To be a skilled behavior analyst who uses FBA, one must be well versed in the logic of the functional analysis methodology. Knowing only how to implement common test conditions in a rigid or static manner will lead to your eventual failure in this arena. Fully comprehending the logic of the process, however, will allow you to test any variable, with any child, in any applied setting. Understanding the logic of the analysis will allow you to use the descriptive data to your advantage, to set up new test conditions, to run multiple and never before published structural variations, and to get at minute and specific idiosyncratic variables that might be reinforcing a target behavior. A full appreciation of the logic at the root of this analysis method will allow you to go beyond the typical test conditions used in clinical settings to control and manipulate any referral environment (Iwata, Kahng, Wallace, & Lindberg, 2000).

Again, behaviors are reinforced by positive or negative reinforcers (Cooper, Heron, & Heward, 1987), which can take literally hundreds of forms. The logic of the analysis process, however, does not rely on the specific form of the reinforcer but only on whether the reinforcer is positive or negative. In positive reinforcement, a behavior is followed by the addition of something that increases the probability that behavior will be demonstrated again in the future. Put loosely, the child demonstrates the behavior in order to “get something.” In negative reinforcement, a behavior is followed by the removal of something that
increases the probability that behavior will be demonstrated again in the future. The child demonstrates the behavior to “get out of, or away from, something.”

In order to test a potential positive reinforcer, you need to create the motivation for the child to demonstrate the behavior to access the reinforcer. Remember, test conditions within a functional analysis are arranged in a deliberate attempt to reinforce a target behavior. In a very brief period of time (i.e., 2-20 minutes per session), the behavior analyst expects to see elevated rates of behavior in at least one test condition. The only way to evoke such target behavior repeatedly and reliably over short periods of time is to arrange the environment so that the motivation to demonstrate the behavior is at the highest possible level, assuming that the child’s behavior really is reinforced by the variable being tested. For positive reinforcement, this means creating a relative state of deprivation. A child whose aggression is reinforced by adult attention will not demonstrate aggression if you are engaging that child with a high level of attention. A child whose SIB is reinforced by access to preferred food items will not self-injure if there is free access to highly-preferred snacks. The behavior analyst must create an EO of deprivation in conditions that test for positive reinforcement. If the only way a child can access a reinforcer is to demonstrate the target behavior, the behavior should be demonstrated at relatively high rates compared to a control condition that makes that reinforcer freely available. You test a behavior’s sensitivity to a reinforcer by making the availability of that reinforcer contingent on the demonstration of the target behavior, and you contrast that rate of behavior with a control condition in which noncontingent access of the reinforcer is available.
To create a deprivation of attention, the behavior analyst must completely withhold all forms of attention. Typically, attention delivery takes the form of brief statements of social disapproval (e.g., “Don’t hit me; You’re hurting me. Please stop hitting your head; We do not do that, etc.”). However, information gathered in the descriptive phase should guide the type of attention delivered. To create a deprivation of a tangible item, the behavior analyst allows the child to access an item for a short period of time (e.g., 10-30 seconds) and then restricts the item. It does not matter what form the reinforcer takes; if the target behavior is reinforced by attention, that behavior will very likely be demonstrated in the condition to access it. Similarly, by taking a child’s preferred item, behaviors that are reinforced by the return of the item are likely to follow. After the deprivation is created and a child demonstrates the target behavior, you very briefly deliver the reinforcer. Regardless of the positive reinforcer being tested, the logic remains the same: Create deprivation of the reinforcer by withholding or restricting it, then briefly provide the reinforcer contingent on the target behavior, and finally re-restrict or withhold the reinforcer. Repeat this pattern throughout the condition.

In order to test for the potential negative reinforcement of a target behavior, an EO must also be created. For negative reinforcement, instead of motivating the child by depriving him/her of something that is delivered after a target behavior, the child's motivation must be to escape from an aversive situation, such as academic demands, chores, people, noise, etc. Negative reinforcers are typically breaks from unpleasant or nonpreferred situations, tasks, demands, or other variables. The break is the reinforcer. To test whether or not a break from something is motivating a behavior, a behavior
analyst must create an aversive situation from which the target behavior leads to escape. If a child’s aggression is reinforced by breaks from, or avoidance of, difficult academic demands, the child will likely not demonstrate the aggression if no academic demands are delivered. If a child’s SIB is reinforced by the reduction of noise in noisy situations, she will not likely demonstrate the target behavior in a quiet room. To test whether or not breaks from academic demands are reinforcing aggression, very difficult or very nonpreferred tasks must be presented. When difficult academic demands are presented, behaviors that are reinforced by breaks from those tasks will likely be demonstrated. To test whether a child’s SIB is reinforced by escape from noisy situations, one must create a very noisy situation. When a noisy situation is presented, behaviors reinforced with the termination of that noise are likely to be seen. Once the aversive situation is created, it has to persist until the target behavior is demonstrated. No other behavior can lead to escape from the aversive event. Depending on what the event is, preventing escape can often be difficult. But, if escape is contacted through a different behavior, the motivation to demonstrate the target behavior may very well decrease. After the aversive event is presented, demonstration of a target behavior produces a brief (e.g., 10-30 second) break. After the break, the aversive situation is again presented. No matter what the aversive situation is, the condition remains the same: Present an aversive situation, prevent the student from escaping until he/she has demonstrated the target behavior, briefly remove the aversive, and finally reintroduce it.

The details of many common conditions will be presented later in this chapter, but the EOs and reinforcers for many conditions are presented below in Table 3.1 to
highlight the logic of the process of creating motivation and

**Positive Reinforcement Conditions**

In-Session Deprivation or Restriction of:

<table>
<thead>
<tr>
<th>In-Session Deprivation</th>
<th>Deliver for Target Behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>Attention</td>
</tr>
<tr>
<td>Toys</td>
<td>Toys</td>
</tr>
<tr>
<td>Preferred Food</td>
<td>Preferred Food</td>
</tr>
<tr>
<td>Preferred Drink</td>
<td>Preferred Drink</td>
</tr>
<tr>
<td>Self Restraint Items</td>
<td>Self Restraint Items</td>
</tr>
<tr>
<td>Activities</td>
<td>Activities</td>
</tr>
<tr>
<td>Physical Touch</td>
<td>Physical Touch</td>
</tr>
</tbody>
</table>

**Negative Reinforcement Conditions**

In-Session Presentation of Aversive:

<table>
<thead>
<tr>
<th>In-Session Presentation of Aversive</th>
<th>Deliver for Target Behavior:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Demands</td>
<td>Break/Escape from Tasks</td>
</tr>
<tr>
<td>Clean-up Tasks</td>
<td>Break/Escape from Tasks</td>
</tr>
<tr>
<td>Adult Proximity</td>
<td>Break/Escape from Adult</td>
</tr>
<tr>
<td>Noise or Music</td>
<td>Break/Escape Noise or Music</td>
</tr>
</tbody>
</table>

**Automatic Reinforcement Conditions**

Leave Child Alone
Ignore Child
Extended Ignoring of Child
delivering a reinforcer for a target behavior.
Table 3.1. The Establishing Operations and reinforcers are presented for Positive, Negative, and Automatic Reinforcement Conditions.

**Ethics in Conducting Functional Analysis**

One may ask about the ethics of conducting analyses that intend to make severe destructive behaviors worse. How is it that this practice of purposefully increasing dangerous behavior is permissible? The answer is that when the specific reinforcers for a target behavior have been identified, a specific and individualized treatment can be applied (Repp & Karsh, 1994). In most situations, the identified reinforcer can be used in a treatment to reduce or eliminate the behavior (Repp, Felce, & Barton, 1988). These treatments will, more often than not, use positive reinforcement (Pelios, Morren, Tesch, & Axelrod, 1999) and will quite often initiate communication systems, beginning with language skills, to replace the target behaviors. It is important to keep in mind that your involvement is based on a referral for persistent severe behavior. This persistent severe behavior was occurring prior to your arrival, and based on what behavior analysts know about severe behaviors, it will continue without significant environmental change (Sidman, 1960). Is it more ethical **not** to obtain precise and specific usable data? Evoking a temporary increase in an already persistent severe behavior in order to decrease or eliminate the behavior is a worthy trade for the child, the peers, the parents, and the school staff. Many times, during functional analyses, a target behavior becomes very efficient. Whereas in a
natural setting the behavior might have been demonstrated in bursts, the behavior during the functional analysis will decrease to only one or two instances as the reinforcer is reliably delivered immediately. So, although there are times when the analysis reinforces the behavior, it does so at lower rates than were previously observed in the referral environment.

Finally, alternative methodologies to experimental analysis that produce causal (as opposed to correlational) outcome data are not available. Without experimental analysis, a behavior analyst’s only option is to continue to observe dangerous behavior in naturally occurring situations. These dangerous behaviors are typically directed at teachers and other unprepared staff, peers, and school property, if not to the student himself. Repeatedly observing naturally occurring situations where unwary staff is subjected to physical assaults, only to have multiple functional hypotheses from which to base an intervention, is not a better choice. The better choice is to allow trained staff to safely evoke behaviors directed at them and to quickly identify the causes of the severe behavior so behavioral interventions can be implemented on sound outcome data.

Where to Conduct Functional Analyses

In a school setting, there are four choices for where the analysis will take place, each with advantages and disadvantages that occur along a continuum. Some potential advantages or disadvantages are more or less relevant depending on the reinforcers being tested in the analysis. The continuum of issues related to location choice varies by two main themes: ecological validity and experimental control. Ecological validity as discussed here
is the extent to which the assessment environment mirrors the referral environment (Brewer, 2000; Hanley, Iwata, & McCord, 2003). A location high in ecological validity is one that is highly similar to the referral environment. One low in ecological validity is a location that is very different from the environment from which the referral was made. For example, if a referral is for aggression that occurs only on the playground, running the analysis in the teacher’s lounge would have low ecological validity. For a referral made for SIB that occurs during self-contained math class, running the analysis during and in that math class would be high in ecological validity. Experimental control, as discussed here, is the extent to which the behavior analyst can manipulate or create adequate EOs and control and manipulate reinforcer access during the analysis (Cooper et al., 1987). When the behavior analyst can control the relevant experimental variables that might confound the EOs, a situation of high experimental control is established. This is crucial because experimental sessions are very short (i.e., 2-20 minutes). For example, in a condition where deprivation of attention is sought, unwanted peer attention, unwanted attention from other adults in the settings, and other sources of attention outside the experimenter’s control would limit the deprivation of attention. This situation would be low in experimental control. The location choices in a school vary along these two dimensions and they are inextricably linked to one another in most scenarios.

The four locations for in-school analyses, presented in order from high to low ecological validity and low to high experimental control, are: in the classroom during instruction, in the classroom when others have left, in a different or unused classroom, and in another school room not used for instruction (e.g., a conference room).
A classroom during ongoing activities is the location that contains the most ecological validity. It is filled with the sights, sounds, people, etc., from which the classroom-based referral was made. However, there is also the highest possibility of experimental confounds. These confounds can come from other sources of attention, disruptions from the ongoing activities or naturally occurring changes in activities in the classroom. Other sources of potential confounds arise from distractions that might interfere with deprivation of attention. Because classrooms are full of interesting things a child might seek to engage during your sessions, the availability of other objects during a session can interfere with EOIs for most conditions. Some classrooms are so full of academic materials, play materials, leisure items, and clutter, that it can be almost impossible to establish experimental control. Depending on the child, the topography of the target behavior, and the conditions being used in the analysis, there exists inherent difficulty in restricting the child’s movement to the part of the classroom used as the analysis area. Physically blocking a child from leaving an area can create unwanted contact, and might create a different motivation for a target behavior than the one being tested. For example, if you are conducting a test condition in which the goal is to deprive a child of attention, physically blocking a child from leaving an area might evoke target behavior that was previously reinforced by escape, not by attention.

Besides the potential confounds to the experiment, conducting analyses when others are present also leaves open the very real possibility of disrupting the learning of peers, distracting the teacher, and disrupting the classroom and other classrooms in the vicinity. This variable needs to be taken seriously and may limit the specific topographies one can analyze in a classroom location. Keeping in mind
that functional analyses are an attempt to reinforce disruptive behavior, the rate of occurrences of the target behavior in the condition that contains the reinforcer generally is quite high. If this increase in target behavior disrupts the class, you may be forced to end the analysis prematurely. However, through communication with staff, a behavior analyst should explain that a very short-term increase in target behavior might be worth the disruption if it ultimately helps eliminate or decrease the target behavior. After all, the target behavior was happening in the referral environment at a significant level prior to the analysis, or the referral would not have been made in the first place. Slightly longer tolerance of an ongoing behavior with the end result of eliminating it might be accepted by those who would otherwise complain about it.

If other students are around the analysis area, it is the responsibility of the behavior analyst to ensure their safety. Students must not be at risk for injury for the sake of completing an in-class functional analysis. If there is a possibility of this happening, choose a different analysis setting.

Conducting a functional analysis in the referral classroom when others have left is the second option to examine in choosing a setting. In most classrooms, there are periods of time when the entire class of students leaves the room for scheduled activities (e.g., lunch, physical education, music, library, community-based instruction, recess, etc.). It may also be possible to confer with the teaching staff and arrange additional times when the class can be out of the room; sometimes students can be brought to the library or outside for extended periods or taught in a neighboring classroom. Consultation with teaching staff might produce creative ways to empty a classroom a couple hours each day until the analysis is completed.
Using the referral classroom when peers have left would be less ecologically valid, but would add more experimental control. From an ecological validity standpoint, if peers leave the room, so might some of the sights, sounds, and variables affecting the target behavior. For a child who throws tantrums during academic tasks, one influence on that behavior might be that the child, when asked to work, sees other children playing or watching videos in a different part of the classroom. If peers have left the room, those variables leave with them and the referred child’s behavior might differ from when the peers are present. Additionally, if a reasonable hypothesis for a child’s aggression is peer attention, testing this variable without peers is impossible. Conversely, if peers and the teacher have left the room, many potential forms of distractions and experimental confounds might also leave with them. Fewer confounds and distractions lead to better experimental control. Peer and teacher talking, movement, and interactions can sometimes confound the EO you attempt in your analysis. Limiting these distractions allows the behavior analyst more control over the variables of interest during the experiment. Some of the confounds mentioned above still exist when the analysis is conducted in the referral classroom without peers present, (i.e., the availability of other objects and materials in the room, other staff entering the room, and restricting the child’s movement within the classroom to an analysis area).

An additional advantage to this setting, beyond the increase in experimental control, is that fewer distractions to others students will arise from the analysis. If no peers are in the room, then no peers will be disturbed by the assessment. Taking very seriously the notion that your analysis can create unwanted negative side effects on the
learning of others, conducting the analysis while no one else is in the room might very well reduce the number of negative comments you receive during the analysis—both from the teaching staff and from the building administration.

Conducting the analysis in a different classroom from which the referral was made can be a great option if space is available. Limited space in school settings, however, often precludes this option. If an unused classroom can be found, the option is reasonable for an analysis setting. Using a classroom other than the referral classroom is the third lowest site on the ecological validity continuum but might add more experimental control. When the analysis is moved from a referral classroom to another classroom, the teacher, the peers, the desks, the classroom items, and all the other sights and sounds from the referral environment are different. This might or might not impact the child’s behavior. If the classroom is an empty unused classroom, ecological validity is very low. However, if for some reason an empty, regularly-used classroom is available, the amount of ecological similarity might not be significantly lower than when using the empty referral classroom. The same threats to ecological validity (as described above) related to peer presence pertain to this setting choice. That is, if peer presence or activity is related to the occurrence of target behavior, those variables leave with the peers. From an experimental control perspective, if the classroom is empty, a high amount of experimental control is probable. These advantages include fewer distractions, fewer competing items, better access to restricting movement, etc. If the classroom is available, but not empty, threats to experimental control are still present. Similar in benefit to the option described above, using an
unused classroom decreases the potential to disrupt the other students and the teacher in the referral classroom.

Conducting the functional analysis in room other than a classroom is often an option for behavior analysts. Creating as close to an analog setting as possible is the best choice for many reasons. First, there is limited space available in many school buildings. Second, it may be impossible or impractical for a class of students to vacate a referral classroom or neighboring classroom. Third, there is very often low tolerance for disrupting other students. Fourth, the requirement in many analyses is to have high experimental control regardless of ecological validity. These non-classroom options can include rooms typically used for speech therapy, occupational therapy, or physical therapy, or a counselor’s office, conference room, teacher’s lounge, time-out or cool down room, or even a storage closet. The behavior analyst seeking an analog setting for a functional analysis might have to be creative to find the ideal space for the assessment. As long as the child's safety is not put at risk, no space should be ruled out.

Analog settings obviously have little to no ecological validity, as they contain none of the sights and sounds of a referral classroom. However, throughout the descriptive phase of the FBA, much information will have been collected that can be used to turn a barren conference room into a semi-ecologically valid analysis setting. Methods of task presentation, task materials, certain desks or work areas, forms of attention, similar tangible or materials necessary for conducting the analysis can be obtained and used in a non-classroom environment.

Whereas ecological validity is lowered in an analog setting, experimental control is usually at its highest. When the behavior analyst has complete control of what is in the room and what is not, variables that are outside his control
when using a classroom setting are eliminated. The child’s access to unwanted materials and unwanted sources of attention can be limited or eliminated. Restricting a child’s access around a portion of a room is often not of concern if the analog room can be used in its entirety.

Use of an analog setting is also the least disruptive to classes and teacher’s schedules. However, when using conference rooms or rooms close to administrators or school staff who are typically removed from the daily tribulations (and noise) of the special education classroom, even small disruptions can cause serious problems with some staff. It is essential that office staff be warned about potential noises, screams, banging, and other sounds that might be expected during an analysis. The last thing you want when running a session in an analog setting is for unwary school staff to interrupt an analysis session to make sure everything is “OK.”

It can sometimes be difficult to determine if confounds to your experiment have impacted the target behavior. If the target behavior is low in all test conditions, when it is typically high under naturally occurring similar situations, confounds may be impacting your data. In the test conditions sections below, data collected by the behavior analyst in each condition is explained. Those data can be used for making determinations about whether or not the analysis needs to be changed from one setting to another because of experimental confounds. Changing locations in the middle of an analysis is allowable if, for practical, safety, or experimental reasons, one location fails to be an adequate setting. Marking this change in location on the graph is necessary for later visual analysis of results.
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