

Functional Assessment¹

Marcie Desrochers
Mandy Newell
Sharon Coleman
College of Charleston

In this paper we will consider the following topics:

- I. What is functional assessment?
- II. What are the goals of functional assessment?
- III. What are the possible causes of problem behavior?
- IV. What are the three ways in which functional assessment can be conducted?
- V. How is treatment tied to the results of a functional assessment?

I. What is Functional Assessment?

Functional assessment refers to a variety of approaches used to gather information about the cause of problematic behaviors to enable the design of effective treatment. Functional assessment approaches include descriptive methods (e.g., interviews, rating scales), direct observations (e.g., ABC, time charts) and functional analysis.

Functional assessment has been studied and extensively used to treat the severe problem behaviors (e.g., self-injurious and aggressive behaviors) of individuals with mental retardation or developmental disabilities (MR/DD). More recently, researchers are studying the effectiveness of a functional assessment approach in other problem areas such as Attention Deficit Hyperactivity Disorder, schizophrenia, and habit disorders (e.g., tics, trichotillomania, thumb suck, nail biting).

Functional assessment, as an approach to treating problem behaviors, can provide important information to aid in clinical decision-making. There are a number of goals for a functional assessment approach.

II. What are the Goals of Functional Assessment?

Functional assessment can be used to:

- a. Define the problem behavior
- b. Identify possible causes of behavior
- c. Predict when the problem behavior will occur
- d. Design effective treatment programs

¹ The authors thank Beth Sulzer-Azaroff for her invaluable comments

a. Define the problem behavior

One of the first and most important steps when planning to assess and treat someone's problem behavior is to objectively and specifically define that behavior. A well-defined behavior is important so the behavior can be reliably or consistently observed and treatment can be administered as intended.

For example, a behavior labeled aggression is too general to be reliably observed. My definition of aggression may differ from yours resulting in disagreement on when the behavior has occurred and when treatment should be administered. To remedy this problem in interpretation, the broad label of aggression must be defined operationally; that is, in terms of specific behaviors. For example, aggression could be defined as someone forcefully applying an open hand, fist, or foot to any body part of another person.

Likewise, tantruming is inadequate as a description of the problem behavior. More specifically and objectively, one definition of tantruming might be screaming above a normal conversational level and forcefully banging one or both fists on the table.

b. Identify possible causes of problem behavior

The research literature in the area of mental retardation/developmental disability (MR/DD) suggests different categories of variables may influence severe problem behaviors. The goal of functional assessment is to identify the factors predictive of individuals' particular problematic behaviors.

General categories of causes include: (a) ***positive reinforcement*** or events, objects or sensory stimuli that, when they immediately follow a behavior, result in an increase in rate of the behavior; and (b) ***negative reinforcement*** or stimuli or events (e.g., demands, tasks, internal stimulation, attention) that, when removed immediately after a behavior, increase its rate.

For instance, the individual might be engaging in finger sucking as a function of the sensory stimulation produced by engaging in that behavior (i.e., sensory reinforcement). It may also be the case that the child screams more when his parents reprimand him (e.g., "No, don't do that!") (i.e., attention reinforcement). Or, the individual may be hitting and kicking a teacher to get out of an aversive instructional situation (i.e., escape or negative reinforcement). In the following picture a young boy is protesting (i.e., banging his fist on the table and saying, "No!") doing the schoolwork given by his teacher who removes it, thus negatively reinforcing the boy's behavior.



c. Predict when the problem behavior will occur

A functional assessment approach is also used to gather information to allow prediction of when the problem behavior will occur. Once we have a reasonable amount of evidence for why the client's problem behavior occurs, we should be able to predict the circumstances under which it is likely to happen. Additionally, if you know those circumstances, they can be altered in some way to decrease the likelihood of the problem behavior.

For example, if Mary cries and hits herself due to fatigue when her bedtime approaches, then an earlier bedtime can be arranged. Darell's hitting and screaming for candy at the grocery store may be prevented by bringing some of his favorite snack on the shopping trip and keeping the trip short.

d. Design effective treatment programs

Consideration of the possible causal variables for the problem behavior is important for the selection of effective treatment. Treatment will vary depending on the functional hypothesis or reason for the problem behavior.

For example, one client might be engaging in aggressive behavior because that has tended to gain her attention from the teacher and other students in the classroom (i.e., positive reinforcement). Another client avoids difficult schoolwork because he or she is removed from the classroom immediately after an aggressive outburst (i.e., negative reinforcement). In the first case, treatment may involve providing positive reinforcement for desirable behavior (e.g., working on school work), while in the second case the difficulty of the task may be decreased or breaks after brief periods of working on difficult material may be provided.

Conducting a functional assessment will help to clarify the function of the client's problem behavior. This then can lead to applying a more effective treatment.

III. What are the possible causes of problem behavior?

There are many different causes of behavior and specific relationships between particular behaviors and their consequences can vary across individuals (as well as from time to time, setting to setting and so on). This variability in behavior suggests why it is important to conduct functional assessments individually. We must consider the person's unique circumstances and

accurately identify the factors responsible for the problem behavior. In general, positive reinforcement, negative reinforcement, or other factors might be possible reasons for the occurrence of the problem behavior.

Inadvertently produced positive reinforcement can increase the frequency of problem behaviors. The challenge is that there are any number of consequences that are positive reinforcers for an individual and what is a positive reinforcer for one may or may not be one for another. Attention (even in the form of reprimands!), objects (e.g., toys, food), and events (e.g., seeing a show, going for a walk) can be positive reinforcers when they increase the behavior that preceded it. Some individuals might also engage in self-abusive or other behaviors (e.g., head hitting, finger sucking) due to the sensory stimulation that results from that behavior (see the table below).

The best way to determine if something is a positive reinforcer for an individual is to present that stimulus immediately after each instance of a behavior during a set time period, and measure its change in frequency. You then compare the frequency of the behavior under the trial condition to one in which the behavior is not followed with that stimulus. If the rate is higher in the former than the latter, then the selected stimulus may well be functioning as a positive reinforcer. To be certain that no events inadvertently paired with the introduction of the trial consequence confounded your assessment, you need to repeat removing and applying conditions. If results are similar and the behavior is consistently higher when the specific consequences follow it, then it is likely that the consequence is a positive reinforcer.

Table of Examples of Problem Behavior Maintained by Positive Reinforcement

The individual <i>receives</i> the following types of positive reinforcement immediately after the problem behavior resulting in its increase:	Positive Reinforcement
Attention	reprimands given after a child screams
Objects	getting a toy after hitting another child
Sensory stimuli	sucking on fingers due to the sensations it produces

Negative reinforcement takes place when an aversive stimulus or situation is present and some behavior removes or prevents the occurrence of the aversive stimulus, leading thereby to an increase in the rate of that behavior (see the table below). For example, a child who is having difficulty with his homework, talks to nearby classmates to avoid completing the work. Or, in a crowded and noisy room an adult starts to scream and shout with the consequence of being removed from that unpleasant environment.

As is the case with positive reinforcers, a stimulus that is aversive for one individual may not

be one for another. The best way to determine if something is a negative reinforcer is to test whether, when certain events are removed immediately after a behavior, the rate of that behavior increases compared to a condition in which no consequences are delivered. As above, this test should be replicated or repeated to ensure consistency in the results and rule out confounding factors.

Table of Examples of Problem Behavior Maintained by Negative Reinforcement

The individual <i>escapes/avoids</i> the following types of negative reinforcement immediately after the problem behavior resulting in its increase:	Negative Reinforcement (escape/avoidance)
Attention	runs away to escape negative attention by others
Demands/Task	tantrums result in an unpleasant or difficult task being removed
Sensory stimuli	hitting oneself to relieve pain

Other possible reasons for problem behavior include frustration or removal of positive reinforcers that had been delivered in the past, arousal (e.g., an environment that is too noisy, crowded, or fluctuating), conditioned emotional behavior (e.g., anxiety, fear, anger), or biological/physiological factors (e.g., allergies, PMS, illness, sleep deprivation, medication). These factors may also “set the stage” or increase the likelihood for the occurrence of problem behavior if other conditions are also present (e.g., difficult work assignment, certain person). Conducting a thorough functional assessment can help to identify the possible causes for the problem behavior.

IV. What are the ways in which functional assessment can be conducted?²

A functional assessment can entail one or a combination of the following approaches:

- a. Descriptive assessments
- b. Observational assessments
- c. Functional analysis or experimental manipulation

a. Descriptive Assessments

The term *descriptive assessments* refer to various methods used to describe the behavior and situation surrounding it, as one attempts to identify the possible causes of the problem behavior. Descriptive assessments involve conducting specially designed interviews, rating scales, or surveys. These procedures entail collecting information about the nature, possible causes, conditions (e.g., fatigue, hunger, illness), antecedents, consequences, certain people, and places associated with occurrence of the problem behavior.

For example, standardized functional assessment interviews could be held with the client or

² Please note that these assessment procedures should be performed only by well-trained and experienced individuals or under the supervision of a qualified individual.

someone who has regular contact with the client. During an hour to an hour and half period, the clinician would ask the client, staff, teacher, or parent about a description of the behavior, what events or stimuli occur before or after it, what approaches to reduce the behavior had been tried in the past, any medical complications, what activities the individual typically engages in, and when the behavior typically occurs.

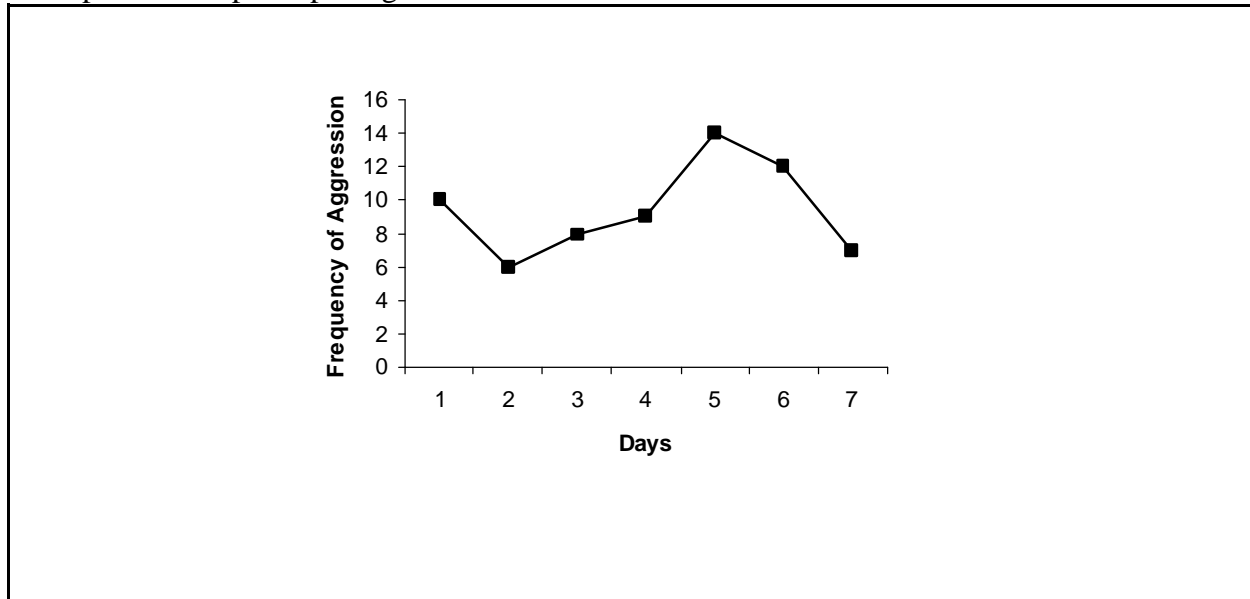
b. Observational Assessments

Using an *observational approach*, a person would collect data in the situation in which the client's problem behavior is likely to occur. There are several different observational assessments that can be conducted including collecting baseline information, using a time chart, or conducting ABC observations.

Baseline. When gathering baseline data, an observer unobtrusively records information, such as frequency or duration of the problem behavior during an observational session of a given duration, in the setting where the behavior typically occurs. To obtain a representative sample of the behavior, baseline observational data should be collected across as many pertinent situations and during as much time per day as needed to clearly interpret the results. At minimum, three to five sessions of stable data occurring under the same conditions would need to be collected.

Baseline data can be plotted on a graph to illustrate the frequency or percentage of the problem behavior occurring across sessions and to allow trends in the data (e.g., increasing, decreasing, or stable) to be identified. See the Figure below for an example of graphed baseline data depicting the levels of problem behavior across sessions.

Example of a Graph Depicting Baseline Data



Time Chart. Another method of collecting observational assessment information is to use a *time chart*, where a mark is made in the appropriate cell to indicate the time period and day in which behavior was observed (see Figure below). From this information, certain activities, events or people correlated with the occurrence of the problem behavior can be identified as possible causes of the problem behavior. For example, if it is found that Sally consistently runs around and screams at around 10 am, then the activity that usually occurs at that time, say spelling, can be explored as somehow being associated with her behavior (e.g., difficulty, noise, boring) and possibly contributing to it.

Example of a Time Chart

	M	T	W	T	F	S	S
8:00							
9:00					X		
10:00	X		X	X			
11:00					X		
12:00							
1:00			X				
2:00		X		X			
3:00	X		X		X		
4:00							
5:00							
6:00							
7:00							
8:00							
9:00							
10:00							

X = Instance of Problem Behavior

ABC Observations. Another method of collecting observational data is to perform **ABC observations**. In the situation where the problem behavior is most likely to occur the clinician unobtrusively observes the antecedents or events that occur before the behavior, the problem behavior, and its consequences.

For example, in a classroom situation the observer might record antecedents (stimuli or events) such as instructions by the teacher, remarks by classmates or certain times. The behaviors that immediately occur following those antecedents would then be noted very specifically and objectively (e.g., raising one hand above head and hand motioning for the teacher's attention, "I don't want to do this assignment"). Then, the consequences for that behavior would be recorded (e.g., teacher repeats the instruction or teacher reprimands the student). The ongoing antecedents ("A"), behavior ("B"), and consequences ("C") would be continuously noted during the observational period.

An analysis of the frequency of certain antecedent-behavior-consequence patterns would be examined to develop a hypothesis regarding the cause of the problem behavior. For example, if the data reflect that reprimands followed the problem behavior of screaming on 10 of the 15 total number of observations, then positive reinforcement by attention may be involved. Or, if after 13 out of 15 instructions to complete work assignments the individual was out-of-seat, then negative reinforcement may be a possible reason for that behavior.

Example of ABC Observation

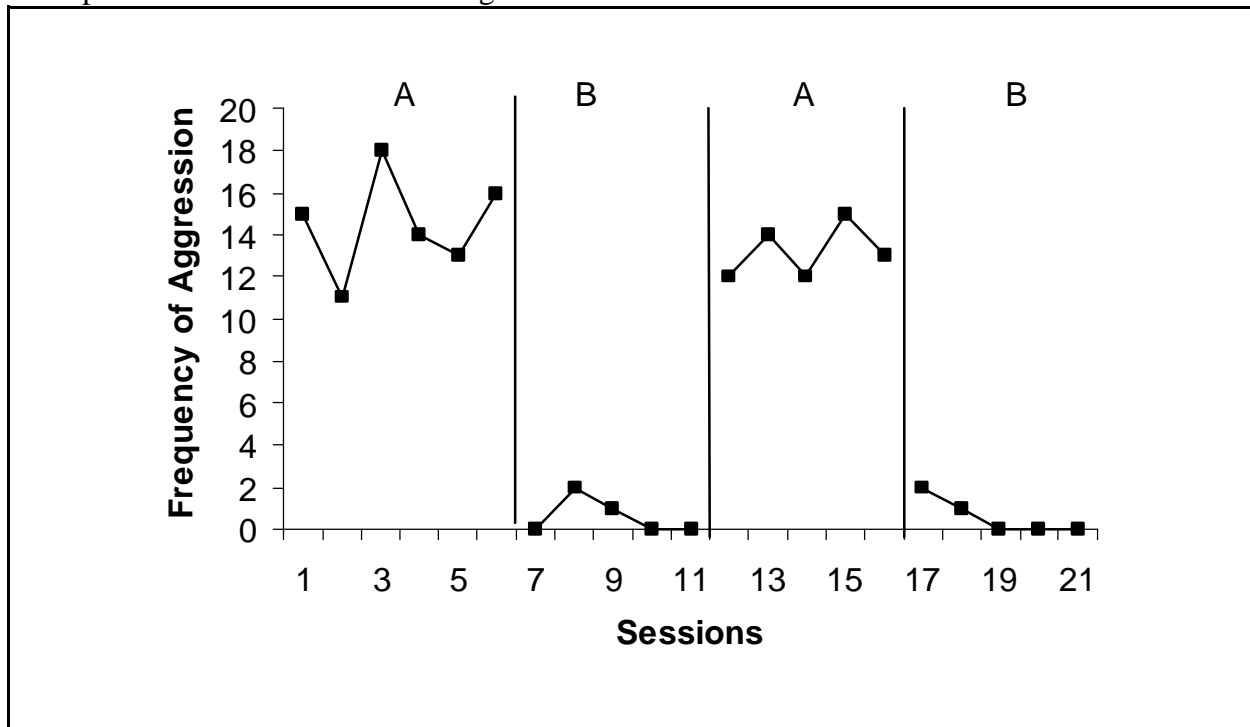
ABC Observation			
Client: Barbara Beam.			
Situation: Special education class. Picture naming task with teacher's assistant (TA).			
Observer: Your psychology assistant.			
People Present: 15 other students, teacher, TA			
Time	Antecedent	Behavior	Consequence
1:30 pm	TA hold up picture & "What's this?"	"hoos"	"Good, Barbara, that's a horse."
1:45	Picture of flower presented - "What's this?"	"hoose"	"No, it's a flower"
	Flower & "What's this?"	No response	"Flower, say flower"
	Flower & "What's this?"	Cry, flap hands	"Quiet, Barbara"
	Flower & "What's this?"	Grab card & rips it while screaming and flapping hands	"Barbara, no!"
1:52		Slowly stops crying, sitting quietly, finger flicking	
1:55	"Barbara, say flower"	"fo"	Wait 6 seconds
	"Barbara, say flo"	"flo"	"Good!"
	"wer"	"wer"	"Great working, yes, flower!" & she is given a popcorn chip
1:59	"Barbara, say flower"	"Flower"	"Excellent, that's it, flower!" & given a popcorn chip

c. Functional analysis or experimental manipulation

Functional analysis involves conducting an experiment to identify the function of the client's problem behavior. Various conditions can be presented using single subject experimental research designs, such as multielement or ABAB designs.

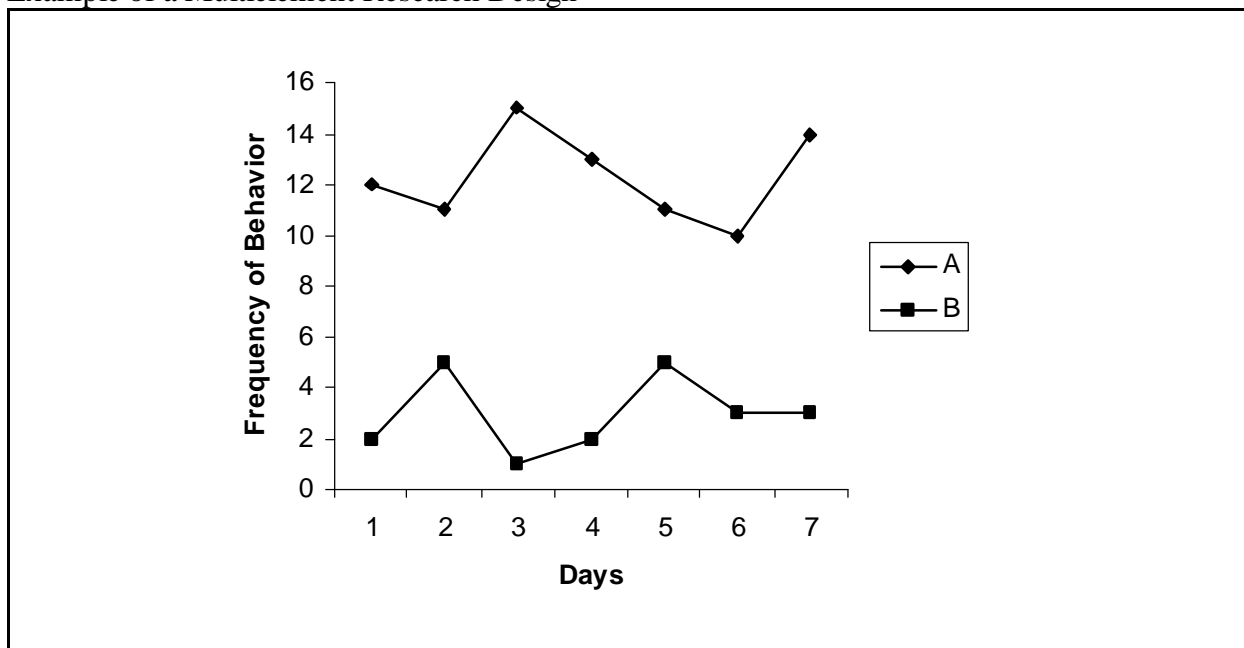
When implementing an *ABAB research design*, or a reversal-replication research design, the first step involves measuring the dependent variable (the client's problem behavior) during baseline phase (A), when no treatment is applied (see Figure below). Once stability of the behavior has been achieved, the treatment or independent variable (B) is applied and its effect on behavior is observed. Lastly, these two phases are repeated or replicated. A convincing demonstration of the effect of the independent variable on the dependent variable is provided if the behavior changes only when treatment is present and not when it is absent. In other variations of this design different treatment conditions can be compared as opposed to including a baseline comparison.

Example of an ABAB Research Design



In the *multielement research design* two or more conditions or treatments (i.e., independent variable) are alternated in rapid, almost, concurrent, fashion design (e.g., treatments A and B are conducted in one day or during the same hour). This design is also known as alternating treatment or simultaneous treatment research design. The purpose of the multielement research design is to determine which of several conditions or treatments produce a change in the behavior of interest (see the example depicted in the Figure below). An effect is noted by the difference in levels of the behavior between conditions.

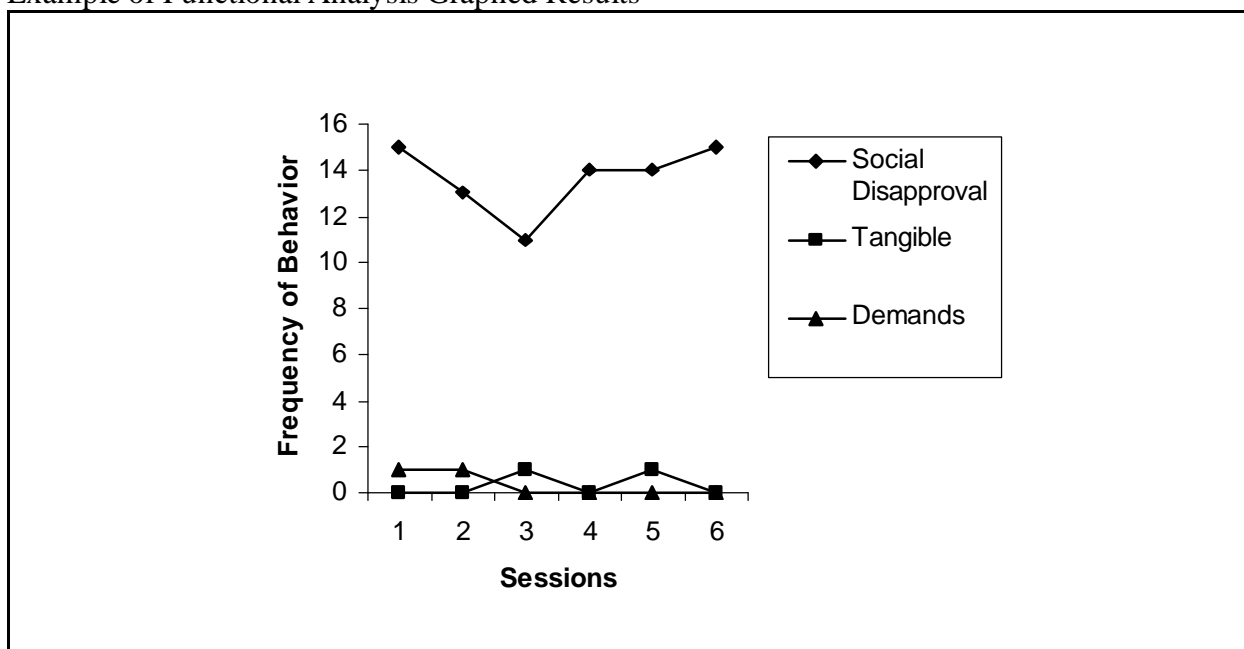
Example of a Multielement Research Design



Typical conditions in which levels of the problem behavior can be measured and compared, using replication-reversal or multielement research designs described above, include: (a) *attention condition* wherein reprimands (e.g., “No, don’t do that”) are delivered after each problem behavior; (b) *tangible condition* wherein a preferred object (e.g., toy, food) that is out-of-reach is given to the client following each problem behavior; (c) *demand condition* wherein a task (e.g., difficult math assignment) is presented and following instances of the problem behavior it is removed for a brief period; (d) *play condition* wherein toys are provided, the experimenter interacts positively with the client and any instances of the problem behavior are ignored; and (e) *alone condition* wherein the client is placed in a therapy room alone with no toys available. The alone and play conditions are typically used as a control or comparison condition with the other conditions (i.e., demand, tangible, attention). Note that these conditions can be conducted in a laboratory situation (analogue) or in the situation where the client’s problem behavior naturally occurs (e.g., classroom, home).

These conditions are presented, removed and compared with other conditions to test various possible causes of the client's problem behavior. To determine whether attention is maintaining the problem behavior (i.e., attention positive reinforcement), the levels of problem behavior when the attention condition is presented is compared to that in the alone or play condition. If the behavior occurs more frequently after attention has been provided immediately after it than when it has not, then attention positive reinforcement serves to control the problem behavior. Tangible positive reinforcement may maintain the problem behavior when the levels of the problem behavior are higher when the tangible condition is present compared to that in other conditions. Similarly, to determine whether the client is engaging in the problem behavior to escape or avoid certain activities or tasks (i.e., negative reinforcement), the levels of the problem behavior in the demand condition can be compared to levels in one of the other conditions (e.g., play or attention conditions). A hypothesis of sensory stimulation maintaining the problem behavior can be inferred if the problem behavior occurs at high levels no matter the condition present. Sensory stimulation may also be the cause if the client's problem behavior is high in the alone condition, but not in other conditions.

Example of Functional Analysis Graphed Results



In the above graph it can be noted that the highest levels of problem behavior occur in the social disapproval condition compared to very low levels in the tangible and demands conditions. This finding suggests that the problem behavior is a function of positive reinforcement, that is, during instruction, when a problem behavior occurs remonstrations (e.g., “No, stop that!”) are delivered and this serves to maintain the behavior. Also take note that in the above graph a multielement research design is displayed to evaluate the effects of each condition on behavior.

Problems with Functional Assessment Approaches

There are advantages and disadvantages to using the various functional assessment methods that must be considered when interpreting findings generated from their use. Often, though, the problems associated with using any single type of assessment may be minimized by applying several assessment methods in combination. These together can produce a much stronger case favoring a particular functional hypothesis

While descriptive methods (e.g., rating scales, interviews) can provide much information as to the nature and possible causes of the problem behavior, these methods are simply descriptive and do not yield a clear indication of the functional relations for the behavior. Other unrecognized factors may have been overlooked in the descriptive assessment that are the actual determinants for the behavior. In addition, interviews and rating scales are susceptible to errors in recall, bias, and problems in interpretation of questions and answers to questions.

Observational methods have the advantage of providing the clinician with direct contact with the possible antecedents and consequences for the problem behavior. Similar to descriptive methods, however, there is the potential for error. Observations involve merely describing what is happening in a situation and no controls or tests are used to rule out other possible reasons for the behavior. The observer may fail to note the relevant factors actually controlling the problem behavior or other conditions may coincide with the actual functional stimuli.

Functional analysis or experimental manipulation of the controlling variables is the only method that yields a “cause and effect” interpretation of the findings. Since this approach involves manipulating conditions (e.g., attention, alone, demand) while controlling or holding constant other potentially confounding factors, it can identify the specific factors maintaining the problem behavior. Conducting a functional analysis has as its main disadvantages that the procedure can be time consuming and sometimes arranging the different situations can be difficult (e.g., in a classroom with many students). Additionally, when the problem is multiply determined or low rates of occurrence of the problem behavior exist, then interpretation of the results of a functional analysis may be difficult.

Summary of Types of Functional Assessments

Types	Descriptive	Direct Observation	Functional Analysis
Examples	Interviews, rating scales, surveys	ABC observations, Time charts	Experimental manipulation of various conditions (toy play, demands, attention, tangible, alone)
Advantages	A lot of information, quick	Possible causes identified	Clear maintaining variable(s) for behavior identified
Disadvantages	Bias, memory, other unidentified factors may be involved	Other unidentified factors may be involved	Difficult to conduct

V. How is treatment tied to the results of a functional assessment?³

The type of treatment used to decrease the client's problem behavior should depend on what conditions are responsible for the client's problem behavior. Failure to consider the cause of the client's problem behavior can lead to ineffective or even counter-productive treatment procedures.

There are three general categories of treatment approaches: (a) teaching new behaviors; (b) antecedent manipulation or altering the events and stimuli that occur prior to the behavior; and (c) consequence manipulation or altering the events or stimuli that occur following the behavior. Antecedent manipulation can lead to rapid changes in levels of the problem behavior whereas teaching new behaviors or reducing the problem behavior by altering consequences may take longer to decrease the problem behavior. Additional considerations that influence the impact of treatment involve how long the problem behavior has occurred, what treatments have been tried in the past, and how consistently past contingencies (i.e., antecedents, behavior, consequences) have been applied. When implementing an effective treatment program it is important to have well-trained staff or parents who can consistently deliver appropriate antecedent and consequences.

³ Please note that these treatment procedures should be performed only by well-trained and experienced individuals or under the supervision of a qualified individual.

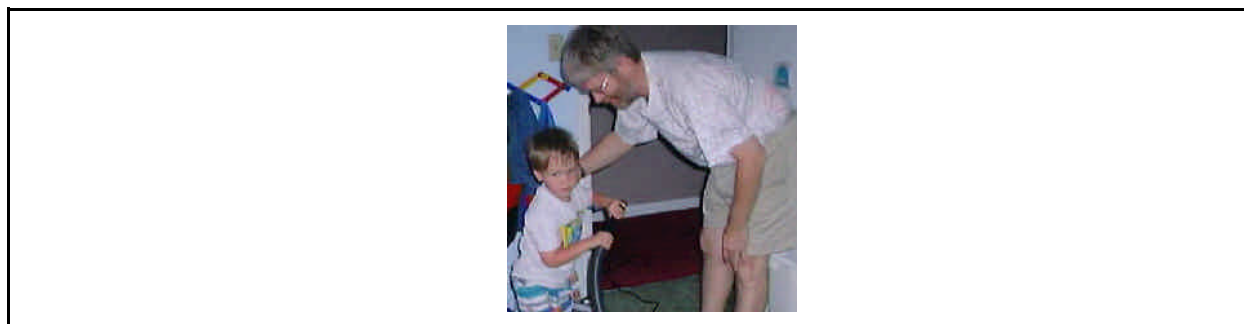
Treatment Approach for Behaviors Maintained by Attention Positive Reinforcement

Problem behaviors can be maintained by the consequences that follow it. Attention, even negative attention or reprimands, may function as a positive reinforcer and serve to increase or maintain the behavior.

For behaviors maintained by attention reinforcement, one effective strategy entails teaching a functionally equivalent behavior. That is, if the client is engaging in the problem behavior to receive attention from particular individuals (even negative attention), then teaching the client to ask appropriately, through spoken, sign, or pointing to bliss symbols, for their attention would help to reduce the problem behavior.

Any specifically desired behavioral alternatives to the problem behavior also could be reinforced with attention. This procedure is called ***differential reinforcement of alternative behavior or DRA***. The rationale for this approach is that if the client is receiving the positive reinforcer of attention for desirable behavior, then the reason to perform the problem behavior diminishes. Also, if other desired behaviors are reinforced, then those behaviors will increase in frequency, thereby reducing the opportunity to engage in the problem behavior.

If a specific behavior can be identified that is incompatible (i.e., a behavior that cannot occur at the same time as the problem behavior) with the problem behavior, then this behavior should be selected to be reinforced rather than just any desirable behavior. This procedure is called ***differential reinforcement of incompatible behaviors or DRI***. For example, someone might be positively reinforced with attention for using two hands to complete a puzzle instead of putting her hands in her mouth. Similarly, the client could be reinforced with positive attention for sitting to decrease running around the class. Or, as illustrated below, praise such as a pat on the back and positive statements could be provided immediately following desirable behaviors like vacuuming.



Another useful approach is to present a reinforcer following a *time period* in which the problem behavior did *not* occur. This procedure is called ***differential reinforcement of other behavior or DRO***. Initially, the time period during which the problem behavior is absent, and which leads to the identified reinforcer could be very brief (e.g., 2 sec). With success, the requisite duration can gradually be lengthened.

Antecedent manipulation for attention-based behaviors may entail providing frequent positive attention at random times regardless of the client's behavior. This procedure, called *non-contingent reinforcement*, is thought to be effective because the client has rich access to the reinforcer that otherwise she or he would engage in the problem behavior to receive.

Manipulation of consequences through *extinction* involves eliminating all reinforcers like attention that typically followed the problem behavior in the past (e.g., eye contact, saying, "No!"). Positive reinforcement should always be used in conjunction with an extinction procedure. Specifically, when the client receives the identified positive reinforcers for desirable behavior in order to offset the undesirable negative effects that tend to accompany extinction (e.g., emotional behavior, aggression) are reduced. We also need to withstand a temporary worsening of the unwanted behavior that often results after extinction is instituted and before it gets better. This phenomenon is called *extinction burst*. Persisting in using extinction is critical because "giving in" by supplying the reinforcer at that point will be counterproductive, in that it risks causing the undesired behavior to intensify.

Treatment Approach for Behaviors Maintained by Tangible Positive Reinforcement

Problem behaviors can be maintained by the consequences that follow it. Receiving desirable objects following behavior may function as a positive reinforcer and serve to increase or maintain the behavior.

For behaviors maintained by tangible reinforcement (e.g., hitting another child to steal a toy), one effective strategy is to teach a functionally equivalent behavior. That is, if the client misbehaves to gain an object, then teach the client to ask appropriately for that object.

Any desired behavior other than the problem behavior could also be reinforced with delivery of the desired object (i.e., differential reinforcement of alternative behavior). The rationale for using this approach is that, if the client is receiving the object following desirable behavior, then there will be no reason to perform the problem behavior. Also, if other desired behaviors are reinforced, then those behaviors will increase in frequency thereby reducing the opportunity to engage in the problem behavior.

Differential reinforcement of an incompatible behavior with the problem behavior (i.e., DRI) could also be used. For example, if the individual is stealing food from others at a mealtime, then provide him with extra dessert for eating just his own meal. One could also use DRO by providing positive reinforcement following a time period during which the problem behavior was absent.

One antecedent manipulation strategy is non-contingent reinforcement, which would entail providing frequent access to desirable objects for behaviors other than the problem behavior at random intervals independent of the client's behavior. Alternatively, the individual can simply be allowed continuous free access to the desired item. For instance, if a child is likely to compete aggressively with other children over preferred toys, then, if feasible, provide the desirable items in sufficient quantity to permit everyone access to them.

Manipulation of consequences through extinction involves eliminating all access to the desired tangibles following the problem behavior. For example, a child striking another child to get his toy should not be allowed to play with that toy immediately after that incident. Recall that an extinction procedure should always be used with some form of positive reinforcement procedure wherein the client is given a preferred item following a desirable behavior to counteract some of the undesirable negative effects of extinction (e.g., emotional behavior, extinction burst).

Treatment Approach for Behaviors Maintained by Negative Reinforcement

When aversive stimuli are present (e.g., difficult task or unpleasant conditions) and an instance of a behavior serves to reduce or eliminate that stimuli, the behavior will increase in similar situations in the future. This account of problem behaviors is termed negative reinforcement.

For behaviors maintained by negative reinforcement (e.g., hitting others to “make them go away,” hitting self to get out of doing work), one effective strategy is to teach a functionally equivalent behavior. That is, if the client is engaging in the problem behavior to get out of a situation, then teach the client to ask appropriately to leave, have a break, or receive assistance.

Any desired behavior other than the problem behavior could also be reinforced with the same consequence previously produced by the problem behavior (i.e., differential reinforcement of alternative behavior). An incompatible behavior (i.e., DRI) could be reinforced (e.g., working instead of engaging in disruptive behaviors). Also positive reinforcement for time periods during which the problem behavior did not occur (i.e., DRO) could be used. For example, the best time to give the student a break for completing a certain number of math problems correctly is following the work and not after off-task behavior.

Antecedent manipulation can involve providing non-contingent reinforcement or frequent breaks irrespective of the problem behavior. Another approach is *demand fading* wherein the demands and instructions formerly delivered to the client and that served as antecedents for the problem behavior are eliminated; then, across days, gradually reintroduced. For example, three days of no demands might initially be scheduled; then, if the problem behavior remain low, four demands might be presented, and so on until an acceptable number of demands are made while the problem behavior remain at tolerable levels.

Manipulation of consequences through extinction involves eliminating all access to negative reinforcement following the problem behavior. This procedure would entail not allowing the client to get out of the situation until a desirable behavior has been emitted. So, an individual who, regularly and with no physical reason, is saying that she is sick when physical education class is about to occur should not be allowed to skip that class as was done in the past. Assistance might be provided to the client to guide performance of the desired behavior if a difficult task is involved, after which the negative reinforcer (e.g., break from work) could be provided.

Treatment Approach for Behaviors Maintained by Sensory Reinforcement

For behaviors maintained by sensory reinforcement, the behavior itself generates some stimulation that serves to maintain it. Behaviors such as finger sucking or screaming might occur due to the consequences produced from the behavior itself.

A functionally equivalent behavior could be taught for behaviors maintained by sensory reinforcement (e.g., hitting oneself due to the sensations it produces, spitting because of the sound it produces when hitting the floor). If the individual is engaging in the problem behavior because of the particular sensory consequences it produces, then one can reinforce a new behavior that produces that same consequence. For example, teaching someone to press a key to turn on a vibration pad, music, or visual display instead of yelling. Or, teaching someone to point to a communication board to indicate that she wants to rock in the rocking chair instead of twirling.

Any desired behavior other than the problem behavior or a specific incompatible behavior could also be reinforced in that manner. For example, completing a puzzle rather than hitting oneself. Also DRO could be used wherein brief periods in which the problem behavior is absent are reinforced with these equivalent sensory reinforcers..

Antecedent manipulation can involve providing non-contingent reinforcement or access to the reinforcer maintaining the problem behavior, irrespective of the behaviors occurring. Another approach would be to enrich the general environment in the situation in which that problem tends to intensify (e.g., increase the activities, diversity of options, provide choices).

Manipulation of consequences through sensory extinction involves eliminating all access to sensory reinforcement that typically occurred following the problem behavior. For problem behaviors such as finger sucking, for example, gloves could be placed on the client's hands so that the tactile sensations that were generated from engaging in the behavior no longer are enjoyed.

Punishment

For all causes of problem behaviors, punishment procedures, such as time out (removing the client from access to positive reinforcers for a designated time period) or physical restraint, should only be attempted if all other less intrusive and restrictive procedures have been given a fair try and found to be ineffective. And even then, one must strictly adhere to ethical guidelines before and while any punishment program is implemented. These include, among others, consent, confidentiality, personnel expertise as well as gaining the approval for the program from an ethical review committee.

Summary of Treatment Implications for the Main Causes of Problem Behavior

	Cause of Problem Behavior			
Treatment Implications	Attention Reinforcement	Tangible Reinforcement	Negative Reinforcement	Sensory Stimulation
Reinforcement	Use attention reinforcer for desirable behavior e.g., pats on back, praise	Use tangible reinforcer for desirable behavior e.g., toys, games	Use escape reinforcer for desirable behavior e.g., brief break from work	Use sensory reinforcer for desirable behavior e.g., music, rocking chair, soft fabric
Communication Training	Teach functional communication e.g., “Look at me”	Teach functional communication e.g., “Give me the object”	Teach functional communication e.g., “Help me please”	Teach functional communication e.g., “I like music/touch
Extinction	Attention extinction	Tangible extinction	Escape extinction	Sensory extinction
Environmental Modifications	Enrich the environment, give attention before the problem behavior occurs	Enrich the environment, give tangibles before the problem behavior occurs	Teach skill development or compliance training, provide more assistance, give task choice	Increase general stimulation in the environment or environmental enrichment
Punishment	Time out	Time out		

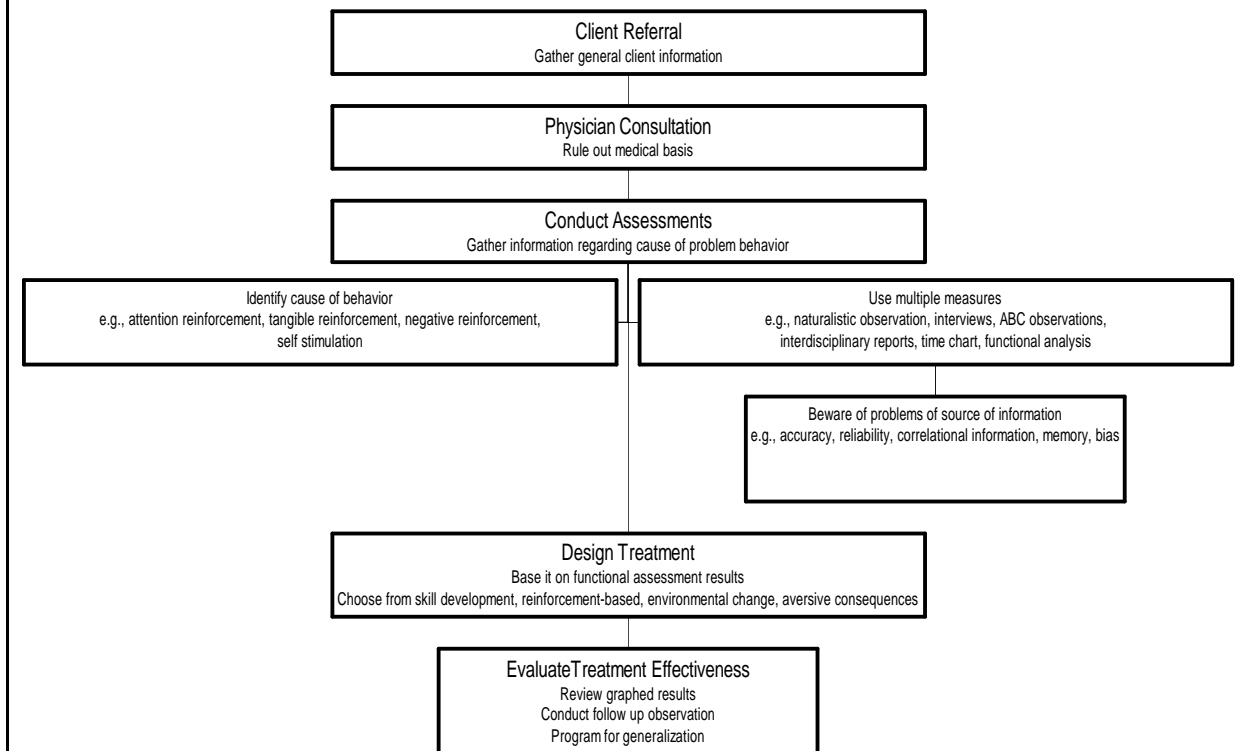
Summary

A functional assessment approach can provide invaluable information for the design of effective treatments. Descriptive, observational, and experimental manipulation approaches can be used to identify the problem behavior, predict when it will occur and determine the function of the problem behavior. Several types of assessments can be conducted to generate the pertinent information for determining why the behavior occurs, when it occurs, and what can be done to decrease it. In general, compared to the other strategies, a functional analysis will most clearly, identify the cause of the problem behavior since it entails conducting an experiment and controls for overlooked confounding factors that might be influencing the results.

The functions of many problem behaviors, such as aggression and self-injurious behaviors, can be grouped into two main categories; positive reinforcement and negative reinforcement. Among the positive reinforcers that may be responsible for increasing an individual's problem behavior can be negative attention, preferred tangibles, and sensory stimulation. Negative reinforcers may include escape from difficult work, certain situations (e.g., crowds, noise), or a certain level of stimulation (e.g., too hot, hungry, or boring).

Treatment is integrally tied to the results of the functional assessment in that certain functions of behavior will dictate the use of certain procedures to decrease that behavior. There are general categories of treatment approaches that include teaching functional communication, changing the situation or stimulus conditions for the problem behavior, and manipulating consequences. Depending on the function of the problem behavior, whenever feasible, the reinforcers maintaining it should be used to reinforce desirable alternatives (e.g., specific communication response or other desirable behavior). Additionally, those reinforcers identified as controlling the problem behavior should no longer be provided (i.e., extinction).

Optimal Approach to Solving Client Cases



Name or Code:

Concept Checks: Please write your answers to the questions below.

1. Define functional assessment.

2. What are the three general ways in which functional assessment can be conducted?

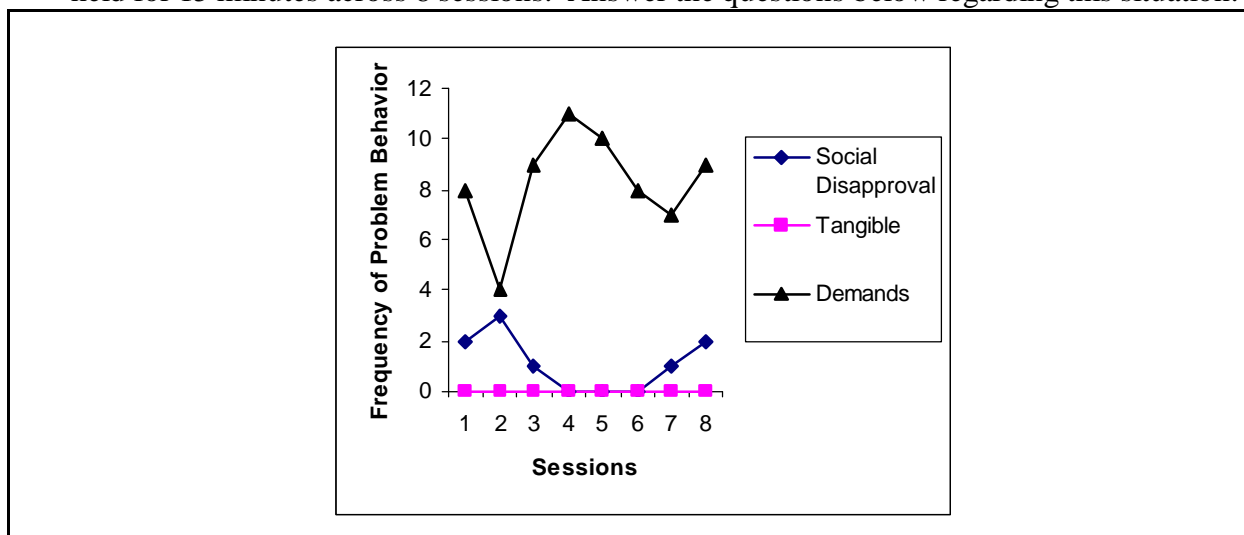
3. What are two main causes of problem behavior?

4. A researcher is measuring aggression. Which of the following is most clearly **inadequate** as an operational definition of the term?
 - A. pressing a button which makes it difficult for another subject to complete a task
 - B. honking one's horn at an intersection for a period of more than two seconds
 - C. attempting to harm someone
 - D. moving a switch to deliver electric shocks to a competitor

5. Sally keeps getting out of bed at night. She gives various excuses such as needing a glass of water, telling her mom something, forgot to feed the dog, etc. Her mom tries as best as she can to address Sally's need and then get her back to bed as fast as she can. What is a likely reason why Sally gets out of bed at night?
 - A. Tangible reinforcement
 - B. Attention positive reinforcement
 - C. Sensory positive reinforcement
 - D. Negative reinforcement

6. The behavior analyst is called to help decrease Allen's frequency of spitting behavior. Allen has profound mental retardation and must stay in a wheelchair for most of the day. During an assessment it was noted that he spat more often when his wheelchair was parked on linoleum, but did not spit at all when it was on carpet. This test of the conditions under which the behavior occurred was repeated across several days with similar results.
- A. What type of assessment was performed?
 - B. What was the probable cause of his spitting behavior?
7. Aiden leaves his seat, engages in loud noises, and interacts with other students when he is supposed to be working on individual assignments. The teacher's assessment indicates that his problem behaviors are maintained by access to peer attention and that they are most likely to occur if independent assignments are given after Aiden has gone without interacting with his peers for a long time. Which of the following treatment approaches would be most effective with Aiden?
- A. Give Aiden a break from his school work to read a book of his choice whenever he has worked on his assignment for a short period of time.
 - B. Allow lots of peer interaction and then require gradually longer and longer work periods.
 - C. Don't let Aiden get out of doing his work (i.e., escape extinction).
 - D. Teach Aiden to say, "I don't want to do this anymore" so that he can choose another task to complete.

8. The following graph depicts the frequency of problem behavior for a child who displays off-task behaviors in the classroom (e.g., giggling with neighbors, touching objects in desk, etc.) when his teacher has instructed the class to independently complete a specific assignment. In the social disapproval condition, the teacher told the child to continue his work and not to do whatever off-task behavior he happened to be engaged in. In the tangible condition, the boy was given whatever object that he was touching. In the demands condition, he was provided with a break from his school work whenever he engaged in off-task behavior. The graph illustrates the levels of the boy's off-task behavior in each of these three conditions held for 15 minutes across 8 sessions. Answer the questions below regarding this situation.



- What is probably maintaining the problem behavior as illustrated in the above graph? Explain why.
- What is the name of the type of functional assessment approach used in the above graph? What are the advantages and disadvantages to this approach?
- What treatment approaches might be used for the child's problem behavior depicted in the above graph?
- What type of research design is being implemented to test the variables maintaining the problem behavior?

Answers to Concept Checks:

1. Functional assessment refers to a variety of approaches used to identify the cause of the problem behavior so that effective treatments can be designed.
2. The three general ways in which functional assessment can be conducted are descriptive assessments, direct observation, and functional analysis.
3. The two main causes of problem behavior are positive reinforcement and negative reinforcement.
4. C
5. B
6. A. Functional analysis
B. Sensory reinforcement
7. B
8.
 - a. What is probably maintaining the problem behavior as illustrated in the above graph? Explain why.

Negative reinforcement in the form of escape is probably maintaining the problem behavior because the boy's off-task behavior is higher in the demands condition compared to that in the attention and tangible conditions.

- b. What is the name of the type of functional assessment approach used in the above graph? What are the advantages and disadvantages to this approach?

This is a functional analysis or experimental manipulation of the problem behavior. This type of functional assessment provides clear information about variables controlling the problem behavior, however, it can be difficult to carry-out or to arrange the implementation of the various conditions.

- c. What treatment approaches might be used for the child's problem behavior depicted in the above graph?

For behaviors that are maintained by negative reinforcement, alternative functional communication responses can be trained. For instance, if the boy's schoolwork is too difficult then he could be taught to ask the teacher for more assistance and then receive that consequence after he does so. Alternatively, he could be provided with a break from his schoolwork when he

successfully completes a portion of it. It would also be important not provide any escape from his schoolwork following the problem behavior (i.e., escape extinction).

- d. What type of research design is being implemented to test the variables maintaining the problem behavior?

The functional analysis in the above graph depicts use of a multielement single-organism research design.

Recent Functional Assessment Resources

I. What is functional assessment?

O'Neill, R. E., Horner, R. H., Albin, R. W., Sprague, J. R., Storey, K., & Newton, J. S. (1997). *Functional assessment and program development for problem behavior: A practical handbook* (2 Ed.). Pacific Grove, CA: Brooks/Cole Publishing Company.

This book provides an overview of what functional assessment is, how to do it, and treatment implications. Many handy forms used for conducting functional assessments are provided in this book. These authors are notable for their development of a Functional Assessment Interview.

II. What are the possible causes of problem behavior?

LeBlanc, L. A., Hagopian, L. P., Marhefka, J. M., & Wilke, A. E. (2001). Effects of therapist gender and type of attention on assessment and treatment of attention-maintained destructive behavior. *Behavioral Interventions, 16*, 39-57.

In this case study, the researchers examined the effects of therapist gender (male versus female) and type of attention (physical versus verbal) on rate of problem behavior of a young female with profound mental retardation. First, the results of a functional analysis found that problem behavior was greatest when attention followed the child's problem behavior. Then, a new assessment was used to examine the effects of gender and attention type. An interaction effect occurred with the highest levels of aggression in the male therapist, verbal attention condition. Functional communication training reduced the child's aggressive behaviors and therapist gender had an impact on the effectiveness of the intervention.

Mozzoni, M. P., & Hartnedy, S. (2000). Escape and avoidance hypothesis testing using an alternating treatment design. *Behavioral Interventions, 15*, 269-277.

In this case study, the researchers reduced the problem behavior of a 15 year old male with an acquired brain injury. Three treatments were implemented using a multielement research design. Although problem behavior decreased in all three treatment conditions, the treatment which resulted in the lowest level of problem behavior was the earned escape condition. In this condition, a break was given after two minutes of no problem behavior while the client participated in speech therapy (i.e., a DRO procedure). Time was gradually increased until escape was earned after 30 minutes of no problem behavior during speech therapy.

O'Reilly, M. F., Lancioni, G. E., King, L., Lally, G., & Dhomhnaill, O. N. (2000). Using brief assessments to evaluate aberrant behavior maintained by attention. *Journal of Applied Behavior Analysis*, 33, 109-112.

In this experiment a functional analysis was used to determine the function of the aggressive and pain behaviors of a child diagnosed with William's syndrome. Levels of the problem behaviors were measured under differing noise levels. Under the noise condition, the problem behavior of aggression occurred when demands were present, but not when attention or play conditions were present. Pain behavior, described as whining, crying, and using her hands to cover her ears, occurred during all three functional analysis conditions (demand, attention, and play) when noise was present. When noise was absent or when noise was present and earplugs were used, almost no pain or problem behavior occurred. These results indicate that noise level was relevant for this child's problem behavior.

III. What are the three ways in which functional assessment can be conducted?

1. Descriptive approaches

See O'Neill et al. (1997).

Paclawskyj, T. R., Matson, J. L., Rush, K. S., Smalls, Y., & Vollmer, T. R. (2000). Questions about behavioral checklist for functional assessment of aberrant behavior. *Research in Developmental Disabilities*, 21, 223-229.

This article presents data on the test-retest, inter-rater and internal consistency of a functional assessment checklist (QABF). The checklist is designed to help determine the possible controlling variables for problem behavior of individuals with mental retardation. Possible controlling variables included in this scale include social attention, escape, tangible reinforcement, physical discomfort, and nonsocial reinforcement. Test retest scores were reliable, inter-rater reliability was generally high, and each subscale of the QABF had consistently high external reliability.

2. Observational approaches

See O'Neill et al. (1997).

3. Functional analysis

Kennedy, C. H., Meyer, K. A., Knowles, T., & Shukla, S. (2000). Analyzing the multiple functions of stereotypical behavior for students with autism: Implications for assessment and treatment. *Journal of Applied Behavior Analysis*, 33, 559-571.

In this study functional analysis conditions (demand, no attention, etc.) were used to assess the stereotypical problem behaviors of five children with autism. The first study found that stereotypy occurred across all conditions for all five students. It was concluded that the stereotypic behavior displayed by these participants was multiply determined. In the second study, using a multiple baseline across functions of the problem behavior with one participant, functional communication training was sequentially implemented across categories of the multiple controlling variables, which resulted in a decrease in a participant's problem behavior. Overall, the results indicate that the causes of stereotypy for children with autism may be varied and complex.

Calloway, C. J., & Simpson, R. L. (1998). Decisions regarding functions of behavior: Scientific versus informal analyses. *Focus on Autism and Other Developmental Disabilities*, 13, 167-175.

In this study researchers compared the effectiveness of using formal functional assessment methods (i.e., functional analysis) to informal methods. The problem behavior of three preschoolers with developmental disabilities was analyzed by staff who used a functional analysis approach to those who did not (i.e. formal and informal evaluations, respectively). The maintaining factors were identified through the functional analysis and successful treatments were implemented. The results from the informal evaluations were not consistently accurate or reliable across raters. These results indicate that educators and child-care providers need training in functional assessment methods.

IV. How is treatment tied to the results of a functional assessment?

Cipani, E., & Spooner, F. (1997). Treating problem behaviors maintained by negative reinforcement. *Research in Developmental Disabilities*, 18, 329-342.

In this paper four treatments for individuals whose problem behavior is maintained by negative reinforcement are presented. The definition, conceptualization, applications, and guidelines for use of such treatments are explained. Topics such as functional communication training, behavioral momentum, differential reinforcement of an alternative escape behavior, and errorless learning techniques are reviewed.

Cowick, B., & Storey, K. (2000). An analysis of functional assessment in relation to students with serious emotional and behaviour disorders. *International Journal of Disability, Development, and Education*, 47, 55-75.

This paper begins with a brief explanation of functional assessment, including information about interviews, direct observations, functional analysis. A six-class model is applied to students with emotional behavior disorders and a listing of the behavioral indicators for different controlling variables for problem behavior is presented. Methods to reduce problem behaviors, such as positive programming, ecological manipulation and direct treatment are also reviewed in this article.

DeLeon, I. G., Fisher, W. W., Herman, K. M., & Crosland, K. C. (2000). Assessment of a response bias for aggression over functionally equivalent appropriate behavior. *Journal of Applied Behavior Analysis, 33, 73-77.*

In this study the use of functional communication training was evaluated. A comparison of various schedules of reinforcement for aggression concurrent with positive reinforcement of a functionally equivalent response (i.e., asking for toys) was examined. The authors found that aggression occurred more often than the communication response when the amount of reinforcement for each response was equivalent. However, when the schedule of reinforcement for the communication response was twenty times (i.e., fixed ratio 1) stronger than the schedule of reinforcement for the problem behavior (i.e., fixed ratio 20), communication levels increased while aggression levels decreased. These results indicate that the schedules of reinforcement for the problem behavior and its replacement should be considered to determine the most effective treatment.

Fisher, W. W., O'Connor, J. T., Kurtz, P. F., DeLeon, I. G., & Gotjen, D. L. (2000). The effects of noncontingent delivery of high- and low-preference stimuli on attention-maintained destructive behavior. *Journal of Applied Behavior Analysis, 33, 79-83.*

In this study the effects of providing an alternate stimulus (preferred toys) as non-contingent reinforcement (NCR) to decrease a problem behavior maintained by attention was evaluated. First, a functional analysis was conducted to determine the possible maintaining variable for the destructive behavior exhibited by a boy with severe mental retardation and other physical problems. The authors found that of the four conditions (social attention, demand, tangible, and toy play) presented, the social attention condition produced the highest rates of destructive behavior. The authors then examined potential alternative reinforcers by observing the boy's responses when presented with a number of preferred stimuli. The effectiveness of NCR was examined using one high preference stimulus (e.g., music) and one low preference stimulus (e.g., rain-stick). The authors found that implementing NCR with the high preference stimulus decreased the problem behavior to almost zero while NCR with the low preference stimulus did not have a significant effect on the problem behavior. These results indicate that NCR with an alternative, preferred stimulus may be used as a successful part of a treatment plan.

Jensen, C. C., McConnachie, G., & Pierson, T. (2001). Long-term multicomponent intervention to reduce severe problem behavior: A 63-month evaluation. *Journal of Positive Interventions, 3*, 225-236.

In this case study, an adult male with autism and moderate mental retardation's severe problem behavior was modified. Multiple observations and interviews were conducted to identify the cause of the client's self-injurious, aggressive, and disruptive behaviors. It was unclear as to the exact cause of the problem behavior (attention, sensory reinforcement, or escape) and so several interventions were tried. Use of a recliner and training to request the recliner was associated with a decrease in the problem behavior.

Umbreit, J. (1997). Elimination of problem behavior at work through an assessment based-antecedent intervention. *Education and Training in Mental Retardation and Developmental Disabilities, 32*, 129-137.

In this case study, an adult female with severe mental retardation was urinating in her pants but had been toilet trained since the age of 3 years. Structured interviews and structured observations, A-B-C charts, were used to develop the hypothesis that the behavior was attention maintained. Then the hypothesis was tested using a reversal design, (A= baseline and B= attention from staff). Data supported the attention hypothesis. An antecedent intervention was designed and implemented to prevent the urination in pants from occurring. The intervention was attention from staff during breaks by having her help set-up for the next activity (i.e., noncontingent reinforcement). The experimenters alternated baseline and intervention days with urination in pants consistently zero during intervention days. Treatment acceptability was rated highly by all staff members.