Welcome to our final Discussion Board lecture, class! In this lecture, we will focus on research designs. In ABA, we take repeated measures of the target behavior, graph these data, and then use research designs to determine if our intervention was effective. Using these single-subject research designs, we look for a functional relationship between the independent variable, our treatment, and the dependent variable, the target behavior. Let’s look at this functional relationship further.

We can say that our intervention was effective if we can show a functional relationship between the intervention and the target behavior. What is a functional relationship? A functional relationship is said to occur when the target behavior changes when our treatment is implemented, and this process is replicated at least once with the behavior changing again during the replication. You must have both – the change in behavior with treatment implementation and the replication of this effect. Research designs involve both this treatment implementation and the replication. If we can demonstrate a functional relationship between our treatment and the target behavior, we can rule out that extraneous variables caused the behavior to change.

This graph shows a functional relationship. During baseline, we can see that the frequency of out of seat behavior was occurring at high rates on an increasing trend. As soon as our treatment (DRO) was implemented, the frequency of out of seat behavior declined rapidly. This change of behavior when our treatment was implemented is not enough to demonstrate experimental control. We must replicate this effect. That is what you see in the second half of the graph. We return to baseline and see the behavior start to increase again. We then re-implement our intervention and the behavior reverses trend and starts to decrease. We have both the behavior change and the replication and can now say that we have a functional relationship between DRO and the frequency of out of seat behavior.

The simplest type of research design is an AB design. In an AB design, the A stands for baseline and the B stands for treatment. The AB design is the only design that does not demonstrate a functional relationship because treatment is not replicated across phases. The AB design shows us a correlation, not a functional relationship because we aren’t able to demonstrate experimental control when we have no replication. We cannot rule out the influence of extraneous variables on the target behavior if we don’t replicate our results. AB designs are used in non-controlled settings where proving a treatment caused a behavior change is not that important. You can still say the behavior changed, you just cannot identify what caused it.

The next design is the ABAB reversal design. We call this a reversal design because after the first treatment phase, the researcher removes the treatment and reverses back to baseline. With the addition of a second baseline and a re-implementation of the treatment, you can demonstrate a functional relationship. There are several things to consider when contemplating using an ABAB design. Is it ethical to remove treatment? With dangerous behaviors such as severe aggression or self-injurious behavior, it may not be ethical to withdrawal a treatment and return to a baseline condition. You must also consider if the treatment truly can be removed. If you have taught a new skill, how do you remove the learning and go back to when the client did not know how to perform the skill?

If you find yourself unable to use an ABAB design due to the nature of the behavior targeted for change, the multiple baseline design is a great choice. In a multiple baseline design, your baseline and treatment phases occur for different behaviors in the same subject, different settings for the same subject, or across different subjects. The key to a multiple baseline design is that the implementation of the treatment is “time-lagged.” The treatment for the behavior, subject, or setting starts at different times, giving the graph a staggered appearance. When the behavior changes only when the treatment is implemented, and this is replicated across “legs” of the design, the researcher can demonstrate a functional relationship.

The alternating treatments design is also known as the multielement design. In an alternating treatments design there is a rapid alteration of two or more treatments (two independent variables) on one target behavior (one dependent variable). On day 1, the subject gets treatment A, on day 2 gets treatment B, on day 3 gets treatment B, on day 4 gets treatment A, and so on. We then compare the differing effects of the treatments on the behavior. If we can show that the behavior changes when one of the treatments is implemented, then we can demonstrate a functional relationship. In a changing criterion design, baseline is started on the target behavior and each treatment phase is associated with a step-wise change in a criterion rate for the target behavior. So, each phase of the design provides a baseline for the following phase. When the rate of the target behavior changes with each stepwise progression, this is replication and experimental control is demonstrated. As long as the target behavior changes to meet the changing performance criteria, then you have been able to demonstrate a functional relationship.

Our research designs have high internal validity when we can demonstrate that the independent variable (our treatment) was the sole variable responsible for the change in the behavior. If you can clearly demonstrate a functional relationship in your graphed data, you have demonstrated a high degree of internal validity. Threats to internal validity include subject variables like maturation, setting variables like uncontrolled events or changes in the environment, measurement variables like observer drift or observer bias, and issues with treatment integrity. External validity is the degree to which you are able to generalize your results to conditions other than the original treatment condition. For example, if you change the setting or the people involved, are you able to get similar results with the treatment? The best way to demonstrate external validity is to systematically replicate the experiment. Threats to external validity or things that hamper your confidence in the external validity of a study include: only demonstrating results with one subject, only conducting the experiment in one setting, only using one person implementing the treatment. Basically, any experiment conducted with very similar subjects, with very similar behaviors, in very similar settings will have a hard time demonstrating external validity. That wraps up our discussion on research designs and ends our last discussion board lecture. Thank you for listening!