Behav Analysis Practice (2014) 7:117–125
DOI 10.1007/s40617-014-0014-3

DISCUSSION AND REVIEW PAPER

Advance Notice for Transition-Related Problem Behavior: Practice Guidelines

Adam T. Brewer · Kathleen Strickland-Cohen · Wesley Dotson · D. Courtney Williams

Published online: 19 August 2014

Abstract Transitions between daily activities can occasion or elicit problem behavior in individuals with intellectual and developmental disabilities (IDD). Providing advance notice to signal an upcoming transition is a common practice in early and special education settings (e.g., Riffel 2010; Sandall et al. 2005). While the literature contains many demonstrations of the efficacy of various advance notice procedures, other studies have shown negative results. Practitioners are faced with the challenge of deciding whether advance notice is a viable treatment option for transition-related problem behavior in light of these contradictory findings. To assist the practitioner in this decision-making process, we provide a brief review of the advance notice literature, concentrating on the studies reporting that advance notice is ineffective at reducing transition-related problems. The goal is to provide practitioners with a better understanding of the environmental conditions under which advance notice is likely to be ineffective at decreasing problem behavior as well as the conditions under which it *can* be effective at reducing transition-related problem behavior. Discriminating these conditions may yield a useful set of practice guidelines for deciding when advance notice is a viable treatment option for decreasing transition-related problem behavior.

Keywords Advance notice · Vocal notification · Transition-related problem behavior · Self-injury · Tantrums · Noncompliance · Autism · Intellectual and developmental disabilities · Preschoolers · Translational research · Unpredictable transitions · Rich-lean transitions · Negative incentive shifts

A. T. Brewer (✉) · K. Strickland-Cohen · W. Dotson
Burkhart Center for Autism Education and Research, Texas Tech University, 2908 18th St., Lubbock, TX 79409, USA
e-mail: adam.brewer@ttu.edu

D. C. Williams
Institute for Lifespan Studies, University of Kansas, Lawrence, USA

Transitions between activities can account for a significant proportion of teaching time in school settings (see Sainato et al. (1987) and are a ubiquitous feature of normal, everyday life. Activity transitions involve stopping the current activity and engaging in a new activity. Orderly and timely transitions are important to maintain a successful educational setting, and the ability to move from activity to activity is a major factor for independent living for persons with intellectual and developmental disabilities (IDD) such as autism.

Transitions can be a major source of problem behavior (e.g., self-injury, tantrums) in individuals with IDD (Schmit et al. 2000) and typically developing children (e.g., Riffel 2010). Severe problem behaviors such as self-injurious behaviors (SIB) and aggression can pose serious harm to both the individual exhibiting problem behavior and others in the environment, and may lead to restriction of the individual's social and educational opportunities. In classroom settings, problem behaviors can increase the amount of time spent transitioning between activities. Self-injury and stereotypy can also be distracting to peers (Conroy et al. 2005), and noncompliance can severely disrupt the classroom. Time spent by teaching staff trying to cope with the problem behavior of one child or a small number of children during transitions within the classroom consumes valuable instructional time for all students. Furthermore, high rates of problem behavior have been associated with reduced willingness of teachers to tolerate students with IDD in typical educational settings (Dunlap and Carr, 2007).

To create effective learning environments, it is imperative that practitioners be able to identify highly effective strategies supported by research for reducing transition-related problem behaviors. Within an evidence-based practice model,

practitioners are asked to base decisions regarding which practices to select on the best evidence available (Kratochwill et al. 2013). However, there is often a significant gap between those practices most widely used and described as "effective" in applied settings and those that have been systematically researched (Burns and Ysseldyke 2009). This issue can be further complicated when the literature contains discrepant findings related to a specific practice. Advance notice is one strategy that is often used to promote problem-free transitions in a variety of applied settings. Although there have been a number of studies supporting the use of advance notice, recent researchers have presented conflicting evidence. The purpose of this article is to review these discrepant findings with the goal of understanding the potential reasons for the contradictory results.

Advance Notice

Advance notice refers to any procedure used to signal when the current activity will end and what the next activity will be. Advance notice can take a variety of forms. A primary recommendation for practice is that the form of advance notice should be tailored to fit the behavioral repertoire of the individual for whom it is being implemented (e.g., Banda et al. 2009; Flannery et al. 1995). For typically developing preschool and elementary-aged students, vocal statements, other auditory and visual cues (e.g., bells, flashing lights), and timing devices are commonly used to signal upcoming transitions in educational settings (Riffel 2010; Sandall et al. 2005). Activity schedules are a popular form of advance notice for individuals with autism (e.g., Banda and Grimmett 2008; Flannery et al. 1995).

Activity schedules provide individuals with information on the timing of the termination of the current activity and the nature of the next activity, with such information usually involving visual depictions. They have two primary functions. One is to promote independent transitions between activities throughout the day. The second is to provide a predictable structure to the environment to reduce stress and anxiety from unpredictable transitions. One of the oldest and most-used classroom interventions for children with autism (the TEACCH model) is built on the assumption that providing structure and predictability to the student's day is a necessary part of all successful support programs (Mesibov and Shea 2010).

The rationale behind providing advance notice to increase the predictability of an upcoming transition (or reduce "uncertainty") can be traced back to Flannery and Horner's (1994) studies designed to evaluate the effects of advance notice on rates of problem behavior (e.g., property destruction and aggression toward others) for two teenagers with autism and intellectual disabilities in classroom and community settings. One participant was exposed to conditions with and without advance notice of an unfamiliar or a familiar activity. During baseline, problem behavior was more likely to occur when asked to interact with the unfamiliar task compared to the familiar task. Problem behavior reliably decreased when advance notice was provided in the form of a verbal description of the unfamiliar activity and modeling the steps involved to complete that activity. Another participant was exposed to a consistent schedule of activities during which no problem behavior occurred. However, problem behavior was more likely to occur when the schedule of activities was made unpredictable by presenting activities in a randomized order. Advance notice was then delivered in the form of a list containing information about the order and duration of upcoming activities. After the participant demonstrated accurate prediction of the upcoming activity, he experienced the randomized schedule and problem behavior was reliably reduced. These results support the efficacy of using advance notice to enhance predictability in the environment and produce concomitant reductions in transition-related problem behaviors. This study is often cited in support of the "uncertainty" reduction hypothesis.

Conceptually, unpredictability is an environmental variable that can render transitions aversive. As such, uncertainty provides a source of motivation (i.e., makes the stimuli associated with the transition aversive) for escaping the transition through noncompliance, stereotypy, self-injury, or aggression. If these responses are followed by the caregiver canceling or postponing the transition (i.e., remaining in the current activity), then a negative reinforcement contingency has been arranged. This contingency reinforces a response by removing the stimuli associated with transition, which can maintain problem behaviors. Advance notice may work because it removes the uncertainty of the timing and nature of the transition and renders the transition no longer aversive. This removes the motivation, or establishing operation, for escape.

The presentation of an aversive stimulus can have behavioral effects other than motivating escape and avoidance behaviors. Presentation of aversive stimuli can elicit emotional responses that may engender aggression and disrupt adaptive operant behaviors in animals (e.g., Pitts and Malagodi 1996) and humans (e.g., Iwata et al. 1982). People with IDD (including autism) and young children may engage in stereotypy, tantrums, and aggressive behaviors when exposed to aversive stimulation. This is an important issue when selecting a treatment approach because consequence-based manipulations such as extinction of negative reinforcement can reduce problem behaviors maintained by escape and avoidance but do not reduce the aversive properties of the environment. Thus, the individual is left in an aversive environment with no functional response. Advance notice procedures are designed to remove the aversive properties of the transition.

It is important to note that empirical research testing the "uncertainty" hypothesis in applied settings is limited. Basic research can help to provide a better understanding of the aversive nature of unpredictable consequences. For example, basic research with animals has shown that aversive events (electric shocks) may be less aversive when they are preceded by a signal, as animals will choose a larger, signaled shock over a smaller, unsignaled shock (for a review see, Badia et al. 1979). Advance notice may render aversive transitions less aversive and reduce problem behaviors via this behavioral process.

Although advance notice procedures are widely considered to be effective (e.g., Banda and Grimmett 2008; Lequia et al. 2012; Koyama and Wang 2011; Sterling-Turner and Jordan 2007), discrepant findings regarding the effectiveness of advance notice have been reported (Cote et al. 2005; McCord et al. 2001; Wilder et al. 2006; Waters et al. 2009; Wilder et al. 2010; Wilder et al. 2007). Some researchers have speculated that these negative results indicate that advance notice procedures are ineffective (Wilder et al. 2010). We propose that a closer examination of the controlling variables of transition-related problem behavior may yield insights into when advance notice is recommended as a treatment option. To provide a context for the contradictory findings, we will begin by touching upon oft-cited studies reporting that advance notice is effective at reducing transition-related problem behavior.

Positive Findings

Schmit et al. (2000) evaluated the effects of advance notice in the form of visual schedules on tantrums (i.e., screaming, hitting, and falling to the ground) during activity transitions in a young child with autism within an early childhood special education classroom. In baseline, a verbal cue was provided to signal the end of an activity. However, this cue did not signal the nature of the upcoming activity in the form of "time to go to _____." If the participant failed to transition within 5 s, then the participant was physically escorted during the transition to the next activity. In the advance notice conditions, pictorial and verbal cues of the upcoming activity (e.g., a picture of inside the building and "time to come inside") were presented immediately prior to the transition to the next activity. Advance notice reduced tantrums during transitions between activities across both school and community settings. Similar results have been reported when providing visual cues alone, which are often referred to as visual activity schedules (e.g., Dettmer et al. 2000; Hume and Odom 2007).

Tustin (1995) assessed the effects of an advance notice treatment package on rates of stereotypy (e.g., body rocking and hand flapping) in an individual with autism and moderate intellectual disabilities in a workshop setting. During the no-advance-notice baseline conditions, the job supervisor requested the participant to immediately transition to a new activity, removed the current activity, and replaced it with the new activity. Praise was provided contingent on engagement with the new activity and no consequences were delivered for engaging in problem behavior. In the advance notice conditions, 2 min prior to a transition, the supervisor placed the materials for the new activity next to the current activity, asked if the participant would like to transition to new activity, and left the room. After 2 min, the supervisor returned to the room and delivered praise contingent on engagement with the new activity. Consistent with baseline, if the participant failed to transition to the new activity, then the supervisor removed the past activity and immediately presented the new activity; no consequences were arranged for stereotypy. Tustin's results demonstrated a functional relationship between the use of advance notice and decreased rates of stereotypy. He reported that the participant transitioned to the new activity without the supervisor removing the previous activity. These positive results can be reasonably attributed to the effects of Tustin's advance notice treatment package; similar positive results have been reported (Flannery and Horner 1994; O'Reilly et al. 2005). However, the effective component of Tustin's treatment package may have been the opportunity to choose when to transition rather than making predictable the timing of the upcoming transition and the content of the upcoming task. To develop a better understanding of the efficacy of specific advance notice methods, a component analysis (e.g., Ward-Horner and Sturmey 2010) of various forms of effective advance notice practices is needed.

Several reviews indicate that advance notice procedures are effective at reducing transition-related problem behavior (Banda and Grimmett 2008; Lequia et al. 2012; Koyama and Wang 2011; Sterling-Turner and Jordan 2007). Sterling-Turner and Jordan (2007) found that, for individuals with autism, photographic cues, activity schedules, and video priming strategies were all effective at reducing transition-related problem behavior. Banda and Grimmett (2008) conducted a systematic review of the autism literature and reported activity schedules were effective at reducing transition-related problem behavior; Koyama and Wang (2011) reported similar results with individuals with other intellectual disabilities. In a systematic and quantitative review of the autism literature on activity schedules, Lequia et al. (2012) found that, regardless of the participant characteristics, intervention setting, or form of the activity schedule, advance notice was nearly always effective at reducing transition-related problem behavior. Thus, there is an established body of evidence that advance notice procedures are effective for reducing problem behavior at transitions.

Negative Findings

McCord et al. (2001) examined the effects of advance notice in the form of a vocal prompt on self-injury related to

transitions in two men with severe IDD in their home environment. Transitions were defined as a change from either (a) one activity to another, (b) between two locations, or (c) both. During a functional analysis (FA) of transition-related problem behavior, participants were exposed to several types of transitions. One type of transition consisted of transitioning from engaging in a neutral activity (e.g., sitting alone) to initiating either a highly- or less-preferred activity, with and without a change in physical location between activities. Another type of transition involved terminating a highly- or less-preferred activity and moving to a neutral activity, with and without location changes. Participants were also exposed to transitions from a neutral activity to a different physical location (without requiring an individual to engage in a specified upcoming activity). The duration of engagement with each activity was 2 min. If problem behavior occurred during the transition, then the participant was allowed to return to the previous activity. For one participant, problem behavior was maintained both by avoidance of a physical change in location and also the avoidance of certain task instructions. For the other participant, problem behavior was maintained only by avoidance of a physical change in location. These FA results and conditions served as a baseline. The authors then introduced several treatments. During treatment evaluation, advance notice was provided in the form of a vocal statement or question given 1 or 2 min prior to the transition (e.g., "Hayden, would you like to move to the kitchen soon?"). Advance notice did not decrease self-injury in these two individuals with profound IDD. Instead, other treatment procedures directed at consequences (e.g., differential reinforcement of alternative behavior, extinction, and blocking) were effective at reducing transition-related problem behavior.

Advance notice in the form of a vocal statement or question given 1 or 2 min prior to the transition failed to reduce transition-related problem behavior in studies using similar procedures to McCord et al. (2001) with other populations. Advance notice did not decrease tantrums in preschoolers (Wilder et al. 2006) nor did this procedure decrease noncompliance in children (Cote et al. 2005; Wilder et al. 2010; Wilder et al. 2007).

Using a different form of advance notice, Waters et al. (2009) assessed the effects of visual schedules on the problem behaviors of two children with autism in a classroom setting. The authors used a similar FA methodology as McCord et al. (2001) for assessing transition-related problem behavior. The FA revealed that problem behavior was maintained by avoidance of a nonpreferred activity and access to a preferred activity. In order to discover a treatment that could address both functions of problem behavior (e.g., positive and negative reinforcement), participants were initially exposed to three of the same transition from a preferred to nonpreferred activity during baseline. A vocal prompt was delivered at the start of each transition (e.g., "Music is finished; it's time to work."). If problem behavior occurred during the transition, the therapist terminated the transition and provided access to the previously preferred activity. During treatment evaluation, advance notice was delivered in the form of a visual schedule that contained pictures of the current and upcoming activities. Between the end of the completed activity and before the start of the upcoming activity, the therapist physically prompted the participant to engage in a routine of removing the picture of the completed activity and carrying the picture to the location of the new activity. Advance notice failed to decrease transition-related problem behavior for both participants. Problem behavior was reduced, however, when extinction and differential reinforcement of other behaviors was implemented.

Understanding the Discrepant Findings

The key to understanding the discrepant findings related to the effectiveness of advance notice as a treatment for transition-related problem behavior may be found in the difference in the controlling variables for transition-related problem behavior across the different studies. The studies reporting positive results of advance notice shared some common features. These studies used multiple tasks or arranged tasks in such a way that the participant could not accurately predict the timing of the upcoming transition and/or the content of the upcoming task. Another important shared feature of the studies reporting positive results was that if problem behavior occurred, the participants were not allowed to terminate the current activity and return to the previous one (i.e., problem behavior was never reinforced). In addition, advance notice was delivered in a format that they could understand. For example, advance notice in the form of a list of the day's upcoming activities could be understood by a higher-functioning adult with autism but would not be comprehensible to a nonverbal individual who could not read. Thus, advance notice tends to be effective when aspects of the transition that are unpredictable control problem behavior, when engaging in problem behavior during the transition does not result in access to the pre-transition activity or postpone the transition, and when the form of advance notice is tailored to the individual's needs.

While the studies reporting negative findings may be interpreted as demonstrating that advance notice is ineffective (Wilder et al. 2010), it may be more appropriate to interpret them as demonstrating some of the environmental conditions under which advance notice procedures will not be effective. Further, these studies provide potential practical alternative procedures (e.g., differential reinforcement, extinction) to use when advance notice fails to reduce problem behaviors during transitions.

One of the major features of the studies reporting negative results is that problem behavior was controlled by variables

unrelated to unpredictable aspects of a transition. In all of these studies, transition-related problem behavior was controlled by the termination of a preferred activity or demands to initiate a nonpreferred activity (e.g., a specific task or physically moving from one location to another). In addition, these transitions may have already been predictable because the timing of the transition was consistent and participants were repeatedly exposed to the same activities in the same order (moving from task A to task B). Another important feature of these studies was that if participants engaged in problem behavior, they were allowed to terminate the current activity and return to the pre-transition activity (i.e., the challenging behaviors were reinforced in baseline and advance notice phases). Thus, the ineffectiveness of advance notice to reduce transition-related problem behavior is not surprising because (a) the aversive properties of the transition were not related to unpredictability and (b) advance notice could not compete with a reinforcement contingency for problem behavior. In cases where problem behavior is triggered by the termination of a preferred activity or the initiation of an aversive activity and maintained by positive or negative reinforcement, consequence-based treatments are recommended (see Geiger et al. 2010). Thus, the discrepant findings regarding the effectiveness of advance notice in the literature are likely a result of a difference in controlling variables for transition-related problem behavior across the two types of research and treatment designs.

Another potential set of controlling variables for transition-related problem behavior, related to a negative shift in the value of the pre- and post-transition activities, may also mediate the effects of advance notice as a treatment option. For instance, O'Reilly et al. (2005) found that advance notice in the form of activity schedules reduced problem behavior at several transitions (e.g., a no-interaction condition to play condition and from demand to no-interaction conditions), but advance notice did not reduce problem behavior at transitions from a play to a demand condition. These findings may be relatable to basic research findings if the play condition was a relatively highly preferred activity and the demand condition was a relatively less-preferred activity.

Basic research has indicated that an activity that is otherwise benign can be rendered aversive if the context of the past activity is relatively more favorable or more preferred than the upcoming activity. In the basic laboratory, food-deprived nonhuman animals responding for food (e.g., Perone and Courtney 1992) and people with IDD responding for money (Williams et al. 2011) transitioned unpredictably between reinforcement schedules ending in large and small reinforcers (akin to relatively rich and lean tasks). Responding maintained by small reinforcers was disrupted for long periods (pre-ratio pause) when subjects had just completed a rich schedule and were presented with the stimuli associated with the lean task (a rich-to-lean transition). It was demonstrated that the lean "task" was not the cause of this "noncompliance" because transitions from lean-to-lean did not produce long pauses. The rich-to-lean transition was shown to be aversive because animals will emit escape responses that place them in time-out in response to signaled transitions predominantly in the rich-to-lean transition compared to transitions from lean to rich conditions or between two rich and two lean conditions (Everly et al. 2014; Perone 2003). Individuals with IDD and histories of self-injury also were more likely to self-injure during rich-to-lean transitions in a laboratory setting (DeLeon et al. 2005). The increased pausing, escape, and self-injury during rich-lean transitions compared with lean-to-lean conditions demonstrates that the lean condition is otherwise benign until it is embedded within the context of a rich-to-lean transition, and this context may be a source of aversive stimulation for transition-related problem behavior. Importantly, this class of behaviors did not occur if the upcoming reinforcer magnitude was not signaled. That is, when the nature of the transition was unpredictable (the magnitude of the reinforcer after completing the task), disruptive and escape behaviors did not occur.

A possible translation of these basic findings to an applied setting is that making the upcoming unfavorable transition more discriminable via advance notice procedures may increase the likelihood of transition-related problem behavior or relocate the problem behavior to the time at which advance notice is delivered. Basic research (Baron et al. 1992) and ongoing research in our human laboratory suggest that imposing a neutral activity (a noncontingent time-out period) between a highly and less-preferred transition may reduce problem behavior at a highly preferred to less-preferred activity transition. Future translational and applied research is sorely needed to assess the prevalence of problem behavior at highly preferred to less-preferred activity transitions in applied settings and to examine the effectiveness of potential treatment strategies.

To reiterate, it is not a simple "yes" or "no" answer to whether advance notice is effective at reducing transition-related problem behavior. The important question to ask oneself when deciding whether or not to use advance notice as a treatment option is, "What are the controlling variables for problem behavior at transitions?" The studies reporting negative results for advance notice tell us that advance notice will not work when problem behavior is controlled by the termination of a preferred activity or the initiation of an unpreferred activity such as the avoidance of a physical change in location. Advance notice is *still* recommended if problem behavior is controlled by unpredictable features of the environment.

Practice Guidelines for Advance Notice as a Treatment Option for Transition-Related Problem Behavior

To support practitioners in the treatment selection process, Fig. 1 provides a flowchart for deciding what procedures

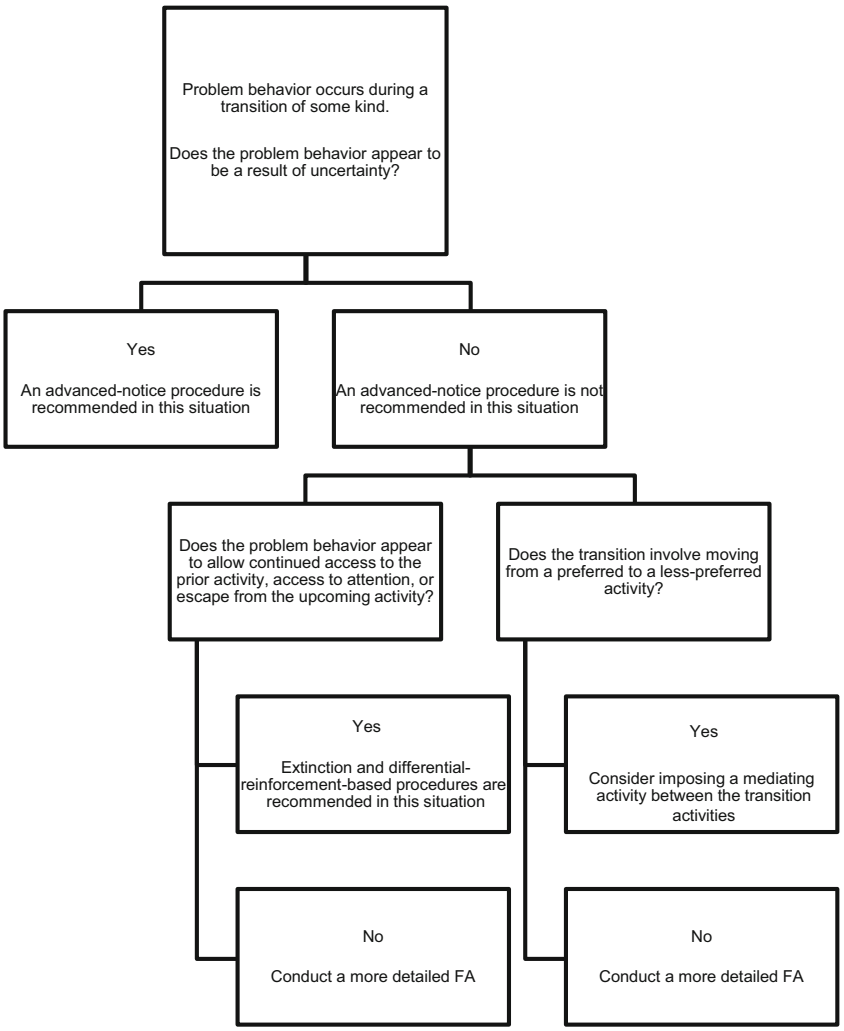

Fig. 1 A decision tree to determine the treatment most likely to be effective in treating transition-related problem behavior

are recommended as a treatment option for transition-related problem behavior. The flowchart begins with initial questions to determine which type of transition assessment to pursue (e.g., assessing predictability variables, termination of a preferred activity/initiation of an aversive activity, or a high-to-low-preference activity transition) followed by an appropriate treatment recommendation (e.g., advance notice, extinction, or noncontingent time-out). Table 1 provides examples of questions that can be asked about different environmental determinants of problem behavior that will help practitioners move through the decision-making process.

Table 1 Questions to ask while moving through the decision tree for determining a treatment

Questions to determine role of unpredictability on problem behavior	Questions to determine role of termination of a preferred activity or initiation of an unpreferred activity (with and without a location change) on problem behavior	Questions to determine role of rich-to-lean transitions on problem behavior
-Does the individual exhibit more problem behavior in situations in which there is no clear routine? -Does the individual exhibit problem behavior when things change or the environment is inconsistent? -Does the individual exhibit problem behavior when surprised or asked to do something unexpectedly?	-Does the individual engage in problem behavior when a preferred activity is removed or stopped? -Does the individual engage in problem behavior at the start of an unpreferred activity such as a location change?	-During which of the following types of transitions does the individual engage in problem behaviors? -Moving from a preferred to another preferred activity -Moving from a preferred to a less-preferred activity -Moving from a low-preferred to another low-preferred activity -Moving from a low-preferred to a preferred activity

When Advance Notice is Recommended as a Treatment Option for Transition-Related Problem Behavior The effectiveness of advance notice appears to depend on a particular set of controlling variables that render aspects of a transition unpredictable, such as uncertain timing of the transition and/or the nature of the upcoming task being unknown. Flannery et al. (1995) developed an assessment for transition difficulties related to unpredictability in school or community contexts with individuals with IDD. They suggest conducting a functional assessment of transition-related problem behavior (e.g., indirect assessment, direct observation, or controlled manipulations) to determine whether problem behavior at transitions is due to "unpredictability" variables. For instance, practitioners may begin by interviewing parents and caregivers about whether problem behavior is more likely to occur when there is a change in the sequence of activities, content, timing, or presentation of an unfamiliar item/activity/person (see Table 1 for a list of example questions). This information can guide direct observations or arranging a functional analysis of transition-related problem behavior. If transition-related problem behavior is reliably controlled by variables associated with unpredictability, then advance notice is recommended as a treatment option.

Flannery et al. (1995) further recommend that the type of advance notice selected should be tailored to the individual's needs and abilities. For instance, brief verbal advance notification may not be appropriate for individuals with severe IDD. Poor language skills in this population may be why visual activity schedules are more common in practice than the 2-min vocal warnings used in studies reviewed earlier. Beyond these initial considerations and prior to treatment implementation, practitioners should conduct an assessment to establish that the advance notice cue functions as a discriminative stimulus. Flannery and Horner's (1994) verification procedure (e.g., correct responses on a quiz about upcoming activities) may serve as a model for this purpose. It may be necessary to provide a history of differential reinforcement when the cue is presented and then test the effects of the cue to establish the cue as a discriminative stimulus (see, Hanley et al. 1999). For example, if a picture of a toilet is presented, establish that the individual will walk to the restroom. This can be done by typical prompt fading and reinforcing more and more independent correct responses. Establishing the advance notice cue as a discriminative stimulus in a priori fashion should increase the probability that advance notice reduces problem behavior. In cases where advance notice is ineffective, the teacher or therapist can reasonably rule out that treatment was simply ineffective because the participant could not "understand the information."

Depending on the level of expertise of the practitioner, one may begin to directly assess whether problem behavior is more likely to occur in the presence of unpredictable events such as change in sequence, content, novelty, or timing of the transition. We recommend consulting the previously discussed Flannery and Horner (1994) procedures on how to incorporate these predictability variables into a direct assessment of transition-related problem behavior. If conclusive results are obtained, then one may begin to attempt to increase the predictability of the transition by providing advance notice and analyze its subsequent effects on problem behavior. A long-term goal for individuals with transition difficulties maybe to disrupt inflexible routines that are initially beneficial for early learning environments. Future research should be aimed at systematically fading out advance notice supports in ways that promote tolerance for unpredictable events that are likely to be encountered in noncontrolled settings later in life.

As a reminder, advance notice is unlikely to work if engaging in problem behavior results in postponing the upcoming transition or returning to the pre-transition activity. As a best practice approach, it is recommended that teaching and habilitative environments be arranged in a way that maximizes predictability. This follows the recommendations of many "how-to" manuals in regard to building supportive environments for individuals with ASD (e.g., Mesibov and Shea 2010). It should be noted that these programs generally indicate how to manage challenging behavior if it occurs. The general adage is that challenging behaviors should not be reinforced by attention or allowing escape. If after such environmental engineering has been implemented and challenging behavior remains problematic, then traditional functional assessments and consideration of consequence-based treatments should be undertaken.

When Advance Notice is Not Recommended as a Treatment Option for Transition-Related Problem Behavior The studies reporting negative results for advance notice involved transitions that may have been entirely predictable and in which the problem behavior was being reinforced by allowing the client to escape or postpone the transition. If the controlling variables of transition-related problem behavior are not related to unpredictability, then advance notice is not recommended for a treatment option. In these cases, one should consider assessing other variables that can control transition-related problem behavior, such as the termination of a preferred activity or the initiation of an unpreferred activity such as a change in physical location. We recommend testing these variables by using the assessment model described by McCord et al. (2001) earlier in this paper. It is also important to point out an excellent observation made by Wilder et al. (2006). In some cases, problem behavior may simply be due to escaping an unpreferred task rather than making the transition when an individual exhibits problem in both the pre- and post-transition period. In all of these cases, recommended treatment options are extinction alone or in conjunction with differential reinforcement. Readers may also wish to

consult the decision-making model by Geiger et al. (2010) for treating escape-maintained behavior.

Another set of variables to consider that might be controlling problem behavior at transitions are those that involve a shift from a preferred to a less-preferred activity. While an assessment for those variables tailored for applied setting does not currently exist, there are ways the effects of such variables might be evaluated. For example, one could give an individual 2 min of exposure to the most-preferred and least-preferred activities identified through a preference assessment. Thereafter, individuals could be exposed to four types of transition: preferred-to-preferred, preferred-to-least preferred, least-preferred-to-least-preferred, and least-preferred-to-preferred. No differential consequences should be provided contingent upon problem behavior. Based on translational research, the expected outcome here is that problem behavior will be more likely to occur at the preferred-to-least-preferred transition compared to the other three transition types if variables related to a negative shift are controlling problem behavior.

A potential advantage of exposing individuals to the aforementioned four types of transitions is that it may also allow a practitioner to determine if problem behavior is due to some of the variables assessed in the McCord et al. (2001) paper. For instance, if problem behavior is more likely to occur at a preferred-to-preferred and preferred-to-least-preferred transitions (note that these transitions share the same pre-transition activity) than the other two types of transitions, the problem may be due the termination of a preferred activity or satiation. If problem behavior is more likely to occur at the least preferred-to-least-preferred and preferred-to-least-preferred transitions than the other transitions, then problem behavior may be due to the aversive features of an upcoming unpreferred activity. If problem behavior is due to change per se, then problem behavior may be likely to occur across all four transitions or during both a preferred-to-least-preferred and a least-preferred-to-preferred transition. Thus, exposing individuals to these four types of transitions may be an efficient way to detect transition-related problem behavior. In terms of potential treatments options, future research will need to explore which procedures best address problem behaviors occasioned/elicited by transitions from preferred to unpreferred activities. Basic research suggests that providing a neutral period between activities (e.g., a "sit-and-wait" and possibly incorporating a mid-preferred activity) could be effective.

Closing Remarks

The current paper extended prior reviews that found advance notice procedures effective in educational and experimental settings by reviewing studies reporting negative results. We also provided a possible account of the reasons for the discrepant findings—that advance notice procedures are only effective for treatment of problem behaviors maintained by uncertainty or unpredictability during the transition. Thus, the presence of variables rendering the transition uncertain in some way is a boundary condition for the likely effective use of advance notice. Advance notice will likely not be effective when the problem behavior is controlled by other variables such as the termination of a preferred activity, the initiation of unpreferred activity such as physical change in location, and, perhaps, transitions from highly preferred to less-preferred activities.

This knowledge of environmental conditions for which advance notice will and will not be effective yielded guidelines for practice. Deciding when to use advance notice and when not to use it should be based on the type of transition problem the individual is experiencing (the underlying behavioral process). If the problem is due to "uncertainty," we recommend using advance notice; however, if the transition is due to the context of the past favorable activity rendering an otherwise benign activity aversive or an unpreferred and aversive activity, then we do not recommend providing advance notice. Thus, it important to match treatment options for transition-related problem behavior to the type of transition difficulty.

Need-to-know points:

- Discrepant findings regarding the effectiveness of advance notice in reducing transition-related problem behavior may be attributed to differences in controlling variables of problem behavior between studies.
- Do not assume that all transition-related problem behavior is due to "uncertainty."
- Advance notice is recommended for transition difficulties at unpredictable transitions.
- Advance notice will not work if engaging in problem behavior allows the individual to escape or postpone the transition.
- Advance notice is not recommended for transition difficulties associated with termination of a preferred activity or initiation of an aversive activity associated with the transition.
- Advance notice may not be recommended for preferred to less-preferred activity transitions.

Acknowledgments This paper was written with support of National Institutes of Health grants R01HD044731, P01HD055456, and P30HD002528 to the University of Kansas.

References

Badia, P., Harsh, J., & Abbott, B. (1979). Choosing between predictable and unpredictable shock conditions: data and theory. *Psychological Bulletin, 86*, 1107–1131.

Banda, D., & Grimmett, E. (2008). Enhancing social and transition behaviors of persons with autism through activity schedules: a review. *Education and Training in Developmental Disabilities, 43*, 324–333.

Banda, D. R., Grimmett, E., & Hart, S. L. (2009). Activity schedules. *Teaching Exceptional Children, 41*, 16–21.

Baron, A., Mikorski, J., & Schlund, M. (1992). Reinforcement magnitude and pausing on progressive-ratio schedules. *Journal of the Experimental Analysis of Behavior, 58*, 377–388.

Burns, M. K., & Ysseldyke, J. E. (2009). Reported prevalence of evidence-based instructional practices in special education. *The Journal of Special Education, 43*(1), 3–11.

Conroy, M. A., Asmus, J. M., Sellers, J. A., & Ladwig, C. N. (2005). The use of an antecedent-based intervention to decrease stereotypic behavior in a general education classroom: a case study. *Focus on Autism and Other Developmental Disabilities, 20*(4), 223–230.

Cote, C. A., Thompson, R. H., & McKerchar, P. M. (2005). The effects of antecedent interventions and extinction on toddlers' compliance during transitions. *Journal of Applied Behavior Analysis, 38*, 235–238.

DeLeon, I. G., Williams, D., Gregory, M. K., & Hagopian, L. P. (2005). Unexamined potential effects of the noncontingent delivery of reinforcers. *European Journal of Behavior Analysis, 6*, 57–69.

Dettmer, S., Simpson, R. L., Myles, B. S., & Ganz, J. B. (2000). The use of visual supports to facilitate transitions of students with autism. *Focus on Autism and Other Developmental Disabilities, 3*, 163–169.

Dunlap, G., & Carr, E. (2007). Positive behavior support and developmental disabilities. In S. Odom, R. Horner, M. Snell, & J. Blacher (Eds.), *Handbook of developmental disabilities* (pp. 469–482). New York: Guilford.

Everly, J. B., Holtyn, A. F., & Perone, M. (2014). Behavioral functions of stimuli signaling transitions across rich and lean schedules of reinforcement. *Journal of the Experimental Analysis of Behavior, 101*, 201–214.

Flannery, K. B., & Horner, R. H. (1994). The relationship between predictability and problem behavior for students with severe disabilities. *Journal of Behavioral Education, 4*, 157–176.

Flannery, K. B., O'Neill, R. E., & Horner, R. H. (1995). Including predictability in functional assessment an individual program development. *Education and Treatment of Children, 18*, 499–509.

Geiger, K. B., Carr, J. E., & LeBlanc, L. A. (2010). Function-based treatments for escape-maintained problem behavior: a treatment-selection model for practicing behavior analysts. *Behavior Analysis in Practice, 3*, 22.

Hanley, G. P., Iwata, B. A., & Lindberg, J. S. (1999). Analysis of activity preferences as a function of differential consequences. *Journal of Applied Behavior Analysis, 32*, 419–435.

Hume, K., & Odom, S. (2007). Effects of an individual work system on the independent functioning of students with autism. *Journal of Autism and Developmental Disorders, 37*, 1166–1180.

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

Koyama, T., & Wang, H. T. (2011). Use of activity schedule to promote independent performance of individuals with autism and other intellectual disabilities: a review. *Research in Developmental Disabilities, 32*, 2235–2242.

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial & Special Education, 34*, 26–38.

Lequia, J., Machalicek, W., & Rispoli, M. J. (2012). Effects of activity schedules on challenging behavior exhibited in children with autism spectrum disorders: a systematic review. *Research in Autism Spectrum Disorders, 6*, 480–492.

McCord, B. E., Thomson, R. J., & Iwata, B. A. (2001). Functional analysis and treatment of self-injury associated with transitions. *Journal of Applied Behavior Analysis, 34*, 195–210.

Mesibov, G., & Shea, V. (2010). The TEACCH program in the era of evidence-based practice. *Journal of Autism and Developmental Disorders, 40*, 570–579.

O'Reilly, M., Sigafoos, J., Lancioni, G., Edrisinha, C., & Andrews, A. (2005). An examination of the effects of a classroom activity schedule on levels of self-injury and engagement for a child with severe autism. *Journal of Autism and Developmental Disorders, 35*, 305–311.

Perone, M. (2003). Negative effects of positive reinforcement. *The Behavior Analyst, 34*, 1–14.

Perone, M., & Courtney, K. (1992). Fixed-ratio pausing: joint effects of past reinforcer magnitude and stimuli correlated with upcoming magnitude. *Journal of the Experimental Analysis of Behavior, 57*, 33–46.

Pitts, R. C., & Malagodi, E. F. (1996). Effects of reinforcement amount of attack under a fixed-interval schedule in pigeons. *Journal of the Experimental Analysis of Behavior, 65*, 93–110.

Riffel, L. (2010). A resource book for the classroom. Retrieved from http://www.behaviordoctor.org/files/books/Coach%20Manuals/Oklahoma/PDFCoachThree/targetbehavior.pdf

Sainato, D. M., Strain, P. S., Lefebvre, D., & Rapp, N. (1987). Facilitating transition times with handicapped preschool children: a comparison between peer-mediated and antecedent prompt procedures. *Journal of Applied Behavior Analysis, 20*, 285–291.

Sandall, S. R., Hemmeter, M. L., Smith, M. J., & McLean, M. E. (2005). *DEC recommended practices: a comprehensive guide*. Longmont, CO: Sopris West.

Schmit, J., Alper, S., Raschke, D., & Ryndak, D. (2000). Effects of using a photographic cueing package during routine school transitions with a child who has autism. *Mental Retardation, 38*, 131–137.

Sterling-Turner, H., & Jordan, S. (2007). Interventions addressing transition difficulties for individuals with autism. *Psychology in the Schools, 44*, 681–690.

Tustin, R. D. (1995). The effects of advance notice of activity transitions on stereotypic behavior. *Journal of Applied Behavior Analysis, 28*, 91–92.

Ward-Horner, J., & Sturmey, P. (2010). Component analysis using single-subject experimental designs: a review. *Journal of Applied Behavior Analysis, 43*, 685–704.

Waters, M. B., Lerman, D. C., & Hovanetz, A. N. (2009). Separate and combined effects of visual schedules and extinction plus differential reinforcement on problem behavior occasioned by transitions. *Journal of Applied Behavior Analysis, 42*, 309–313.

Wilder, D., Chen, L., Atwell, J., Pritchard, J., & Weinstein, P. (2006). Brief functional analysis and treatment of tantrums associated with transitions in preschool children. *Journal of Applied Behavior Analysis, 39*, 103–107.

Wilder, D. A., Zonneveld, K., Harris, C., Marcus, A., & Reagan, R. (2007). Further analysis of antecedent interventions on preschoolers' compliance. *Journal of Applied Behavior Analysis, 40*, 535–539.

Wilder, D. A., Nicholson, K., & Allison, J. (2010). An evaluation of advance notice to increase compliance among preschoolers. *Journal of Applied Behavior Analysis, 43*, 751–755.

Williams, D. C., Saunders, K. J., & Perone, M. (2011). Extended pausing by human subjects on multiple fixed-ratio schedules with varied reinforcer magnitude and response requirements. *Journal of the Experimental Analysis of Behavior, 95*, 203–220.