

Behavior Dimensions and Measurement Systems

In this video, we will discuss how to identify an appropriate measurement system that is aligned to the behavior dimension of interest used in evaluating whether a functional-assessment-based intervention is effective.

The reason we collect behavioral data is to accurately measure behavioral performance which is necessary for many reasons including accurately measuring baseline levels of behavior as well as objectively determining effectiveness of any intervention effort. We will use a single-case design, which we will discuss more thoroughly in the video on **Step 5: Testing the Intervention**. Behavior has several different dimensions; it is necessary to first identify the **behavior dimension** that is of interest before you can select an appropriate measurement system.

Behavior has at least six dimensions, these are: frequency or rate, duration, latency, topography, locus, and force.

Frequency refers to the number of responses in which the behavior occurred. Think count. Frequency is the dimension of interest when you want to know how many times something occurs – such as number of times a student answered a question correctly. Whereas **rate**, refers to a ratio of count, per observation time, and is calculated by dividing the number of responses by the total observation time. So, if I was interested in knowing the rate of correct responding, I would count the number of correct answers on a student's math facts sheet and divide that number by time it took that student to complete, so count of 9 correct answers during a ten-minute work block would equal a rate of .90 per minute.

A second possible dimension is **duration**, or how long a behavior lasts. Duration is a good dimension of interest when measuring a behavior that a person is engaging in for too long or for too short of a time. For duration, you can measure the total duration of an entire observation session (for example, the student was out of his seat for 43 minutes in a 60 min window) or duration per occurrence, (such as, the student was out of his seat for an average of 3.07 per minute over fourteen instances).

A third possible dimension, **latency** refers to the amount of time it took for a behavior to occur or be initiated. Latency is a good dimension when you are interested in the length of time between when a behavior is requested (stimulus) and when it actually begins (response). For example, wanting to know how long it takes a student to begin writing after the teacher explains the writing task and asks the student to begin.

A fourth possible dimension, **topography**, refers to what a behavior looks like, or more specifically its shape and form. For example, you may be interested in the letter-writing skills of a student's cursive or the form of one's bat swing.

A fifth possible dimension, **locus**, refers to where the behavior occurs, that is, its location or context. So, this may be of interest when you want to know where the behavior is or is not occurring. For example, does the child eat in the cafeteria, in the hallway, or on the playground?

A final dimension, **force**, refers to the strength of intensity of the behavior. For example, does the child scream or speak softly? More specifically, do the child speak loudly enough to be heard from a distance of 5 ft? 20 ft? What about from across the playground?"

Once the behavior dimension has been identified, it is important to select **a measurement system** that is well aligned to its dimension. To begin this selection process, you must first ask yourself, does the performance of the behavior take about the same length of time as every other time. If so, the behavior is **uniform**. Examples of uniform behavior include talking out of turn, cussing, and swearing. **Nonuniform** behaviors on the other hand refers to behaviors that vary in length each time. Examples of non-uniform behaviors include being off-task or wandering around the room, this information is helpful as measurement systems are derived between two groups: event-based and time-based.

Event-based measurement systems tend to be well aligned for measuring uniform behaviors and include gathering **permanent products, frequency recording** where you count the number of times the behavior was observed in a session and convert to **rate** when possible, or rating the **intensity or magnitude** in which a behavior was performed.

Time-based measurement systems tend to be well aligned for measuring non-uniform behaviors such as **duration** or **latency recording**, interval recording, or time sampling. **Interval recording** and **momentary time sampling** are flexible and provide useful data. Across these systems an observation period is divided into equal intervals and observations are recorded for each interval. In **partial interval recording**, a behavior is marked for occurring in that interval if the behavior occurred at all at any time point during that interval. Whereas in **whole interval recording**, a behavior is marked for occurring in the interval if the behavior occurred during the entire length of that interval. For example, if I was observing for 15 minutes and each interval lasted 30 seconds and in the second interval I observed the behavior of interest for only 5 seconds I would indicate no occurrence of that behavior for that whole interval, whereas in partial interval recording I would have as the student demonstrated the behavior of interest partially during the interval. **Momentary time sampling** on the other hand is a recording system where you record whether the behavior is occurring at the moment that each interval ended. In a 15 minute observation using a 1 minute interval, I would record whether the behavior was occurring at the end of each 1 minute. There are a number of devices that can be worn at the waist or wrist and apps available to assist you in interval recording such as these systems described.

Across interval recording and momentary time sampling systems, data are most often reported as percentage of total intervals in which the target behavior was scored as occurring. Partial-interval recording has a tendency to overestimate behavior – so you may consider this system for behaviors you want to decrease such as “off task”. Whole-interval recording has a tendency to underestimate, and should be considered for behaviors you want to increase such as academic engaged time. It is important to consider your goal for the behavior you are measuring: is your goal to increase or decrease the behavior? The answer to this question will inform your selection of the appropriate measurement system.

The topics in this video offer a very brief introduction to behavioral dimensions and some measurement systems, for more in-depth coverage, you may read **Applied Behavior Analysis (2nd edition)** by Cooper, Heron and Heward (2007) and **Functional Behavior Assessment and Function-Based Intervention: An Effective, Practical Approach** by Umbreit, Ferro, Liaupsin, and Lane

(2007). You may also look at examples available on the **Ci3T websites** and **Iris Center** website, which is headquartered at Vanderbilt University in Nashville, and Claremont Graduate University in Claremont, California.