOW

Backward Chaining

This process focuses on the patient completing the last step in the sequence. This technique is used to give the patient quicker access to reinforcement.

Behavior Chain

Complex behavior composed of many single responses that occur in a specific sequence.

Chaining

A procedure used to teach a behavior chain.

Forward Chaining

This technique moves a patient from the first step to the last. Each step must be mastered before the next step in the skill series is added.

Task Analysis

Breaking down a complex behavior into a sequence of components.

Total Task Presentation

A procedure used to teach all of the steps of the behavior chain during each presentation of the learning task. The behavior technician provides prompts throughout the sequence.