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Using Multiple-Stimulus Without Replacement (MSWO) Preference Assessments to Increase Student Engagement and Performance

Justin is a 10th-grade student who attends an alternative school for students with significant behavior problems. Like all the other students in his classroom that serves students with emotional and behavioral disorders (EBD), Justin is on a point card system. The point card helps the teachers monitor Justin's target behaviors – identified as verbal disruption and aggression – and provide feedback to him about his performance each day. The point card also serves as part of a token economy in that students in Justin's class are able to earn access to various rewards if they earn a pre-requisite number of points each day.

As part of his transition to the alternative school, a functional behavioral assessment (FBA) was conducted for Justin. Based on all the data collected, it was hypothesized that the function of Justin's problem behavior was attention, with a possible secondary function of tangible items and activities. Because of this, the menu of rewards that Justin's teachers have selected for him consists primarily of one-on-one time with a teacher and tangible items.

Although Justin's disruptive and aggressive behaviors have decreased in frequency since being placed in the program for students with EBD, his academic performance has not improved. In fact, Justin's academic skills have improved very little in the past two years. To address this concern, teachers have added an "academic engagement" component to Justin's point card so that he can earn additional points when he listens to instruction and is engaged with the assigned task. Despite this addition to the behavior plan, Justin typically puts his head down during instruction and refuses to complete his assignments. Justin's teachers and parents are at a loss as to how to motivate him.

Meeting the behavioral and academic needs of students with emotional and behavioral disorders (EBD) presents a number of significant challenges to educators. Children and adolescents with EBD commonly engage in behaviors that affect their ability to excel socially and meet academic expectations. These students often earn lower grades, pass fewer classes, and experience higher rates of school dropout than typical students as well as other students with high incidence disabilities (Daly et al., 2009; Lane, Barton-Arwood, Nelson, & Wehby, 2008). Indeed, more than half of students with EBD drop out, three-fourths function below expected grade level in reading, and 97% function below expected grade level in math (Bradley, Doolittle, & Bartolotta, 2008). Educators of students with EBD need efficient, research-based ways to promote desired academic and social behaviors. The purpose of this article is to present a simple method called multiple stimulus without replacement preference assessment that educators can use to choose appropriate, meaningful rewards that can lead to improved academic and behavioral performance among youth with EBD.

When a reward that is presented to a student as a consequence for a specified behavior serves to increase the future occurrence of that behavior, the reward is said to be a reinforcer. For instance, if a student begins to comply with more teacher instructions as a result of having earned access to the teacher's attention, the teacher's attention is serving as a reinforcer for the behavior of compliance. Multiple stimulus without replacement preference assessment is a systematic procedure for selecting preferred reinforcers that involves providing an arrangement of reward choices for a student to select his or her most preferred options (DeLeon & Iwata, 1996). In addition to tangible items (e.g., puzzles, dolls, or building blocks) or edible items (e.g., Skittles or Goldfish) that may be included in the options, social or activity reinforcers (e.g., one-on-one play time with a peer) also may be included. This variety of options presented gives

choices for students that potentially match the function of their problem behavior, thus leading to more effective outcomes. Function of behavior refers to the idea that all behavior serves a purpose, usually to gain something such as attention or a preferred item or avoid something such as difficult work.

It is well established that function-based interventions (i.e., interventions matched to students' desire to gain or avoid something) lead to behavior change more efficiently and effectively with students with EBD than non-function-based strategies (Lewis, Hudson, Richter, & Johnson, 2004). One of the challenges for educators of students with EBD, however, is that the function of problem behavior often varies from student to student. A functional approach to problem solving in the area of behavior suggests that "one size does NOT fit all." However, there is evidence that many of the interventions used in classrooms and alternative educational settings serving students with EBD are based on what the program has always done, rather than on individual students' function of behavior (Pierce, Reid, & Epstein, 2004; Vidair, Sauro, Blocher, Scudellari, & Hoagwood, 2014).

Typical practice with common behavior reinforcement systems includes rewards that are paired with points earned for meeting certain behavioral expectations. While individual students may have different behavioral expectations on their point cards, the choices for rewards are often the same for every student. Earned points are exchanged for a reward from a fixed list of items, usually tangible prizes, which may or may not function as a reinforcer for individual students (Paramore & Higbee, 2005). While token economies can be quite effective and efficient tools, an item used as the reward is not considered a reinforcer if it does not lead to a change in desired or undesired behavior. Often the rewards chosen in an attempt to alter behaviors may be selected arbitrarily, rather than by taking into account students' preferences and the function of their

problem behavior (Resetar & Noell, 2008). The identification of reinforcers that are matched to the function of behavior using a procedure such as multiple-stimulus without replacement may be key to effective programming for these students.

A Brief History of Preference Assessments

A number of approaches have been established for identifying preferred items and potential reinforcers. Much of the early research in this area has been with individuals with significant disabilities. Because the individuals were often nonverbal, it was important to find ways to assess preference that did not rely on self-report. In one of the first investigations of this kind, Pace, Ivancic, Edwards, Iwata, and Page (1985) described a single-stimulus systematic assessment in which items thought to be preferred were selected and presented one at a time to students with significant disabilities. The percentage of trials in which students approached each item when it was presented was used to infer the relative preference of each item for each student. For instance, if a student approached and reached for a mirror 8 of the 10 times it was presented and approached a flower only 2 of the 10 times it was presented, it would be assumed that the mirror was more highly preferred than the flower. Pace and his colleagues were able to demonstrate that the items identified in this manner as highly preferred were more powerful reinforcers than those identified as low preferred.

Following this line of research, Windsor, Piche, and Locke (1994) described a multiple-stimulus (MS) approach. In this approach, an entire array of items was presented at once, and students were asked to select and approach their most preferred item. This procedure was then repeated over a number of trials. Windsor and her colleagues found that this method, when compared to other approaches, typically identified the same items as highly preferred. However, the MS method required less time to administer.

Building on this work, DeLeon and Iwata (1996) investigated a multiple-stimulus without replacement (MSWO) method of conducting preference assessments. In the MSWO procedure, an array of items was presented at once as in the MS method; however, after an item was selected as most highly preferred, it was removed from the array and the remaining items were presented again. This process was repeated until all items were selected. DeLeon and Iwata suggested that the MSWO procedure produced accurate results in less time than the other methods described above. Similarly, Carr, Nicolson, and Higbee (2000) extended this research by investigating a "brief MSWO assessment" and demonstrating the effectiveness of this method at identifying preferred items that could serve as reinforcers.

Although DeLeon and Iwata's (1996) original investigation of MSWO was conducted with adults with significant disabilities, a number of studies have replicated these results and found the MSWO method to be effective at identifying reinforcers for students with EBD. Paramore and Higbee (2005) conducted a brief MSWO preference assessment to determine effective reinforcers in an educational setting with adolescents with EBD. The authors concluded that a brief MSWO preference assessment can provide a way to accurately predict reinforcers for individuals with EBD. One limitation of this study was that only edible items were used as options. Daly and his colleagues (2009) used a MSWO procedure to assess the relative preference of school activities (e.g., going to the library, drawing on paper, using the computer, playing in the gym) among four fourth-graders with EBD. The authors found that task performance improved for all students when they were able to work for a reward identified as highly-preferred by the MSWO assessment. Finally, Stangl (2012) investigated the effectiveness of a brief MSWO procedure with six secondary students (grades 8-12) at an alternative school for students with EBD. Although there was a high degree of variability, Stangl found mean

performance across all students highest in the MSWO condition when compared to a condition in which tokens for teacher-nominated items at the school store could be earned and a condition in which no rewards were available.

How to Conduct a Brief MSWO Assessment

Figure 1 represents a simple flow chart consisting of the steps involved in conducting a brief MSWO preference assessment. Further explanation and additional details are provided below:

Step 1: Select Items

Between five and eight items should be selected for inclusion in the MSWO assessment. These may include tangible leisure items such as toys or edibles such as crackers or candy. Activities (e.g., free time in the gym) may also be included. If so, a description of the activity can be written on a notecard or a picture may be used, depending on the developmental level of the student.

At this stage, the items to be included represent simply a best guess of objects or activities that would be enjoyable or motivating to the student. While the results of the student's FBA might help inform the items to be included, it might also be wise to include items that are not directly matched to function. For example, in the opening vignette, Justin's disruptive behavior is thought to be maintained by teacher attention and access to tangible items. In this case, items representing these contingencies (e.g., taking a walk with a teacher for teacher attention and computer time for access to tangible) should be included in the MSWO assessment. In addition, it might be a good idea to also include one or more items representing an escape function (e.g., a "no homework" ticket). Because point cards often target multiple behaviors that may represent multiple functional response classes (Cooper, Heron, & Heward, 2007), the

inclusion of an array of items representing multiple contingencies can help ensure that an important class of motivators is not left out.

Step 2: Prepare Materials and Data Sheet

Once items have been selected, they should be gathered for the assessment. For activities or non-tangible items, a representation should be made that the student can understand. This might be a written description or a picture. Once all items have been gathered, they should be displayed in a straight line with items about one to two inches apart so that they may be easily viewed by the student once the assessment starts. Items may be displayed on a table, or ideally, on a tray or large surface that can be removed from the table in between presentations.

Next, the data sheet should be prepared. Figure 2 shows a sample data sheet which has been completed for Justin as detailed below. After the student and teacher name and date of assessment, the items chosen for the assessment should be written on the data sheet. Although the data sheet can be used for up to eight items, fewer may be used. Once the assessment begins, the order in which items are selected by the student should be recorded on the data sheet. For instance, the first item selected would be written next to the space marked "1" and the second item selected would be written next to the space marked "2."

Step 3: Conduct the Assessment

When all the preparations have been made, the student should be brought to the assessment area. During the procedure, the student should be seated in a chair positioned in front of a table. A simple explanation as to the purpose of the assessment should be given to the student, such as, "We want to find out what you would most enjoy here at school." Once the student is seated, the tray or surface containing the items can be placed in front of the student on the table. At this point, a few minutes should be given for the student to manipulate tangible

items and read or be read to the social/activity options and ask questions about any options they may not understand.

Once it is clear that the student understands each of the options, the assessment can begin. The student is given the simple instruction to "point to what you'd most enjoy." After the item is selected, the remaining items (or entire tray) are removed from the table. The student is given access to the selected item for approximately 10-20 seconds, while the remaining items are rotated on the tray. Once an item is selected, it is not replaced. For instance, if the first presentation consists of six items, only five would remain for the second presentation. Prior to each subsequent presentation, the remaining items are rotated and equally spaced apart. This procedure is repeated until all items are selected, or until the student refuses to make any more selections.

After conducting the entire procedure once, all items are replaced on the tray and rotated. The entire process is then repeated two more times for a total of three preference assessment sessions. This is done to help ensure that an adequate and representative sample of data points is gathered. These three sessions can be conducted back-to-back or over the course of several days.

Step 4: Summarize the Data

After the selection order of all items has been recorded on the data sheet, a ratio of times selected over times presented is recorded next to each item. For instance, the first item selected would have been selected once and presented once, so "1/1" would be recorded. The second item would have been selected once and presented twice, so "1/2" would be recorded. If a student stops making selections at any point, the remaining items would be recorded as "0/number of items". Once this has been done for all three preference assessment sessions, a percentage of trials in which the item was selected can be calculated. For example, if during

three sessions an item produced ratios of 1/1, 1/2, and 1/1, the overall sum would be 3/4 or 75 percent. Based on this percentage, a rank order of highest to lowest preferred can be established.

Although Justin has not been diagnosed with cognitive deficits, his academic skills appear to be well below those of his peers. It has been difficult for teachers to determine precisely at what skill level Justin is functioning because he has generally refused to participate in academic assessments. Justin's teachers estimate that his skills in reading and math are approximately two to three years below grade level. More frustrating is the fact that, as mentioned earlier, there has been minimal growth in the two years that Justin has been attending the alternative school.

At Justin's most recent individualized education program team meeting, the discussion again turned to the challenge of motivating Justin. The school psychologist suggested that a preference assessment might be helpful in identifying more meaningful and reinforcing rewards for Justin. The team discussed what this might entail, and Justin's teacher, Ms. Davis, agreed to conduct a brief MSWO assessment with the assistance of the school psychologist.

To test whether or not the MSWO assessment was effective and worth the time and effort to conduct it, the team decided to compare Justin's math performance across three conditions: days when Justin's rewards were determined by the results of a MSWO preference assessment, days when he earned tokens for points on his point card to be exchanged for teacher-identified rewards, and days when no rewards were offered. In this way, the team would be able to determine if the MSWO assessment actually made an impact on Justin's performance. The team decided to focus on math because it was of particular concern to Justin's parents, and because

Justin had self-identified math as his least favorite academic subject. Justin's math lessons and assignments were generally at a 7th-grade level.

On Day 1, Justin was given his math instruction and assignment but was offered no incentive for completing his work. On Day 2, Justin was told that he could earn points on his point card for participation in math class. These points could then be exchanged for teacher-identified rewards. This condition represents the typical programming for Justin's class and corresponds to his behavior support plan. On Day 3, a brief MSWO preference assessment was conducted before math class. Figure 2 represents the data sheet from this assessment.

As indicated on the data sheet in Figure 2, the team selected six potential rewards to include in the MSWO assessment. Several of these (i.e., computer time, walk with a teacher, and soda) were already included in the menu of rewards available as part of the point card token economy employed in the classroom. The remaining items were selected by the team during a brainstorming session. During this conversation, the most challenging reward to develop, for both logistic and philosophical reasons, was one matched to an escape function. Logistically, it was difficult to conceive of a way to make escape from a task contingent upon completion of that task (or to allow Justin to earn an "escape" from his math work by completing math work). In addition, several team members objected to the idea of making escape from class assignments a "reward" on the philosophical grounds that learning should be intrinsically rewarding. Nonetheless, consensus was reached and the team included the reduction of math work time by 5 minutes as a potential reward matched to an escape function.

Based on the results of this assessment, on Day 3, Justin was told that if he was engaged and participated in math, he could earn his MSWO-identified reward (i.e., math class would end 5 minutes early). Over the next several days, one or two additional data points were gathered

for each of the three conditions. Figure 3 presents Justin's performance in math class over the course of approximately two weeks. As indicated on the graph, the number of digits correct on Justin's math assignments was greatest when he was working for the MSWO-identified reward, despite the fact that he had 5 minutes less to complete his assignment during these sessions than on other days.

After considering this data, the team determined that the brief MSWO preference assessment had effectively identified a reinforcer that the team had not previously made available to Justin. While Justin's FBA had identified adult attention and tangible functions for his problem behavior, it had not pointed the way to contingencies that would effectively motivate and reinforce appropriate behavior. The team elected to continue with the point card system but make sure that the menu of rewards made available to Justin always included the reward identified by the MSWO assessment as most highly preferred. The team also decided to re-administer the MSWO assessment every two to three weeks to find out if Justin's preferences changed over time.

Conclusion

The job of educational professionals serving students with EBD is two-fold: to effectively treat and reduce challenging behaviors, and to provide educational programming and instruction to build students' academic proficiency. The identification of meaningful rewards for students is a prerequisite to reinforcement of both prosocial and academic behaviors. The MSWO preference assessment offers a simple and relatively time efficient method to identify these rewards.

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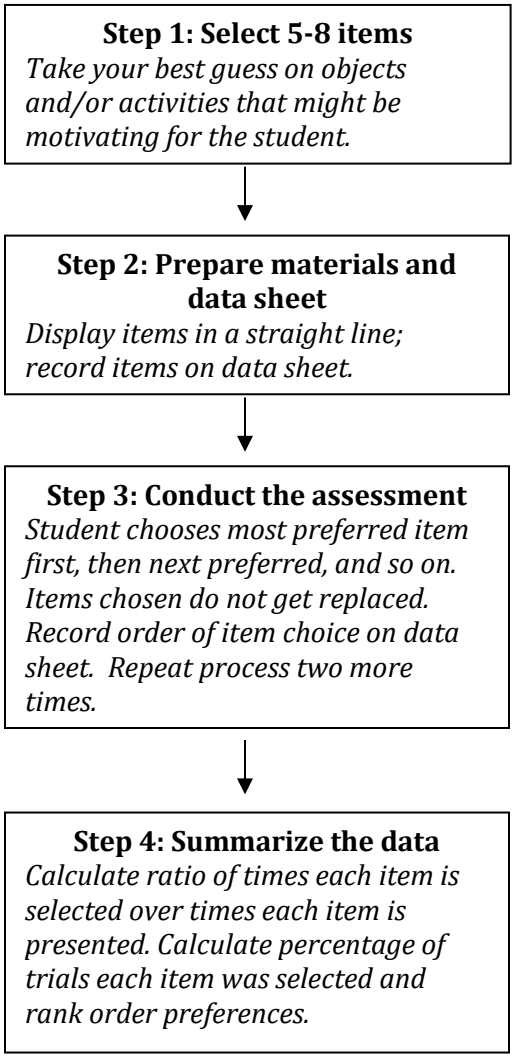

Figure 1. Steps to Conduct an MSWO Preference Assessment

Brief Multiple Stimuli without Replacement (MSWO) Data Sheet

Student Name: *Justin* Teacher Name: *Ms. Davis* Date: *3-23-17*

Items (Include 5-8):

10 minutes of Computer time	*5 minutes of "No Math" time*
Walk around school grounds with teacher	*Soda during recess*
10 minutes of gym time with a friend	*10 minutes of IPad time*

Preference Assessment #1:

Order of items selected by students:	# of times selected / # of times presented
1. *No Math time*	*1/1*
2. *Gym time*	*1/2*
3. *IPad*	*1/3*
4. *Walk with teacher*	*1/4*
5. *Computer time*	*1/5*
6. *Soda*	*1/6*
7.	
8.	

Preference Assessment #2:

Order of items selected by students:	# of times selected / # of times presented
1. *Gym time*	*1/1*
2. *No math time*	*1/2*
3. *Walk with teacher*	*1/3*
4. *ipad*	*1/4*
5. *Computer time*	*1/5*
6. *Soda*	*1/6*
7.	
8.	

Preference Assessment #3:

Order of items selected by students:	# of times selected / # of times presented
1. *No Math time*	*1/1*
2. *Walk with teacher*	*1/2*
3. *Gym time*	*1/3*
4. *IPad*	*1/4*
5. *Computer time*	*1/5*
6. *Soda*	*1/6*
7.	
8.	

Summary Data:

Item:	Total % Selected:
1. *No Math time*	*1/1 + 1/2 + 1/1 = 3/4 = 75%*
2. *Gym time*	*1/2 + 1/1 + 1/3 = 3/6 = 50%*
3. *Walk with teacher*	*1/4 + 1/3 + 1/2 = 3/9 = 33%*
4. *IPad*	*1/3 + 1/4 + 1/4 = 3/11 = 27%*
5. *Computer time*	*1/5 + 1/5 + 1/5 = 3/15 = 20%*
6. *Soda*	*1/6 + 1/6 + 1/6 = 3/18 = 17%*
7.	
8.	

Figure 2. An example of a completed Brief MSWO data sheet. Adapted from Carr, Nicolson, & Higbee (2000).

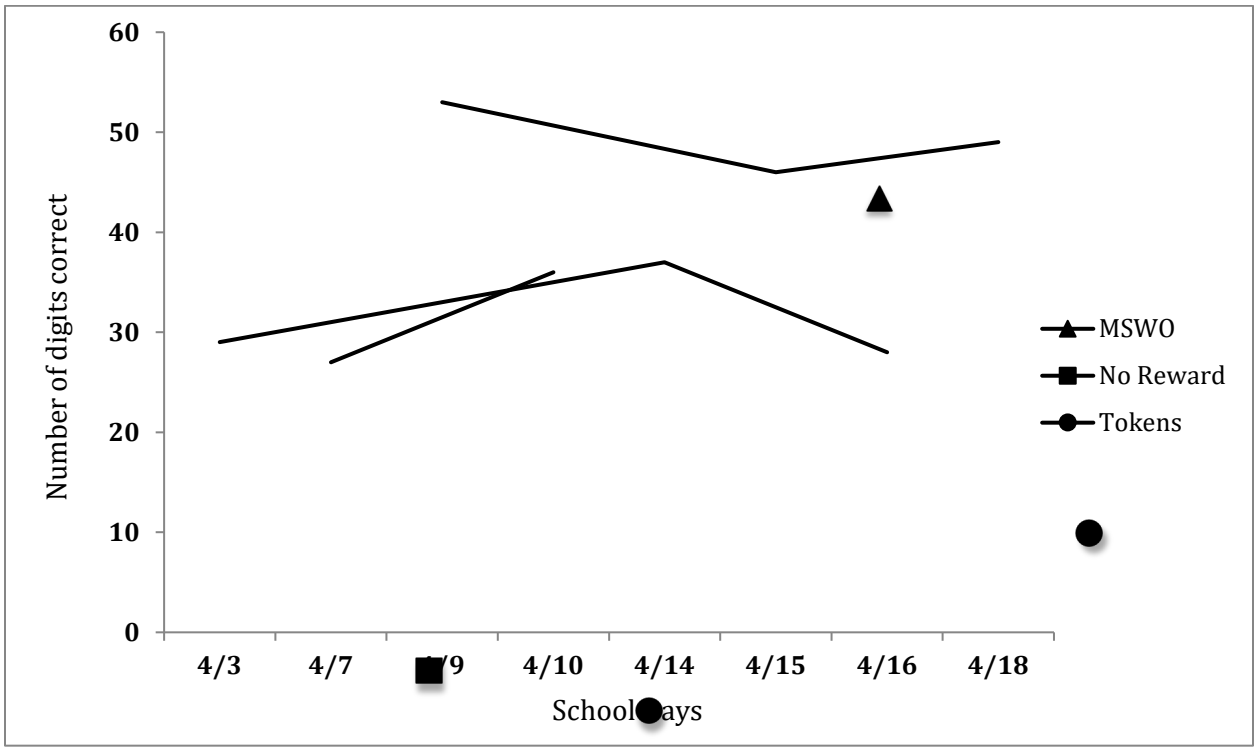

Figure 3. Justin's math performance across conditions.