

CHAPTER 23

Antecedent Interventions



Key Terms

antecedent intervention
behavioral momentum
fixed-time schedule (FT)
functional communication
training (FCT)

high-probability (high-*p*) request
sequence

noncontingent reinforcement (NCR)
variable-time schedule (VT)

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Content Area 9: Behavior Change Procedures

9-1	Use antecedent-based interventions, such as: contextual or ecological variables, establishing operations, and discriminative stimuli.
9-5	Use response-independent (time-based) schedules of reinforcement.
9-23	Use behavioral momentum.
9-26	Use language acquisition/communication training procedures.

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Applied behavior analysts traditionally emphasized the three-term contingency: how consequences affect behavior, and how differential consequences produce stimulus discrimination (S^D) and stimulus control. Rarely did applied behavior analysts address how an antecedent event itself affected behavior. However, this situation changed following the publication of two greatly influential articles: one on establishing operations (Michael, 1982) and the other on functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). The convergence of motivating operations (MOs) and functional behavior assessments allowed applied behavior analysts to conceptually align applied research on the effects of antecedent conditions other than stimulus control (e.g., S^D s) to basic principles of behavior. This convergence advanced our understanding of how antecedents affect behavior, a historically underemphasized area of applied behavior analysis.

Practitioners have long used antecedents effectively to develop desirable behaviors, to diminish problem behaviors, and to design environments that select adaptive behaviors in social, academic, leisure, and work environments. Arguably, teachers may use antecedent interventions more frequently than consequence arrangements (e.g., reinforcement, punishment, extinction) to change behavior. The long-established practice of arranging antecedent conditions for behavior change adds support to an increasing experimental database of desirable behavioral outcomes that are functionally related to changing antecedent conditions (e.g., Wilder & Carr, 1998). Table 23.1 shows common behavior challenges

and the antecedent interventions that practitioners have used to address them.

Defining Antecedent Interventions

Conceptual Understanding of Antecedent Interventions

Some textbooks and journal articles classify all antecedent-based behavior change strategies under a single term such as *antecedent procedures*, *antecedent control*, *antecedent manipulations*, or *antecedent interventions*. Although economical, using the same term to identify interventions based on stimulus control (S^D s) and interventions involving motivating operations (MOs) can lead to confusion about, or failure to recognize, the different functions of these antecedent events. S^D s evoke behavior because they have been correlated with increased availability of reinforcement. The evocative function of MOs, however, is independent of the differential availability of effective reinforcement. MOs (e.g., an establishing operation) increase the current frequency of certain types of behavior even when an effective reinforcer is not available. Applied behavior analysts should be cognizant of the different factors underlying the evocative functions of S^D s and MOs.

In addition to improved conceptual clarity and consistency, understanding the different reasons for the evocative functions of S^D s and MOs has important applied implications. Antecedent treatments involving stimulus control must include manipulating consequent

Table 23.1 Examples of Behavior Challenges and Antecedent Interventions That Might Address Them

Challenging behavior situation	Antecedent intervention
Disruptive or noncompliant behaviors associated with doing homework or taking a bath.	Provide a choice: "Do you want to do your homework first, or take a bath first?"
Poor socialization and communication skills among persons with developmental disabilities eating at a cafeteria-style-arranged dinner table.	Switch the seating arrangement to a family-style configuration.
A student misbehaves by disrupting other students.	Move the misbehaving student's desk closer to the teacher and away from the peers bothered by the student's misbehavior.
Infant during the creeping and crawling stage can encounter many potentially dangerous events.	Attach gates to stairways, plug electrical outlets, put locks on cabinet doors, remove table lamps.
Student causes disruptions when requested to complete a math worksheet with 25 problems.	Present five sets of five problems each.
Some students misbehave when entering the resource room. Long transition times are clearly correlated with the misbehavior and lead to many difficult problem behaviors.	The teacher pins an index card for each student on the bulletin board. The card contained a personalized question. When entering the resource room, students take their cards from the bulletin board, go to their desks, and write a response to the question on the card.

events, changing the differential availability of reinforcement in the presence and absence of the S^D. Behavior change strategies based on motivating operations must change antecedent events. Understanding these differences may improve the development of more effective and efficient behavior change efforts involving antecedent events.

Classifying Functions of Antecedent Stimuli

Contingency Dependent

A *contingency-dependent* antecedent event is dependent on the consequences of behavior for developing evocative and abative effects. All stimulus control functions are contingency dependent. For example, in the presence of 2 + 2 = ?, a student responds 4, not because of the stimulus 2 + 2 = ?, but because of a past reinforcement history for saying 4, including perhaps a history of non-reinforcement for making any other response except 4. This chapter uses the term *antecedent control* to identify contingency-dependent antecedent events.

Contingency Independent

A *contingency-independent* antecedent event is not dependent on the consequences of behavior for developing evocative and abative effects. The antecedent event itself affects behavior-consequence relations. The effects of motivating operations are contingency independent. For example, sleep deprivation can influence the occurrences of problem behaviors in the absence of a history of pair-

ing sleep deprivation with reinforcement or punishment of those behaviors. This chapter uses the term **antecedent intervention** to identify behavior change tactics based on contingency-independent antecedent events.¹

Antecedent Intervention

Abolishing Operations

Applied behavior analysts have used several antecedent interventions, singularly or in treatment packages, to decrease the effectiveness of reinforcers that maintain problem behaviors (i.e., abolishing operations). Table 23.2 provides examples of antecedent interventions that used abolishing operations to decrease the effectiveness of reinforcers maintaining the problem behaviors and a corresponding reduction of those behaviors.

Temporary Effects

Smith and Iwata (1997) reminded us that the effects of MOs are temporary. Antecedent interventions by themselves will not produce permanent improvements in behavior. However, while using an antecedent intervention to diminish a problem behavior, a teacher or therapist can simultaneously apply procedures such as extinction to reduce the problem behavior and differential reinforcement of alternative behaviors to compete with the problem behavior. Because of the temporary effects of MOs, antecedent interventions most often serve as one component

¹Because Chapter 17 addressed contingency-dependent antecedent events (i.e., stimulus control), this chapter focuses on contingency-independent antecedent events (i.e., MOs).

Table 23.2 Examples of Antecedent Interventions Using Abolishing Operations

Abolishing operation	Example
Provide corrective prompts as an antecedent event.	Antecedent corrective academic prompts reduced destructive behavior to zero (Ebanks & Fisher, 2003).
Provide pre-session exposure to stimuli that function as reinforcers.	A father-son playtime preceding compliance sessions improved son's compliance to father's requests (Ducharme & Rushford, 2001).
Provide free access to leisure activities.	Manipulation of leisure items effectively competed with SIB maintained by automatic reinforcement (Lindberg et al., 2003).
Reduce noise levels.	Reducing noise levels decreased stereotypical covering ears with hands (Tang et al., 2002).
Change levels of social proximity.	Low levels of distant-proximity reduced aggressive behaviors (Oliver et al., 2001).
Offer choices.	Escape-maintained problem behaviors were decreased when students had opportunities to choose among tasks (Romaniuk et al., 2002).
Increasing response effort.	Increasing response effort for pica produced reductions in pica (Piazza et al., 2002).

of a treatment package (e.g., combining an antecedent intervention with extinction, differential reinforcement of alternative behavior, or other procedures). These kinds of treatments may produce maintaining effects.

Three antecedent interventions with established experimental results are noncontingent reinforcement, high-probability request sequence, and functional communication training. The remainder of this chapter will elaborate on these three antecedent interventions and present definitions and guidelines for their effective use.

Noncontingent Reinforcement

Noncontingent reinforcement (NCR) is an antecedent intervention in which stimuli with known reinforcing properties are delivered on a fixed-time (FT) or variable-time (VT) schedule independent of the learner's behavior (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993).² Noncontingent reinforcement may effectively diminish problem behaviors because the reinforcers that maintain

²This chapter uses the phrase *presenting stimuli with known reinforcing properties* to describe the delivery of noncontingent reinforcers. Interpreting the NCR procedure as presenting a reinforcer, or presenting a reinforcer noncontingent, on a fixed-time or variable-time schedule is technically inconsistent with the functional definition of reinforcement (Poling & Normand, 1999). Reinforcement requires a response-reinforcer relation. We use the term *NCR* in this chapter to describe the time-based procedures for reducing problem behaviors because the discipline of applied behavior analysis has continued its use, and the term *NCR* serves a useful descriptive purpose.

the problem behavior are available freely and frequently. This enriched environment with positive stimuli may function as an abolishing operation (AO), reducing the motivation to engage in the problem behavior.

NCR uses three distinct procedures that identify and deliver stimuli with known reinforcing properties: (a) positive reinforcement (i.e., social mediation), (b) negative reinforcement (i.e., escape), and (c) automatic reinforcement (i.e., without social mediation). NCR provides an important and effective intervention for problem behaviors. It is a common treatment for persons with developmental disabilities.

NCR with Positive Reinforcement

Kahng, Iwata, Thompson, and Hanley (2000) provided an excellent example of applying NCR with positive reinforcement. A functional analysis showed that social-positive reinforcement maintained self-injurious behavior (SIB) or aggression in three adults with developmental disabilities. During baseline, each occurrence of SIB or aggression produced attention for two of the adults, and a small bit of food for the third adult. During the initial sessions of NCR, the adults received attention or small bits of food on an initial fixed-time (FT) schedule (e.g., 5 seconds). Later, the schedule was thinned to a terminal criterion of 300 seconds. Figure 23.1 presents the baseline and NCR performances of the three adults and shows that the NCR procedure effectively decreased occurrences of SIB and aggression.

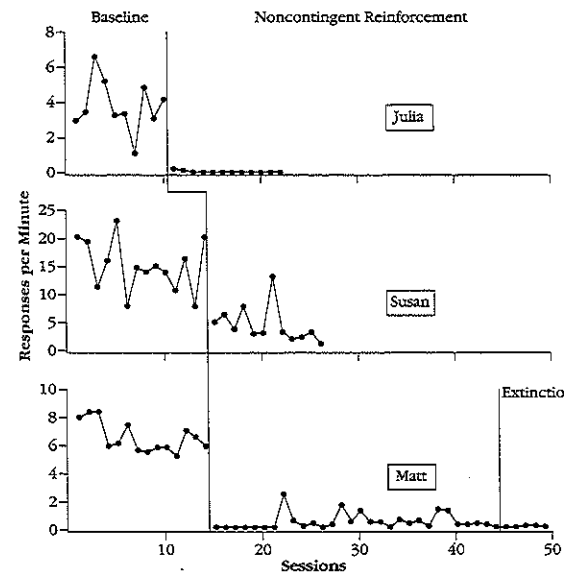


Figure 23.1 Number of SIB or aggressive responses per minute during baseline and NCR by three adults with developmental disabilities. From "A Comparison of Procedures for Programming Noncontingent Reinforcement Schedules" by S. W. Kahng, B. A. Iwata, I. G. DeLeon, & M. D. Wallace 2000, *Journal of Applied Behavior Analysis*, 33, p. 426. Used by permission. Copyright 2000 by the Society for the Experimental Analysis of Behavior. Reproduced by permission.

NCR with Negative Reinforcement

Podak, Miltenberger, and Romaniuk (2003) analyzed the effects of NCR escape on the instructional task compliance and problem behaviors of Andy and John, 7-year-old boys with autism. Andy's task was to point to cards with teacher-specified pictures, words, or letters in them. John used a marker to trace each letter of written words. Problem behaviors included resisting prompts, throwing materials, and hitting. During baseline, the therapist gave an instruction for task engagement, and contingent on problem behavior following the instruction, removed the task materials and turned away from the child for 10 seconds. During the NCR escape condition, the therapist used an initial FT 10-second schedule for escape, meaning that the student had a break from the instructional requests every 10 seconds of the session. The initial 10-second FT schedule was thinned each time the boy achieved a criterion for two consecutive sessions: 10 seconds to 20 seconds, to 30 seconds, to 1 minute, to 1.5 minutes, and finally to a terminal criterion of 2 minutes. The NCR escape procedure increased compliance and decreased problem behaviors.

NCR with Automatic Reinforcement

Lindberg, Iwata, Roscoe, Worsdell, and Hanley (2003) used NCR as a treatment to decrease the self-injurious behavior (SIB) of two women with profound mental

retardation. A functional analysis documented that automatic reinforcement maintained their SIB. The NCR procedure provided Julie and Laura with free access to a variety of home-based, highly preferred leisure items (e.g., beads, string) that they could manipulate throughout the day. Figure 23.2 shows that NCR object manipulation of preferred leisure items effectively diminished SIB, and the effects were maintained up to a year later. This experiment is important because it showed that NCR object manipulation could compete with automatic reinforcement to reduce the occurrence of SIB.

Using NCR Effectively

Enhancing Effectiveness

The following procedural recommendations identify three key elements for enhancing the effectiveness of NCR. (a) The amount and quality of stimuli with known reinforcing properties influence the effectiveness of NCR. (b) Most treatments include extinction with NCR interventions. (c) Reinforcer preferences can change during intervention. That is, the NCR stimuli may not continue competing with the reinforcers that maintain the problem behavior. DeLeon, Anders, Rodriguez-Catter, and Neider (2000) recommended periodically using a variety of available stimuli with the NCR intervention to reduce problems of changing preferences.

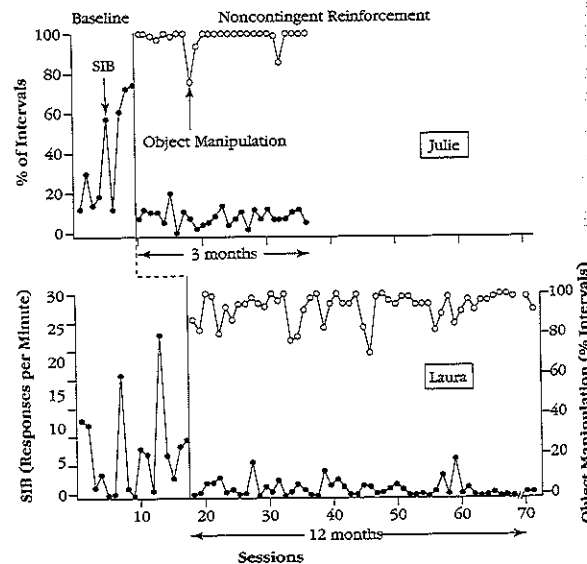


Figure 23.2 Levels of SIB and object manipulation exhibited by Julie and Laura during observations at home while NCR was implemented daily.

From "Treatment Efficacy of Noncontingent Reinforcement during Brief and Extended Application" by J. S. Lindberg, B. A. Iwata, E. M. Roscoe, A. S. Worsdell, & G. P. Hanley, 2003, *Journal of Applied Behavior Analysis*, 36, p. 14. Copyright 2003 by the Society for Experimental Analysis of Behavior. Reproduced by permission.

Functional Behavior Assessment

The effectiveness of using NCR is dependent on the correct identification of the positive, negative, or automatic reinforcers maintaining the problem behavior. Advances in functional behavior assessments have greatly improved the effectiveness of NCR by facilitating the identification of maintaining contingences of reinforcement (Iwata et al., 1982/1994).³

Emphasizing NCR

Applied behavior analysts can enhance the effectiveness of an NCR intervention by presenting a greater amount of stimuli with known reinforcing properties than the rate of reinforcement in the non-NCR condition. For example, Ringdahl, Vollmer, Borrero, and Connell (2001) found that NCR was ineffective when the baseline condition and the NCR condition contained a similar amount of reinforcer delivery. NCR was effective, however, when the NCR schedule was denser (i.e., continuous reinforcement) than the baseline schedule. Applied behavior analysts can use the rates of reinforcement during baseline to establish an initial NCR schedule to ensure a discrepancy between baseline and NCR conditions.

Ringdahl and colleagues (2001) suggested three procedures for emphasizing reinforcement during the NCR intervention: (a) Increase the delivery of stimuli with known reinforcing properties, (b) use an obviously different schedule of reinforcement at treatment onset (e.g., continuous reinforcement), and (c) combine differential reinforcement of other behavior (DRO) with the NCR treatment package. DRO will decrease the adventitious reinforcement of the problem behavior from the time-based NCR schedule.

Time-Based NCR Schedules

Most applications of NCR use a **fixed-time schedule (FT)** for the delivery of stimuli with known reinforcing properties. The interval of time for the presentation of these stimuli remains the same from delivery to delivery. When applied behavior analysts program the NCR time interval to vary from delivery to delivery, it is called a **variable-time schedule (VT)**. For example, an NCR VT schedule of 10 seconds means that, on the average, stimuli with known reinforcing properties are presented every 10 seconds. This VT schedule could use time intervals

such as 5, 7, 10, 12 and 15 seconds, arranged to occur in random sequence. Even though most applications of the NCR procedures have used FT schedules, VT schedules can be effective also (Carr, Kellum, & Chong, 2001).

Setting the initial NCR time schedule is an important aspect of the NCR procedure. The initial schedule can have an impact on the effectiveness of the intervention (Kahng, Iwata, DeLeon, & Wallace, 2000). Applied behavior analysts consistently recommend an initial dense FT or VT schedule (e.g., Van Camp, Lerman, Kelley, Contrucci, & Vorndran, 2000). The therapist can set a dense time value (e.g., 4 seconds) arbitrarily. Usually, however, it is more effective to set the initial time value based on the number of occurrences of the problem behavior, which will ensure frequent contact with the NCR stimuli.

The following procedure can be used to determine an initial NCR schedule: Divide the total duration of all baseline sessions by the total number of occurrences of the problem behavior recorded during baseline, and set the initial interval at or slightly below the quotient. For example, if the participant emitted 300 aggressive acts during 5 days of the baseline, and each baseline session was 10 minutes in duration, then 3,000 seconds divided by 300 responses produces a quotient of 10 seconds. Accordingly, these baseline data suggest an initial FT interval of 7 to 10 seconds.

Thinning Time-Based Schedules

Applied behavior analysts use a dense FT or VT schedule to begin the NCR procedure. They thin the schedule by adding small time increments to the NCR interval. However, thinning a time-based schedule is best begun only after the initial NCR interval has produced a reduction in the problem behavior.

Applied behavior analysts have used three procedures to thin NCR schedules: (a) constant time increase, (b) proportional time increase, and (c) session-to-session time increase or decrease (Hanley, Iwata, & Thompson, 2001; Van Camp et al., 2000).

Constant Time Increase. A therapist can increase the FT or VT schedule intervals by using a constant duration of time, and decrease the amount of time that the learner has access to the NCR stimuli by a constant amount of time. For example, a therapist can increase the schedule interval by 7 seconds at each opportunity, and each time decrease access to the stimuli by 3 seconds.

Proportional Time Increase. A therapist can increase the FT or VT schedule intervals proportionately,

³Chapter 24 provides a detailed description of functional behavior assessment.

meaning that each time, the schedule interval is increased by the same proportion of time. For example, each time interval is increased by 5% (e.g., 60 seconds = initial FT schedule; first schedule increase = 90 seconds [5% of 60 = 30]; second increase = 135 seconds [5% of 90 = 45]).

Session-to-Session Time Increase or Decrease. A therapist can use the learner's performance to change the schedule interval on a session-to-session basis. For example, at the end of a session, the therapist establishes a new NCR time interval for the next session by dividing the number of problem behaviors that occurred in that session by the duration of the session and using that quotient as the next session's FT interval.

A therapist will decrease the interval if the problem behavior starts to worsen during schedule thinning. The duration of the NCR interval can be increased again after control of the problem behavior has been reestablished, but in more gradual increments.

Setting Terminal Criteria

Applied behavior analysts usually select an arbitrary terminal criterion for NCR schedule thinning. Kahng and colleagues (2000) reported that the terminal criterion of a 5-minute FT schedule has been used commonly in applied research, and that it seems to be a practical and effective criterion. In addition, they reported that research has not established an advantage for a terminal criterion of a 5-minute FT schedule over denser schedules (e.g., 3 minutes) or thinner schedules (e.g., 10 minutes).

Considerations for Using NCR

NCR makes an effective intervention. It has advantages in addition to effectiveness, and some disadvantages. Table 23.3 lists the advantages and disadvantages of using NCR.

Table 23.3 Possible Advantages and Disadvantages of NCR

Advantages
NCR is easier to apply than other positive reductive techniques, which require monitoring student behavior for the contingent delivery of the reinforcer (Kahng, Iwata, DeLeon, & Wallace, 2000).
NCR helps create a positive learning environment, which is always desirable during treatment.
A package treatment that includes NCR with extinction may reduce extinction-induced response bursts (Van Camp et al., 2000).
Chance pairings of appropriate behavior and NCR delivery of stimuli with known reinforcing properties could strengthen and maintain those desirable behaviors (Roscoe, Iwata, & Goh, 1998).
Disadvantages
Free access to NCR stimuli may reduce motivation to engage in adaptive behavior.
Chance pairings of problem behavior and NCR delivery of stimuli with known reinforcing properties could strengthen the problem behavior (Van Camp et al., 2000).
NCR escape (i.e., negative reinforcement) can disrupt the instructional process.

High-Probability Request Sequence

When using a **high-probability (high-p) request sequence**, the teacher presents a series of easy-to-follow requests for which the participant has a history of compliance (i.e., high-p requests); when the learner complies with several such high-p requests in sequence, the teacher immediately gives the target request (i.e., low-p). The behavioral effects of the high-probability request sequence suggests the abative effects of an abolishing operation (AO) by (a) reducing the value of reinforcement for non-compliance to the low-probability requests (i.e., reducing the value of escape from requests), and (b) reducing the aggression and self-injury often associated with low-p requests.

To apply the high-p request sequence, the teacher or therapist selects two to five short tasks with which the learner has a history of compliance. These short tasks provide the responses for the high-p requests. The teacher or therapist presents the high-p request sequence immediately before requesting the target task, the low-p request. Sprague and Horner (1990) used the following dressing anecdote to explain the high-p procedure:

Typical Instruction

Teacher: "Put on the shirt." (low-p request)

Student: Avoids the hard task by throwing a tantrum

Typical Instruction with High-p Request Sequence

Teacher: "Give me five." (high-p request)

Student: Slaps teacher's outstretched hand

Teacher: "All right, nice job! Now, take this ball and put it in your pocket." (high-p request)

Student: Puts the ball in pocket

Teacher: "Great! That is right! Now, put on the shirt." (low-p request)

Student: Puts on shirt with assistance

Student compliance provides opportunities for the development of many important behaviors. Noncompliance, however, is a prevalent problem with persons with developmental disabilities and behavior disorders. The high-p request sequence provides a nonaversive procedure for improving compliance by diminishing escape-maintained problem behaviors. The high-p request sequence may decrease excessive slowness in responding to requests and in the time used for completing tasks (Mace et al., 1988).

Engelmann and Colvin (1983) provided one of the first formal descriptions of the high-p request sequence in their compliance training procedure for managing severe behavior problems. They used the term *hard task* to identify the procedure of giving three to five easy requests immediately before requesting compliance with a difficult task. Applied behavior analysts have used several labels to identify this intervention, including *interspersed requests* (Horner, Day, Sprague, O'Brien,

& Heathfield, 1991), *pretask requests* (Singer, Singer, & Horner, 1987), and **behavioral momentum** (Mace, & Belfiore, 1990). Currently, most applied behavior analysts identify this antecedent intervention with the label *high-p request sequence*.

Killu, Sainato, Davis, Ospelt, and Paul (1998) evaluated the effects of the high-p request sequence on compliant responding to low-p requests and occurrences of problem behaviors by three preschool children with developmental delays. They used a compliance criterion of 80% or higher for selecting high-p requests for two children, and a 60% criterion for the third child. Compliance of less than 40% was used to select the low-p requests.

The request sequence began with the experimenter or a trainer presenting three to five high-p requests. When a child complied to at least three consecutive high-p requests, a low-p request was immediately presented. Praise was provided immediately following each compliant response. Figure 23.3 shows the children's performances before, during, and after the high-p sequence. The sequence delivered by two different trainers increased compliant responding to the low-p requests of the three

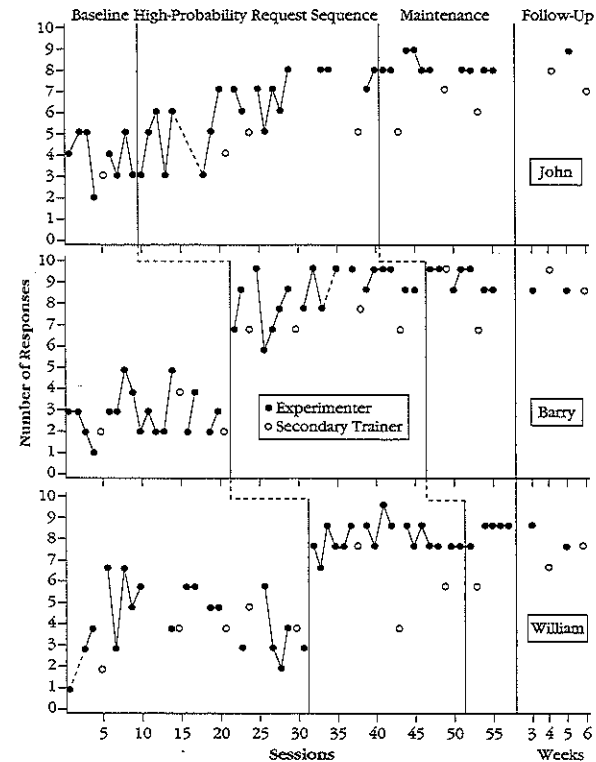


Figure 23.3 Number of compliant responses to low-probability requests delivered by the investigator and second trainer across sessions and conditions. Participants were given 10 low-p requests each session. Dashed lines indicate student absences.

From "Effects of High-Probability Request Sequences on Preschoolers' Compliance and Disruptive Behavior" by K. Killu, D. M. Sainato, C. A. Davis, H. Ospelt, & J. N. Paul, 1998, *Journal of Behavioral Education*, 8, p. 358. Used by permission.

children. Compliant responding maintained across time and settings.

Using the High-*p* Request Sequence Effectively

Selecting from Current Repertoire

The tasks selected for the high-*p* request sequence should be in the learner's current repertoire, occur with regularity of compliance, and have a very short duration of occurrence. Ardoin, Martens, and Wolfe (1999) selected high-*p* requests by (a) creating a list of requests that corresponded to student compliance, (b) presenting each request on the list for five separate sessions, and (c) selecting as high-*p* requests only those tasks that the student complied with 100% of the time.

Mace (1996) reported that the effectiveness of the high-*p* sequence increases, apparently, as the number of high-*p* requests increases. A high-*p* request sequence with five requests may be more effective than a sequence with two requests; but the increase in effectiveness may have a trade-off in efficiency. For example, if the same, or nearly the same, effectiveness can be obtained with two or three high-*p* requests as can be obtained with five or six, a teacher might select the shorter sequence because it is more efficient. When participants consistently comply with the low-*p* requests, the trainer should gradually reduce the number of high-*p* requests.

Presenting Requests Rapidly

The high-*p* requests should be presented in rapid succession, with short interrequest intervals. The first low-*p* request should immediately follow the reinforcer for high-*p* compliance (Davis & Reichle, 1996).

Acknowledging Compliance

The learner's compliance should be acknowledged immediately. Notice how the teacher in the previous dressing example acknowledged and praised the student's

compliance before presenting the next request ("All right, nice job!").

Using Potent Reinforcers

Individuals may emit aggression and self-injurious behaviors to escape from the demands of the low-*p* requests. Mace and Belfiore (1990) cautioned that social praise may not increase compliance if motivation for escape behavior is high. Therefore, high-quality positive stimuli immediately following compliance will increase the effectiveness of the high-*p* intervention (Mace, 1996). Figure 23.4 lists considerations for the application of the high-*p* request sequence.

Functional Communication Training

Functional communication training (FCT) establishes an appropriate communicative behavior to compete with problem behaviors evoked by an establishing operation (EO). Rather than changing EOs, functional communication training develops alternative behaviors that are sensitive to the EOs. This is in contrast to the noncontingent reinforcement and high-probability request sequence interventions that alter the effects of EOs.

Functional communication training is an application of differential reinforcement of alternative behavior (DRA) because the intervention develops an alternative communicative response as an antecedent to diminish the problem behavior (Fisher, Kuhn, & Thompson, 1998). The alternative communicative response produces the reinforcer that has maintained the problem behavior, making the communicative response functionally equivalent to the problem behavior (Durand & Carr, 1992). The alternative communicative responses can take many forms, such as vocalizations, signs, communication boards, word or picture cards, vocal output systems, or gestures (Brown et al., 2000; Shirley, Iwata, Kahng, Mazaleski, & Lerman, 1997).

Figure 23.4 Considerations for using the high-*p* request sequence.

1. Do not use the high-*p* request sequence just after an occurrence of the problem behavior. The student might learn that responding to a low-*p* request with the problem behavior will produce a series of easier requests.
2. Present the high-*p* request sequence at the beginning and throughout the instructional period to reduce the possibility of problem behaviors producing reinforcement (Horner et al., 1991).
3. Teachers might knowingly or unknowingly let instruction drift from low-*p* requests to only high-*p* requests, and select easy tasks to avoid student escape-motivated behavior, a possible outcome from escape-motivated aggression and self-injury associated with low-*p* requests (Horner et al., 1991).

Carr and Durand (1985) defined functional communication training as a two-step process: (a) completing a functional behavior assessment to identify the stimuli with known reinforcing properties that maintain the problem behavior, and (b) using those stimuli as reinforcers to develop an alternative behavior to replace the problem behavior. FCT provides an effective treatment for many problem behaviors maintained by social attention.

FCT-based interventions typically involve several behavior change tactics in addition to teaching the alternative communicative response. For example, applied behavior analysts often use a combination of response prompting, time-out, physical restraint, response blocking, redirection, and extinction with the problem behavior.

Durand (1999) used FCT in school and community settings to reduce the problem behaviors of five students with severe disabilities. Durand first completed functional behavior assessments to identify the objects and activities maintaining the problem behaviors. Following the functional assessments, the students learned to use a communication device that produced digitized speech with which they could request the objects and activities identified during the functional behavior assessments. The five students reduced the occurrences of their problem behaviors in a school and in a community setting in which they used digitized speech to communicate with persons in the community. Figure 23.5 presents data on the percentage of intervals of problem behaviors occurring in community settings for each student. These data are socially significant because they show the importance of teaching skills that recruit reinforcement in natural settings, thereby promoting generalization and maintenance of intervention effects.

Effective Use of FCT

Dense Schedule of Reinforcement

The alternative communicative response should produce the reinforcers that maintain the problem behavior on a continuous schedule of reinforcement during the early stages of communication training.

Decreased Use of Verbal Prompts

While teaching the alternative communicative response, verbal prompts such as *look* or *watch me*, are used often. After the communicative response is established firmly, the trainer should gradually reduce the verbal prompts and if possible eliminate them altogether to remove any prompt dependence associated with the intervention (Miltenberger, Fuqua, & Woods, 1998).

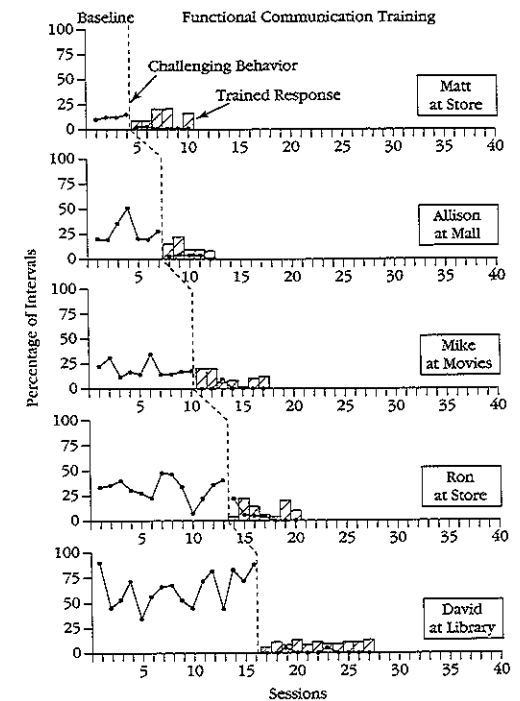


Figure 23.5 Percentage of intervals of challenging behavior by each of the five participants in baseline and FCT in community settings. The hatched bars show the percentage of intervals of unprompted communication by each student.

From "Functional Communication Training Using Assistive Devices: Recruiting Natural Communities of Reinforcement" by V. M. Durand, 1999, *Journal of Applied Behavior Analysis*, 32, p. 260. Copyright 1999 by the Society for Experimental Analysis of Behavior. Reproduced by permission.

Behavior Reduction Procedures

The effectiveness of FCT is likely to be enhanced if the treatment package includes extinction for the problem behavior and other behavior-reduction procedures such as time-out (Shirley et al., 1997).

Schedule Thinning

Thinning the reinforcement schedule for a firmly established communicative response is an important part of the FCT treatment package. The time-based procedures described earlier for thinning NCR schedules—constant time increase, proportional time increase, and session-to-session time increase or decrease—are not appropriate for schedule thinning with the alternative communicative response. They are incompatible with the methods

used to differentially reinforce the alternative communicative behavior because the FCT intervention does not alter the EO that evokes the problem behavior. The alternative communicative behavior must remain sensitive to the evocative function of the EO to compete with the problem behavior. For example, consider a child with developmental disabilities who has a history of engaging in self-stimulatory behavior when presented with difficult tasks. A therapist teaches the child to ask for assistance with the difficult tasks (i.e., the alternative communicative behavior), which reduces the self-stimulatory behavior. After firmly establishing *asking for assistance*, therapists and caregivers would not want to decrease giving assistance with the tasks when asked (thinning the reinforcement schedule). A decrease in giving assistance has the potential to produce the recovery of the self-stimulatory behavior by breaking the alternative communicative behavior-reinforcer contingency.

Hanley and colleagues (2001) recommended a procedure for schedule thinning that used a dense fixed-interval schedule of reinforcement (e.g., FI 2 seconds, FI 3 seconds) during the initial teaching of the alternative communication response. Once the communicative response was established, they suggested gradually thinning the FI schedule. This procedure, in contrast to time-based procedures, maintained the contingency between responding and reinforcement. They cautioned that thinning the FI schedule during FCT interventions could produce undesirable high rates of the alternative communicative response that could disrupt the home or classroom settings. Hanley and colleagues further suggested the use of picture cues and external "clocks" to announce when reinforcement is available as a possible way to control the undesirably high rate of the communicative response. Table 23.4 summarizes the advantages and disadvantages of using FCT.

Table 23.4 Possible Advantages and Disadvantages of Functional Communication Training

Advantages

Excellent chance for generalization and maintenance of the alternative communicative response because the communicative response often functions to recruit reinforcement from significant others (Fisher et al., 1998).

May have high social validity. Participants report preferences for FCT over other procedures to diminish behavior (Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997).

When the alternative communicative behavior and the problem behavior have the same schedule of reinforcement (e.g., FR 1), an FCT intervention may be effective without using extinction (Worsdell, Iwata, Hanley, Thompson, & Kahng, 2000).

Disadvantages

The FCT treatment package usually includes extinction. May produce undesirable effects (see the discussion of extinction effects in Chapter 19).

The extinction procedure is very difficult to use consistently, allowing for intermittent reinforcement of problem behaviors.

Participants may emit inappropriately high rates of the alternative communicative response to recruit reinforcement (Fisher et al., 1998).

Recruitment of reinforcement can occur at inconvenient or impossible times for the caregiver (Fisher et al., 1998).

The fact that FCT leaves intact the environment that evoked the problem behavior, may limit its overall effectiveness (McGill, 1999).



Summary

Defining Antecedent Interventions

1. The term *antecedent* refers to the temporal relation of stimuli or events coming before an occurrence of behavior.
2. The convergence of research on motivating operations (MOs) and functional behavior assessments has allowed applied behavior analysts to conceptually align applied research on the effects of antecedent conditions other than stimulus control (e.g., S^Ds) to basic principles of behavior.
3. Functions of antecedent stimuli or events can be classified as contingency dependent (stimulus control) or contingency independent (MO).
4. Conceptually, this chapter uses the term *antecedent intervention* to identify behavior-change tactics based on contingency-independent antecedent stimuli.
5. Applied behavior analysts have used several antecedent interventions, singularly or in treatment packages, to decrease the effectiveness of reinforcers that maintain problem behaviors (i.e., abolishing operations).

Antecedent Intervention

6. Because of the temporary effects of MOs, antecedent interventions most often serve as one component of a multi-component treatment package (i.e., in which antecedent interventions are paired with extinction, differential reinforcement, or other procedures).

Noncontingent Reinforcement

7. Noncontingent reinforcement (NCR) consists of presenting of stimuli with known reinforcing properties on a fixed-time (FT) or variable-time (VT) schedule independent of the participant's behavior.
8. NCR uses three distinct procedures that identify and deliver stimuli with known reinforcing properties: (a) positive reinforcement (i.e., social mediation), (b) negative reinforcement (i.e., escape), and (c) automatic reinforcement (i.e., without social mediation).
9. An NCR-enriched environment may function as an abolishing operation (AO), reducing the motivation to engage in the problem behavior.

High-Probability Request Sequence

10. The behavioral effects of the high-probability (high-*p*) request sequence suggests the abative effects of an AO by (a) reducing the potency of reinforcement for noncompliance to the low-probability requests (i.e., reducing the value of escape from requests), and (b) reducing the aggression and self-injury often associated with low-*p* requests.

11. To apply the high-*p* request sequence, the teacher or therapist selects two to five short tasks with which the learner has a history of compliance. These short tasks provide the responses for the high-*p* requests. The teacher or therapist presents the high-*p* request sequence immediately before requesting the target task, the low-*p* request.
12. Applied behavior analysts have used several labels to identify this intervention, including *interspersed requests*, *pre-task requests*, and *behavioral momentum*.

Functional Communication Training

13. Functional communication training (FCT) is a form of differential reinforcement of alternative behavior (DRA) because the intervention develops an alternative communicative response as an antecedent to diminish the problem behavior.
14. Functional communication training is an antecedent intervention package for establishing an appropriate communicative behavior to compete with problem behaviors evoked by an establishing operation (EO). Rather than altering the value of EOs as does NCR and the high-*p* request sequence, functional communication training develops alternative behaviors that are sensitive to the EOs that maintain the problem behavior.
15. The alternative communicative response produces the reinforcer that has maintained the problem behavior, making the communicative response functionally equivalent to the problem behavior.