Functional Analysis:
The Use of Analogues in Applied Settings

Janine Peck Stichter

For more than 15 years, functional assessment has been increasingly used by practitioners and researchers to link specific environmental events identified as affecting challenging behavior to the selection of effective intervention strategies. The expanding literature base, along with recent revisions to the Individuals with Disabilities Education Act (IDEA, 1997) mandating the use of functional behavioral assessment in specific situations, has led to increased interest in this process. Despite the recent fervor exhibited in the research literature and related personnel preparation activities, one step of the process is frequently omitted in the application of functional behavioral assessment within natural settings—the use of analogues to empirically verify assessment results. Due to the level of control necessary for employing analogues, they have predominantly been used in clinical settings and have only more recently been within natural settings. This article presents an overview of the present knowledge base and possible applications of experimental analyses in classrooms for students with autism and related disabilities.

For more than 15 years, functional assessment (FA) has been increasingly used by practitioners and researchers to link specific environmental events identified as affecting challenging behavior to the selection of effective intervention strategies (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982; Iwata, Pace, Cowdery, & Miltenberger, 1994; Kern, Childs, Dunlap, Clarke, & Falk, 1994; Sasso et al., 1992; Umbreit, 1995). The expanding literature base, along with recent revisions to the Individuals with Disabilities Education Act (IDEA) mandating the use of functional behavioral assessment in specific situations, has led to increased interest in this process. *Functional assessment* (FA) refers to a set of procedures used to identify contextual variables that promote and maintain challenging behavior and, based on this assessment, select interventions that alter one or more of the variables (Lennox & Miltenberger, 1989). FA techniques are based on the following assumptions (Carr & Durand, 1985; Durand & Carr, 1987; Iwata et al., 1994; Mace, Lalli, & Pinter-Lalli, 1991):

1. Specific contextual factors are directly related to target behavior.
2. These variables can be identified by assessing not only the behavior but also the variables that serve to trigger and maintain the behavior.
3. Systematic manipulation of these variables can either reduce challenging behavior or support the development of appropriate functional skills.

Functional analysis is a subcategory of the larger FA process and entails the direct and systematic manipulation of variables suspected to contribute to challenging behavior. Analogue conditions are often used to conduct such an analysis, and experimental designs are employed to determine functional relationships between the behavior and the antecedents/consequences that control the behavior. Analogue assessment involves creating specific conditions during which antecedents and consequences are held constant and specific variables suspected to directly effect the target behavior are systematically presented in a counterbalanced manner (Conroy, Fox, Crain, Jenkins, & Belcher, 1996; Gable, Hendrickson, & Sasso, 1995; Sasso, Conroy, Stichter, & Fox, in press; Sasso et al., 1992). Due to the level of control necessary for employing analogues, they have traditionally been used in clinical application and have only more recently been examined within natural settings. This article presents an overview of the present knowledge base and potential applications of analogues as part of experimental analyses in classrooms for students with autism and related disabilities.

Typically, analogues are employed as part of a comprehensive package of assessment techniques (Conroy et al., 1996; Gable et al., 1995; O'Neill et al., 1997). Interviews and other, more informal assessment tools have been recommended for gathering preliminary information from various sources concerning challenging behaviors and factors, such as classroom events, that may contribute to them (O'Neill et al., 1997). Next, direct observation is used to gather additional data, in particular to corroborate specific patterns and trends and further define possible environmental and behavior relationships (O'Neill et al., 1997). Analogues are then designed to test the hypothesis developed from the previously mentioned descriptive assessments and provide specific direction for the development of assessment-based interven-

FOCUS ON AUTISM AND OTHER DEVELOPMENTAL DISABILITIES
VOLUME 16, NUMBER 4, WINTER 2001
PAGES 232–239

tions (Brady & Halle, 1997). Without such an analysis there is no actual verification of the hypothesis until interventions are attempted. This increases the likelihood that designed interventions may not actually match the function of the behavior and subsequently decreases the likelihood that their implementation will result in positive effects, particularly long-term ones. Analogues may also be tailored to assess the effects of interventions on the target behavior. For example, if the behavior of concern is aggression or self-injury, there are times when employing analogues to validate a hypothesis, which would create the potential for inducing high levels of those responses, may not be ethically defensible. In these cases analogue conditions can instead be developed to empirically compare the effects of a proposed intervention on levels of appropriate behavior (Brady & Halle, 1997).

The Functional Analysis Database

There is a significant amount of research on the use of functional analysis with persons with developmental disabilities (Iwata et al., 1994), frequently including autism (Brady & Halle, 1997; Carr, Yarbrough, & Langdon, 1997; Richman & Hagopian, 1999; Roane, Lerman, Kelley, & Van Camp, 1999). However, much of this research has been predominantly reported in the literature base related to clinical application. This is changing, however, as more research is being conducted in school settings (Carr et al., 1997; Frea & Hughes, 1997; Sasso et al., 1992), including general education classrooms (LeVelle, 1998). Combined (clinical and applied) analogue assessment research represents the largest single database in the area of FA (Derby et al., 1992; Iwata et al., 1994).

As the use of FA procedures increases, additional research is being conducted to identify which processes (informal or formal) are most useful under various situations. Initial research on the effectiveness of analogues, as compared to more indirect and descriptive assessment processes in applied settings, has rendered mixed results (Fox, Conroy, & Heckaman, 1998; Sturmey, 1995). Sasso et al. (1992) demonstrated a high rate of correspondence between results of descriptive and analogue assessments. However, other research has indicated incompatible results between methodologies (Conroy et al., 1996; Paclawaskyj, 1998). Carr et al. (1997) demonstrated that the lack of agreement between experimental and descriptive methods in one study was the result of idiosyncratic stimulus variables that systematically altered the effects of each initial analogue condition, rendering the results inconclusive. Subsequently, a more detailed analysis was conducted, and results demonstrated that initial hypotheses from interviews and direct observation were not sufficiently precise. In this instance it was clear that the full continuum of FA was paramount for accurate results. Clearly, the literature is just beginning to explore these issues in applied settings. Additional work in this area is necessary, particularly in regard to the validity of descriptive and analogue assessments conducted by practitioners, as opposed to clinicians.

Another area of research with particular relevance to autism involves the contextual nature of the behavior (Brady & Halle, 1997). For example, a child may be reported to engage in problematic levels of stereotypy when he is "left alone." However, descriptive measures may not accurately predict when this behavior will occur because it does not seem to occur every time the child is left alone. Functional analysis or analogue assessments are uniquely designed to determine the relevance of specific variables within the context of "alone." Because of the complexity and contextually specific nature of some behavior, it is often necessary and beneficial to conduct a more systematic analysis of the variables contributing to each discrete behavior (Brady & Halle, 1997). For example, Carr et al. (1997) demonstrated the use of analogues to assess the effects of a child's ability to manipulate small objects on his behavior within certain contexts. This analysis determined that this access to small objects affected the function of the behavior across conditions and settings. Initial descriptive FA procedures (i.e., interviews and direct observation) led to the hypothesis that social attention and escape were variables that influenced the problem behavior. An analogue assessment was developed to test these hypothesized variables, but the results of this analysis were inconclusive. Additional hypotheses based on further review of the information provided were then developed, resulting in an analogue assessment that included the effects of access to large and small objects on the behavior. This analysis suggested an alternative function to the two originally hypothesized. The analogue assessment served two important purposes in this case. First, it demonstrated that the initial hypotheses were not correct and, therefore, saved teacher time and effort in the design and implementation of interventions matched to an incorrect function. Second, the analogue assessment allowed for more molecular analysis of idiosyncratic contextual variables that affect a behavior across functions. In the case of the child with stereotypic behavior, initial descriptive assessment might have resulted in the hypothesis that he engages in this behavior when alone for sensory induction (self-stimulation). However, an analogue assessment might show that it does not occur consistently under that condition (i.e., when left alone). Further analysis might demonstrate that the behavior occurs in the alone condition only when magazines are present and might thus also occur in other conditions (i.e., attention seeking) when magazines are present. Therefore, although he might be more likely to engage in the stereotypy when alone, the predominant variable is magazines, and in the presence of those magazines the behavior may occur at anytime. Similarly, Richman and Hagopian (1999) demonstrated that the specific level of attention, as opposed to the more broadly defined functions (i.e., attention, demand, tangible), served as the function of the behavior for one student. Given the increased occurrence of stimulus overselectivity by individuals with autism, this level of analysis might be very helpful in determining functional

relationships for these individuals. Thus, in many cases the increased amount of control afforded by experimental analogue assessments might be very beneficial in applied settings in increasing the accuracy by which the function of more idiosyncratic or high-rate behaviors are determined. More descriptive or informal measures, on the other hand, might be more likely to render these high rates of behavior as "constant" when plotted on a scatterplot, or when recalled by an interviewee.

Conducting Analogues in Applied Settings

A growing body of research supports the utility of analogue assessments in applied settings (Carr et al., 1997; LeVelle, 1998; Peck, Sasso, & Jolivette, 1997; Roane et al., 1999; Sasso et al., 1992; Umbreit, 1995). Analogue assessment conducted in the context in which the behavior occurs provides a number of advantages, including the following (LeVelle, 1998):

1. Analogue conditions can be more reflective of the actual activities and environmental variables naturally occurring in the classroom.
2. Analogue assessment allows for a more accurate assessment of teacher's or peers' effect on target behavior.
3. Analogue assessment is a brief, yet specific, assessment that can verify proposed interventions, as opposed to more descriptive methods that rely on interpreted correlational data to drive intervention.

Analogues are conducted across variables thought to contribute to the target behavior. These variables may include social attention, demand/escape, tangible items, free play (control), and an alone condition, which is used to rule out any sensory or automatic functions of the behavior. (For a more complete explanation of these conditions, see Peck, Sasso, and Stambaugh, 1998, and Sasso and Reimers, 1988.) Each condition is measured separately for 10 to 20 minutes each, keeping all other factors except the variable being measured (i.e., attention) constant.

Classroom analogues are typically developed in one of two ways. First, practitioners can identify tasks and activities within the daily classroom routine that most resemble the typical analogue conditions mentioned previously and then measure the occurrence, rate, or intensity of target behavior in these situations. For example, for an attention analogue, the teacher might give the student independent seatwork, telling the student that he or she needs to get to work, while the teacher is busy working nearby. Each time the child engaged in the target behavior, the teacher would stop working and attend to the behavior by saying, "Please don't do that; you need to work." This teacher attention is provided only in instances of the target behavior; all other behaviors are ignored, and no other variables or environmental contexts are changed throughout the condition. This type of basic analogue assessment would be done to get some initial information on the proposed function of the behavior to develop a hypothesis. Once a hypothesis has been developed (e.g., the function of the behavior is teacher attention), then the attention condition would be rerun and then compared with perhaps just one alternate condition (e.g., escape) to verify that the attention condition truly elicited higher rates of the target behavior. These analogues are typically 10 to 15 minutes long and should incorporate materials, persons, and scenarios typical of the environment whenever possible. By using natural environments and persons as part of this analysis, the teacher is then provided clear direction for intervention. For example, it may now be clear that the teacher needs to shape the child's behavior to gain attention as a reinforcer for appropriate behavior. In addition, this approach may highlight specific areas for potential skill development to allow the student to access teacher attention in a more appropriate manner.

A second, more detailed use for analogue assessment is to look at specific classroom-related variables already hypothesized (e.g., through interviews and direct observation) to affect target behavior. For example, it is hypothesized through interviews that a student engages in the target behavior to gain teacher attention. Direct observation, however, reveals that the student does not consistently engage in the target behavior in instances where there is no access to teacher attention. In this situation it might be very beneficial to test what are often called setting events. In other words, under what conditions does the student use the behavior of concern to seek out teacher attention? In this case it might be revealing to run the attention condition but change the setting events, keeping everything else constant. For example, one might run the previously described attention condition but run one analogue during large group and another during small group or one-on-one instruction to see if instructional delivery affects need for teacher attention. Other variables might include different subject areas or different personnel (e.g., teacher vs. paraprofessional). In these cases analogues are conducted to fine-tune hypotheses, therefore promoting the development of more prescriptive interventions based on the individual's specific educational needs. (For a more comprehensive description of typical analogue conditions in natural settings, see Gable et al., 1995; Peck et al., 1998; and Sasso et al., 1992.)

Analogue assessment can be designed in a number of ways. The order and specific variables comprising each analogue depend on the specific variables that have been hypothesized to either maintain or trigger the behavior of concern. For example, it is hypothesized that a child exhibits mild aggression toward others to gain attention. To verify this, the investigator creates a series of analogue conditions that include demand/escape, social/attention, tangible, and control (i.e., free play/alone) conditions. These are typically considered the four standard conditions of a functional analysis. For the first analogue, a demand/escape scenario is created in which task demands are removed for any occurrence of target behavior. Next is the social/attention condition, in which social disapproval/attention is only provided for each oc-

currence of the behavior. Following this, a scenario is created in which access to preferred items is only offered for each occurrence of the target behavior. A final analogue might be a control/alone condition in which the child has access to preferred activities or objects but is left alone without the nearby presence of others and any task demands.

Data on the occurrence of the target behavior are recorded for each condition and are then assessed to determine if any additional conditions should be created or repeated. If, for instance, increased amounts of the target behavior occurred in the attention and alone conditions, these two analogues might be repeated to determine if a hypothesis of attention is truly supported by the data. If no clear differences emerge between these analogues, further conditions can be created as described previously (e.g., comparing different levels of attention or access to specific objects).

It is also not always necessary to run all four of the standard conditions for every analogue assessment. If, for example, it is relatively evident from descriptive assessments that teacher attention is maintaining the behavior, but it appears that certain contexts or persons are more integral than others, two conditions can be developed to assess the potency of these variables. Under one condition the primary teacher might attend to the behavior, and the other condition might be the same except that the primary teacher is replaced with a paraprofessional. This would help demonstrate whether adult attention or a specific adult's attention is the reinforcer. Similarly, analogue assessments can also be very effective in identifying specific curricular or instructional triggers (antecedents/setting events) of the target behavior. In such cases it might not be prudent to run traditional analogues (alone, attention, escape, and tangible). Instead, analogues can be designed, for example, to assess the impact of group versus one-on-one instruction, fine versus gross motor tasks, morning versus afternoon instruction, and so forth. In these situations only the presence of these instructional variables would change, and all other variables would be held constant.

As with any educational intervention (academic or behavioral), periodic reassessment is best practice. Reassessment can be effectively accomplished by conducting "miniassessments." Once practitioners are experienced in conducting analogue assessments, they can do brief assessments as needed throughout the school year to verify or refute the effects of particular antecedents or consequences. Because of the unique behavioral characteristics of some students with autism, they may easily be affected by what appears to others to be minor changes in their environments, and the specific variables affecting their behavior may change over time. Brief analogue assessments may be more beneficial for addressing these assessment problems than descriptive methods. A brief set of analogue conditions can be run to verify an old behavioral relationship or to identify a new one (Brady & Halle, 1997). In a recent application of analogue assessment in a classroom setting, a teacher was trained to conduct analogues. Once she had conducted the initial series of analogues, the data led the teacher to hypothesize that her paraprofessional might have had an effect on behavior. The teacher then devised a specific set of analogues to test this hypothesis. This possible variable had not been addressed in the interview or through direct observation but was only considered once initial analogues that controlled for the effects of extraneous variables such as paraprofessional presence had been conducted (Stichter, 2000). Once an intervention was in place, the miniassessment to look at paraprofessional presence and behavior was run a month later. This information not only directly affected the student's program but was also relevant to the teacher's upcoming determination of whether this particular paraprofessional would be a good candidate to continue working with some of the students.

Direct Application of Analogue Assessment Information

Although IDEA 1997 prescribes specific uses for FA regarding challenging behavior, the literature has shown expanded application of this assessment process. This is especially true for the use of functional analysis/analogue assessment. Analogue assessment can provide a plethora of data that allows the practitioner to simultaneously assess different forms of behavior as well as coexisting behavior patterns or trends. For example, as analogue assessment systematically identifies variables that affect challenging behavior, simultaneous information is often derived regarding the conditions that support appropriate behavior. These conditions can later be combined to verify possible treatments within the assessment process (Sturmey, 1995). This is not only efficient but also allows a practitioner to more easily interpret the data and develop appropriate interventions that best match the student's needs. This is of particular interest because the interpretation process (from hypothesis to intervention) within the FA process has often been cited as one that suffers from the greatest lack of external validity (Stichter, Shellady, Sealander, & Eigenberger, 2000).

Analogues have also been shown to be helpful in the development of skill acquisition programs when the target behavior is the result of a skill deficit (Wacker, Wiggins, Fowler, & Berg, 1988). In addition to identifying an effective intervention from this empirical assessment and confirming its effectiveness, the practitioner can also evaluate the utility of the chosen replacement behavior (Brady & Halle, 1997). Also, analogue assessment can be used to identify instructional variables that contribute to the acquisition of proactive responses as well as specific structural variables that shape maladaptive behavior. These antecedent analyses have been used to develop modified instructional presentations (Kern et al., 1994; Stichter, 2000), to increase academic performance, and to determine optimal conditions for inclusive opportunities for students with autism (Peck et al., 1997).

Another use for analogue assessments in applied settings is analysis of the effects of behavioral momentum and transition lags (Sturmey, 1995). As mentioned previously, applied analogues are often 10 to

15 minutes in length and often produce one data point per session, representing the percentage or frequency of target behavior per session. However, these same data can be calculated in a minute-by-minute analysis to demonstrate possible behavior trends (Kahng & Iwata, 1999) within a session. For example, a student might show moderate rates of the target behavior across a number of analogue sessions, leading to the notion that either the function is indiscernible or the analogues were not conducted accurately. However, a minute-by-minute analysis might reveal that rates of the target behavior were consistently high throughout a specific analogue, which would serve to identify this analogue condition as a factor relevant to the function. Yet in the analogue condition directly following this first analogue, such a minute-by-minute analysis demonstrated initially high rates of the target behavior in the first few minutes of the condition and then few to no occurrences for the remaining 75% of the condition. This might demonstrate carryover effects from the prior condition (behavior momentum) or, in the case of many students with autism, might be much more reflective of difficulties with certain types of transition that vary from one condition to another. This information then can be used to identify the characteristics of difficult transitions as well as more desirable transitions from one type of instruction to another.

For example, a student might exhibit consistently high rates of the target behavior throughout an analogue designed to assess the effects of large-group instruction. After 10 minutes, he is switched to an analogue condition designed to measure the effects of small-group instruction. Without a minute-by-minute analysis, it might appear that high rates of the target behavior occur in both large and small groups. The assumption is made that the student cannot do any form of group instruction and needs a paraprofessional or other more restrictive support. A minute-by-minute analysis, however, shows that consistently high rates were exhibited in the large group but occurred only in the first 4 minutes of the small-group condition. This information can be used in multiple ways. First, if repeated with similar results, it might give an indication of the amount of time it takes the student to effectively transition (i.e., 4 minutes), which then can be built into appropriate programming and behavior support. Second, these two analogues can be replicated with a third condition placed in between. If with this third condition (e.g., an alone condition) he exhibits low rates of the target behavior by the time he is in the small-group instruction condition, it might indicate that this child does engage in small-group instruction well but needs downtime and a visual cue when transitioning from large-group instruction, or it might indicate the order in which instruction would best be presented to the child.

Finally, when an assessment team hypothesizes that a behavior has multiple functions, analogues allow for the empirical determination of functional relationships between each behavior and controlling variables (Gable et al., 1995). This is often the case for individuals with limited communicative repertoires. Unfortunately, in many of these cases it is often reported that "the student does it all the time" or "does it for no apparent reason," when in actuality the behavior is occurring at high frequency or seems to be lacking a pattern because it serves multiple purposes. Interviews may establish the notion that these multiple functions exist, but for more complex situations, neither interviews nor direct observations provide the precision of analogues in clearly discerning each motivating factor for a behavior.

Limitations to the Use of Functional Analysis Analogues

As with many behavioral or educational procedures, functional analysis has limitations. The initial demonstrations of functional analyses were conducted in what is now considered the "long version" (Carr & Durand, 1985; Iwata et al., 1982, 1994). This version requires repeated measures over extended periods of time, requiring extensive control and possibly multiple exposures to challenging behavior. Additionally, in some cases these repeated exposures to the analogue conditions may actually create a function for a behavior that did not previously exist in the classroom. Thus, having a student repeatedly participate in an analogue condition that provides attention for disruptive behavior might actually teach the student to act out to get attention (Conroy et al., 1996). This degree of control and the amount of time required create obvious limitations for applied use.

The brief functional analysis model was developed to address some of these limitations (Northrup et al., 1991). This clinical version requires approximately 90 minutes and no more than one or two data points per condition. This shorter version has been demonstrated to be as equally responsive a method of analysis (Derby et al., 1992; Iwata et al., 1994) as the longer version (Kahng & Iwata, 1999). However, without a significant degree of design precision, it has been hypothesized that a small number of data points may not adequately control for transition effects from one condition to another nor be a sufficiently representative sample of behavior in natural settings (Symons et al., 1998). Nonetheless, research on the use of analogues in natural settings is still developing and is currently insufficient to evaluate these concerns.

One frequently cited concern about analogue assessment is the ethical issue of exposing a student to conditions that might evoke undesirable behavior, particularly when the behavior is considered dangerous to self or others. This is certainly a valid concern that should be carefully addressed. However, the issue of ethics is not unique to functional analyses (Repp & Karsh, 1994). Taking 2 weeks of direct observation on the naturally occurring rate of dangerous behavior may be no more desirable than 2 days of analogue conditions to identify function and derive intervention. Also, if a priori criteria are established for termination of analogues when behavior becomes excessive or dangerous, these kinds of safeguards allow for the use of analogues as a sound option for otherwise difficult-to-assess

behaviors (particularly when other assessment procedures are inconclusive) and may be viewed as the equivalent of an "allergy test" (Conroy et al., 1996). Some researchers have also demonstrated that in instances where exposure to the target behavior is not ethically defensible, analogue assessments may be most beneficial for expedient identification of appropriate behavior conditions and the development of interventions with a greater degree of accuracy than more descriptive analyses (Calloway & Simpson, 1998; Northrup et al., 1991). This is particularly important if the challenging behavior is such that "false starts" or wasted time on inappropriate interventions would be considerably more unethical.

Another possible limitation of analogues is in regard to certain types of behaviors. Analogues may not be the most appropriate or at least the best primary assessment tool for low-frequency behaviors (Sturmey, 1995). These behaviors occur on such intermittent schedules and may have such an extensive chain of behaviors that precede them that more descriptive measures may be more useful. Consider, for example, a young man with autism who defecates in his pants an average of twice a month, with up to 3 months with no occurrence. A precipitating medical condition is ruled out, and through an FA process of interviews and direct observation, it is hypothesized that the behavior serves to escape some sort of demand tasks. Because of the low frequency of the behavior, testing this hypothesis through an analogue assessment would be unrealistically lengthy and unlikely to render a sufficient amount of data for any firm conclusions. Additionally, in this case a multitude of factors might need to converge simultaneously for this behavior to occur (e.g., lower-GI activity, a series of prior demands and nonpreferred activities, and the specific demand that occurs right before the behavior). This further reduces the likelihood that the behavior can be adequately measured in any series of controlled analogue conditions. In this case, it might be better to use further detailed descriptive measures to develop an intervention (e.g., choice-making opportunities, safety signals, a visual schedule). Then, if desired or necessary, the analogue assessment can be used to measure the effects of the proposed intervention on warning behaviors (e.g., increased agitation, unresponsiveness, increased vocalizations) that have been identified as signals that the target behavior may be more likely to occur.

Similarly, very high rates of a behavior may make it increasingly difficult to distinguish one analogue condition from another if behaviors occur so frequently that the contingent attention or social approval cannot be discernibly applied. For example, a child may engage in high-rate stereotypy (e.g., body rocking) during the escape attention condition; however, once this condition is changed to contingent attention, the behavior continues at such an intense rate (i.e., carryover from the agitated state created in escape) that the practitioner cannot discernibly provide attention every time the behavior occurs. Therefore, a direct functional relationship (cause and effect) between providing contingent attention and the target behavior cannot be discerned. In this case a longer control condition embedded between each analogue condition, the use of minute-by-minute analyses, or multiple assessment procedures would be needed to verify the hypothesis.

A great deal has been written about practicality of analogues in applied settings, particularly in regard to three main areas: teacher time, level of expertise needed, and teacher acceptability (Calloway & Simpson, 1998; Davis, 1998). The predominant concern about functional analysis in applied settings seems to center on the perception that analogues entail a complex clinical process with excessive time demands (Axelrod, 1987; Dunlap et al., 1993; Symons et al., 1998). However, little or no research has been conducted to demonstrate that analogues are less time efficient or are more technically complex than descriptive methods. Both methods are an integral part of the larger functional assessment process; nevertheless, use of analogue assessment to verify hypotheses or to further define conditions under which behavior occurs is often the first step dropped by field-based personnel conducting FA. It can also be one of the shortest steps in terms of actual time duration; those approaches relying solely on indirect measures can require significantly more time (e.g., 2 weeks of direct observation data and three interviews; Artesani & Mallar, 1998; Carr et al., 1997).

A second major concern regarding the feasibility of analogue assessments is the amount of expertise required (Calloway & Simpson, 1998; Davis, 1998; Sturmey, 1995). It is argued that given the degree of control and precision inherent in analogue assessment, there is a lack of reliability in analogues conducted by practitioners, which in turn may compromise assessment validity in the applied settings (Sturmey, 1995). Despite the assumption that practitioners can use more descriptive methods more reliably, there is little research to support this notion. Although reliability is a precursor to validity, it does not prove validity. In addition, few studies using interviews have reported interobserver reliability (Sasso et al., in press). Furthermore, a number of studies have demonstrated that teachers may be able to conduct analogue assessment with a great deal of reliability and fidelity (Conroy et al., 1996; LeVelle, 1998; Sasso et al., 1992; Stichter, 2000; Umbreit, 1995). To convincingly argue that one form of measurement is better for practitioners than another, research would need to be conducted by practitioners trained in both models and then studied, without any involvement by those who conducted the research, to determine if either method was conducted with greater fidelity. Until this is done, it would seem unnecessary and rather destructive to argue for one method over another. Instead, it is important to recognize the necessity of each form of measurement in the FA process. It has also been hypothesized that extra expertise in the form of consultation or additional training is needed when using analogues because of the difficulty in interpreting and translating results into treatment packages (Sasso et al., 1992). This need for expert consultation, however, may be

necessary for all forms of FA, both descriptive and analogue (Stichter et al., 2000). Teachers need to be given sufficient time and training to conduct the functional assessment, including analyses. No one form of FA is likely to be more effective under current teacher caseloads (Calloway & Simpson, 1998).

Finally, factors such as time and expertise can influence the acceptability of any of these procedures. However, it has also been suggested that practitioners may reject functional analysis if the conditions require them to alter the manner in which they deliver instruction (Davis, 1998). Although pertinent, this concern then also raises the question regarding the likelihood that these same practitioners will embrace an intervention package designed from any form of FA that calls for a change in instructional delivery and teacher behavior. By conducting the analogues in a natural setting with the usual practitioners in that setting, teachers can experience firsthand the effects of their instructional behavior on the student, reinforcing the notion that they can positively affect the behavior through their actions. Furthermore, preliminary investigation in this area is showing positive teacher acceptability ratings for the use of analogues (LeVelle, 1998; Sasso et al., 1992; Stichter, 2000; Umbreit, 1995).

Conclusions

The goal of functional analysis is to avoid repeated implementation of unsuccessful strategies (Iwata et al., 1982, 1994). Functional analysis has a long empirical history demonstrating its success in meeting this goal. Additionally, an increasing amount of research is being conducted demonstrating the applicability of this form of FA in applied settings. The use of analogue assessment in natural settings provides for improved ecological validity and therefore increases the likelihood that resulting interventions are accurately and simultaneously matched not only to the function of the behavior but also to the environment. In applied settings in particular, analogue analysis is not a stand-alone technology. Instead, analogue assessment should be considered part of a battery of techniques, including more informal and descriptive measures used to identify the possible sources of behavior control (Conroy et al., 1996; Mace & Lalli, 1991). The large clinical database on functional analysis has supported the use of the combination of analogue assessment and interviews throughout its long history as a way to identify initial analogue conditions and to drive more prescriptive analyses. Future practice should continue to develop complementary descriptive and analogue methods for applied settings (Carr, 1994), as opposed to defining a superior single assessment tool.

The issue of validity is, and should be, of constant scrutiny with all forms of assessment in applied settings. However, until additional research in the area of feasibility and time commitment by teachers has been conducted, it is inappropriate to render the use of analogues in the classrooms by teachers as unfeasible. In the interim, it is more responsible to address the current knowledge regarding the effectiveness of analogues and their implementation by practitioners. Furthermore, it is important to acknowledge that FA, by its nature, is not a simple procedure; rather, it mirrors the complexity of the behaviors it is designed to address. Therefore, it should always command a certain degree of expertise, similar to that demanded for effective academic instruction. Although the question of feasibility regarding analogue assessment is not definitive, the large database supporting the effectiveness of this form of analysis would indicate that this is a technique that should be further developed and readily available to practitioners in applied settings.

ABOUT THE AUTHOR

Janine Peck Stichter, *PhD, is an associate professor of special education at Cnetral Michigan University. Her current research interests include functional behavioral assessment, setting events, and challenging behavior. Address: Janine Peck Stichter, Central Michigan University, 220 Rowe Hall, Mt. Pleasant, MI 48859.*

REFERENCES

Artesani, A. J., & Mallar, L. (1998). Positive behavior supports in general education settings: Combining person-centered planning and functional analysis. *Intervention in School and Clinic, 34,* 33–38.

Axelrod, S. (1987). Functional and structural analysis of behavior: Approaches leading to reduced use of punishment procedures. *Research in Developmental Disabilities, 8,* 165–178.

Brady, N. C., & Halle, J. W. (1997). Functional analysis of communicative behaviors. *Focus on Autism and Other Developmental Disabilities, 12,* 95–104.

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

Carr, E. G. (1994). Emerging themes in the functional analysis of problem behavior. *Journal of Applied Behavior Analysis, 27,* 393–399.

Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Behavioral Education, 18,* 111–126.

Carr, E. G., Yarbrough, S. C., & Langdon, N. A. (1997). Effects of idiosyncratic stimulus variables on functional analysis outcomes. *Journal of Applied Behavior Analysis, 30,* 673–686.

Conroy, M., Fox, J., Crain, L., Jenkins, A., & Belcher, K. (1996). Evaluating the social and ecological validity of analog assessment procedures for challenging behaviors in young children. *Education and Treatment of Children, 19,* 232–256.

Davis, C. (1998). Functional assessment: Issues in applied research. *Preventing School Failure, 43,* 34–36.

Derby, K. M., Wacker, D. P., Sasso, G. M., Steege, M., Northrup, J., Cigrand, K., & Asmus, J. (1992). Brief functional assessment techniques to evaluate aberrant behavior in an outpatient setting: A summary of 79 cases. *Journal of Applied Behavior Analysis, 25,* 713–721.

Dunlap, G., Kern, L., dePerczel, M., Clarke, S., Wilson, D., Childs, K. E., White, R., & Falk, G. D. (1993). Functional analysis of classroom variables for students with emotional and behavioral disorders. *Behavioral Disorders, 18,* 275–291.

Durand, V. M., & Carr, E.G. (1987). Social influences on "self-stimulatory" behavior: Analysis and treatment application. *Journal of Applied Behavior Analysis, 20,* 119–132.

Fox, J., Conroy, M., & Heckaman, K. (1998). Research issues in functional assessment of the challenging behaviors of students with emotional and behavioral disorders. *Behavioral Disorders, 24,* 26–33.

Frea, W. D., & Hughes, C. (1997). Functional analysis and treatment of social–communicative behavior of adolescents with developmental disabilities. *Journal of Applied Behavior Analysis, 30,* 701–704.

Gable, R., Hendrickson, J. M., & Sasso, G. M. (1995). Toward a more functional analysis of aggression. *Education and Treatment of Children, 18,* 226–242.

IDEA Amendments of 1997, 20 U.S.C. § 1401 (26).

Iwata, B. A., Dorsey, M., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1982). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27,* 197–209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2,* 3–20, 1982)

Iwata, B. A., Pace, G. M., Cowdery, G. E., & Miltenberger, R. G. (1994). What makes extinction work: An analysis of procedural form and function. *Journal of Applied Behavior Analysis, 27,* 131–144.

Kahng, S. W., & Iwata, B. (1999). Correspondence between outcomes of brief and extended functional analysis. *Journal of Applied Behavior Analysis, 32,* 149–160.

Kern, L., Childs, K. E., Dunlap, G., Clarke, S., & Falk, G. D. (1994). Using assessment-based curricular intervention to improve the classroom behavior of a student with emotional behavioral challenges. *Journal of Applied of Behavior Analysis, 27,* 7–19.

Lennox, D. B., & Miltenberger, R. G. (1989). Conducting a functional assessment of problem behavior in applied settings. *Journal of the Association for Persons with Severe Handicaps, 14,* 304–311.

LeVelle, J. A. (1998). *Analog functional assessment in general education settings.* Unpublished doctoral dissertation, Louisiana State University, Baton Rouge.

Mace, F. C., & Lalli, J. S. (1991). Linking descriptive and experimental analysis in the treatment of bizarre speech. *Journal of Applied Behavior Analysis, 24,* 553–562.

Mace, F. C., Lalli, J. S., & Pinter-Lalli, E. (1991). Functional analysis and the treatment of aberrant behavior. *Research in Developmental Disabilities, 12,* 155–180.

Northrup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook, J., & DeRaad, A. (1991). A brief functional analysis of aggressive and alternative behavior in an outclinic setting. *Journal of Applied Behavior Analysis, 24,* 509–522.

O'Neill, R. E., Horner, R. H., Albin, R. W., Storey, K., Sprague, J. R., & Newton, S. (1997). *Functional analysis of problem behavior: A practical assessment guide* (2nd ed.). Pacific Grove, CA: Brooks/Cole.

Paclawaskyj, T. (1998). *Questions about behavioral function (QABF): A behavioral checklist for functional assessment of aberrant behavior.* Unpublished doctoral dissertation, Louisiana State University, Baton Rouge.

Peck, J., Sasso, G. M., & Jolivette, K. (1997). Use of structural analysis hypothesis testing model to improve social interactions via peer-mediated intervention. *Focus on Autism and Other Developmental Disabilities, 12,* 219–230.

Peck, J., Sasso, G. M., & Stambaugh, M. (1998). Functional analyses in the classroom: Gaining reliability without sacrificing validity. *Preventing School Failure, 43,* 14–18.

Piazza, C., Hanley, G., Fisher, W., Ruyter, J., & Gulotta, C. (1998). On the establishing and reinforcing effects of termination of demands for destructive behavior maintained by positive and negative reinforcement. *Research in Developmental Disabilities, 19,* 395–407.

Repp, A. C., & Karsh, K. G. (1994). Hypothesis-based interventions for tantrum behaviors of persons with developmental disabilities in school settings. *Journal of Applied Behavior Analysis, 27,* 21–32.

Richman, D., & Hagopian, L. P. (1999). On the effects of "quality" of attention in the functional analysis of destructive behavior. *Research in Developmental Disabilities, 20,* 51–62.

Roane, H. S., Lerman, D. C., Kelley, M., & Van Camp, C. M. (1999). Within-session patterns of responding during functional analyses: The role of establishing operations in clarifying behavioral function. *Research in Developmental Disabilities, 20,* 73–89.

Sasso, G., Conroy, M. A., Stichter, J. P., & Fox, J. (in press). Slowing down the bandwagon: The misapplication of functional behavior assessment for students with emotional and behavioral disorders. *Behavioral Disorders.*

Sasso, G. M., & Reimers, T. M. (1988). Assessing the functional properties of behavior: Implications and applications for the classroom. *Focus on Autistic Behavior, 3*(5), 1–15.

Sasso, G., Reimers, T., Cooper, L., Wacker, D., Berg, W., Kelly, L., & Allaire, A. (1992). Use of descriptive and experimental analyses to identify the functional properties of aberrant behavior in school settings. *Journal of Applied Behavior Analysis, 25,* 809–821.

Stichter, J. P. (2000). [The use of analogs to identify setting events in applied settings for students with emotional behavioral disorders]. Unpublished raw data.

Stichter, J. P., Shellady, S. M., Sealander, K., & Eigenberger, M. (2000). Teaching what we do know: Preservice training and functional behavior assessment. *Preventing School Failure, 44*(4), 142–146.

Sturmey, P. (1995). Analog baselines: A critical review of the methodology. *Research in Developmental Disabilities, 16,* 269–284.

Symons, F. J., McDonald, L. M., & Wehby, J. H. (1998). Functional assessment and teacher collected data. *Education and Treatment of Children, 21,* 135–159.

Umbreit, J. (1995). Functional assessment and intervention in a regular classroom setting for the disruptive behavior of a student with attention deficit hyperactivity disorder. *Behavioral Disorders, 20,* 267–278.

Wacker, D. P., Wiggins, B., Fowler, M., & Berg, W. K. (1988). Training students with profound or multiple handicaps to make requests via microswitches. *Journal of Applied Behavior Analysis, 21,* 331–334.

Whitaker, S. (1993). The reduction of aggression in people with learning disabilities: A review of psychological methods. *British Journal of Clinical Psychology, 32,* 1–37.