PS385: Targeted Topics in Applied Behavior Analysis

**Discussion Board Lecture: Unit 5 Media Lecture**

**Unit 5: Behavior Measurement and Experimental Analysis**

Welcome, students! Unit 5 provides an opportunity for us to go “in depth” with regard to experimental design in applied behavior analysis (ABA). There are five major categories of experimental design, i.e., AB design; Withdrawal design; Alternating Treatment design; Changing Criterion design; and Multiple-baseline design. You will learn how to select an experimental design, the procedures for implementing each; and the advantages and limitations of the design in this unit.

Before you begin your exploration of experimental design, it is important to review the analysis of data. Behavior analysts are “data driven!” All of our decisions regarding our clients are based upon the data collected during baseline and intervention – and later during follow-up of maintenance of skills after the intervention has ended.

Let’s start at the beginning – single-subject designs. Single-subject designs require repeated measures of the target behavior during baseline and intervention. A comparison is made between intervention data and baseline data to determine whether the behavior is changing in the desired direction. Single-subject designs require that the individual (or a small group examined as one entity) act as his/her/its own control. In other words, you will determine the effectiveness of your intervention based upon the comparison of intervention to baseline data.

To begin the implementation of an intervention, it is important that the client’s target behavior is stable. Baseline data can show that the behavior is increasing, decreasing, or is variable (unstable). The best context to determine whether an intervention is effective is to wait (if possible) for the baseline data to reach a steady state (stable).

When determining the effectiveness of an intervention, during the comparison of intervention data with baseline data, you would examine the level, trend, and variability. The “level” is the average rate of the behavior during a condition. For instance, you may be recording the frequency, duration, latency, or intensity/magnitude of a behavior. Various denominations of level would be reflected on the Y-axis, while the date or session would be recorded on the X-axis. By plugging your data into a graph, you would be able to determine, at a glance, whether the target behavior was increasing, decreasing, or remaining the same.

“Trend” is a consistent, one-direction change (either increasing or decreasing) in the rate of the behavior during a condition (e.g., baseline or intervention). An increasing trend is referred to as, “ascending,” while a decreasing trend is referred to as, “descending.”

“Variability” is the fluctuation in the rate of the target behavior during a condition. Typically, we do not begin an intervention when the data is variable. “Variability” does not show any distinctive trend in the behavior. It is, in essence, “all over the map!” The data is highly unstable and the data points do not fall within a narrow range of values. What does “narrow range of values” mean? Well, basically, stable data usually have data points that are directly in front of and in back of a given point within a narrow range of two data points. This would be considered “stable data.”

Beyond level, trend, and variability, there are three other factors that should be examined when conducting a visual analysis of data. These factors include the immediacy of the change in the behaviors following a condition; any overlap of data points between conditions; and the degree of change in the behavior.

Now that you have reviewed some of the fundamentals of the analysis of data, let’s explore research – or experimental – designs! The AB design (A = Baseline; B = Intervention) compares intervention data with baseline data to infer the effectiveness of the intervention. One cannot say that effectiveness is proven because it does not provide for replication of the procedure, i.e., the intervention strategy has not been withdrawn in order to prove that the intervention (independent variable) is the variable that affected the target behavior (dependent variable)

The reversal design (ABA) requires repeated measurement of the target behavior during three consecutive phases, i.e., a baseline phase (absence of the intervention – independent variable); a treatment phase (introduction of the intervention – independent variable); and a return to baseline conditions (withdrawal of the intervention). You may ask yourself why a researcher or practitioner would want to return to baseline conditions. Well, the ABA design produces stronger evidence that the independent variable (intervention) has the predicted effect if the target behavior (dependent variable) returns to baseline levels when the independent variable is removed. It demonstrates experimental control - or the effectiveness of the intervention.

The Withdrawal design (Reversal design) (or ABAB design) adds a second baseline after the intervention strategy and then reintroduces the intervention strategy after the second baseline. If the behavior changes again in the same, or similar, way it did with the first presentation of the intervention, strong evidence exists as to the intervention’s effect on the target behavior.

There are several variations of the Reversal design; however, one to keep in mind is the BAB design in which the practitioner begins with the intervention rather than taking baseline data. This can be done if taking the time to record baseline data may be inappropriate for ethical or practical reasons.

Ethical implications must be considered when removing an effective treatment in order to provide scientific verification of the independent variable’s ability to change behavior. One would not want to remove a seemingly effective intervention for self-injurious or aggressive behaviors due to the potential of harm to the client or others.

Alternating Treatments design (ABAC) is very similar to the Withdrawal design, but instead of reintroducing the same intervention, the practitioner adds a second, different intervention (Condition C). Baselines and interventions can be repeated often in Alternating Treatment designs across multiple conditions, but each intervention should be implemented an equal number of times. The beauty of this design is that the practitioner can compare two or more interventions in terms of effectiveness and then select the most effective for ongoing treatment. This design requires the rapid alternation of the presentation of each intervention on the behavior. Experimental control is shown when the data paths for two different independent variables (interventions) show little to no overlap.

The Changing Criterion design evaluates the effectiveness of an intervention strategy by progressively increasing or decreasing the target behavior in stepwise changes by manipulating the conditions of the intervention. This is one of my favorite experimental designs to use for acquisition programs! It doesn’t require the withdrawal of the intervention and does not delay the intervention or present any of the ethical issues related to withdrawing an effective intervention. The three factors to consider with using this design are: the length of the intervention stages; the size of the criterion change; and the number of criterion changes, which can determine the effectiveness of the intervention strategy. This design entails a series of treatment phases, each requiring an improved level of performance over the previous phase. Experimental control is demonstrated when the subject’s behavior closely conforms to the gradually changing criteria.

And, the most popular experimental design is saved for last! The Multiple-baseline design is an extension of the AB design. It can analyze the effectiveness of an intervention strategy on two or more behaviors of one individual; two or more individuals with the same target behavior; or the effectiveness of an intervention strategy for one individual in two or more settings. The Multiple-baseline design provides replication of the intervention strategy and may provide information on causality between the behavior and the intervention when there is a change in the target behavior. In a Multiple-baseline design, the treatment variable (intervention) is applied sequentially to two or more behaviors, and the effect on each behavior is noted. In a Multiple-baseline design, simultaneous baseline measurement is begun on two or more target behaviors. After stable baseline responding has been achieved, the independent variable is applied to one of the behaviors while baseline conditions remain in effect for the other behaviors. After maximum change has been noted in the first behavior, the independent variable is then applied in sequential fashion to the other behaviors in the design. Experimental control (effectiveness) is demonstrated when each behavior changes only when the independent variable (intervention) is applied.

So, go forth and learn about the advantages, limitations, and appropriateness of these designs!

Thank you for viewing your Unit 5 lecture!