Facilitating Transitions Between and Within Academic Tasks
An Application of Behavioral Momentum

DAVID L. LEE

ABSTRACT

Transitions are critical times for both teachers and students. Efficient between-task and within-task transitions can greatly improve academic learning time. The purpose of this article was to review one intervention, high-probability (high-p) task sequences, as a method to promote more effective transitions. High-p sequences involve presenting a student with a series of brief requests with a history of compliance immediately prior to a request to complete a task that generally results in noncompliance. The results of this review indicate that high-p sequences are an effective method to make academic transitions more efficient. Ideas for application and future research are discussed.

With the recent emphasis on academic achievement and “leaving no child behind,” teachers are asked to teach and students are asked to learn more material than ever before. Many states now have academic standards that provide a general framework of academic content for schools. The amount of content to learn is reflected in the high number of objectives for each grade level. For example, third-grade students in Pennsylvania are required to complete work based on approximately 76 academic standards with 371 corresponding benchmarks across 13 content areas.

Given the current lay of the educational landscape, practitioners need evidence-based methods that help children transition to tasks more quickly and remain engaged in those tasks for longer periods of time. Smooth transitions provide more time for academic instruction and reduce behavior problems (Paine, Radicchi, Rosellini, Deutchman, & Darch, 1983).

There are several research-based strategies designed to decrease transition time and increase task engagement. Some of these interventions focus on changing antecedents (modifying task requirements), whereas others focus on delivering consequences for appropriate and inappropriate behavior. For example, Kern, Childs, Dunlap, Clarke, and Fulk (1994) used the results of a functional assessment to develop an intervention that included reducing assignment length, modifying content, and providing alternatives to handwriting for written work for an 11-year-old student with a history of academic noncompliance. This multicomponent antecedent intervention resulted in increased academic engagement. McGinnis, Friman, and Carlyon (1999), on the other hand, employed a consequence-based intervention with a group of elementary-school students who failed to complete mathematics assignments. McGinnis et al. found that delivering tokens, which could be traded for preferred items at a later time, increased math work completion and engagement relative to the baseline condition.

Clearly, practitioners have a range of options to help students initiate and remain engaged in academic tasks. However, no type of intervention is without disadvantages. Modifying antecedents may involve reducing task requirements, which can compromise the integrity of the curriculum and make it more difficult to cover required content. Similarly, delivering consequences for appropriate behavior can be difficult in practice, because some children rarely engage in the target responses, resulting in reinforcement levels that are too low to maintain certain academic behaviors. These low rates of academic behavior are problematic, given the positive
correlation between task persistence, or on-task time, and academic achievement (Rosenshine & Berliner, 1978). The question is how to increase the rate of academic behavior of students who have a history of not engaging in such behavior, so that reinforcement can more readily occur. Recently, one technique derived from the basic behavioral literature has shown promise as a method to help students initiate tasks more quickly and stay engaged longer.

High-probability (high-p) request sequences is an intervention that practitioners can use to make it more likely that a nonpreferred behavior will occur. For this intervention, a series of brief requests with a high probability (high p) of compliance is delivered just prior to a request with a low probability (low p) of compliance. For example, a teacher may ask a student to take out a pencil (high-p request), write his or her name on a piece of paper (high-p request), and write the date at the top of the paper (high-p request), immediately prior to asking the student to begin math seatwork, a low-p activity. The responses generated by the high-p requests carries over and increases compliance to the request that had previously resulted in noncompliance.

The effects of high-p request sequences have been examined across populations, including participants with severe mental retardation (e.g., Harchick & Putzier, 1990), young children with behavior disorders (e.g., Davis & Reichle, 1996), and general education students (e.g., Ardon, Martens, & Wolfe, 1999); types of requests, including self-care (e.g., Mace & Belfiore, 1990; Mace et al., 1988), communication (e.g., Davis, Brady, Hamilton, McEvoy, & Williams, 1994; Sanchez-Fort, Brady, & Davis, 1995), and transition from activity to activity (e.g., Ardoin et al., 1999); and intervenors, including experimenters (e.g., Mace & Belfiore, 1990), classroom teachers (e.g., Ardoin et al., 1999), parents (e.g., Ducharme & Worling, 1994), and same-age peers (e.g., Davis & Reichle, 1996). The results of these individual studies and of a recent meta-analytic review (Lee, 2005) suggest that high-p sequences are effective at increasing compliance to nonpreferred requests. However, studies in this area have primarily focused on compliance with requests in the areas of self-care and communication for individuals with low-incidence disabilities. It is only recently that high-p sequences have been used in school settings with children with high-incidence disabilities to increase academic behaviors. The purpose of this article is to review the research on high-p request sequences in academic settings and discuss the role that this intervention plays in helping students initiate and remain engaged in nonpreferred academic tasks.

BEHAVIORAL MOMENTUM

The high-p request intervention is based on the theory of behavioral momentum (Nevin, 1996). Nevin et al. coined the term behavioral momentum in an effort to describe the dynamics of behavior in changing environments (Nevin, Man-
dell, & Atak, 1983). Nevin theorized that behavior possesses a momentum much like that found in physical objects.

In physics, momentum is a function of mass and velocity. A train traveling at 50 mph is more difficult to stop (i.e., possesses more momentum) than a car traveling at the same speed, because the train has more mass. Similarly, it is more difficult to stop a car traveling at 70 mph than that same car traveling at the lower velocity of 20 mph. Behavioral momentum, much like its counterpart from physics, is affected by two similar entities that parallel mass and velocity. Behavioral mass, the focus of basic researchers, is determined by the level of reinforcement associated with a specific stimulus condition. These researchers suggest that responding to stimulus conditions associated with high levels of reinforcement (“mass”) is more resistant to interruption than responding to stimulus conditions associated with lower levels of reinforcement (Dube, MacIlvane, Mazzitelli, & McNamara, 2003; Grace, McLean, & Nevin, 2003). For example, a student may work harder on a brand-new task, the completion of which has never been reinforced, for their favorite teacher because that teacher is associated with high levels of reinforcement.

Behavioral velocity, or rate of responding, has been the focus of more applied research. It is the velocity component of behavioral momentum that gave rise to high-p request sequences as a means to increase compliance. Engaging in a series of tasks with a high probability of occurrence increases the overall rate of responding (and subsequent reinforcement) for a given task and results in increased compliance to less preferred steps or problems within that same task (Lee & Laspe, 2003).

TRANSITIONING TO ACADEMIC TASKS

One application of high-p sequences in academics has been to facilitate task-to-task (i.e., between-task) transitions. Several researchers have examined the use of high-p sequences to facilitate between-task transitions. For example, Wehby and Hollahan (2000) delivered a series of high-p requests (e.g., take out your pencil, put your name on the paper) to a student with a learning disability (LD) just prior to asking that same student to initiate independent math assignments. The high-p requests resulted in a decrease in the time to initiate independent math work. Davis, Reichle, and Southard (2000) compared the effects of high-p requests and preferred items as distractors. Children in this study were either asked to complete a series of three to four high-p requests or given a preferred item just prior to a request to transition to a new activity (low-p request). The results indicated that both interventions produced more efficient transitions relative to baseline conditions. However, social validity data indicated that teachers preferred high-p sequences to the preferred item as a distractor intervention to enhance the efficiency of transitions. Similarly, Ardoin et al. (1999) delivered a series of high-p requests to a group of second-grade general education
students to facilitate transition of opening calendar time. The high-\(p\) intervention increased compliance with requests to transition and decreased the latency to perform transition behaviors for two of the three students studied.

These three studies suggest that high-\(p\) sequences are effective at helping students transition from one activity to another, which may increase their academic learning time. However, the high-\(p\) procedure was not equally effective across all students. One participant in the Ardoin et al. (1999) study failed to transition appropriately even after receiving the high-\(p\) intervention. A closer examination of the data indicates that the student did not comply with either the high-\(p\) or the low-\(p\) requests during the intervention. Thus, the momentum of compliance achieved through responding to the high-\(p\) requests was never established. This brings to light an important point when using high-\(p\) sequences: The effectiveness of the procedure depends on the ability of practitioners to identify and ensure that the high-\(p\) tasks occasion compliance. Teachers must be sure to first identify appropriate high-\(p\) tasks and then monitor the effectiveness of those tasks throughout the intervention.

**Transitioning Within Academic Tasks**

In some instances, it is what happens during the task—that is, a between-task transition has occurred—that is of concern. A second application of behavioral momentum in academic settings has been to facilitate transitions within tasks. Discrete tasks are composed of cycles of transition and task completion. For example, students who are asked to complete a social studies assignment transition to the first question when asked to complete the assignment, complete the first question, then transition to the second question, complete the second question, and so on, until the task is finished. Part of increasing academic productivity is decreasing the amount of time that students take “off” after each problem or question. Much as with transitioning between tasks, students who transition efficiently within tasks are more productive academically. Several researchers have examined high-\(p\) task sequences as a method to make within-task transitions more efficient in the academic areas of math and language arts.

**Mathematics**

The first application of high-\(p\) sequences to enhance academic productivity was by Belfiore, Lee, Vargas, and Skinner (1997). Two students (ages 14 and 15) who attended a community-based alternative school for children with behavioral and academic difficulties participated in this study. In the first phase of the study, an assessment was conducted to determine possible high- and low-\(p\) tasks. Data from this assessment indicated that single-digit and multidigit multiplication problems could serve as the high-\(p\) and low-\(p\) tasks, respectively. In the second phase of the study, the students completed math problems in two conditions. In the traditional format, the participants completed a series of 10 multidigit (low-\(p\)) multiplication problems printed on cards. In the high-\(p\) condition, the participants completed a similar series of low-\(p\) problems. However, each low-\(p\) problem was preceded by a series of three high-\(p\) problems on the same card (e.g., \(2 \times 2 = \_\), \(4 \times 3 = \_\), \(7 \times 5 = \_\), \(348 \times 763 = \_\)). The researchers found that latency to initiate nonpreferred problems was lower in the high-\(p\) condition. Hutchinson and Belfiore (1998) later replicated these results with younger children (ages 9 and 10) using a different measure, the rate of digits completed.

The Belfiore et al. (1997) and Hutchinson and Belfiore (1998) studies suggested that the addition of high-\(p\) tasks helped students make more efficient within-task transitions. Both studies were similar to previous research in this area, in that they relied on a series of tasks that typically resulted in compliance to establish a momentum of responding that carried over to nonpreferred tasks within the same response class. However, these initial studies on academic productivity differed from prior work in two important ways. First, the high-\(p\) tasks were embedded in typical, ongoing academic tasks. In previous studies examining between-task transitions, the researcher/practitioner verbally delivered high-\(p\) sequences on an “as needed” basis. For example, a student may refuse to begin working on an independent assignment. The teacher in this case could deliver a series of high-\(p\) requests prior to repeating the low-\(p\) request to begin independent seatwork. The results of the two studies by Belfiore and colleagues indicate that teachers can modify tasks earlier in the day, well before delivering the lesson, to achieve desired effects. Second, increases in academic productivity were achieved without the use of teacher-delivered consequences. In previous studies, verbal praise was often delivered when participants complied with both high- and low-\(p\) requests (e.g., Mace et al., 1988). The added verbal praise in the high-\(p\) condition increased the rate of responding (and reinforcement), so that momentum carried through to the nonpreferred request. In the current academic studies (Belfiore et al., 1997; Hutchinson & Belfiore, 1998), task completion may have served as a conditioned reinforcer, precluding the need for the teacher to deliver reinforcers to help maintain the rate of responding. Other researchers (see Skinner, 2002) have demonstrated similar findings in assessing the reinforcing effects of brief, discrete tasks using choice-making paradigms.

Although the results of the initial studies on high-\(p\) task sequences without teacher-delivered reinforcers in academics were consistent with other research on high-\(p\) request sequences, researchers have continued to examine ways to enhance the robustness of the procedure. One avenue was through intervention packages that did include teacher-delivered reinforcers. Belfiore, Lee, Scheeler, and Klein (2002) asked a group of elementary-age students with behavioral and academic difficulties to complete a series of nonpreferred mathematics problems in three conditions. The baseline condition was
composed of a series of 10 nonpreferred (low-p) problems. In the traditional high-p condition, students were asked to complete a series of problems presented in the high-p format used in earlier studies (three high-p problems followed by one low-p problem). The final condition was similar to the traditional high-p condition, except that students were permitted to discard every other problem card. This discarding constituted a possible negative reinforcement contingency by allowing escape from a nonpreferred (low-p) task. The results indicated that the traditional high-p task decreased the latency to initiate the nonpreferred tasks, thus replicating previous findings. The addition of the escape condition, however, did not result in enhanced compliance relative to the traditional high-p condition.

In a follow-up study, Lee, Belfiore, Scheeler, Hua, and Smith (2004) examined the effects of added positive reinforcement on within-task transitions during a math task. Four elementary-age children were asked to complete math problems in four conditions. Two conditions, baseline and traditional high-p, were the same as those used in previous studies. For the third condition, students completed a similar high-p task, except that tokens were delivered on completion of each low-p problem. These tokens were later exchanged for small gifts (e.g., candy, pencils, erasers) at the end of each session. In the final condition, students were asked to complete a series of low-p problems, much like the baseline condition, and were given a token for every low-p problem completed. As in prior studies, the students were faster to begin nonpreferred problems in the high-p only intervention relative to both baseline and the low-p with additional reinforcers conditions. The researchers also found that the addition of token reinforcers enhanced the effects of the high-p sequences when compared with all other conditions.

Overall, data from the studies that examined the effects of added reinforcers on within-task transitions in mathematics have delivered mixed results. Providing a negative reinforcement contingency did not increase academic productivity relative to traditional high-p sequences. Belfiore et al. (2002) hypothesized, as Mace and Belfiore (1990) had earlier, that the high-p sequence may change the valence of the low-p task, making it less aversive and, therefore, less amenable to negative reinforcement contingencies. The reinforcement value gained from completing the brief high-p tasks may have been greater than the reinforcement value of escaping an aversive task for these students. However, positive reinforcers added to existing high-p tasks resulted in increased academic persistence. These results are in line with the theory of behavioral momentum, which suggests that increases in rates of responding and reinforcement enhance persistence (Nevin, 1996).

**Language Arts**

Lee et al. (2004) examined the effects of completing a series of preferred (high-p) handwriting tasks on the rate of completion of a nonpreferred handwriting task. In that study, the nonpreferred (low-p) task consisted of the students copying a word from a sample stimulus onto a series of blanks (e.g., elephant _ _ _ _ _ _ _ _ _ _ _ _). For the preferred (high-p) task, the students were asked to copy a single letter 3 to 4 times (e.g., write the letter /l/ _ _ _ _ _ _ _ _ _ _ _ _). When the low-p task was preceded by the high-p task, the students copied the stimulus words at a higher rate. This finding expands the results of previous studies to a new academic task, letter writing. Most interesting was the finding that responding decreased in the low-p-only condition as a function of session length. However, decreases in responding over time were not found in the high-p condition. That is, the high-p task resulted in student responding that was more consistent throughout the length of the session, indicating higher levels of overall engagement.

In a second study on writing, Lee and Laspe (2003) compared the effects of high-p sequences and verbal prompts on journal writing. Four students in a resource classroom were asked to respond to story starters in each of four conditions. In the high-p condition, the students were asked to perform two to three simple writing tasks that generally resulted in compliance when they had stopped writing in their journals for longer than 1 min (e.g., “Write the word red. Write the word at. Write the word boy.”). The high-p task was followed by a request to continue writing in the journal (low-p request). The high-p-with-added-praise condition was similar to the high-p-only condition, except that verbal praise was given after the completion of each high-p word and when the students resumed writing in their journals. In the verbal prompt condition, the teacher delivered a verbal prompt to begin writing (e.g., “Please begin writing in your journal.”) when the students had stopped writing for longer than 1 min. Similarly, in the verbal-prompt-with-added-praise condition, students were given verbal praise when they resumed writing in their journals after the verbal prompt. The results of this study indicated that both the high-p sequence and the verbal prompts increased the number of words written relative to the baseline condition, with little difference in the number of words written between experimental conditions. However, the ratio of words written for each implementation of the respective interventions was greater in the high-p with praise condition. That is, the high-p-with-praise intervention was more efficient and needed to be implemented fewer times than the verbal prompt condition to achieve similar effects for this writing task.

**Discussion**

High-p request sequences use tasks or requests with a high probability of completion to make it more likely that requests or tasks with a low probability of completion will occur. Over the last 20 years, the high-p technique has enjoyed ongoing support in the basic and applied behavioral literature as a
method to increase compliance primarily for individuals with severe disabilities. More recently, high-p sequences have been used to facilitate transitions both between and within ongoing academic tasks. Overall, the results of this review suggest that the high-p intervention is effective at increasing the efficiency of task transitions and enhancing academic productivity.

**Implications for Practitioners**

**Using High-p Sequences.** Gersten, Vaughn, Deshler, and Schiller (1997) indicated that ease of use was one principle that governed the implementation of research-based practices in school settings. Fortunately, practitioners can use an easy, five-step process to implement high-p sequences (Lee, Belfiore, Gormley, in press). The first step is to identify tasks or requests that result in noncompliant behavior (i.e., low-p tasks). Second, a list of tasks or requests that generally result in compliance must be developed (i.e., high-p tasks). In developing this list, practitioners should select high-p tasks that are brief (preferably less than 5 s). It is also important that teachers continually monitor responses to high-p requests and tasks, because compliance may change over time. The effectiveness of the intervention depends on the ability of the high-p requests and tasks to occasion compliance. If students are noncompliant to the high-p requests or tasks, the integrity of the intervention may be compromised. Third, tasks with embedded high-p requests must be developed. For example, a teacher may redesign a written assignment by placing a series of two or three high-p tasks just prior to each low-p task or begin a between-task transition with a few high-p tasks followed by a request to transition to the new activity (low-p request). When designing tasks, it is important to note that the time between the last high-p request or task in a series and the subsequent low-p request should be kept to a minimum. Previous research (Lee, in 2005) has shown that the effectiveness of the procedure decreases when low-p requests are delivered more than 10 s after the last high-p request. Fourth, data should be collected to determine the effects of the intervention. Practitioners should collect data on the latency of between-task transitions or the number of tasks completed during a given class. As stated earlier, the duration of intervention (efficiency) and responding to high-p requests and tasks should also be monitored. Finally, the high-p sequences may be faded out over time by reducing the number of high-p tasks.

**Advantages and Disadvantages of High-p Sequences.** Prior to implementing any intervention, teachers must weigh the potential benefits and drawbacks of the procedure. High-p task sequences have several advantages over other interventions that are designed to increase task compliance. First, the antecedent nature of the intervention can help prevent instances of reduced academic productivity. Teachers can spend more time on direct instruction, as opposed to managing student behavior. Second, effects are realized by increasing, not decreasing the academic workload. Increasing the academic workload enhances content coverage, which is an important instructional variable (Mastropieri & Scruggs, 1994). Decreasing the workload of students who are already behind academically may have a detrimental effect on skill development. Third, the high-p task sequence can be used to provide a review of relevant academic material. Teachers can use these tasks to make transitions more efficient and to increase proficiency at performing those same high-p tasks. Finally, the high-p sequences can be implemented as part of an intervention package that includes the antecedent high-p intervention as well as consequence-based techniques, such as positive reinforcement, to enhance the effectiveness of the procedure.

One potential disadvantage of high-p sequences is that they can increase the duration of a task. Researchers and practitioners alike often overlook efficiency as one way to evaluate the effectiveness of an intervention. Interventions that produce desired changes in behavior in a short amount of time are more efficient (and generally more desirable) than interventions that require more time to change behavior. However, if the intervention helps a student who previously refused to work to initiate and remain engaged in academic tasks, the additional time may be temporarily acceptable.

**Limitations and Future Research**

Although high-p requests can help make transitions more efficient, more research must be conducted to realize the full benefits and potential limitations of the procedure. For example, investigations in the area of preference and mastery may help to determine the characteristics of high-p tasks. Previous research has already indicated that the effectiveness of the procedure hinges on the ability of the high-p task to generate increased rates of responding (Ardoin et al., 1999; Lee, in 2005). If teachers are to use this procedure effectively, practical methods to determine high-p tasks must be identified. Future researchers should also attempt to further validate the effects of the procedure across more academic content areas. For example, the intervention has not been examined in the area of reading, which has been identified as a national priority (No Child Left Behind Act, 2001). High-p tasks may make it more likely that children will practice difficult reading skills, thereby increasing reading proficiency. Finally, and perhaps most important, researchers must continue to examine the effects of this promising intervention in the context of socially valid outcomes. As we more fully develop high-p procedures, we must not forget that real teachers must use this technique with real students in the context of real classrooms.

DAVID L. LEE, PhD, BCBA, is an associate professor in the Department of Educational and School Psychology and Special Education at The Pennsylvania State University. His research focuses on issues of classroom management for teachers of children with behavior disorders. Address: David L.
REFERENCES


