Transitioning Children with Autism from One-on-One Discrete-Trial Settings to Special Education Classrooms

Jennifer L. Freeman
Western Michigan University, freeman.jenn@gmail.com

Follow this and additional works at: https://scholarworks.wmich.edu/dissertations
Part of the Psychology Commons, and the Special Education and Teaching Commons

Recommended Citation
Freeman, Jennifer L., "Transitioning Children with Autism from One-on-One Discrete-Trial Settings to Special Education Classrooms" (2016). Dissertations. 2485.
https://scholarworks.wmich.edu/dissertations/2485

This Dissertation-Open Access is brought to you for free and open access by the Graduate College at ScholarWorks at WMU. It has been accepted for inclusion in Dissertations by an authorized administrator of ScholarWorks at WMU. For more information, please contact maira.bundza@wmich.edu.
TRANSITIONING CHILDREN WITH AUTISM FROM ONE-ON-ONE DISCRETE-TRIAL SETTINGS TO SPECIAL EDUCATION CLASSROOMS

by

Jennifer L. Freeman

A dissertation submitted to the Graduate College in partial fulfillment of the requirements for the degree of Doctor of Philosophy Psychology Western Michigan University December 2016

Doctoral Committee:

Richard Malott, Ph.D., Chair
Stephanie Peterson, Ph.D.
Steven Ragotzy, Ph.D.
Carmen Jonaitis, Ph.D.
TRANSITIONING CHILDREN WITH AUTISM FROM ONE-ON-ONE DISCRETE-TRIAL SETTINGS TO SPECIAL EDUCATION CLASSROOMS

Jennifer L. Freeman, Ph.D.
Western Michigan University, 2016

The goal of an early intensive behavioral intervention (EIBI) program is to teach each child the skills necessary to make meaningful progress in less-restrictive environments (Fox, Dunlap & Crushing, 2002). However, few studies have detailed the steps necessary for a “successful” transition into these educational settings. We transitioned two children, who received 20 hours a week of one-on-one discrete-trial therapy and attended a half-day special-education pre-school classroom, to a full-time educational setting. With the goal of aiding each during his/her transition, this study used the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (Sundberg, 2008), particularly the barriers and transitions assessments, to evaluate each child’s strengths, deficits, and barriers. We also collaborated with their teachers to collect classroom expectations and recommended pre-requisite skills. Our intervention focused more on teaching commonly used classroom skills and barrier reduction, and less on the acquisition of additional academic skills. All targeted skills, except Cooper’s transitions, transferred from the one-on-one setting to his/her new classroom after some follow-up classroom staff training. Also, we did intervene to decrease Cooper’s flops during transitions in his kindergarten classroom.
ACKNOWLEDGMENTS

First, thank you Dr. Richard Malott. This dissertation would have not been possible without your dedication, support, and feedback, and effective performance management.

Thank you to my committee members Dr. Stephanie Peterson, Dr. Steven Ragotzy, and Dr. Carmen Jonaitis for all of your time and guidance. Thank you Kelly Kohler for editing, advising, and mentoring. I cannot express how much all of your time and dedication to this project meant to me.

Thank you Alissa DeNato, Tatvia Manuel, and Timothy Stone. Your time and effort spent assisting with assessments, running sessions, and collecting data was of great value to this study. I could not have done all of this without your hard work and positive attitude.

Thank you Cooper and Ariana’s family for allowing me to work with your amazing children. To all three special-education classroom teachers, thank you for your collaboration and feedback on all interventions for both children. I sincerely appreciated the opportunity to be a guest in your classroom and learn from all of you.

Thank you to all the members of Behavior Analysis Training System (BATS) and the Kalamazoo Autism Center (KAC) for all of your emotional and intellectual support, particularly Jennifer Mrljak, Sarah Lichtenberger, Sydney Harbaugh, Katie Mahaffy, Blaire Michelin, Justin Daigle, and Amelia Fonger.

Finally, thank you Linda Freeman, Jack Freeman, Sarah Freeman, Katie Freeman, and Scott Uzarski for your love and support during this entire process.

Jennifer L. Freeman
# TABLE OF CONTENTS

ACKNOWLEDGMENTS ......................................................................................................................... ii  
LIST OF TABLES ............................................................................................................................ vii  
LIST OF FIGURES .......................................................................................................................... viii  
INTRODUCTION ................................................................................................................................... 1  
METHOD ................................................................................................................................................. 3  
  Treatment Design .......................................................................................................................... 3  
  Interobserver Agreement .............................................................................................................. 3  
  Participants ...................................................................................................................................... 3  
  Settings .......................................................................................................................................... 5  
  Assessment ..................................................................................................................................... 6  
  Transition Process ............................................................................................................................ 7  
  Teaching Procedures ....................................................................................................................... 9  
ARIANA ............................................................................................................................................... 11  
  On-Task Behavior at the KAC .......................................................................................................... 12  
    Data Collection ............................................................................................................................... 13  
    Baseline ....................................................................................................................................... 13  
    Procedure ..................................................................................................................................... 13  
    Results ......................................................................................................................................... 14  
Pre- and Post-On-Task Training Data ............................................................................................... 15  
  Data Collection ............................................................................................................................... 15
<table>
<thead>
<tr>
<th>Table of Contents—Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-training</td>
</tr>
<tr>
<td>Post-training</td>
</tr>
<tr>
<td>Instruction Following</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Transitions</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results</td>
</tr>
<tr>
<td>Intensive Tact Procedure</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Discussion</td>
</tr>
<tr>
<td>COOPER</td>
</tr>
<tr>
<td>Instruction Following</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Manipulating Items</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results</td>
</tr>
<tr>
<td>Echoic Articulation Training</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Carrying Plates</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Transitions</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Results and Discussion</td>
</tr>
<tr>
<td>Decreasing Flops</td>
</tr>
<tr>
<td>Data Collection</td>
</tr>
<tr>
<td>Baseline</td>
</tr>
<tr>
<td>Intervention with a Toy</td>
</tr>
<tr>
<td>Return to Baseline</td>
</tr>
<tr>
<td>Intervention with Music</td>
</tr>
<tr>
<td>Hand-holding and Lift Protocol Only (Within-Classroom Transitions)</td>
</tr>
<tr>
<td>Section</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hand-holding and Lift Protocol with Instructor (Within-Classroom Transitions)</td>
</tr>
<tr>
<td>Hand-holding and Lift Protocol Only (Outside-of-Classroom Transitions)</td>
</tr>
<tr>
<td>Intervention with Music Choice</td>
</tr>
<tr>
<td>Return to Baseline</td>
</tr>
<tr>
<td>Intervention with Choice Board</td>
</tr>
<tr>
<td>Staff Training</td>
</tr>
<tr>
<td>Discussion</td>
</tr>
<tr>
<td>Discussion</td>
</tr>
<tr>
<td>VB-MAPP PRE- AND POST-TEST RESULT</td>
</tr>
<tr>
<td>Ariana</td>
</tr>
<tr>
<td>Cooper</td>
</tr>
<tr>
<td>Discussion</td>
</tr>
<tr>
<td>APPENDICES</td>
</tr>
<tr>
<td>A Pictures Used for Instruction Following and Transitions</td>
</tr>
<tr>
<td>B Intensive Tact Data Sheet</td>
</tr>
<tr>
<td>C List of Modeled Responses for Material Manipulation Procedure</td>
</tr>
<tr>
<td>D Epilogue for Ariana and Cooper</td>
</tr>
<tr>
<td>E Treatment Fidelity Checklist for Cooper’s Decreasing Flops Intervention</td>
</tr>
<tr>
<td>F VB-MAPP Score Sheets</td>
</tr>
<tr>
<td>G Human Subjects Institutional Review Board Approval Form</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Participant Characteristics for Each Child at the Start of the Study .......................... 4
LIST OF FIGURES

1. Diagram of the Transition Process ................................................................. 9
2. Intervention Timeline for Ariana ........................................................................ 12
3. Ariana’s Percentage of Time-On-Task During a 5-min Play Activity at the KAC .......... 14
4. Percentage of Time-On-Task During Classroom Observations Before and After Transition Training at the KAC ........................................................................ 16
5. Ariana’s Percentage of Correct Responses .......................................................... 18
6. Ariana’s Percentage of Correct Transitions .......................................................... 20
7. Percentage of Correct Tacts Emitted During the Intensive Tact Procedure ........ 22
8. Intervention Timeline for Cooper ........................................................................ 24
9. Percentage of Correct Responses During the Instruction Following Procedure .......... 25
10. Black Circles Represent Cooper’s Correct Wait Trials and Open Circles Represent His Correct Imitation Trials ............................................................. 28
11. The Number of Trials to Mastery for Each Echoic Target in Order of Introduction .... 29
12. Pre- and Post-Test Score of Cooper’s Early Echoic Skills Assessment (EESA) .... 30
13. Cooper’s Percentage of Correct Responses for the Carrying Plates Procedure ........ 32
14. Percentage of Correct Transitions to Three Different Locations .......................... 33
15. Cooper’s Mean Number of Flops per 10ft During Transitions to Locations Outside the ASD Classroom .............................................................. 36
16. Cooper’s Mean Number of Flops per 10ft During Transitions to Locations Inside the ASD Classroom .............................................................. 37
17. Cooper’s Mean Number of Flops per 10ft During Transitions to Different Locations Inside and Outside of the ASD Classroom .................................................. 38
List of Figures—Continued

18. The Results of Ariana’s VB-MAPP Assessment Before and After the Study .................. 44
19. The Results of Cooper’s VB-MAPP Assessment Before and After the Study ................. 45
INTRODUCTION

The long-term impact of an early, intensive behavioral intervention (EIBI) program depends, in part, on the preparation and successful transition from pre-school to kindergarten (Fox, Dunlap & Crushing, 2002; Lovaas, 1987). Therefore, it should be a goal of an EIBI program to teach the foundational skills that will allow the child to transition into the appropriate least restrictive environment. An appropriate least restrictive environment may be interpreted differently from one school district to another, from one professional to another, and one parent to another. However, the most important question may be, will this child make meaningful and measurable progress in that environment (Sundberg, 2011)? As behavior analysts and a member of a child’s transition planning team, it is our responsibility to assess and then teach the skills necessary for a child to be able acquire skills based on the learning opportunities presented in an educational setting.

Russo and Koegel (1977) were among the first to conduct an applied, classroom-based intervention for a young girl with autism. They intervened on a set of skills that were functional for her in the pre-school classroom (e.g., social behavior, following directions, and reducing stereotypy). First, they taught the target skills in a one-on-one setting, then they trained the classroom staff to maintain the interventions. It was so successful that the child transitioned to a mainstream kindergarten. However, two of the three skills that were taught, did not effectively transfer until they conducted additional classroom staff training.
More recently, Krantz and McClannahan (1999) also suggested a similar, general model for a transition to mainstream settings. They suggested training target skills in the one-on-one setting prior to introducing the child to the new classroom, evaluate the child’s skills in their new environment and, if necessary, address any potential problems. This process proved successful for their children enrolled in the Princeton Child Development Institute. Data collected from 1975 to 1991 found that 35-39% made successful transitions to mainstream public school classrooms. Although they have no comparison groups, they suggested that both the objective measures used to determine "readiness" for a mainstream educational environment and the technical support (i.e., staff training) provided during the transition contributed to those outcomes.

At the Kalamazoo Autism Center (KAC), two of our children who received 20 hours a week of one-on-one discrete-trial therapy and attended a half-day special-education pre-school classroom, were scheduled to transition to a full-time educational setting. The purpose of this study was to use this opportunity to replicate the transition process described by both Russo and Koegel (1977) and Krantz and McClannahan (1999) for our children at the Kalamazoo Autism Center (KAC). First, we describe the general transition process, and then its implementation for two children with autism who transitioned into two different, but typical, full-time special-educational classrooms.
METHOD

Treatment Design

We designed two case studies based on the recommendations of Azrin (1977). Each skill intervention used basic behavioral principles (e.g., differential reinforcement); were applied, outcome-oriented, and child directed. We used the VB-MAPP as a pre- and post-test assessment tool to evaluate overall progress and changing-criterion designs with generalization probes for each skill target.

Interobserver Agreement

A variety of behavior technicians and special-education instructors collected interobserver agreement data on 33% of all sessions, with a mean agreement of 88% and a session range of 73% to 100%.

Participants

We selected two 5-year-old children with autism who received part-time services from the Kalamazoo Autism Center (KAC) and the WoodsEdge Learning Center (WELC) (see settings). At the start of this study, they were in a group-skills preschool classroom at WELC for 15 hours per week and the KAC for 20 hours per week. They had also been scheduled to make the transition from the pre-school classroom to two different full-time special-education kindergarten classrooms in the summer or fall of that year.
Ariana was scheduled to move to a local special-education classroom (see settings section). According to her teachers and her individualized education plan (IEP) team,\(^1\) factors that influenced her placement were her independent, imaginative play skills and her level of independence during activities of daily living.

Cooper was scheduled to be placed in an autism spectrum disorder (ASD) kindergarten classroom at WELC. His placement factors included his high rate of problem behavior (e.g., elopement, flopping, and throwing) and low independence level in the bathroom (he had not yet been toilet trained). See Table 1 for more participant characteristics.

### Table 1

**Participant Characteristics for Each Child at the Start of the Study**

<table>
<thead>
<tr>
<th>Participant</th>
<th>Age</th>
<th>Gender</th>
<th>Placement</th>
<th>Placement Factors</th>
<th>VB-MAPP Score</th>
<th>VB-MAPP Assessment Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper</td>
<td>5 yr</td>
<td>Male</td>
<td>ASD KG Classroom</td>
<td>Flopping Elopements lack of independent toileting skills</td>
<td>Milestones: 64 Barriers: 29 Transitions: 40</td>
<td>Emitted 15 different spontaneous mands Performed 10 motor movements on command Generalized matching Explored objects Spontaneously followed peers Generalized imitation Scored a 22.5 on the EESA Vocally approximated 15 words Vocally approximated own name Put items away with assistance or prompts Listener verbally or at least 100 words</td>
</tr>
<tr>
<td>Ariana</td>
<td>5 yr</td>
<td>Female</td>
<td>Sp. Edu KG classroom</td>
<td>Imaginative, self-directed play skills Independent activities of daily living</td>
<td>Milestones: 84 Barriers: 25 Transitions: 72</td>
<td>Emitted 8 different spontaneous mands Tacted at least 25 different items Performed 10 motor movements on command Generalized matching Engaged in imaginative play with toys Independently drew or worked in a pre-academic workbook for 5 min Attended to an art activity for 5 minutes, Spontaneous mands to peers Generalized imitation Scored at least a 40 on the EESA Vocalized 15 whole words Completed 5 fill-in statements Responded to group instructions Listener verbally of 50 words Taxed numbers 1-5</td>
</tr>
</tbody>
</table>

---

\(^1\) An individual education program (IEP) team is a group of individuals composed of the parents, special educators, local representative of the educational agency, speech pathologist, occupational therapist, behavior analyst who develop a specialized education plan for a child with special needs (IDEA, 1997).
We collected data in three different locations in southwest Michigan: the Kalamazoo Autism Center (KAC), the WoodsEdge Learning Center (WELC), and a local special-education classroom. The KAC was a practicum site for Western Michigan University’s psychology students who implemented one-on-one, discrete-trial training for children with autism. The experimenter or a trained undergraduate behavioral technician conducted all KAC sessions during each child’s typical four-hour day at his/her desk or in the play area.

The WELC was a special-education center-based school. We collected data in the group-skills classroom, the on-site autism spectrum disorder (ASD) classroom, and an off-site special-education kindergarten classroom located in a local public elementary school. The primary goal for the students in the group-skills classroom was continued development of communication skills, learning in a small group (3–4 children), developing appropriate play with toys and work on toileting and other activities of daily living skills. The goal of the ASD kindergarten classroom was to continue developing higher levels of communication, promote independence, and work on appropriate behavior and social skills. Finally, the off-site special education classroom’s goals were the same as the onsite ASD room except it also included the participation with peers in a general education setting.

We conducted generalization probes in all three special-education classrooms and also collected data during teacher instructions. We continued intervention only with Cooper in his ASD kindergarten classroom, as Ariana did not need continued training.
Assessment

The assessment tool used for this study was the Verbal Behavior Milestones Assessment and Placement Program (Sundberg, 2008) comprised of three components, the milestones, barriers and transitions assessments. All three are based on the basic principles of behavior and Skinner’s *Verbal Behavior* (1957). Prior to this study, it had been used at the KAC and historical assessment data were available for each child.

Milestones assessment listed 15 categories of measurable language and learning skills of a typical 3-year-old-child. Each point represents a milestone skill, with a maximum of 170 points possible.

The barriers and transitions assessments provided a comprehensive list of behaviors or repertoires that may either hinder or predict success for a particular child in a future classroom. More specifically, the barriers assessment is a summarized list of 24 possible language and learning barriers for children with autism. Each barrier can be scored from 0 to 4 for a total of 96 points. The higher the score indicates more barriers. The goal is to reduce this score to zero. The identification of barriers could be used to develop individualized intervention strategies to reduce those barriers and increase overall instructional time and/or learning opportunities in a mainstream classroom.

The transitions assessment can be used to identify if the child is making consistent meaningful progress towards acquiring the skills of a typically developing 3-year-old child. It consists of 24 possible transition skills. Each category can be score from 0 to 5 points, with a maximum of 90. The higher the score, the more “ready” the child is for a mainstream classroom. This assessment identifies priorities for a child who is about to transition into those learning
environments; focusing less on the continued acquisition of academic skills (e.g., intraverbals) and more on the barriers to learning, pre-academic, and pre-requisite skills (e.g., on-task, retention of skills over time, self-help, etc.) (Sundberg, 2008).

Also, Krantz and McClannahan (1999) developed a list of skills that were possible predictors for later success in mainstreamed-kindergarten classrooms. Similar to the VB-MAPP, this list included little-to-no rates of interfering responses (stereotypy and/or problem behavior), sustained engagement during classroom activities, imitation of adult physical/vocal behavior, following simple instructions, generative expressive language, demonstrate generalization across settings, and respond to delayed reinforcement schedules. And once those repertoires were established, other pre-academic skills may be introduced, such as naming (incidental learning), choice-making, picture-activity schedules, and social interactions. These recommendations were also considered when selecting target behaviors for each child.

Transition Process

A child’s transition process is gradual and should start early in the child’s programming. Ideally, classroom “readiness” skills (e.g., instructional control, turn taking, giving up reinforcers, independence, classroom routines, group instructions) should be established before a transition is scheduled (Sundberg, 2011). Therefore, proper assessment and prioritization of any barriers should begin soon after a child is enrolled in an ABA program.

Also, a child’s future placement is determined by their IEP team and is a collaborative effort to select the setting that will be of the most educational value to that child (Sundberg, 2011). As a behavior analyst, the relationship you establish with the members of the child’s IEP
team will allow for open communication between team members, collaboration on goal selection, and the ability to observe the child in its current educational environment (if applicable). Part of this step involves obtaining written consent from the family to be able to communicate with the child and their school and classroom teacher about the child.

During this study, the ability to observe in the classroom had several benefits; we were able to see the child in an educational setting, establish classroom expectations or pre-requisite skills (e.g., remaining on-task, turn-taking, waiting, remaining in the educational area, low rates of stereotypy or other inappropriate behaviors, and responding to 1-step to 2-step instructions), observe how learning opportunities are presented, classroom routines, collect data on target behaviors, and later assess for transfer or generalization of the child’s skills into the classroom. During the classroom observation we collected information on teacher-to-student ratio, reinforcers/reinforcement schedules used, how learning opportunities are presented, instructional activities, commonly-used instructions, daily routines, and observe the instructional aids and materials used in the classroom. We used this information during the training process to promote generalization of the skills into the classroom setting.

The next steps of the transition process involved teaching each skill at the Kalamazoo autism center and observing the child in their new kindergarten classroom to assess for the level of transfer and generalization for each skill. Based on the recommendations of Krantz and McClannahan (1999), we collaborated with the classroom instructors to define our role while in the child’s new kindergarten classroom and established “fade out” criteria to signify when transition services would be concluded.
Our role was first to only observe the child interacting with the instructors in the classroom. If the child’s data remained at the mastery criterion, no other steps were taken at that time. If the child’s behavior did not meet the mastery criterion after the first session, we assessed why and then discussed necessary changes with the classroom teacher. Once all behavior’s met the mastery criterion, we informed the classroom staff that we would begin our “fading out” process. This process included a follow-up one-month classroom observation, a 6-month classroom observation, and at least two email correspondences during the final 6-month follow-up period. See Figure 1 for a diagram outlining our entire transition process.

![Figure 1. Diagram of the Transition Process](image)

**Teaching Procedures**

For Ariana, we selected instruction following, transitions between locations in the classroom, tacting, and on-task behavior as her intervention goals. For Cooper, we selected
instruction following, transitions between locations, echoic articulation training, carrying plates and material manipulation. We used a time-delay procedure to teach instruction following, tacting, and material manipulation and differential reinforcement for on-task behavior, transitions, and carrying objects. We will describe these teaching methods in detail below.

Time-delay procedures can be used to establish language skills and promote generalization for children with autism (Halle, Marshall, & Spradlin, 1979). This errorless-training procedure is commonly used in EIBI programs to teach expressive, receptive, social, play, and leisure skills (Neitzel & Wolery, 2009). At the KAC, time-delay was a standard error-correction procedure. Cooper and Ariana had generalized imitation and therefore, usually responded to our modeling of the target response (least intrusive prompt) following the given delay.

We used a progressive time-delay procedure (0-s to 3-s delay) with a least-to-most prompt hierarchy during transition training at the KAC. The least-intrusive prompt was a model of the correct response and the most intrusive prompt was a full-physical prompt.

Intervention for instruction following, material manipulation and tacting always began at a 0-s delay (model of the correct response, immediately after the instruction), and the trial was correct if the child imitated the model during this phase. We continued with the least-to-most prompt hierarchy if the child did not immediately imitate the correct response. Once the child made a correct response we delivered social praise and the reinforcer, regardless of the intrusiveness of the prompt. The mastery criterion to move to the 3-s delay was three sessions at 8 of 9 correct (89%) or two sessions at 100% correct.
During the 3-s delay phase, we presented only the instruction and no immediate model of the correct response. We modeled the correct response only if it was made within 3s. We continued with the prompt hierarchy if the child did not respond immediately to the model and marked the trial as correct if the response was made within 3 s of the instruction. We marked the trial as incorrect if the child made an incorrect response or responded after the model. Again, regardless of the intrusiveness of the prompt, we delivered a reinforcer once the child made the target response.

Intervention for transitions, on-task behavior, echoic articulation training, and carrying items included differential reinforcement for correct responses and an error-correction procedure for incorrect responses. If the child made a correct response within 5 s of the instruction, we immediately presented praise and a reinforcer, and marked the trial as correct. If the child made an incorrect response or no response within 5 s, we presented an error-correction procedure. These procedures varied slightly depending on the target behavior and will be described in the relevant section.

We used a nine-trial data collection system to teach all the skills, except for the intensive tact procedure (20 trials per session), at the KAC. If the procedure included three targets, we presented each target three times in random order.

ARIANA

The goal was to increase on-task behavior, spontaneous vocal-verbal behavior (i.e., tacting), independent transitions, and instruction following (See Figure 2). Transition training occurred at the KAC and only generalization probes were conducted in the special-education
classrooms. We did not continue training after her transition from KAC to the kindergarten classroom because it was not needed. For each skill, we will describe Ariana’s performance during observations in the group-skills pre-school classroom, in baseline at the KAC, during transition training at the KAC, and then after her transition into her kindergarten classroom.

![Figure 2. Intervention Timeline for Ariana. White boxes represent the baseline, black boxes represent the intervention phase and striped boxes represent the observational probe phase. Gaps between the phases were due to schedules and events in the schools.](image)

**On-Task Behavior at the KAC**

Increasing on-task behavior during an activity reduces a child’s dependency on staff prompting (Hall, McClannahan, & Krantz, 1995) and is a critical component for successful participation in mainstream settings (Krantz & McClannahan, 1999). The goal of this intervention was to increase on-task behavior during known non-preferred activities, using differential reinforcement and blocking for elopement at the KAC. For this skill, we have two
sets of data 1) KAC training data and 2) pre-and post-training observation data collected from both her group-skills and kindergarten classroom (both are described below).

Data Collection

At the KAC, we measured on-task behavior during a 5-min activity using partial-interval recording. We marked every 15-s interval as correct (on-task) if she remained within two feet of the activity area with face oriented toward the materials and off-task if she eloped from the area or turned away from the activity at any time during the interval.

Baseline

She was on-task less than 20% of intervals during a 5-min play activity. We did not present any reinforcers, block elopements, or redirect her back to the activity during baseline.

Procedure

Each session began with Ariana seated at a table and a non-preferred play activity (e.g., marble play set, magnetic dress-up dolls, or building blocks) placed in front of her. Then, we said “play” started a count-up timer, and stood about five-feet away from her desk. We marked the trial correct if she was on-task for an entire 15-s interval and presented social praise and a reinforcer (i.e., an edible placed into a cup or a token on her token board). Any 15-s interval during which an elopement occurred was incorrect. Each elopement was blocked immediately, and she was directed back to the table using the least intrusive prompt necessary (typically a
gentle physical prompt at the shoulder), and represented the instruction. No reinforcer was presented for that 15-s interval.

Results

Ariana’s on-task behavior during a play activity met the mastery criterion in four sessions (See Figure 3). During the generalization phase, her percentage of on-task behavior decreased for two sessions after we added coloring activities. In her special-education kindergarten classroom, her high rate of on-task behavior during similar play activities maintained at 80% or above for all three observations. Though her on-task behavior data met the mastery criterion, a token economy was implemented for Ariana in her kindergarten classroom between the first and second observational probe. This was done to increase her performance on other behavior targets (e.g., instruction following) that are described below.

![On-Task Behavior During 5-min Play Activities](image)

*Figure 3.* Ariana’s Percentage of Time-On-Task During a 5-min Play Activity at the KAC. Observational probes were conducted in her special-education kindergarten classroom.
Pre- and Post-On-Task Training Data

Data Collection

During classroom observations, we used a stopwatch to measure her duration of on-task behavior during a variety of 15–20 min activities (e.g., breakfast, structured play activities, and group instruction). The time was stopped if she left the learning environment or at the end of the activity and the time resumed if she returned to the activity before it ended.

Pre-training

During pre-training observations, Ariana was on-task 45% of the intervals with a range of 15% to 86% during five group-skills classroom observations of non-preferred play activities (see Figure 4). During these observations, she eloped from the area and instructors were often unable to redirect her.

Post-training

Her percentage of on-task behavior during all classroom activities in her group-skills preschool classroom increased from 30% during her last baseline probe to 90% during the first post-intervention probe. The data vary between 75% and 95% after she transitioned into her special-education kindergarten classroom. However, after the teacher’s implemented a token economy, her on-task behavior maintained at 90% or above for the final three observational probes.
On-Task Behavior in Special Education Classrooms: Pre- & Post-On-Task Training

![Graph showing on-task behavior](image)

Figure 4. Percentage of Time-On-Task During Classroom Observations Before and After Transition Training at the KAC. Squares represent her performance in the group-skills preschool classroom and the triangles represent her performance in the special-education kindergarten classroom.

**Instruction Following**

We observed three specific vocal instructions in her group-skills classroom: raise hand, quiet mouth, and quiet hands. Usually, the teacher presented a picture card simultaneously with each vocal instruction. Therefore, we taught Ariana to raise her hand when we said “raise hand,” close her mouth and place a forefinger vertically to her lips when we said “quiet mouth,” and place her hands on top of one another on her lap or on the table in front of her when we said “quiet hands.”
Baseline

No model, error-correction or reinforcer was delivered for any responses during the three sessions of baseline. Ariana’s mean correct responses were 37% (chance level).

Procedure

Each session began with Ariana facing the instructor. We waited for her to make eye contact and then presented each verbal instruction simultaneously with a corresponding picture card.² We presented each instruction with her sitting at her desk during the 0-s delay and 3-s delay phases. However, during natural environment training sessions, we presented each instruction at other locations within the classroom (i.e., at the snack table, outside or in the play room).

Results and Discussion

Ariana’s responses met the mastery criterion in six sessions (See Figure 5). Sessions continued during the natural-environment-training phase until there were at least four sessions at 90% or above, across two days or with two different behavior technicians to ensure consistent, correct responding. We did not fade out the picture card prompt because her new classroom typically used those visual prompts with all students. However, the ability to follow instructions without the use of additional prompts is ideal for most children in mainstream or other less restrictive environments (Krantz & McClannahan, 1999; Sundberg, 2008).

²For a visual example of each stimulus used during instruction, see Appendix A.
Ariana responded correctly to 50% of teacher-presented instructions during our first observation in the new special-education kindergarten classroom. A token economy was implemented shortly after the first observation and her compliance with instructions increased to 100% during the second follow-up observation. Also, during the second visit to the classroom, her teachers reported a high rate of compliance with all simple instructions throughout her day.

Instruction Following

![Graph showing percentage correct responses over sessions](image)

Figure 5. Ariana’s Percentage of Correct Responses. The first four phases were conducted at the KAC and the observational probe data were collected in her special-education kindergarten classroom.

Transitions

Usually, Ariana eloped or required two or more prompts to move from one classroom activity to another in her group-skills classroom. Our goal was to increase correct, independent transitions within the classroom using differential reinforcement, a least-to-most prompt hierarchy, and blocking for elopements. We taught three different transitions, walking to the
sink, the bathroom and the snack table. Each was selected because they were 10–15 ft in distance and present in both the KAC classroom and her group-skills classroom. Later, to promote generalization, we taught her to respond to a “wait” instruction and then presented a short activity at the destination before we moved on to the next trial (i.e., eat a small snack, wash hands, turn off a light, grab a toy, etc.). We only collected data on the wait trials, not her engagement in the activity presented after the transition. Though, anecdotally she completed those tasks with little to no prompts.

Baseline

We did not provide a reinforcer for correct responses, prompts for incorrect responses or blocked any elopements in baseline. Ariana’s mean correct transitions were 33% over nine sessions.

Procedure

Each trial began when we said “walk to ___” and simultaneously presented the corresponding picture card. We marked her response as correct if she walked to the specified location without prompts or elopements and incorrect if she walked in the wrong direction or eloped. When needed, we used a least-to-most hierarchy to prompt the correct response and presented a reinforcer, regardless of the intrusiveness of the prompt, after she made the target response.

We added a wait instruction (we held up a hand and said “wait”) after 19 sessions of consistent, correct responding for walking to each location. We taught her to wait for 5–10s at
the location during the wait-training sessions. We collected data separately for the walking to and waiting response, but did not deliver a reinforcer until after the 5–10s wait interval had elapsed with no elopements.

Results

Ariana’s transitions met the criterion for mastery in five sessions (See Figure 6), but we continued sessions for maintenance. When we added a wait instruction, she waited consistently after each transition. However, correct transitions decreased after the sixth session, possibly due to the delayed reinforcer delivery for the walking response.

Figure 6. Ariana’s Percentage of Correct Transitions. Black circles represent correctly walking to the location and open circles represent correctly waiting at the location for 5-10 s.

After she transitioned into her special-education kindergarten classroom, Ariana independently responded to only 50% of the instructions (i.e., go to the snack table, go to the
classroom door, go to the bathroom). As mentioned previously, in the time between the first and second observation sessions, her classroom teacher added a token reinforcement system. The contingent presentation of tokens may have increased her correct transitions to 100% during the second observation.

**Intensive Tact Procedure**

Ariana emitted on average 1.2 spontaneous words per minute during two one-hour observations at the KAC. Often, her spontaneous vocal behavior consisted of babbling or non-functional/unintelligible speech. Her most frequent intelligible mands were “no” or “stop.” We used an intensive tact procedure (Greer & Du, 2010) to increase her spontaneous vocal behavior at the KAC.

**Baseline**

Ariana independently labeled the items 10% over two sessions. We pointed to the object if she did not look at it immediately, but we did not provide any feedback for correct or incorrect responses. We moved on to the next trial if no response was made within five seconds.

**Procedure**

Each session included 20 different targets that were divided into sets of five. Each set was taught in a different location in the KAC classroom.\(^3\) We presented objects one at a time to

\(^3\)For a list of targets and locations used for the intensive tact procedure, see Appendix B.
Ariana by placing each object in front of her. We pointed to the item if she did not look at it immediately, but presented no verbal instructions.

Results and Discussion

Her responses met the mastery criterion within five sessions (See Figure 7). However, during a single, one-hour, free-operant post-intervention observation session, she only emitted .73 words per minute. This suggested that the intensive tact procedure did not effectively increase spontaneous words in her natural environment. We may have seen better results with more time and training sessions. Unfortunately, we were not able to continue sessions or train for generalization before our post-intervention observation, as she transitioned to her special-education kindergarten classroom soon after.

Figure 7. Percentage of Correct Tacts Emitted During the Intensive Tact Procedure
At the end of her three-month training at the KAC, Ariana learned and maintained appropriate on-task behavior, independent transitions, and simple, commonly-used instructions. Many of her behaviors did not transfer during the first observation session in the kindergarten classroom. We suspected that her lack of performance was due to no effective reinforcers in her new classroom environment. And, when her kindergarten instructor(s) used contingent reinforcement for target behaviors with a token economy, her performance returned to mastery levels. Three months after she transitioned, her teacher had no complaints about her performance. Specifically, she was remaining on-task, emitting higher rates of spontaneous intelligible speech, and following instructions and classroom routines independently (see Appendix D for details).

COOPER

The goal was to increase instruction following, independent transitions, material manipulation, plate carrying, and articulation (see Figure 8). Transition training occurred at the KAC and generalization probes were conducted in both his pre-k and kindergarten classrooms. Also, unlike Ariana, we continued training in his autism spectrum disorders (ASD) kindergarten classroom to decrease his flops during classroom-scheduled transitions. For each skill, we will describe Cooper’s performance during observations in the group-skills pre-school classroom, in baseline at the KAC, during transition training at the KAC, and after his transition into his ASD kindergarten classroom.
Instruction Following

While at the KAC, we taught Cooper to follow three commonly-used classroom instructions: quiet hands, raise hand and quiet mouth.

Baseline

We presented each instruction simultaneously with a picture card but did not provide any additional prompts or feedback for correct or incorrect responses. Cooper's mean correct responses were 36% (chance level) for four sessions.

Figure 8. Intervention Timeline for Cooper. White boxes represent the baseline, black boxes represent the intervention, and striped boxes represent the observational probes. Gaps between the phases were due to schedules and events in the schools.
Procedure

Cooper’s instruction following procedure was the same as Ariana’s with the exception of the natural environment training phase. Her natural environment training only included presenting the instruction in novel settings. Cooper’s included providing instructions after arriving at a new location, intermittently during playtime activities, when he was engaging in loud, non-functional vocal behavior, or playing with items inappropriately.

Results and Discussion

His responses met the criterion for mastery in five sessions and remained at mastery level during natural environment training at the KAC (See Figure 9). After Cooper transitioned into his ASD classroom his responding remained at 88% or above during the one-week and one-

![Instruction Following Diagram](image)

*Figure 9. Percentage of Correct Responses During the Instruction Following Procedure.*
month follow-up observations. Also, the instructors reported that Cooper was responding to all taught instructions independently and even raising his hand before the visual prompts were presented during group activities.

Manipulating Items

When presented toys or other objects Cooper would usually swipe, throw, or immediately begin engaging in stereotypic or inappropriate behavior (e.g., shuffling them back and forth or hiding them). These behaviors often delayed or interfered with classroom instruction for both Cooper and the other children. Therefore, we used signal training to teach him to wait before interacting with the items and then imitation training to teach appropriate item manipulation.

Baseline

We presented only the “wait” instruction with no consequences for any responses. Cooper’s mean correct responses were 9.5% across two sessions.

Procedure

Each session began with a set of items placed in front of Cooper: Play-doh and a tray, a crayon and paper, or magnets and a magnetic board. Then, we said “wait” and held up a “wait” card. If Cooper’s hands remained in his lap during the 5–10 s interval, we said “yeah” or “go play” and he was allowed to manipulate items for three seconds. We presented a reinforcer and marked the trial as correct if he reached only after he was given permission (“yeah” or “go ahead”). If he reached for the items before permission was presented we blocked his hands,
redirected them back into his lap, and marked the trial as incorrect. We re-presented the instructions until a correct response was made and then delivered the reinforcer.

After Cooper’s responses met the mastery criterion for waiting, we introduced imitation training. Instead of saying “yeah” after the wait trial, we said “do this” and modeled an appropriate use of the materials. Then gave permission to reach forward and imitate the model. We marked the trial correct if he imitated the response correctly and incorrect if he made no response or a non-target response after the model. We blocked any inappropriate play, redirected his hands back to his lap, and represented the trial (up to three times) or until the correct response was made. For both set of responses, we delivered a reinforcer after the correct response was made or moved on to the next trial if he made no correct response after three attempts.

Results

Cooper met the mastery criterion in six sessions during the wait-training phase and maintained at the mastery level during the maintenance and imitation training phases (See Figure 10). When we added the imitation training, his imitative responses met the mastery criterion in three sessions. Later, we faded out the immediate imitation model and responses still remained at the mastery level with no inappropriate toy manipulation observed during those sessions.

After Cooper transitioned to his ASD classroom, he made no correct waiting or imitative responses on three occasions during our first observation. Soon after, we trained the staff to provide the wait signal and to model appropriate toy manipulation. After training and during the

---

4 See Appendix C for a list of modeled responses used during this procedure.
Figure 10. Black Circles Represent Cooper’s Correct Wait Trials and Open Circles Represent His Correct Imitation Trials.

one-month follow-up observation. we observed correct waiting and imitative responses on three of four opportunities.

Echoic Articulation Training

At the start of this study, Cooper correctly responded to 22.5 of the 50 echoic opportunities on the Early Echoic Skills Assessment (Sundberg, 2008). Often his articulation was unintelligible to unfamiliar adults. Our goal was to use an intensive echoic training procedure with differential reinforcement to increase his articulation intelligibility. We collaborated with his speech pathologist at the WELC and selected a combination of words and consonant-vowel targets based on her recommendations.
Procedure

We gave Cooper three attempts to make the correct echoic response and provided a vocal model for each. We delivered a reinforcer for correct echoic responses, regardless if it was first, second, or third attempt. After three attempts with no correct response, we ended the trial and presented a well-mastered, non-echoic trial before moving on to the next echoic trial.

Results and Discussion

Cooper mastered 17 of 21 targets at the KAC (See Figure 11) with an average of 14 trials per target ranging from 9 to 39 trials. Three of the targets were not mastered because he transitioned out of the KAC before meeting the mastery criterion. The final un-mastered target “Ga,” was possibly too advanced for him at the time of the study.

![Trials to Mastery for Echoic Targets in Order of Introduction](image)

*Figure 11. The Number of Trials to Mastery for Each Echoic Target in Order of Introduction. Black bars indicate targets mastered and white bars represent un-mastered targets.*
After four weeks and 378 trials of articulation training Cooper’s EESA score increased from 22.5 to 59 of 100 echoic opportunities. After he transitioned into his kindergarten classroom, he spontaneously emitted echoic responses an average of 5.5 per hour (across three sessions). His instructors reported that his rate of echoics was higher and more consistent than his classroom peers (see Figure 12).

**Cooper's Early Echoic Skills Assessment:**

<table>
<thead>
<tr>
<th>Score</th>
<th>Pre-Test</th>
<th>Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apr-15</td>
<td>Jul-15</td>
</tr>
<tr>
<td>0</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>20</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>50</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>70</td>
<td>40</td>
</tr>
<tr>
<td>70</td>
<td>80</td>
<td>30</td>
</tr>
<tr>
<td>80</td>
<td>90</td>
<td>20</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
<td>10</td>
</tr>
</tbody>
</table>

*Figure 12.* Pre-and Post-Test Score of Cooper’s Early Echoic Skills Assessment (EESA) (Sundberg, 2008).

**Carrying Plates**

Cooper often dropped or threw items when carrying them from one location to another. And also required hand-over-hand prompting to prevent dropping food during meal times at the KAC. Our goal was to use differential reinforcement and an error-correction procedure to teach him to carry a plate, with a food item on it, 5–10 ft without dropping or throwing them.
Baseline

We said “carry to the table” but provided no reinforcement for correct responses or error correction for incorrect responses. He only carried the plate to the table successfully once of nine opportunities.

Procedure

Each session began with Cooper standing in front of his desk where we presented a food item on small plate and said, “carry to the table.” We praised and allowed him to consume the food on the plate if he did not drop anything. When he did drop something, we said, “pick up,” returned him to the start location, placed a fresh his food item on the plate, and re-presented the instruction. He was allowed also to consume the reinforcer once he made the correct response.

Results and Discussion

He met the mastery criterion in two sessions and remained at mastery level for the following seven sessions at the KAC (See Figure 13). During the one-week and a one-month follow-up observation in his ASD classroom, he carried objects correctly six of seven opportunities. Anecdotal accounts from his instructors were that when he carried his food in his ASD classroom, he would walk slowly, look at the food he was carrying, and not drop it, which had not been observed prior to the intervention.
Figure 13. Cooper’s Percentage of Correct Responses for the Carrying Plates Procedure. Observational probes were conducted in his ASD classroom.

Transitions

Usually, Cooper would elope and/or flop to the floor during transitions between activities in his group-skills preschool classroom. His flopping and elopements restricted his independence in both school and community settings and was a concern for both his instructors and his parents. Our goal was to use differential reinforcement and blocking for elopements and flops to increase his transitions between locations at the KAC (see Figure 14).
Baseline

We presented no reinforcers for correct responses and did not block elopements or flops. Cooper transitioned correctly an average of 55% of the trials for three sessions. Also, we did not present the wait instruction (part of the training procedure) during baseline.

Procedure

See Ariana’s transitions section for details.

![Transitions Graph]

*Figure 14.* Percentage of Correct Transitions to Three Different Locations. Observational probes were conducted in his ASD classroom.
Results and Discussion

At the KAC, Cooper met the mastery criterion in two sessions. We added the wait instruction after seven sessions of mastery-level responding. His responses maintained at the mastery level for the remainder of the sessions at the KAC. However, once he moved to his ASD classroom, his correct transitions quickly declined, possibly due to the increased walking distance and no effective reinforcers. The classroom-based intervention used to decrease flops during these transitions is described the next section.

Decreasing Flops

After Cooper moved to his ASD kindergarten classroom, he usually flopped\(^5\) (i.e., at least one body part, beside the bottom of his feet, touching the floor) when walking from one location to another. The results of a functional analysis screening tool (Iwata, 2005) suggested that flops were maintained by access to attention and automatic reinforcement (i.e., stimuli from laying on the floor or opportunity to crawl and then run). However, flops were still occurring at least once during all transitions after attempting to provide attention only while walking and removing that attention while he was on the floor. This suggested that an attention-only intervention would not be sufficient. Instead, we added a second reinforcement contingency that would ideally compete with the present automatic reinforcers. We used differential reinforcement for walking, hand holding (to block elopements), and a lift protocol to decrease flops while walking in his ASD

\(^5\) We originally collected data on both flops and elopements. However, hand-holding decreased elopements to near zero because it removed Cooper’s opportunity to elope; we, therefore, did not include those data.
classroom. Distances between locations inside the classroom were 15 ft, and distances between different locations in his school varied anywhere from 20 to 560 ft.

Usually, transitions between activities in Cooper’s ASD classroom began when an instructor said “go check your schedule.” He would then locate his visual activity schedule, select the icon that was at the top, carry the icon to the corresponding location, and either wait at the location until the activity began or wait at the classroom door before walking to another location in the building. Typically, instructors did not hold his hand during the “schedule-checking” steps but the instructors did hold his hand or he held on to a “walking” rope while transitioning to other locations in the building. When Cooper flopped his instructor said “stand up.” If he did not stand up immediately, the instructor presented additional instructions or questions (e.g., “you want to go to breakfast?” or “stand up; being on the floor is not safe”) until he stood up. Anecdotally, flops lasted at least two minutes and typically resulted in the loss of classroom instruction time.

Data Collection

We collected data during Cooper’s typically scheduled transitions in his ASD classroom. We recorded the total number of flops that occurred during a walking opportunity and the distance divided by 10 to get an average number of flops that occurred every 10 ft. The classroom instructors collected interobserver agreement (IOA) data.
Baseline

We collected data with all instructors leading the transition. Cooper’s mean number of flops per 10 ft was .58 for walking to locations inside his ASD classroom (see Figure 15). His mean number of flops per 10 ft was .51 for walking to locations outside of the classroom (see Figure 16).

Intervention with a Toy

During this phase, we lead all of Cooper’s transitions while in his ASD classroom. After the instructor’s said “go check your schedule,” we presented two known, preferred small toys and asked “which one?” and he was allowed to select one of the toys. We held his hand during the entire transition and allowed him to carry the toy while walking. If he flopped, we removed the toy, provided no verbal instructions and minimal social attention (e.g., eye contact), and

![Flops during Transitions Outside the ASD Classroom](image)

**Figure 15.** Cooper’s Mean Number of Flops per 10ft During Transitions to Locations Outside the ASD Classroom.
implemented the lift protocol, if he did not stand up immediately. The lift protocol was intended to block elopements and encourage him to stand up. If he did not stand back up immediately, we stood behind Cooper so he was in a seated, upright position. Then, we placed our hands under his arm pits and applied gentle upward pressure. If he resisted this physical prompt at any time, we stopped immediately, but did hold his hand until he stood up. Once he stood up and took a step, gave him back the toy and continued the transition.

Inside the classroom, his mean number of flops per 10 ft transition was essentially unchanged (.58 during baseline and .53 during intervention). But, flops outside the classroom, dropped considerably (.51 during baseline and .08 during the intervention) suggesting that the presentation of a reinforcer while walking decreased his flops only outside the classroom. However, his flops inside the classroom were high for two of the three sessions (See Figure 17).
During those sessions, he threw the toy and when we went to retrieve the toy, he flopped. Throwing the toy occurred outside the classroom as well, but at a much lower rate. Therefore, because of the poor performance inside the classroom, we returned to baseline and then started a different intervention, without the toy.

Return to Baseline

Cooper’s flops increased from .53 to 1.16 per 10 ft inside the classroom and .08 to .42 outside of the classroom.

*Figure 17. Cooper’s Mean Number of Flops per 10ft During Transitions to Different Locations Inside and Outside of the ASD Classroom.*
Intervention with Music

We selected music because it was a previously known reinforcer for Cooper, could be presented continuously, was less prone to satiation, and less disruptive than a toy (Standley, 1996). This intervention was the same, except we presented music (played through headphones) contingent on continuous appropriate walking. We turned off the music (unplugged the headphones from the media player), if he flopped; and it was not turned back on until he stood up and took a step.

Flops decreased from 1.16 to .11, for transitions inside the classroom, and .42 to .19, for transitions outside the classroom. At this time, we wanted to be certain that music was a crucial variable prior to training the staff to use the intervention. For the next phase, we removed music and media player.

Hand-holding and Lift Protocol Only (Within-Classroom Transitions)

This intervention was the same except we no longer presented music while walking. His mean number of flops decreased to zero for transitions inside the classroom. However, these transitions were at zero for five sessions prior to start this intervention (see Figure 17) and remained at zero for all seven sessions. This suggested that neither the toys or music were needed to reduce flops in the classroom and holding his hand during these shorter transitions was all that was necessary. Therefore, we trained the staff to continue the hand-holding intervention for within-classroom transitions only.
Hand-holding and Lift Protocol with Instructor (Within-Classroom Transitions)

The instructors continued the hand-holding intervention for Cooper’s within-classroom transitions. And they would intermittently present small food items after he arrived at his destination, which was the common classroom protocol. Cooper’s mean number of flops per 10 ft remained at zero; Therefore, we discontinued data collection on his flops within the classroom. The remaining interventions occurred only for transitions outside of the classroom.

Hand-holding and Lift Protocol Only (Outside-of-Classroom Transitions)

Outside of the classroom, flops remained at .2, suggesting that music was not crucial. However, his rate of flops was of concern to the ASD classroom staff. Therefore, we re-evaluated music as a reinforcer. This time we included more songs, an opportunity to make a song choice, and the requirement that Cooper sit for 1-min before starting the transition.

Intervention with Music Choice

The intervention was the same except we added a choice-making opportunity before every transition. One minute before a transition, we ended the current (typically preferred) activity by guiding Cooper to a chair and saying “Let’s make a choice.” His walk to the chair was immediately followed by the presentation of the media player. The screen of media player had an icon for each available song. He was allowed to select a song and listen to it for 10 s before the transition. This choice opportunity was also done because it changed the relevant before and after conditions of his typical transitions from the removal of a preferred activity to the presentation of a different preferred activity presented in the classroom. For example, during
a transition from the *Motor Depot* room to the classroom walking resulted in the removal of access to running and biking (preferred activities), therefore when we approached him and said “time to go ___” he would immediately, laugh, run away, and then flop. However, during this phase, when we said “let’s go make a choice” and showed him the media player, he would let us guide him by the hand to a chair and did not elope or flop. By dividing the transition into two steps we removed the penalty (negative punishment) contingency that was typically present during the transition. Instead, the only active contingency during the transition was the continuous presentation of music while walking. Cooper’s mean number of flops decreased from .2 to .01 during this phase.

**Return to Baseline**

We returned to baseline for a short time to ensure our intervention was effective in spite of confounding variables. Cooper’s flops per 10 ft increased from .01 to .9, the highest data point yet.

Furthermore, after reviewing the data and observational notes taken during the previous intervention phase, we noticed that Cooper had started to push away or take off the headphones while walking, but would mand for music once he arrived in the classroom. In addition, we wanted to use an intervention that was equally effective, but easier to implement because it would not require the staff to carry headphones during each transition. Therefore, we changed from continuous reinforcement to differential reinforcement and added a choice-board, complete with several different highly preferred options for Cooper to choose from.
Intervention with Choice Board

We presented a small board that had 3 to 6 icons that represented available reinforcers (e.g., common area, opportunity to choose a song, Cheez-Its, M&Ms, trampoline and iPad). These icons were part of a classroom-wide icon exchange system used throughout his day. During his 1-min sitting period, Cooper was allowed to choose an item or activity by either pointing to the icon, saying the name of the item, or handing the icon to the experimenter. Once he selected an icon, we said, “first walk, then ___;” and then we started the transition. The hand holding and the lift protocol were continued during these sessions. During this phase, flops reduced from .9 in the baseline to .02. At that time, we determined the intervention to be successful and began staff training.

Staff Training

We provided the classroom instructors with a task analysis of our flop intervention. This allowed them to collect treatment fidelity and flop data throughout his day (See Appendix E for the treatment fidelity checklist). Cooper's flops were a mean of .08 during this phase. Though there was a slight increase in flops during the first two training sessions, the rate decreased to almost zero during the remaining six sessions. The staff were consulted weekly on the intervention and the checklist to make sure it was clear and easy to use.

Discussion

Cooper’s flops decreased from about .58 every 10 ft to zero for transitions inside of the classroom and .53 to .02 for transitions outside of the classroom. For transitions outside the
classroom, the most effective intervention package was the choice opportunity, differential reinforcement, hand holding and a lift protocol. For transitions inside the classroom a hand-holding intervention was effective. At the end of this study, flops occasionally occurred during longer transitions, but at a much lower rate and, anecdotally, for shorter durations.

Discussion

At the end of his three-month training at the KAC, Cooper learned and maintained simple instructions, carrying plates to his snack table, appropriate material manipulation, and increased articulation clarity. Also, we intervened for 11 months in his ASD kindergarten classroom to decrease flops and, by the end of the study, those occurred only about once per day. Also, his teachers reported that he was engaged in the group instruction activities, raised his hand to participate, and requested and labeled objects spontaneously. See Appendix D for more details.

VB-MAPP PRE- AND POST-TEST RESULT

A pre-test VB-MAPP assessment was conducted for both children in April 2015, prior to the start of the study. And each post-test was conducted before they transitioned into their new classroom. Cooper’s was on July 2015 and Ariana’s was on August 2015. A description of each child’s results is below.

Ariana

Ariana’s score increased from 84 to 93 of a possible 170 on the milestones assessment, decreased from 25 to 20 of a possible 96 on the barriers assessment (lower scores indicate fewer
barriers), and increased from 72 to 81 of a possible 90 on the transitions assessment (See Figure 18). Specifically, her areas of improvement included independent sustained play for 10 minutes, independent drawing or writing in a pre-academic activity for 5 minutes, sustained social play for 3 minutes, transitioning between school activities with no more than one gestural prompt, sitting in a group of 3 or more children for 10 minutes while attending to the material and responding to teachers instructions, a decrease in her dependency on reinforcers, an increase in her echoic repertoire, and an increase in self-directed leisure time. The increase in sustained on-task behavior, instruction following and transitioning between activities independently was most likely due to her transition training at the KAC.

![Ariana's VB-MAPP Pre- and Post-Training Scores](image)

*Figure 18. The Results of Ariana’s VB-MAPP Assessment Before and After the Study.*
Cooper’s score increased from 64 to 68.5 of 170 on the milestones assessment, decreased from 29 to 22 of a possible 96 on the barriers assessment, and increased from 40 to 56 of a possible 90 on the transitions assessment (See Figure 19). His areas of improvement included playing with items in a creative way at least two times in one hour, transitioning between classroom activities with only a gestural prompt, sitting in a group of three or more for 2 minutes, an increase in his echoic, articulation, and mand repertoire, decreased reinforcer dependency, increase in independent eating, an increase in his generalization of skills, an increase in sustained engagement in academic activities, and transfer of trained skills to new contexts. His increase in transitioning between school activities, articulation clarity, following instructions and playing creatively with toys were most likely due to the KAC training.

Figure 19. The Results of Cooper’s VB-MAPP Assessment Before and After the Study.
Discussion

The purpose of this study was to replicate the research of Russo and Koegel (1977) and Krantz and McClannahan (1999) and to transition two children with autism from a one-on-one discrete-trial setting to a special-education classroom. We first established a transition process and then piloted it for two of our children at the KAC.

Overall, there was generalization of each child’s skills into their new classroom, but several skills needed additional training and/or a schedule of reinforcement to maintain target behaviors. For both children, we designed the one-on-one training of each skill based on the recommendations of Stokes & Baer (1977). We taught each skill as closely as possible to their classroom environment by training loosely, using the same instructional stimuli (e.g., the picture-prompt cards), varying reinforcers, using a similar reinforcement schedule observed in the classroom, and training until the behavior was occurring a high enough rate that it would contact reinforcement in the classroom environment.

Training for generalization was a crucial component, however some skills for each child (listed below) did not transfer immediately because the teaching environment did not support (as well as possible) those target behaviors until we conducted some training of the classroom staff. This was consistent with Malott & Shane (2013) recommendations for the transfer and maintenance of skills in a new environment. In order for an established behavior to be maintained in a new environment, that new environment should reinforce the behavior either on an intermittent reinforcement performance-management schedule or by a naturally occurring reinforcement contingencies (i.e., behavior traps).
For Ariana, we increased on-task behavior, transitions between activities, and instruction following. We did not see an increase in her spontaneous vocal language following the intensive tact procedure, possibly due to the limited amount of time spent on this skill in training. Once she transitioned to her new classroom, she demonstrated each skill at mastery level after a token system was used to provide reinforcement for all appropriate classroom behaviors. The change in performance after token economy was added suggested that her lack of transfer during the first observation was not because she could not perform the skill but because a supporting reinforcement contingency was needed to maintain her performance.

For Cooper, we increased instruction following, carrying plates, manipulating items appropriately, articulating words and sounds clearly, and transitioning between locations in his classroom with minimal flops. Once he transitioned into his new classroom, instruction following and carrying plates transferred into his new classroom without additional training. This was most likely to do the naturally-occurring reinforcement contingencies present in the new classroom. Specifically, hand raising was reinforced with the presentation of a manding opportunity and carrying items to his snack table was immediately reinforced with access to the food item. Material manipulation transferred after the classroom staff were trained to present the “wait” signal. Also, transitioning between activities required 11 months of additional intervention in the ASD classroom before flops reduced to one occurrence per day. For both skills, the classroom staff being trained to present the instruction and to provide reinforcers similar to the training environment most likely supported its transfer to and maintenance in the classroom environment.
The kindergarten classroom instructors for both children completed a short survey after at the end of the study. The results of the survey suggested that the instructors felt that the transition was a successful for their child. It was specifically noted that Cooper entered his classroom with the one of the best instruction-following and echoic repertoires of the class. Ariana’s instructor commented that she entered the classroom with excellent independent and creative play skills.

Though the transition for both children was successful, after spending over 100 hours combined in the kindergarten classrooms, there were several skills that may have benefited from more training time in the one-on-one setting. For Cooper, this was decreasing all problem behaviors, including elopements, and increasing our distance between us and him when presenting instructions. For Ariana, we should have spent more time on increasing her spontaneous vocal behavior.

Also, during our observations, there are several skills that were not targeted but may be beneficial to include in any child’s transition training program. We suggest also considering the following goals: remaining on-task during classroom activities without an adult near, responding to instructions presented from a distance, having a variety of toys as reinforcers, following 2-step instructions without an instructor near and/or requires scanning the environment, peers as reinforcers, and the ability to maintain socially appropriate hygiene (e.g., hands out of nose or pants and sneezing and coughing with mouth covered). We recommend that any future replications of this transition process at the KAC or in any other clinical settings include these skills.

Future research may benefit from conducting a more direct comparison of a child’s transition into a less restrictive environment with or without transition training. Also, additional
replications would help to establish a comprehensive list of targets will be of the most value for children with autism to have before they transition in less restrictive environments and expands upon currently used assessments.
Appendix A

Pictures Used for Instruction Following and Transitions
The pictures used for both Cooper and Ariana’s instruction following and transitions procedure.

A) Quiet hands, B) Quiet mouth, C) Raise hand, D) Snack table, E) Sink, and F) Bathroom
Appendix B

Intensive Tact Data Sheet
The data sheet used during Ariana’s intensive tact procedure.
Appendix C

List of Modeled Responses for Material Manipulation Procedure
A list of all nine modeled responses used during the imitation training phase of Cooper’s material manipulation procedure.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animal Magnets</strong></td>
<td>Rearranging the magnets on board</td>
</tr>
<tr>
<td></td>
<td>Labeling each magnet</td>
</tr>
<tr>
<td></td>
<td>Pointing to each and making the appropriate animal sound</td>
</tr>
<tr>
<td><strong>Playdo</strong></td>
<td>Rolling into ball between hands</td>
</tr>
<tr>
<td></td>
<td>Rolling into a cylinder using one hand and table</td>
</tr>
<tr>
<td></td>
<td>Pushing a ball of playdo flat on to table using one hand</td>
</tr>
<tr>
<td><strong>Coloring</strong></td>
<td>Scribbling within a large circle</td>
</tr>
<tr>
<td></td>
<td>Drawing three circles</td>
</tr>
<tr>
<td></td>
<td>Drawing three vertical lines</td>
</tr>
</tbody>
</table>
Appendix D

Epilogue for Ariana and Cooper
Epilogue

Ariana

One year and one month after her transition into her kindergarten classroom Ariana is reportedly doing well, according to her classroom teacher. She is making progress on her IEP goals, remaining on-task, following simple instructions and responding consistently during group instruction. They are still working to improve the clarity of expressive language and following two-three step instruction, particularly if she is asked to get an item that is not immediately in her eyesight. At the time of the study, her IEP recommended 200 minutes of general education time (e.g. gym and recess). However, at the time, she was not recommended for a different classroom or an increase in the general education time because the academic curriculum was too advanced for her current repertoire.

Cooper

One year and three months after his transition into his kindergarten classroom, Cooper was consistently raising his hand to request songs, toys or to take a turn during group instruction independently and without the use of the picture card. He was echoing words spoken by instructors and in videos spontaneously an average of 5 times hour and spontaneously labeling items in the classroom an average of 6 times per hour. He was engaging in new problem behavior not present before the study (e.g. screaming, and hitting peers) and flops were reportedly still occurring at least once a day during transitions in his classroom. He was not recommended for a new classroom at that time.
Appendix E

Treatment Fidelity Checklist for Cooper’s Decreasing Flops Intervention
The treatment integrity checklist used during the staff training phase of Cooper’s Decreasing Flops intervention.
Appendix F

VB-MAPP Score Sheets
Copy of Cooper’s VB-MAPP milestones assessment.
Copy of Cooper’s VB-MAPP barrier’s assessment.
Copy of Cooper’s VB-MAPP transitions assessment.
Copy of Ariana’s VB-MAPP milestones assessment.
Copy of Ariana’s VB-MAPP barriers assessment.
Copy of Ariana’s VB-MAPP transitions assessment.
Appendix G

Human Subjects Institutional Review Board Approval Form
Date: May 12, 2015

To: Richard Malott, Principal Investigator
    Jennifer Freeman, Student Investigator for dissertation
    Sydney Harbaugh, Student Investigator for thesis
    Allison Beveridge, Student Investigator

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 15-05-11

This letter will serve as confirmation that your research project titled “Transitioning Children with Autism from 1-on-1 Discrete-trial Settings to a Special Education Classrooms” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may only be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., you must request a post approval change to enroll subjects beyond the number stated in your application under “Number of subjects you want to complete the study”). Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: May 11, 2016

3700 Wood Hall, Kalamazoo, MI 49008-5439
PHONE: (269) 387-4500 FAX: (269) 387-4550
WEBSITE: www.wmich.edu/psychology/


