

OBSERVATIONAL LEARNING OF ACADEMIC AND SOCIAL BEHAVIORS  
DURING SMALL GROUP DIRECT INSTRUCTION

By

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## CHAPTER I

### INTRODUCTION

Using response prompting procedures during small group direct instruction has been effective for almost 200 participants with and without disabilities in at least 47 published studies (for a review, see Ledford, Lane, Elam, & Wolery, 2012), including 7 studies conducted with preschool-aged participants (e.g., Alig-Cybriwsky, Wolery, & Gast, 1990; Venn, Wolery, & Greco, 1996). If each participant is taught different behaviors during small group direct instruction, they may learn behaviors taught to their group mates, referred to as observational learning (Bandura, 1977). Learning observationally from group mates results in increased teaching efficiency. In the review, 33 of 47 studies were structured so observational learning could occur. Almost all participants (98%) learned at least some behaviors not directly taught to them, and about 20% learned all behaviors taught to their group mates (Ledford et al., 2012).

In previous studies, observational learning was typically measured for discrete academic behaviors (e.g., naming words) for school-age participants. Few studies with preschool participants measured observational learning of stimuli assigned to group mates. Only one published study was conducted with groups of participants with and without disabilities; this study did not measure observational learning (Venn et al., 1996). Given that small group instruction has been successful for many participants, including preschoolers, small group direct instruction with opportunities for observational learning is recommended practice for early childhood classrooms to increase instructional efficiency when teaching academic skills (Wolery & Hemmeter, 2012). The evidence for the occurrence of observational learning for academic

behaviors raises the question of whether social behaviors, such as peer-directed prosocial behaviors, could be acquired observationally in small group direct instruction on academic behaviors. Ledford and Wolery (in press) evaluated this proposition by showing initial evidence that some social skills (i.e., sharing and to a lesser extent saying “thank you”) can be acquired observationally during small group instruction on academic behaviors.

Acquisition of social skills is important because peer-related prosocial behaviors are necessary for successful performance in early childhood settings (Lane, Stanton-Chapman, Jamison, & Phillips, 2007) and are important predictors of later school performance and peer acceptance (Kohn & Rosman, 1972; Odom et al., 2006; Ullman, 1957). Prosocial behaviors (e.g., sharing, helping, and giving compliments) benefit young children by increasing friendship opportunities and access to play activities and progressively more complicated social exchanges (Ladd, 2008). However, children who do not exhibit prosocial behaviors may be denied these learning opportunities, leading to more delayed social skills. In addition, failure to exhibit prosocial behaviors may lead to decreased peer affiliation for preschoolers with and without disabilities (Quay & Jarrett, 1984; Walker, 2004; Wood, Cowan, & Baker, 2002). Reported peer preference for children with disabilities is lower when compared with typically-developing peers (Kuhne & Wiener, 2000; Sale & Carey, 1995), and does not always improve following social skills interventions, even when direct observation shows an increase in prosocial behaviors in typical settings (Odom et al., 1999). Interventions that result in positive changes in both prosocial behaviors and peer affiliation may be particularly advantageous for young children with disabilities.

Sharing, in particular, is a prosocial behavior that is likely to result in positive responses from peers when exhibited by both children with and without disabilities (Hendrickson, Strain,

Tremblay, & Shores, 1982; Strain, 1985). In addition, parents and teachers report that sharing behaviors (e.g., "waits turn") are important for preschoolers (Lane et al., 2007), and young children commonly name sharing as a positive behavior exhibited by other children (Tisak, Holub, & Tisak, 2007). Therefore, it may be that increasing sharing by children with disabilities would increase reported preference for those children by their peers. However, opportunities to share may not occur frequently enough during typically-occurring activities for children with disabilities to become proficient sharers. Thus, sharing appears to be an important behavior for children with disabilities to learn, and the acquisition of this behavior may occur when increased observation and practice opportunities are provided in the context of small group direct instruction.

In the Ledford and Wolery (in press) study, the acquisition of sharing behaviors during small group instructional sessions was measured when one participant with disabilities and two typically developing group mates were taught discrete academic skills using a progressive time delay procedure (PTD; Wolery, Ault, & Doyle, 1992). Prior to the small group sessions, peers were taught with PTD to share tokens given for correct responding and to say "thank you" when their peers shared (independent variable for observational learning of sharing by child with disabilities). Typically developing peers shared with high fidelity (i.e., frequently) during small group instructional sessions, and participants with disabilities shared during some instructional sessions. During generalization sessions (art and snack activities) conducted before and after instruction on each academic behavior set, sharing consistently increased. Thus, it may be that small group instruction is not only a likely context for learning academic behaviors observationally, but for learning consistently modeled social behaviors as well. The increase in sharing during generalization sessions may be the result of frequent (a) opportunities to observe

peers share; (b) opportunities to be the recipient of sharing; and (c) practice sharing in a simple, predictable context. Because peers shared many times across sessions, children with disabilities were the frequent recipients of prosocial sharing initiations. Thus, the increase in sharing by children with disabilities is in line with previous research showing increased peer social initiations resulted in greater social overtures by young children with disabilities (Strain & Kohler, 1995).

The results of the Ledford and Wolery (in press) study suggest children with disabilities may learn social behaviors modeled by typically developing peers during small group direct instructional sessions. This study, however, had a number of limitations. First, generalization sessions were conducted by the adult who also conducted instructional sessions; her presence may have become the discriminative stimulus for sharing. Second, the research design evaluated the acquisition of academic behaviors rather than sharing behaviors. Thus, although sharing increased for all participants across time in instructional and generalization sessions, no controls existed for common threats to internal validity such as maturation or history. Changes in sharing may have occurred because of factors other than peer modeling during small group direct instructional sessions. Third, no measures of affiliation or of social behaviors during classroom activities were collected, although anecdotal teacher reports suggested positive changes in both. It is unclear whether the anecdotally-reported changes in affiliation were due to small group instruction (e.g., the observation of teaching and reinforcement for correct responding), to peer modeling of sharing (e.g., increased opportunities for prosocial interactions), both experiences, or none of these possibilities.

The present study was designed to address these limitations. Two concurrently implemented research designs were used to evaluate eight questions related to the acquisition,

observational learning, and generalization of academic and sharing behaviors and changes in peer affiliation over time. *The research questions related to academic behaviors are:* (1) Is PTD effective for teaching names of academic stimuli to preschoolers with and without disabilities in small group direct instruction? and (2) Will preschoolers with and without disabilities learn to name their group mates' academic stimuli through observational learning? *The research questions related to sharing are:* (3) Is PTD (used in two short sessions following an initial baseline condition but outside regular small group instructional sessions) effective for teaching participants without disabilities to share during small group instructional sessions? (4) Will participants with disabilities share more often during instructional sessions when group mates without disabilities model sharing than in no-sharing (baseline) instructional sessions? and (5) Will all participants share more in generalization contexts (art and snack) when specific opportunities to share exist and the instructor of the small group direct instruction sessions is absent? *The research questions related to possible collateral changes in peer affiliation are:* Following small group instruction with and without modeling of sharing by typically-developing group mates, will group mates with and without disabilities: (6) Exhibit higher rates of social interactions directed towards their group mates during free play? (7) Engage in more interactions with each other during free play? and (8) Will participants with and without disabilities rate their group mates more favorably on a post-instruction peer preference measure when compared with pre-instruction ratings?

## CHAPTER II

### METHODS

In this study, two research designs were used: One to evaluate acquisition of academic behaviors and another to evaluate acquisition of sharing behaviors. Some sessions were designed to assess academic behaviors (screening and probe sessions), others were designed to teach or assess sharing (teaching typically developing group mates to share [TGMS] and generalization sessions), and others were designed both to teach academic behaviors and to assess sharing behaviors (instructional sessions). Two types of sessions (free play and peer preference sessions) were used to assess changes in affiliation, a potential side effect of small group instruction. Following a description of participants, I describe methods used in three sections. First, I describe sessions and measurement related to academic behaviors. Second, I describe sessions and measurement related to social behaviors. Instructional sessions will be described in both sections, first in relation to the measurement of academic behaviors, and then in relation to measurement of social behaviors. Finally, I discuss sessions and measurement related to affiliation. In Appendix A, a glossary is included to define the children involved in the study, the adult personnel used to carry out the study, and the types of sessions.

#### **Participants**

Three preschoolers with disabilities and 6 preschoolers without disabilities were recruited from an inclusive university-affiliated early childhood program. Each small group had one participant with a disability and two participants without disabilities. Inclusion criteria for all participants were: (a) age between 36 and 66 months, (b) verbal imitation, (c) motor imitation

(measured with the *Motor Imitation Scale*; Stone, Ousley, & Littleford, 1997), (d) identified reinforcers, (e) identified unknown academic stimuli, and (f) consistent attendance. An additional inclusion criterion for participants with disabilities was teacher nomination as a child who did not share materials with classmates during typical activities. Additional inclusion criteria for participants without disabilities were: (a) attendance in the same class for at least an hour each day as the identified participant with a disability, and (b) teacher nomination as a child who was likely to share in typically-occurring activities. Additional classmates served as comparison peers during peer preference assessments but are referred to as peers rather than participants for the remainder of the manuscript. These peers were chosen randomly to match disability status and gender of group mates (when possible), but no additional inclusion criteria were used.

Dimensions, sources, and criteria for inclusion-related variables are shown in Appendix B;

Verbal and Motor Imitation Scales are shown in Appendices C and D.

Alex was a 4-year old child with autism who participated in small group instruction with Adam and Ani (Group A; Table 1). Alex had many age-appropriate academic skills (e.g., naming shapes, colors, letters, and numbers; counting with 1:1 correspondence). He often displayed aggressive behaviors towards peers and when asked to share, Alex would respond with "no" or ignore a peer, often turning away. When peers had preferred items, Alex would often push, hit, or kick the child, grab the items, and run away. At the beginning of the study, Adam, Ani, and Alex were all assigned to different classrooms but were in the same room for early care (7:30-8:30 AM) each day. Approximately halfway through the study, children in the school were assigned to different classrooms, and at this time Alex and Ani were assigned to the same classroom throughout the day. Adam continued to attend early care in the same room with his group mates and his class shared twice-daily playground times with Ani and Alex's class.

Brad was a 4-year old with profound sensorineural hearing loss and language delays who participated in small group instruction with Blair and Beck (Group B; Table 1). Brad wore a cochlear implant in one ear and a hearing aid in the other; a sound field FM system was available in the classroom but was used only during whole-group activities. Brad often chose to play in areas away from peers, and did not engage in sharing without teacher prompting. One typically-developing peer originally chosen as a group mate for Brad left shortly after the study began (during instruction on the first behavior set). Blair replaced this group member during the final four sessions of instruction on the first behavior set, but she was presented with known stimuli (letters) during these instructional sessions rather than unknown stimuli. Thus, she was taught 3 rather than 4 sets of words. Throughout the study, Blair and Brad were in the same classroom all day; Beck was in a different classroom until 3:00 PM but was in the same group as Blair and Brad from 3:00-4:00 each day and shared twice-daily playground times with Blair and Brad's class.

Coby was a 3-year old child with autism who participated in small group instruction with Cade and Cain (Group C; Table 1). Coby had recently learned to name some academic stimuli (e.g., letters, colors) and was able to name some pictures of common items. Coby often engaged in escape behaviors when peers were in proximity, took items from peers without asking, and often cried or screamed when peers took preferred items. At the beginning of the study, teachers reported never having seen Coby communicate meaningfully and independently with a peer. Teachers also reported he did not imitate peers during typical classroom activities. Cade, Cain, and Coby were all assigned to the same classroom for the duration of the study; halfway through the study, all group mates moved together from one classroom to another.

Neither Brad nor Coby was intelligible to novel listeners without contextual clues. Brad was intelligible to familiar adults and peers, and often used gestures and intonation appropriately to assist listeners to understand his speech. Coby was sometimes intelligible to familiar adults, particularly at the single-word level. He did not use gestures, intonation, or other strategies to increase understandability and he primarily communicated by physically moving adult hands to gain access to preferred items or activities.

Table 1  
Participant Information

	<u>Age</u>	<u>Race/ Gender</u>	<u>Diagnosis</u>	<u>Academic Behaviors</u>	<u>Social Behaviors</u>
<b>Group A</b> Alex	58 months	W/ Male	Autism	Correctly named colors, shapes, all uppercase letters, and his own name; when asked to name words, he often guessed a previously taught word with one or more shared letters; named one previously untaught word during initial probe sessions (zebra)	Often played alone and did not tolerate proximity to peers without teacher support unless peers had preferred materials (electronic devices or cars); often engaged in aggressive behaviors (e.g., throwing toys at peers, hitting), particularly when a peer had a preferred item; did not share materials with peers unless prompted
Ani	47 months	AA/ Female	None	Correctly named colors, shapes, 15/26 uppercase letters, her own name in print and other words specifically taught in a separate study; attempted to name some words by guessing previously taught words with one or more shared letters; named no previously untaught words	Played appropriately with peers most of the time; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often; exhibited some minor inappropriate behaviors (ignoring teacher requests, "bossing" other children); did not typically attempt to play with Alex during their regular early care play time, would occasionally engage with him by telling him what to do
Adam	45 months	AA/ Male	None	Correctly named colors, shapes, all uppercase letters, and his own name in print; when asked to name any other words, he named the beginning letter or said "I don't know that one"	Played appropriately with peers; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often; did not typically attempt to play with Alex during early car

Table 1, cont.

<b>Group B</b>					
Brad	51 months	M/ Male	Hearing and speech impairment	Correctly named colors, shapes, 18/26 uppercase letters; recognized own name in print but no other screened words; when asked to name words, he often named the beginning letter	Often played alone; rarely recruited peer attention although he would sometimes engage in appropriate activities with peers when they initiated play; sometimes engaged in inappropriate behavior with peers (e.g., grabbing)
Blair	47 months	W/ Female	None	Correctly named colors, shapes, 24/26 uppercase letters; recognized own name in print but no other screened words; did not attempt to name unknown words	Played appropriately with peers; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often; did not typically attempt to play with Brad during their regular late care play time
Beck	54 months	A/ Male	None	Correctly named colors, shapes, uppercase letters; recognized own name in print; attempted (incorrectly) to name most screened words by guessing a familiar word with the same beginning letter	Played appropriately with peers; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often; did not typically play with Brad during their regular late care play time
<b>Group C</b>					
Coby	47 months	W/ Male	Autism	Correctly named colors, shapes, all uppercase letters; did not recognize any words, including his own name; when asked to name words, he often named the beginning letter	Often wandered alone during play times and avoided classroom areas where peers were playing; often took preferred materials from peers without requesting them; if a peer took a requested item or had a requested item he could not grab, he often cried/screamed

Table 1, cont.

Cade	56 months	A/ Female	None	Correctly named colors, shapes, all uppercase letters, and many common words	Played appropriately with peers; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often; was named as the peer who most often tried to engage Coby and the peer he would tolerate proximity to most often
Cain	47 months	W/ Male	None	Correctly named colors, shapes, 12/26 uppercase letters, and his own name in print. When asked to name other words, he said "I don't know" or said a sentence while pointing to each letter	Played appropriately with peers but played alone more than many typically developing peers; had only been attending his current school for 2 months; exhibited appropriate sharing and other prosocial behaviors (e.g., helping) often

Note: W=White/Caucasian, AA=African American, M=Multiracial, A=Asian

## **Settings**

Participants were all enrolled in a full-day, year around, university-affiliated early childhood program. Participants were enrolled in classes serving primarily 3- to 5-year-old children with and without disabilities. During the school day, classes were staffed by a teacher, teaching assistant, and a paraprofessional employed by the local school system. All sessions were conducted in one of four classrooms or common areas at the school (e.g., a multipurpose room used during after care, playground) while other children participated in typical classroom activities. Sessions occurred at different times during the school day for each group. Participants in Group A engaged in study activities during "early care" (7:30-8:30 a.m.). During early care, two teachers and/or teaching assistants supervised up to fifteen 3- to 5-year olds during free play in one of the four preschool classrooms before the beginning of the school day, at which time the children were taken to their assigned classrooms. Participants in Group B engaged in study activities during "late care," between 3:00 and 4:00 p.m. During this time, after the school day ended, one teacher or teaching assistant supervised approximately 6-12 children as they participated in free play or other activities (e.g., music and movement, art, blocks). Because early and late care locations were rotated throughout the school, Group B received instruction in a different classroom each day. Group C participated in study activities during the time when their classmates were finishing clean-up for lunch and settling for nap (a time designated by classroom teachers as problematic for Coby due to high rates of stereotypic and disruptive behaviors). This group participated in study activities in a multi-purpose classroom used during late care, and were returned to their classroom for nap when the transition between lunch and nap was finished for their classmates. The exception to this timing for Group C is for free play sessions, which were conducted during that group's normal free play time in the classroom (approximately 9:30

a.m.). When time did not permit all members of a group to complete individual screening or probe sessions during their scheduled time, these individual sessions were conducted at other times during the school day designated as convenient by the classroom teacher. All sessions were conducted by the researcher or one of five graduate students; implementers and participating children for each session type are shown in Appendix E.

### **Teaching and Measuring Academic Behaviors**

Acquisition of academic behaviors (reading words) was assessed during screening and probe conditions, and these behaviors were taught during instructional conditions. These conditions are described below, in the order in which they occurred. Screening, probe, and instructional conditions were all conducted by the researcher who also collected data on student responses. A video camera was used for recording each session; it was set up prior to bringing participants to the area so that stimuli were visible and the participants' verbal responses could be heard. Recordings were used to assess interobserver agreement and procedural fidelity; a live recorder of data was not used so that graduate students (who were implementers of generalization sessions) could remain unaffiliated with instruction.

**Screening condition.** The purpose of the screening condition was to identify unknown academic stimuli to be assigned to sets for teaching. Screening occurred prior to the first probe condition. Three participants from each of three small groups (9 participants) were tested in 1:1 sessions across 3 days. The sessions occurred at a table with the child sitting at a side near a corner and the researcher sitting at the end of the table. The researcher recorded data on participant responses during each trial.

**Target stimuli and materials.** For screening sessions, 46 potential target words (presented once each) and 10 known stimuli (uppercase letters; presented 5 times each) were

presented in 3 sessions (32 trials per session). Target and known stimuli were randomly intermixed using the random function to order a list of words in Microsoft Excel®. Materials used during screening sessions include: Instructional stimuli, tokens and token boards, stickers, and small edibles. Words and letters were presented on 8x13 cm cards with Times New Roman size 72 font. Tokens were colored plastic disks (2.5 cm in diameter). Token boards, provided as a location to place earned tokens, were 22x28 cm laminated construction paper with circles printed to indicate to participants where tokens should be placed. For each of three tokens earned, a single edible was available at the end of the session (e.g., for 18 correct responses during screening sessions, 18 tokens and 6 edibles were given; for 6 correct responses during instruction, 18 tokens and 6 edibles were given). If a child received more tokens than "circles" were available, a section of the token board was designated for "extra tokens" but no additional reinforcers were provided for these tokens—thus, a maximum of 6 edibles could be earned in a single session.

***Target behaviors and response definitions.*** All participants were asked to name printed words from common preschool themes (transportation, animals, food, and playground/water play), excluding words that were likely to be used as labels in classrooms (e.g., "cars"). The target behavior was for children to name a word or letter presented on a small card when asked "What is this?" or a similar phrase ("What's this?" "What's this one?"). During screening sessions, three responses were possible: (a) *unprompted corrects*—participant said a correct response to "What is this" within 3 s of the question; (b) *unprompted errors*—participant said a word that was different from the correct response within 3 s of the question; and (c) *no response*—participant said no word within 3 s of the question. Non-word vocal stereotypy was not considered a response.

**Procedures.** To begin each session, the researcher gave a general attending cue ("Look" or "Ready?") and presented the first stimulus after the participant oriented towards the stimulus or researcher. For each trial, "What word?" or a similar question (e.g., "What's that?") was asked by the researcher as the word was presented and the child was given a 3-s response interval. The researcher delivered praise and a single token for correct responses, and ignored incorrect answers and no responses. Following sessions, tokens were exchanged for small edibles (e.g., fish crackers). Following screening conditions for all groups, 24 stimuli were chosen for each group (8 target stimuli per participant).

**Probe conditions.** The purposes of probe conditions were to assess whether (a) participants correctly named target words assigned to each behavior set and (b) named the target words assigned to their group mates. Three participants from each of three small groups (total=9) participated in 1:1 sessions across 3 days in each condition. Probe conditions occurred for three sessions prior to instruction on the first behavior set and following criterion-level performance on each behavior set. Blair and Coby were taught three sets of words, and participated in 4 probe conditions; Brad, Beck, Cade, and Cain were taught four sets of words, and participated in 5 probe conditions; all participants in Group A were taught 5 sets of words and participated in 6 probe conditions. The researcher conducted probe sessions and collected data on participant responding during trials (with the exception of data for Coby, which were collected from video recordings). The seating arrangement was as described for "Screening condition."

**Target stimuli and materials.** During each probe condition, participants were asked to name each word assigned as a target stimulus and to name each word assigned as a target stimulus to each group mate. During probe conditions, the researcher presented between 1 and 3 trials for each of 6 (Blair and Coby), 8 (Brad, Beck, Cade, and Cain), or 10 (Group A) target

stimuli and each of 12-20 stimuli taught to group mates (with more trials occurring for recently instructed sets or for the next behavior set to be taught). Thus, between 36 and 48 trials for instructional stimuli and 8-26 trials for previously known stimuli (e.g., letters) were presented. More previously known stimuli were included in the first probe condition (n=15; due to the large number of unknown stimuli) and in all probe conditions for Coby (n=26; due to problematic behaviors and inattention during sessions with many unknown stimuli which occurred prior to the beginning of the study). All other probe sessions included 8-10 previously named stimuli. Target stimuli, stimuli assigned as targets for group mates, and known stimuli were randomly intermixed using the random function to order a list of words in Microsoft Excel®. A fifth word set was added for Group A; these words were initially screened and were included in probe conditions 4, 5, and 6. All materials used were the same as those described under "Screening condition."

***Target behaviors and response definitions.*** All target behaviors (verbally naming words and letters) and response definitions (unprompted correct, unprompted error, and no response) were the same as those described under "Screening condition."

***Procedures.*** All participants were asked to name printed words chosen following screening and to name known stimuli identified prior to the beginning of the study (uppercase letters). All teacher behaviors, including antecedent (attending cue followed by task direction) and consequent events (praise and token for correct responding, ignoring for incorrect responding or failure to respond) were the same as those described under "Screening condition."

***Instructional (PTD) conditions.*** The purpose of the PTD conditions was to teach participants to read a pair of assigned target words from common preschool categories (specific stimuli shown in Table 2). Participants were taught in groups of three; thus six words were

taught in each session. The researcher conducted instructional sessions and recorded responding during each trial for Groups A and B; the researcher recorded responding using video recordings for Group C. Preference was given to seating the participant with disabilities between his group mates. In some sessions, participants sat on a single side of a long table and in some sessions, two group mates sat along one side while the third group mate sat near them on an adjacent side.

Table 2  
Assignment of Stimuli to Sets and Participants

<u>Participant</u>	<u>Behavior Set</u>				
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
Alex	bus	slide	hippo	cookie	pig
	plane	pool	frog	milk	lion
Ani	truck	swing	monkey	apple	goat
	boat	ball	zebra	banana	giraffe
Adam	crane	goggles	camel	rice	owl
	tractor	tunnel	sheep	cheese	duck
Brad	swing	bus	cookie	frog	--
	pool	plane	banana	zebra	--
Blair	--	truck	apple	monkey	--
	--	boat	milk	sheep	--
Beck	goggles	crane	rice	camel	--
	tunnel	tractor	cheese	hippo	--
Coby	apple	--	truck	swing	--
	milk	--	bus	pool	--
Cade <sup>a</sup>	rice	camel	accident	recess	--
	popsicle	gazelle	vacation	exercise	--
Cain	cookie	monkey	boat	slide	--
	banana	frog	plane	ball	--

Note: Some participants were taught more behavior sets than others; -- indicates that no behaviors were taught. <sup>a</sup>Cade identified some previously unknown target words prior to instruction on the third word set. At this time, new words were assigned to word sets 3 and 4 (*accident, vacation, recess, exercise*). Her data are shown in Figure 8.

**Target stimuli and materials.** Six stimuli (two per participant) were taught during each session, and were randomly intermixed, using the random function to order a list of words in Microsoft Excel®, with no stimulus presented for more than two consecutive trials and no participant receiving more than two consecutive trials. Each stimulus was presented three times per session, for a total of six trials per participant and 18 trials per session. The same materials were used in instructional conditions as in screening and probe conditions: Instructional stimuli, tokens and token boards, stickers, and small edibles (as described above, under "Screening condition").

**Target behaviors and response definitions.** The target behavior for all participants during instructional conditions was to name target words when presented with the stimulus and asked "What is this?" During 0-s delay sessions, three responses were possible: (a) *prompted corrects*—participant said the correct response to the question within 3 s of a teacher model; (b) *prompted errors*—participant said a word different than the correct response, within 3 s of a teacher model; and (c) *no response*—participant said no word within 3 s of teacher prompt. During delay sessions (1-s, 2-s, 3-s, or 4-s), those three responses and two additional were possible: (a) *unprompted corrects*—participant said the correct response to "What is this" before the researcher prompt; and (b) *unprompted errors*—participant said a word that was different from correct response before the researcher prompt. Non-word vocal stereotypy was not considered a response.

**Procedures.** During instructional conditions, the researcher used a progressive time delay procedure (Wolery, Ault, et al., 1992). To begin each trial, the researcher gave a general attending cue (e.g., "Ready?") and presented the stimulus after participants oriented towards the stimulus or researcher. If the target participant did not respond to the attending cue, an individual

direction was given (e.g., "[Name], you need to look"). Then the researcher said "(Target participant's name), what is this?" During the first two sessions, the delay was 0 s, so the question was followed immediately by a researcher's verbal model of the correct name for the stimulus. Following two consecutive sessions of 100% prompted corrects, a 1-s delay was used: The researcher paused for 1 s following the question, and then provided the model prompt if the participant did not respond. After one day with no more than one error (e.g., at least 83% prompted plus unprompted correct responses), a 2-s delay was used. Following the same guideline, the delay was increased to 3 and then 4 seconds. If a participant made more than one error (e.g., fewer than 83% prompted plus unprompted correct responses), the delay was decreased by 1 s during the next session. At the beginning of each session, the researcher gave 1 of 2 reminders; either "We have new words today, so I'll tell you what it is right away and you say what I say" (for 0-s delay sessions) or "I am going to wait to see if you know it, but if you do not know, remember to wait and I will tell you" (for 1- to 4-s delay sessions).

Following both prompted and unprompted correct responses, the researcher delivered praise and three tokens. The researcher ignored non-responding and errors emitted after the prompt. Unprompted errors following the question but prior to the prompt resulted in the researcher saying, "Wait and I will tell you." A group criterion was used to move to the next probe condition; instruction continued until each participant responded correctly before the prompt for an average of 90% of opportunities across 3 consecutive sessions. During all sessions, if the participant did not initiate placing or giving his tokens in the first 5 s and did not finish placing or giving tokens within another 5 s, the researcher gave a reminder to "do something with your tokens so we can do the next word." If, after another 5 s, the participant had not placed or given his tokens, the researcher gave a specific verbal or physical prompt to put tokens on the

token board. This occurred less than once per session for each participant in both probe and instructional conditions, with the exception of the first four instructional sessions for Coby, when it occurred for most trials.

***Modifications to instructional procedures.*** For most participants, two sessions with 0-s delays were used when a new set of words were introduced. For Cade, only one 0-s session was used, since she had previously demonstrated quick acquisition of word-naming and because she requested to "answer by herself" during the second instructional session. Thus, Cade's minimum number of sessions through an individual criterion was 4; for all other participants, the minimum number of sessions was 5.

If a participant did not exhibit any unprompted correct responses for the first 5 days of instruction during which these responses were possible (e.g., not including 0-sec delay sessions), or if 5 instructional sessions were conducted with no increase in correct responding, a modification was made such that the participant was asked to match the target stimulus to an identical stimulus in a field of two, prior to the task question "What is it?" This was done to ensure the child was attending to the stimulus (modifications, used for Blair, Coby, and Cain, are noted on figures with asterisks). Because previous experience in a different study suggested that Ani would need to match stimuli to encourage attending, she performed this task throughout instruction for the first two behavior sets (there was no 5-day criterion for her). Because she learned target words assigned to the second behavior set quickly, matching was discontinued for the remaining behavior sets and responding for behavior sets 3-5 did not require reinstatement of the matching response. For all participants, this modification was discontinued after 1 day at criterion (e.g., 1 day at 100% correct responding) and was not used during any probe condition.

If the child exhibited no unprompted correct responding after five additional sessions (after matching was instated), a second modification was made such that the child was presented with 6 individual trials immediately prior to daily instruction, using the same delay interval used during instruction. Responses during these trials were reinforced with small edibles rather than tokens. These trials were used to give the child additional learning opportunities while keeping the number of opportunities to earn and share tokens similar across participants. This was done for Ani and Coby (sessions noted with arrows on figures). This modification was discontinued after the first day of reaching criterion (e.g., 1 day at 100% correct responding).

### **Teaching and Measuring Sharing**

The independent variable designed to increase sharing for participants without disabilities was sharing training using the PTD prompting procedure (Training group mates to share; TGMS). The independent variable designed to increase sharing for participants with disabilities was the opportunity to observe sharing by participants without disabilities during instructional sessions. Measurement of generalization was done by measuring sharing of different items during generalization sessions for all participants. Each type of session is described below. Instructional and TGMS sessions were video recorded as described above ("Instructional [PTD] conditions"); recordings were used for data collection to measure procedural fidelity and interobserver agreement. Generalization sessions were conducted by one graduate student and recorded by a second student.

**Training group mates to share (TGMS).** The purpose of TGMS sessions was to teach typically-developing group mates to share tokens given for correct responding; their sharing served as observational learning opportunities for their group mate with disabilities during instructional sessions. TGMS sessions occurred in dyads of typically developing group mates

from the same group (Ani & Adam, Blair & Beck, Cade & Cain). This training was time-lagged across participant groups to establish experimental control. A graduate student, serving as a proxy for the participant with disabilities, sat between the participants without disabilities and the researcher sat across from them. The researcher conducted the sessions and recorded participant responses on a data sheet.

***Target stimuli and materials.*** The target stimuli were known items included in screening and probe sessions (uppercase letters). Tokens, token boards, stickers, and small edibles also were used (materials described under "Screening condition" above).

***Target behaviors and response definitions.*** The target behavior was to share tokens given for correct responding, by giving one token to the other typically-developing group mate, and one token to a graduate assistant, serving as a proxy for the participant with disabilities. Shares were recorded when a typically-developing group mate (a) put a token in another group mate's hand (or the hand of the graduate student); or (b) placed the token on or near the token board of the other group mate or graduate student, and away from her own. Three responses were possible: (a) *unprompted shares* occurred when one typically developing group mate shared the tokens before the researcher's verbal prompt was given; (b) *prompted shares* occurred when one typically developing group mate shared, within 4 s of a verbal prompt from the researcher to "share", (c) *prompted no shares* occurred when a group mate failed to share after a verbal prompt from the researcher. Two behaviors were scored per trial: one toward the other group mate and a second toward the graduate student; for each, a *prompted* or *unprompted share* or a *no share* was recorded.

***Procedures.*** At the beginning of TGMS sessions, the researcher told participants that they were going to look at letters and that they were going to practice being good friends by

sharing the tokens given for correct responding. Then, she modeled sharing one token with each of two participants and told the participants to share with each other. The researcher also told the participants that the graduate student was "pretending to be (Alex, Brad, or Coby)" and that she might not share her tokens. She explained that when (Alex, Brad, or Coby) "came back", they should continue sharing with them, but that it was "okay" if (Alex, Brad, or Coby) did not share their tokens, and that they should continue being good friends by sharing their own tokens.

During the initial 10 trials (five per typically developing participant), the researcher used a 0-s delay; she delivered the tokens and immediately provided a verbal prompt to give one token each to the other group mate without disabilities and to the graduate student, who served as the third group member. During the next 12 trials, the researcher used a 1-s delay following token presentation before giving the prompts (4 trials were presented for each participant, and 4 were presented for the graduate student). Participants were given examples of specific appropriate behaviors to exhibit when the graduate student shared (e.g., "You can say thank you," "You can look at her and smile") and when she did not share (e.g., "You can just look at me, so you'll be ready for the next turn"). During these trials, no responses resulted in a verbal prompt ("Remember to give one to [group mate name] and one to [graduate student name]") and prompted and unprompted correct responses were praised. Errors were ignored. On three of four trials, the graduate student did not share her tokens to expose participants to non-sharing trials. During these trials, correct responding to non-shares (e.g., ignoring) was verbally praised, and incorrect responding (e.g., asking for a token, holding hand out expectantly) resulted in corrective feedback ("Remember to keep your hands in your lap and just wait"). The following day or later in the same day (at least 2 hours elapsed between sessions), another training session was held, with 24 trials identical to the final 12 trials during session one, with the exception of

the response interval, which was 2 s for the first 12 trials and 3 s for the last 12 trials. The sessions lasted approximately 7 min across groups.

**Instructional sessions.** The purpose of instructional sessions was to teach naming of words; additionally, the sessions were used to provide observational learning opportunities of sharing for participants with disabilities. Initial instructional sessions served as "baseline" sessions for sharing; these sessions occurred prior to TGMS sessions and did not include planned observational learning opportunities. Sessions occurring after TGMS sessions for each group served as intervention sessions for participants with disabilities (during these sessions, they had observational learning opportunities when their group mates shared). Instructional sessions were conducted daily after the initial probe condition, except on days during which probe conditions were in effect. Because TGMS was implemented in a time-lagged fashion, each group participated in a different number of baseline and intervention sessions. All instructional sessions were conducted by the researcher; she collected data during each trial for Groups A and B and collected data via video recordings for Group C. The seating arrangement was that described above for "Instructional (PTD) sessions."

**Target stimuli and materials.** The target stimuli and materials for trials are the same as those previously described for screening, probe, and instructional sessions (see "Screening condition" above).

**Target behaviors and response definitions.** The target social behavior during instruction was to share two of three tokens given for correct responding, one with each of two group mates. During instruction, because sharing was not prompted, only two sharing responses were possible. *Shares* were scored if a participant gave one or more tokens to a group mate and *no shares* were scored if a participant did not give a token to a group mate. Thus, during any trial in which a

participant responded correctly (prompted or unprompted) by naming a target word, and all three group mates were present, two opportunities to share existed (e.g., a participant shared with each group mate, did not share with either group mate, or shared with one group mate but not with the other).

***Procedures.*** Throughout the experiment, instructional sessions were identical across tiers (behavior sets) with respect to academic instruction and consequences (see "Instructional [PTD] conditions" above). For all groups, initial sessions occurred prior to TGMS, and were considered baseline sessions for sharing behaviors. Because observational learning of sharing by the participants with disabilities was contingent on watching group mates without disabilities share, responding of participants without disabilities was the independent variable for the observing intervention. All procedures (other than sharing by group mates) were exactly the same across conditions, with exceptions noted below.

Group mates without disabilities received a small reward (e.g., stamp or sticker) if they shared for each opportunity (an individual criterion) at the end of each small group instructional session. In all sessions following TGMS, if group mates without disabilities did not share for each opportunity, a verbal reminder was given (e.g., "You did a great job sharing with [Group Mate 1] and [Group Mate 2] some times, but remember you have to share every time if you want a [sticker/stamp]") at the end of the daily small group instructional sessions. These rewards (stickers and stamps) and verbal reminders were given when the group mate with disabilities was not present or was occupied with other materials. If a group mate without disabilities failed to share for more than 20% of trials for two consecutive sessions after TGMS sessions were completed, pre-session reminders were given (e.g., "Remember to share with [Group Mate 1] and [Group Mate 2] every time") when the participant with disabilities was not present.

***Modifications for observational learning opportunities.*** If the child with disabilities did not exhibit sharing after several sessions during which group mates did so (following TGMS sessions), additional modifications were made. The first modification was to praise sharing by group mates on a VR-3 trials schedule (*OL+Praise*; two praise statements to each typically developing group mate per session). The second modification (made after an additional 5 sessions with no sharing by Alex and 3 sessions with no sharing for Coby) was that all children were provided praise and a preferred item (cars or edibles; *OL+Reinforcement*) when sharing occurred, on a VR-3 trials schedule. This reinforcement schedule was thinned to once per session after consistent sharing occurred for all three group mates for 3-4 sessions (VR-6 schedule). The first modification was made to increase salience of sharing and the second modification was made to increase reinforcement for engaging in the desired behavior. These modifications were made because increased salience and reinforcement are likely to increase observational learning (Bandura, 1977).

**Generalization sessions.** The purpose of generalization sessions was to assess whether token-sharing generalized to contexts more like typical classroom activities, when specific opportunities to share existed and the small group instructor was not present. Two types of sessions occurred: snack and art. These sessions were conducted prior to instruction on the first word set, and following criterion-level performance on each word set. Thus, these conditions occurred simultaneously with probe conditions (generalization and probe sessions occurred on the same days). Each generalization condition lasted for four days, with one art or snack session occurring on each day, alternated such that art occurred first for groups A and B and snack occurred first for group C. Sessions were conducted only when all three participants were present, and were conducted by a graduate student unaffiliated with instructional sessions and

recorded by a second graduate student. Preference was given to seating the participant with disabilities between his group mates; in some sessions, participants sat on a single side of a long table and in some sessions, two group mates sat along one side while the third group mate sat near them on an adjacent side.

Generalization sessions were conducted using identical procedures throughout the study; some occurred before instruction on the first behavior set (pre-instruction), some occurred after small group instruction had started but before sharing training for group mates (pre-sharing), and some occurred after both small group instruction and sharing training for group mates occurred (post-sharing).

***Target stimuli and materials.*** Materials used during art generalization sessions consisted of typical preschool art materials, including: (a) less preferred items (crayons) that were typically available in classrooms, (b) more preferred items that were less typically available (glitter glue, shimmer glue, glitter markers, glitter pens, dot markers, and paint pens), and (c) colored construction paper. Materials used during snack generalization sessions consisted of: (a) less preferred edibles (apples and carrots), (b) highly preferred edibles (3 types of small crackers, 3 types of small cookies), and (c) plates.

***Target behaviors and response definitions.*** The target behavior was to share preferred materials within 10 s of receiving them by giving all or part of the materials in a participant's possession to one or more group mates with or without a reciprocal give by the receiving group mate and with or without a request. The 10 s criterion was used as an attempt to capture "immediate" shares of preferred materials. Attempted shares were coded as *shares*: Negative responses to sharing (e.g., pushing materials away, saying "I don't want that!") did not negate a sharing code (e.g., a participant who attempted a share was given credit for sharing, even if a

group mate pushed away materials). *Initial shares* were those occurring within 10 s of receiving materials (e.g., a share was coded as the initial response for each group mate—Participant 1 to Participant 2 and Participant 1 to Participant 3). If no response occurred during the first 10 s to one or both group mates, the initial sharing behavior was recorded as *no share*. Examples and non-examples of sharing for each generalization condition are shown in Appendix F. For each session, one *initial share* was possible for each participant towards each group mate, for a total of eight possible opportunities (in four sessions) during each condition. A secondary dependent variable was the number of *total shares* occurring for each group mate during each session.

These included (a) immediate shares of preferred materials, (b) shares of preferred materials after 10 s, (c) trading preferred or less-preferred materials with a group mate with agreement from that group mate, and (d) giving non-preferred items to a group mate.

***Procedures.*** In each activity, less preferred materials were available for the duration of the activity. For art activities, all children had continuous access to crayons and paper. During snack activities, all children had continuous access to carrots, apples, and plates until all were consumed or refused. Approximately 1 min after starting the activity, the graduate student provided one participant with three highly preferred materials (e.g., 3 cookies, 3 glitter pens) and stood in a nearby area while pretending to be engaged with a cellular phone or paperwork for approximately 90 seconds. When she returned, she removed the highly preferred materials and provided additional preferred items (e.g., 3 crackers, 3 paint pens) for the second and third trials, to a different participant during each, using the same procedures described above. Each participant was given materials during one trial and materials were not re-used during a single condition; the ordering of trials and materials assigned to each were randomly determined, with some exceptions: (1) During the first session of each generalization condition, the participant

with disabilities was assigned to the first trial, and (2) No material was given twice to a single participant (e.g., Alex was not given paint pens during two trials) until all materials had been made available to each participant (e.g., Alex was assigned paint pens and glitter markers during the first condition, during the second condition, he was randomly assigned materials from the remaining four: glitter glue, glitter pens, shimmer glue, dot markers). This assignment of materials was done to decrease the likelihood of sharing materials due to satiation.

Sharing of materials was not prompted or praised during generalization sessions. Graduate students were instructed to respond to queries about sharing (e.g., "Coby's not sharing!") by ignoring responses while attempting to look preoccupied with their own materials. If ignoring was not feasible, graduate students were asked to redirect attention (e.g., "I love your artwork!") rather than making a general or specific related statement ("I don't have any more" or "Coby has all the markers"). The use of each type of response was recorded (described below, under the heading "Procedural Fidelity"). Following the third trial, she instructed group mates that the activity was finished and assisted them in transitioning to another classroom activity, based on classroom teacher direction.

### **Collateral Measures**

To determine whether collateral changes in affiliation occurred among group mates, two additional types of sessions were conducted: free play sessions and peer preference sessions. Proximity and social interactions were directly measured during free play; self-reported affiliation was measured via a paired-choice peer preference assessment.

**Free play sessions.** The purpose of free play sessions was to assess whether participants remained in proximity to group mates for longer durations and whether they engaged in more frequent social interactions with group mates over time during typically-occurring free play

activities in the classroom; this was designed to be a measure of affiliation among group mates. Free play sessions occurred during regularly scheduled free play periods, and were conducted by the researcher and video recorded by a graduate student; all data were collected from these video records using ProCoder for Digital Video (Tapp, 2003). Sessions occurred once per week during instructional conditions only when all three group mates were present. Sessions began when free play started and ended after 12 min, or when any child was removed from free play by classroom staff. Three group mates were recruited to join the researcher in the blocks center; no specific arrangement was prescribed and any child in the class could elect to come to the center.

Free play sessions were conducted using identical procedures throughout the study; some occurred before instruction on the first behavior set (pre-instruction), some occurred after small group instruction had started but before sharing training for group mates (pre-sharing), and some occurred after both small group instruction and sharing training for group mates occurred (post-sharing).

***Target stimuli and materials.*** Materials available during free play sessions included any materials available in the classroom "blocks" area, including blocks, cars, animals, and other building materials. All areas were approximately 2 x 2.5 meters in size; with the exception of the play center for Group C during the first 7 weeks of the study, which was approximately 2 x 1.5 meters in size. Children were not prohibited from bringing in other materials (e.g., books, puppets), unless classroom rules prohibited such. In addition, children were free to move to any other classroom area, where other typical materials were available (e.g., plastic food in housekeeping, books in a reading area, art supplies at a writing center).

***Target behaviors and response definitions.*** Two target behaviors were measured: (1) proximity to group mates, and (2) social interactions with group mates. Proximity was defined as

remaining in the same center as at least one group mate. If one participant left the center, he was considered to be *out of proximity* and the video recorder continued recording the participants who remained in the center. If two participants left the center and stayed together in another center, those children were *in proximity*, and the lone participant left in the blocks center was considered to be *out of proximity*. If all participants were in different centers, all were considered *out of proximity*. Thus, the duration measure estimated how long each group mate stayed in proximity to either or both of his/her group mates. Proximity was measured using real-time recording from video records. Rules for determining proximity are shown in Appendix G.

The maximum duration of proximity to group mates for all participants was 720 s (12 min), except for during three sessions: During one, Alex was required (by classroom staff) to sit with an adult to complete a task contingent on problem behavior (hitting a non-participant). During two sessions, a classroom teacher told Cade to go to the bathroom. In all cases, the video was stopped when children were removed; these sessions were approximately 9 min in duration. Because all videos were not equal in length, duration was calculated as a percentage of time during which participants were proximal to one or both group mates.

Social initiations and responses for each of three group mates in each group were measured from video records using event recording. Social interactions included verbal and non-verbal initiations and responses. *Sharing* responses were coded as a specific type of interaction; *negative interactions* were coded as a second specific type. All other interactions (e.g., neutral and positive non-sharing interactions) were coded simply as *interactions*. Talking with no secondary indicator (e.g., if participant said "block" but did not use a group mate's name or look at her) was not coded as a social interaction. On looking behavior was not scored as an interaction, but looking in response to a request was coded as such. *Negative interactions* were

coded as such if a child engaged in name-calling, aggression, threats, or purposeful destruction of property that included a negative response from a group mate or other peer (e.g., crying, saying no, telling a teacher). Definitions, examples, and non-examples of all behaviors for these sessions are shown in Appendix H. Two different behaviors (e.g., two statements) with more than a 1-s pause or a peer response following the first but before the second behavior were coded as two separate interactions. Examples of these segmenting rules are shown in Appendix I.

***Procedures.*** The researcher started each session by asking all participants to "play with me in blocks for a few minutes". The researcher then spent approximately 2-3 min playing with the group but did not prompt or praise any social interactions. After 2-3 min, she said, "I have to go, but you can keep playing if you want to." Prior to her departure, the researcher tried to engage children, including up to two redirections if children attempted to leave (e.g., "Do you want to play with the bus?" [1] "What about the cars?" [2]). However, participants were not physically prevented from leaving the center during any time. Following the researcher's departure, participants were free to choose a different center at any time, consistent with typical classroom procedures. Following the farewell, adults interacted minimally with participants during the remainder of the play session, but answered questions and provided redirections consistent with classroom policy (e.g., instructions to not throw toys if throwing occurred; interruption of aggressive acts if they occurred).

***Peer preference sessions.*** The purpose of peer preference sessions was to determine the relative preference for each of a participant's group mates when compared with two randomly chosen peers; this relative rank was compared between sessions conducted prior to the beginning of instruction and those conducted following the fifth probe condition. A change in relative rank from pre- to post-instruction would indicate a change in affiliation; this change was described as

*positive* (a peer was rated as more preferred during the post-instruction sessions as compared to the pre-instruction sessions), *negative* (a peer was rated as less preferred during the post instruction sessions as compared to the pre-instruction sessions), or as *no change* (peer received same rating during pre- and post-instruction sessions). The researcher conducted peer preference sessions; a graduate student recorded some sessions for the purposes of collecting interobserver agreement and procedural fidelity data.

***Target stimuli and materials.*** Peer preference sessions occurred on the playground; typical materials (climbing structures, slides, swings, tricycles, balls) were available to all students throughout the sessions. An Apple iPad<sup>TM</sup> was used to present choices and to show a short (approximately 15 s) video during each trial using the ChoiceBoard Creator application (Techno Monkey, 2012). For each participant, two group mates and two non-group mate peers were presented in exhaustive pairs for two trials each (total of 12 pairings). This was done in two to three sessions pre-instruction and repeated in three post-instruction sessions. Participants had the opportunity to choose each peer for between 0 and 6 trials. During each trial, a participant was asked to choose a peer from an array of two. For each participant, choices included the two group mates and two randomly chosen classmates. Each participant with a disability chose among two group mates without disabilities and two non-group mates without disabilities. Each participant without a disability chose among two group mates (one with and one without disabilities), and two non-group mates (one with and one without disabilities).

***Target behaviors and response definitions.*** The target behavior for each trial was for a participant to choose a preferred peer with whom he/she wanted to watch a video. An *response* was scored if the participant touched a peer's photo after the question "Who do you want to watch a video with?" or after the researcher gave the verbal choice corresponding to the photos

("Do you want to watch with [Peer 1] or [Peer 2]?"). The researcher recorded children's responses (the name of the peer chosen) while they were watching the video. *No responses* were recorded if a participant failed to touch any photo. Peers were ranked from 1-4, based on the number of trials they were chosen by each participant for each condition. The child chosen for the most trials was rated as the most preferred peer for that participant. Ratings were not averaged across participants or pre- and post-assessments.

***Procedures.*** Prior to the initial peer preference session, each participant with disability was provided with four to six practice trials, during which he chose between non-participating classmates and/or teachers to ensure task understanding. During peer preference sessions, a variation of the paired-choice peer preference sociometric task (McConnell & Odom, 1986) assessed whether self-reported affiliation changed over time. Each trial began when the researcher showed two photographs to the participant on the Apple iPad™ and provided a task direction ("Who do you want to watch a video with?"). During sessions, to choose a peer with whom s/he would like to watch a video, the participant touched a picture of that peer. If the participant did not touch the picture of the peer, he was given a verbal prompt: (the researcher said: "[Choice 1] or [Choice 2]" while pointing to each choice). The researcher assisted the participant in finding the peer by pointing or guiding the participant to the chosen peer, if needed. The researcher then asked the peer to watch ("[Target participant] wants to watch a video with you!"). The two peers watched a short clip together (about 15 s) on the Apple iPad™. If the chosen peer did not want to watch, this was recorded, but rarely occurred. The target participant was allowed to watch the video regardless of peer choice to participate. After watching the video clip, the researcher started a new trial by saying "Let's do it again." and then followed the above procedures. During trials, all other children participated in regular outdoor

activities (e.g., riding tricycles, swinging), but many non-participating children asked to watch and to "have a turn choosing a friend". These children were allowed to be nearby and to see the screen, but the target participant and chosen peer were given priority (e.g., the researcher said "It's Coby and Cade's turn, so they get to see now" while positioning the device nearest to those participants).

During pre-instruction sessions, Beck did not express interest in watching videos (said "no thanks" to participating), so the researcher gave him choices on the iPad™ using the above procedures, but the task question given was "Who do you want to have a race with?" Beck and the chosen peer then engaged in a "race" to the researcher, who stood approximately 3 meters from their start point. Other children were not prohibited from participating in the races, but attention was given to Beck and the chosen peer (e.g., "Great run, Beck and Brad!"). During post-instruction sessions, Beck participated by watching videos.

### **Experimental Design**

The experimental design for evaluating acquisition of academic behaviors was a multiple probe across behaviors design, with three to five behavior sets for each of nine participants (Gast & Ledford, 2010). The primary experimental design for evaluating acquisition of sharing was a multiple baseline across participants design. These designs operated concurrently for the three participants with disabilities and each dyad of participants without disabilities. Decisions regarding movement from one academic behavior set to the next was made based on acquisition of academic behaviors by a group (average of 90% unprompted correct responses across three consecutive sessions for each group member). The exception to this group criterion was for the move from the first to the second behavior set for Cade and Cain prior to Coby's mastery. This decision was made based on the extended number of sessions required for Coby to acquire the

behaviors and on a planned 11-day absence by Coby. Decisions regarding the change from baseline to intervention conditions for sharing (i.e., conducting TGMS sessions) were made based on the acquisition of sharing behaviors by the participant with disabilities in each group.

### **Procedural Fidelity**

**Probe and instructional conditions.** Procedural fidelity data were collected on every trial for 33% of probe sessions and 33-35% of instructional sessions for each participant in all conditions. Procedural fidelity estimates were calculated for each researcher behavior by dividing the number of researcher behaviors correctly performed by the number of planned behaviors, and multiplying the quotient by 100 (Billingsley, White, & Munson, 1980). Average fidelity was 99.3% for probe sessions and 99.3% for instructional sessions; averages and ranges by group and teacher behavior are shown in Tables 3 and 4. The behavior implemented with the lowest fidelity was recording responses during the inter-trial interval during both probe and instructional sessions (range by session across groups: 64-100%); the researcher often recorded responses as she was presenting the next trial for a participant. This was not a planned procedural modification (e.g., was an error), but was done to ensure a rapid pace of instruction, which increases attending (Carnine, 1976). The only other researcher behavior implemented correctly for fewer than 98% of opportunities for all groups was presenting the task direction during instruction (range by session across groups: 83.3-100%); for these trials, children (most often Adam and Brad) gave a response after seeing the stimulus but prior to the task question "What's this?"

Table 3

*Average Procedural Fidelity and Range across Sessions by Researcher Behavior during Probe Sessions*

<u>Researcher Behavior</u>	<u>Group</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Presents stimulus to target participant prior to asking question	100 (---)	100 (---)	100 (---)
Secure target participant's attention prior to asking question	99.4 (96-100)	99.9 (98-100)	99.6 (97-100)
Ensure matching (if prescribed, based on described rules)	100 (---)	100 (---)	100 (---)
Gives appropriate task direction	99.1 (91-100)	98.9 (91-100)	99.6 (97-100)
Waits 3 s or until participant gives response	98.8 (83-100)	100 (---)	100 (---)
Provides praise (UC)	98.6 (96-100)	99.4 (97-100)	98.0 (93-100)
Provides token (UC)	98.6 (96-100)	99.4 (97-100)	98.9 (94-100)
Ignores response (UE, NR)	97.8 (87-100)	99.1 (98-100)	99.7 (98-100)
Records response	95.5 (64-100)	98.5 (97-100)	99.4 (92-100)
Total correct	99.1 (96.6-100)	99.6 (98.4-100)	99.3 (98.6-100)

Table 4

*Average Procedural Fidelity and Range across Sessions by Researcher Behavior during Instructional Sessions*

<u>Researcher Behavior</u>	<u>Group</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Presents stimulus (to correct participant) prior to asking question	99.0 (94.4-100)	98.7 (88.9-100)	99.6 (93.3-100)
Secure target participant's attention prior to asking question	100 (---)	99.3 (88.9-100)	99.7 (94.4-100)
Ensure matching (if prescribed, based on described rules)	100 (---)	100 (---)	99.6 (93.3-100)
Gives appropriate task direction	98.3 (88.9-100)	95.7 (83.3-100)	98.2 (94.4-100)
Waits appropriate time prior to giving prompt	100 (---)	99.7 (94.4-100)	99.7 (94.4-100)
Gives appropriate prompt	99.7 (94.4-100)	99.7 (94.4-100)	99.2 (94.4-100)
Waits 3 s or until participant gives response	99.0 (83.3-100)	99.3 (94.4-100)	99.8 (96-100)
Provides praise (UC)	99.3 (88.9-100)	99.7 (94.4-100)	99.7 (94.4-100)
Provides token (UC)	99.3 (94.4-100)	100 (---)	99.7 (94.4-100)
Ignores response (UE, NR)	99.0 (94.4-100)	99.7 (94.4-100)	100 (---)
Records response	95.7 (78-100)	98.8 (88.9-100)	99.3 (88.9-100)
Researcher does not tell, show, or otherwise prompt children to share	99.7 (94.4-100)	98.8 (94.4-100)	99.0 (88.9-100)
Researcher does not provide verbal praise or other reinforcement immediately following a share	100 (---)	99.7 (94.4-100)	98.8 (88.9-100)
Total correct	99.2 (97.2-100)	99.3 (96.6-100)	99.4 (96.8-100)

Note: <sup>a</sup>= During "praise" and "praise plus reinforcement" conditions, praises sharing (or praises and provides cars/edibles) according to planned schedule twice per session per participant = 100% fidelity

**Generalization.** During generalization sessions, in addition to recording a percentage of correct planned teacher behaviors, event recording was used for adult responses to participant complaints or questions about sharing, which included (a) redirection ("I'll be back in a second"), (b) general related comments ("I don't have any more crackers"), and (c) group mate-specific related comments ("Tommy has all the crackers"). Each sentence was recorded as a separate comment. Ignoring sharing-related comments and giving a comment included in none of the above categories also were counted using event recording. The relative frequency of type of response to sharing-related commenting was measured to ensure no differences across conditions; graduate student implementers were asked to use redirection or ignoring primarily. In addition, to ensure the opportunities for sharing remained relatively constant across conditions, the average duration of each trial was recorded. Percent correct responding, trial duration, and responses to sharing comments are shown by group and condition in Table 5. The graduate student behavior with the lowest fidelity was failure to remove items prior to starting the next trial; this occurred twice during one snack condition (33% fidelity; Group A) and once during another (67% fidelity; Group B). The only other procedural error occurred when a graduate student prompted Cain to share non-preferred snack items after he put all of those items on his own plate; he did not do so (67% fidelity).

Table 5  
*Procedural Fidelity Data for Generalization Sessions*

<u>Teacher Behavior</u>	<u>Percent Correct by Group (Range by Session)</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Provides less-preferred materials before beginning trials	100 (---)	100 (---)	100 (---)
Followed trial order & gave 3 of each material	100 (---)	100 (---)	100 (---)
Refrained from prompting sharing of any materials	100 (---)	100 (---)	96 (67-100)
Refrained from praising sharing of any materials	100 (---)	100 (---)	100 (---)
Collected materials (if any) at the end of each trial	90 (33-100)	95 (67-100)	100 (---)
Average correct	98 (87-100)	99 (93-100)	99 (93-100)

	<u>Average by Group</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
Duration of each trial in seconds			
Condition 1	91	68	76
Condition 2	<i>104</i>	72	---
Condition 3	<i>111</i>	<i>106</i>	100
Condition 4	<i>106</i>	<i>100</i>	<i>107</i>
Condition 5 <sup>a</sup>	<i>86</i>	85	88
<b>Average</b>	<b>96</b>	<b>86</b>	<b>93</b>
Number of sharing-related responses to participants <sup>a</sup>			
Condition 1	0	0	2 (GRC, ignore)
Condition 2	0	1 (ignore)	---
Condition 3	0	2 ( <i>ignore, redirect</i> )	1 (GRC)
Condition 4	0	0	1 ( <i>ignore</i> )
Condition 5 <sup>a</sup>	1 ( <i>ignore</i> )	0	1 ( <i>ignore</i> )
<b>Average</b>	<b>0.04/session</b>	<b>0.15/session</b>	<b>0.3/session</b>

Note: Data for post-sharing sessions are in *italics*. GRC: General related comment (e.g., "I don't have any more"). Ignore: No verbal response to query. Redirect: Respond to query by making unrelated comment (e.g., "I love your artwork!"). <sup>a</sup>=Data for conditions 5 and 6 are averaged for Group A.

**Collateral measures.** Procedural fidelity data collection occurred for 44% of sessions for Group A, 50% of sessions for Group B, and 33% of sessions for Group C. During free play sessions, average fidelity was 98% across groups; average fidelity and ranges by group and teacher behavior is shown in Table 6. During peer preference assessments, fidelity was 100% for all planned teacher behaviors (presenting the device, asking the question, giving the appropriate response interval, providing a verbal prompt if necessary, providing a second response interval, assisting participant in locating chosen peer and playing the video, and redirecting the chosen peer to engage in another activity), except for waiting 5 s between the task question ("Who do you want to watch a video with?") and providing the prompt "[Choice 1 name] or [Choice 2 name]." Fidelity for this step was 86% (range across sessions: 33-100%).

Table 6  
*Procedural Fidelity Data for Free Play Sessions*

<u>Teacher Behavior</u>	<u>Percent Correct (Range across Sessions)</u>
Begins by ensuring all children are in area	100 (---)
Engages children without prompting social interactions	97.6 (67-100)
Redirects child who attempts to leave area prior to 2 min	95.3 (67-100)
Leaves area after 120 s (before 180s)	100 (---)
Indicates to children they may play in area or elsewhere	93 <sup>a</sup> (0-100)
No research or classroom staff prompt participants to stay in area	100 (---)
Average correct	97.6 (83.3-100)

<sup>a</sup>=All errors were such that the researcher failed to give participants any direction, not that she indicated that they must remain in the area.

## **Interobserver Agreement (IOA)**

**Probe and instructional conditions.** Agreement for responding was calculated on a trial-by-trial basis for 33% of probe sessions and 33-35% of instructional sessions for each participant, distributed evenly across conditions (30-40% of sessions in each condition, for each group). Interobserver agreement data were collected during the same sessions as procedural fidelity data. Sessions were randomly selected for IOA data collection within each condition. The point-by-point method was used (number of agreements divided by number of agreements plus disagreements, multiplied by 100; Ayres & Gast, 2010). During instructional conditions, agreement for sharing behaviors was calculated separately from academic behaviors (but during the same sessions) for each participant on a trial-by-trial basis. During probe conditions, average agreement was 96.8% with 85% of errors being those where one coder coded a *no response* and the other coder coded an *unprompted error* (e.g., neither coder coded a correct response). During instructional conditions, average agreement was 98.1% for academic behaviors and 98.9% for sharing behaviors. For Group A, agreement was lower than for other groups for sharing. For this group, all errors occurred after TGMS sessions and were such that the primary coder coded "no share" and the secondary coder coded a share (e.g., if errors occurred, they underestimated the percent of sharing after the independent variable was implemented). Average agreement and ranges across sessions are shown in Table 7 for each group in each condition.

Table 7  
Average Interobserver Agreement by Group and Condition

	<u>Percent Agreement</u>					
	<u>Academic Behaviors</u>			<u>Sharing</u>		
	<u>Group A</u>	<u>Group B</u>	<u>Group C</u>	<u>Group A</u>	<u>Group B</u>	<u>Group C</u>
Probe	96.8 (93.3-100)	98.6 (80-100)	96.8 (84-100)	---	---	---
Instruction	97.1 (88.9-100)	98.3 (83.5-100)	98.7 (94.4-100)	98.8 (94.4-100)	98.2 (86.0-100)	99.7 (94.7-100)
Generalization	---	---	---	97.2 (83.3-100)	96.7 (83.3-100)	95.8 (83.3-100)

**Generalization.** During generalization (art and snack) conditions, IOA data were collected in 50% of the sessions for each condition with IOA data collection occurring for one art and one snack activity per condition for each group. Agreement was calculated on a trial-by-trial basis for *initial shares* using the point-by-point formula and was collected on *total shares* using the gross method (smaller number of recorded shares divided by larger number of recorded shares). The average percent agreement for *initial shares* across groups and conditions was 97.2%. Average agreement and ranges by group shown in Table 7. The average agreement for *total shares* for Group A was 96.9 (range: 80-100%); for Group B it was 96.6% (range: 83-100%); and for Group C it was 100%.

**Collateral measures.** Interobserver agreement data were collected for 33-50% of free play sessions for each participant in each group; social interactions and duration of proximity were measured for all three group mates during each session. Proximity agreement was calculated on a second-by-second basis, with seconds of agreement divided by seconds with

agreement plus seconds with disagreement, multiplied by 100. Agreement for proximity was 92% for Group A (range: 75-99%), 99% for Group B (range: 99-100%), and 98% (range: 94-99%) for Group C. With the exception of 75% agreement during one session for Ani, all agreement percentages were at least 94%. During the session in which agreement for Ani was low (Week 3), she played near the edge of the center; one coder coded her location as *in proximity* and the other coded *out of proximity*.

For social interactions, point-by-point agreement was calculated separately for each code, using a 5 s window. Average agreement for social interactions was 91% for Group A (range: 79-100% by code, 83-97% by participant), 90% for Group B (range: 76-100% by code, 86-97% by participant), and 98% (range: 94-100% by code, 97-100% by participant) for Group C. In all cases, average agreement less than 90% was the result of 0% or 50% agreement for behaviors that occurred infrequently during a single session (e.g., the researcher coded that one interaction occurred between Brad and Blair, and the secondary coder coded zero interactions [0% agreement] or 1 additional interaction [50% agreement]).

Interobserver agreement data were collected for 46% of peer preference trials during pre-instruction sessions and 44% of trials during post-assessments, with data collected for at least 33% of trials per participant per condition, with the exception of Beck (data were collected for 17% of his trials during the post-instruction assessment due to unplanned absences and scheduling difficulties). Agreement was 100% for Groups A and C, and 94.5% for Group B. Disagreements occurred (n=2) when a child said one participant's name but touched the picture of a different participant.

## CHAPTER III

### RESULTS

Eight research questions were asked: Two related to acquisition of academic behaviors, three related to sharing during instructional and generalization sessions, and three related to collateral measures of peer affiliation as assessed during free play or in paired choice assessments. Results are described below, by research question.

#### **Academic Behaviors**

Acquisition of target academic behaviors for all participants were measured in the context of a multiple probe design across 3 (Blair, Coby), 4 (Brad, Beck, Cade, Cain), or 5 (Group A) behavior sets. Coby only learned three sets of behavior because his group mates were taught their target behaviors from the second behavior set while he continued to receive instruction on behaviors assigned to the first set. Blair only learned three sets of behavior because she replaced a typically developing participant during the final days of instruction on the first behavior set (her data correspond to group mates' behavior sets 2-4; the original group mate's data for the first behavior set are shown in Appendix J). Acquisition of behaviors taught to group mates was measured during pre-instruction probes (before group mates were taught to name the words) and post-instruction probes (following opportunities for observational learning).

Because Coby had a scheduled absence of 11 calendar days after his group mates reached criterion on the first behavior set and before he did, a probe condition was conducted for his two group mates. Thus, instruction for the second behavior set was conducted for Cain and Cade concurrent with continuing instruction on the first behavior set for Coby. This resulted in no data

being collected for Coby during the group mates' second probe condition and no generalization data were collected during this time. Thus, Coby participated in three instructional and four probe conditions; he and his group mates participated in four generalization conditions.

**Research Question #1: Is PTD effective for teaching names of academic stimuli to preschoolers with and without disabilities in small group direct instruction?** All participants learned all target behaviors and reached criterion for each behavior set. Data are shown separately for each participant in Figures 1-9. Alex reached criterion for each of four originally-assigned behavior sets and an extra behavior set assigned prior to the fourth probe condition (Figure 1), as did his group mates (Ani, Figure 2; Adam, Figure 3). Brad reached criterion for each of four word sets (Figure 4) and Blair reached criterion on three word sets (Figure 5). Beck reached criterion on each of four word sets; he was present during fewer school days than his group mates, thus he participated in fewer sessions, shown in Figure 6. Coby learned three sets of behaviors; he learned the first assigned behavior set during instruction on the first two behavior sets for his group mates (Figure 7). Both of his group mates learned four sets of behaviors; Cade learned two sets assigned prior to the first probe condition (behavior sets 1 and 2) and two sets assigned prior to the third probe condition (behavior sets 3 and 4). Cade learned four words originally assigned to the third and fourth behavior sets without instruction (data shown in fifth tier in Figure 8). Cain learned four originally assigned word sets (Figure 9).

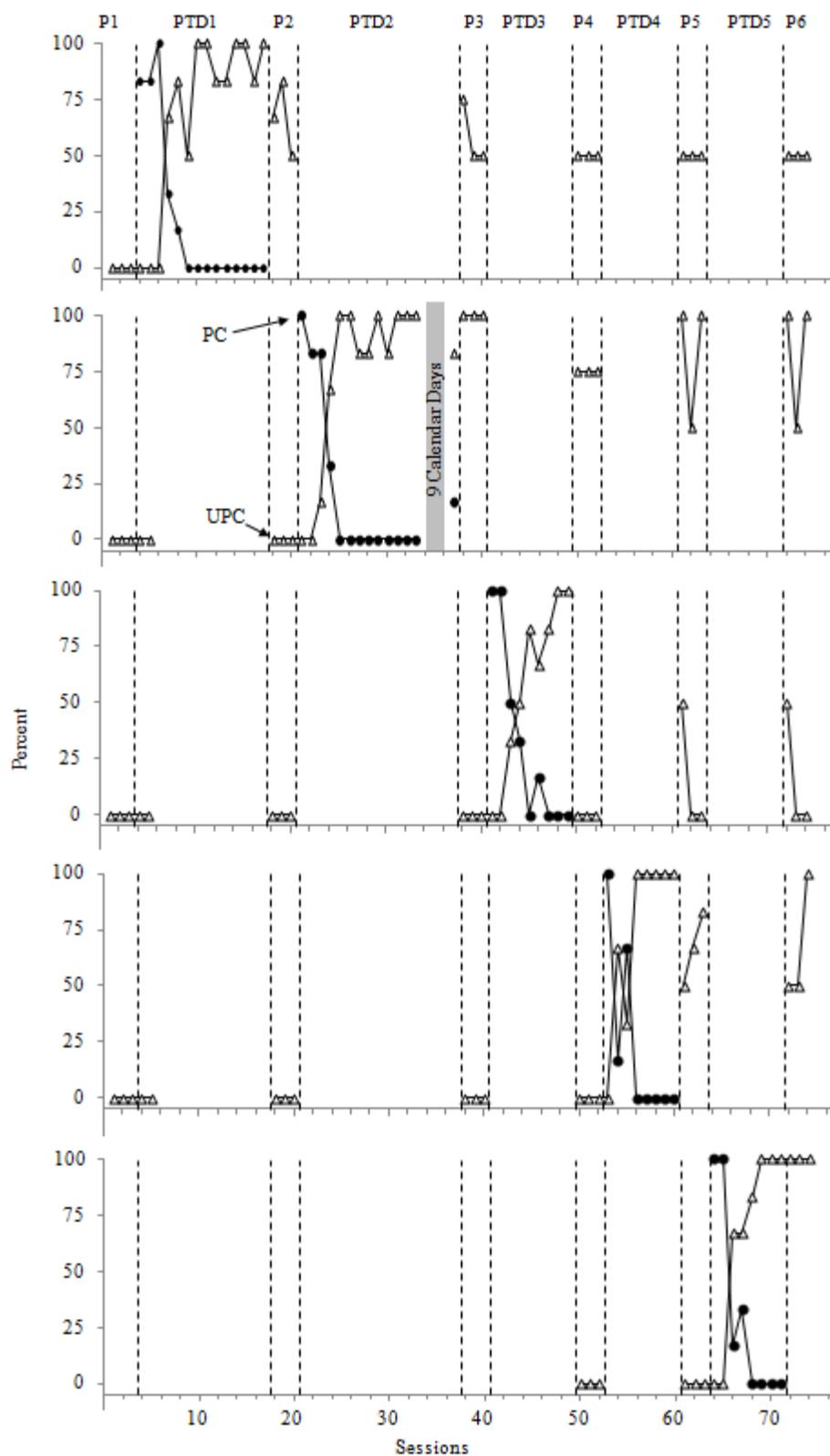


Figure 1. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Alex.

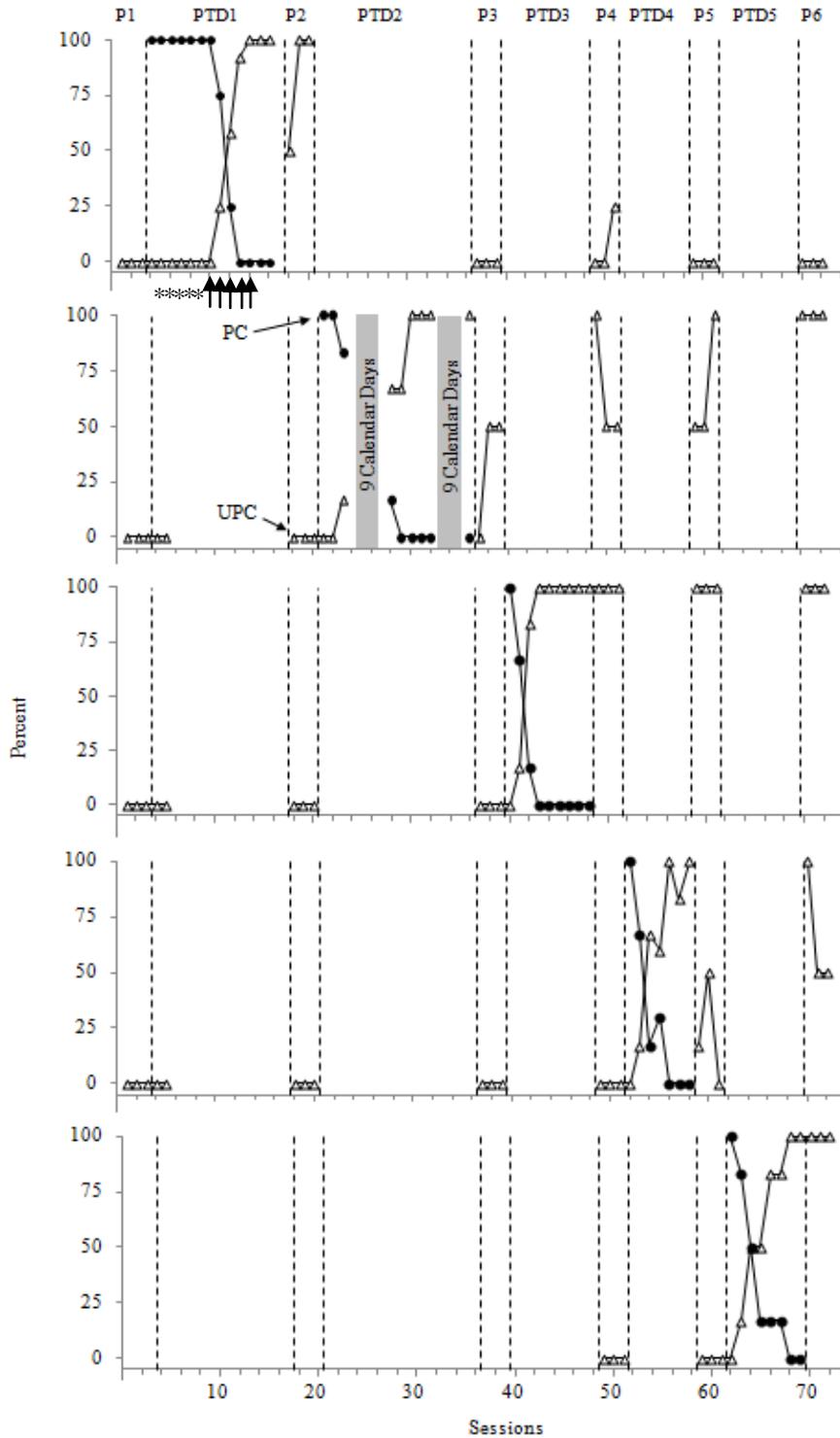


Figure 2. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Ani. Asterisks denote sessions during which Ani was asked to match target stimuli prior to responding to encourage attending. Arrows denote sessions during which Ani was presented with extra trials (n=6) in an individual format prior to small group sessions.

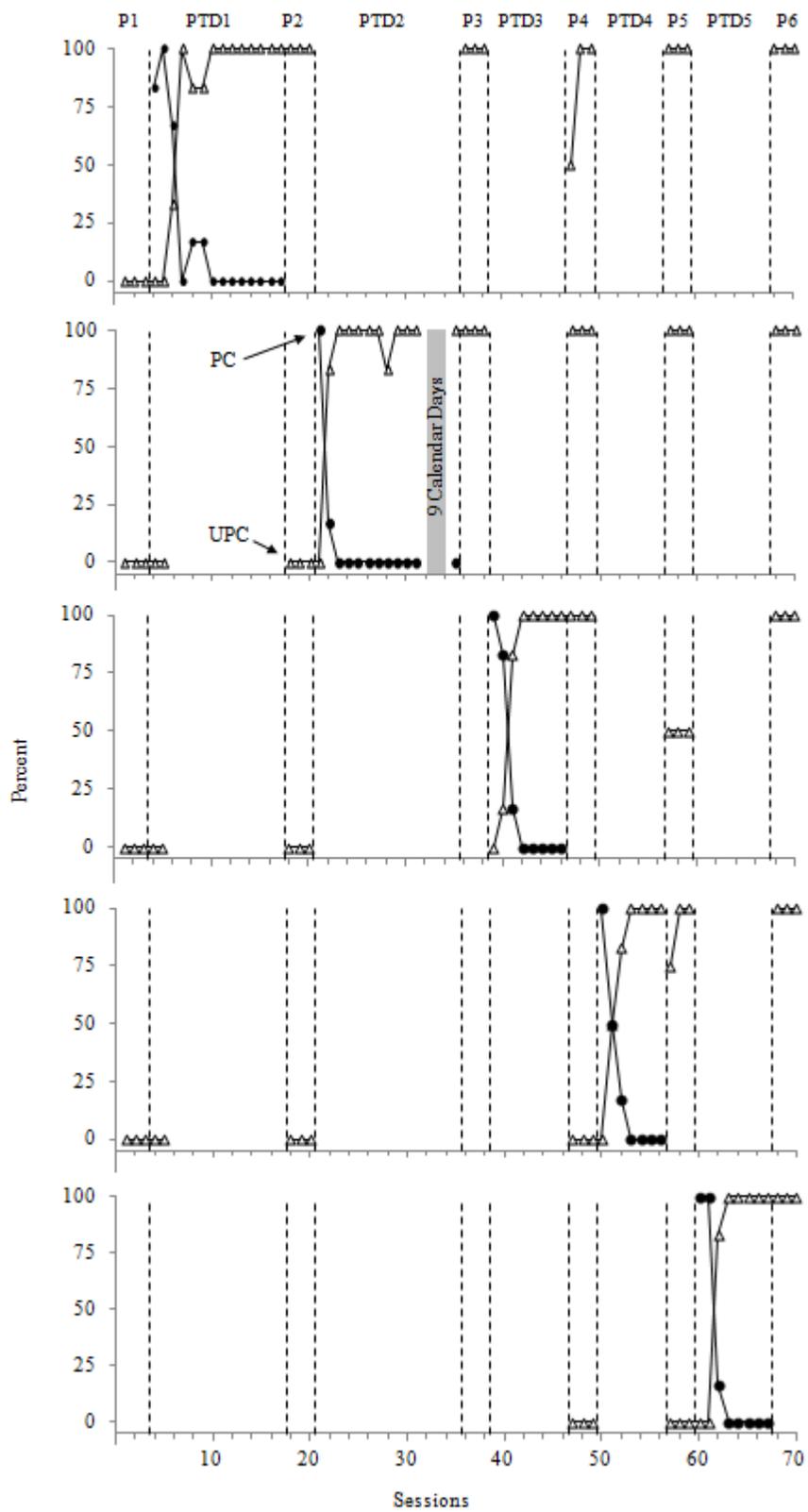


Figure 3. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Adam.

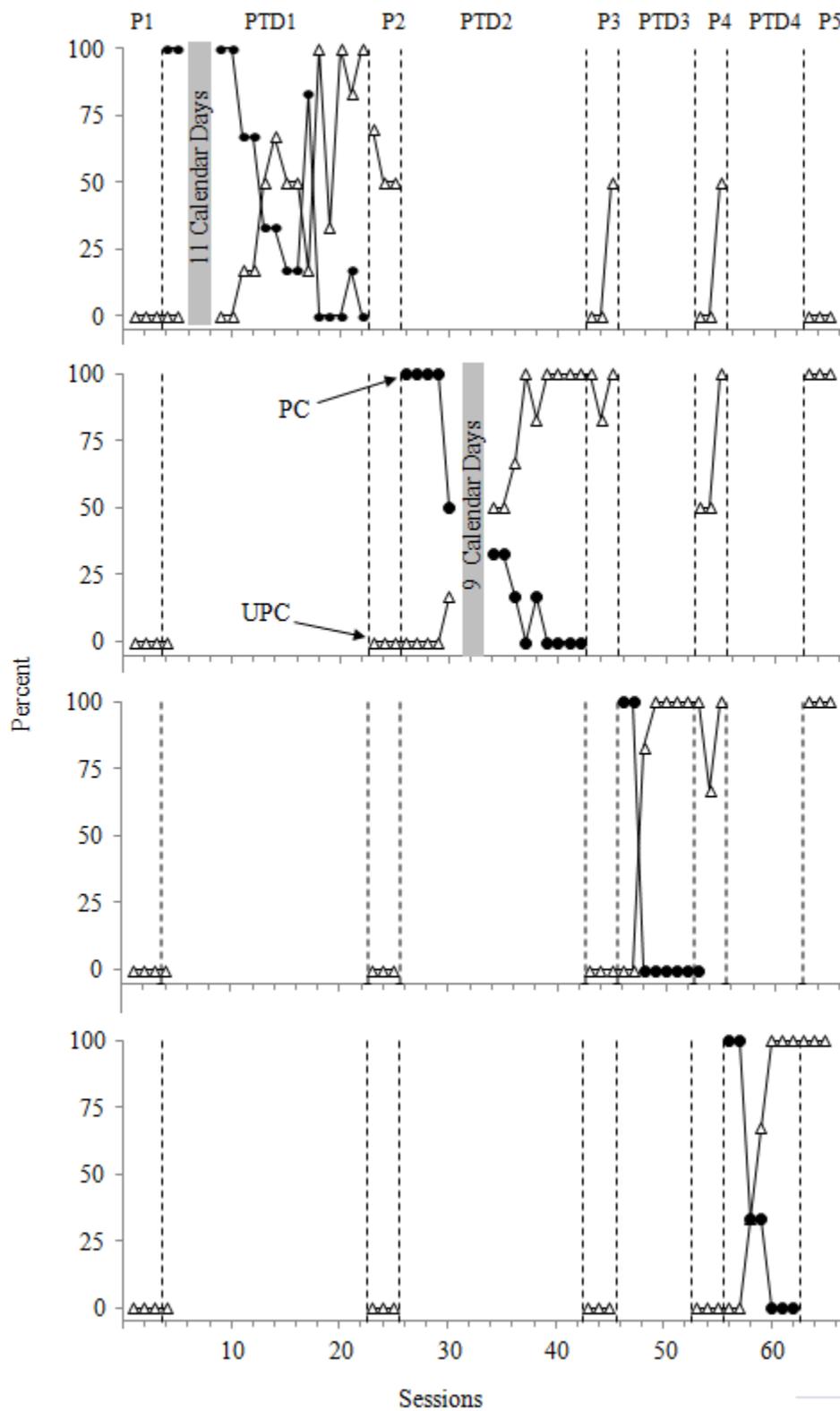


Figure 4. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Brad.

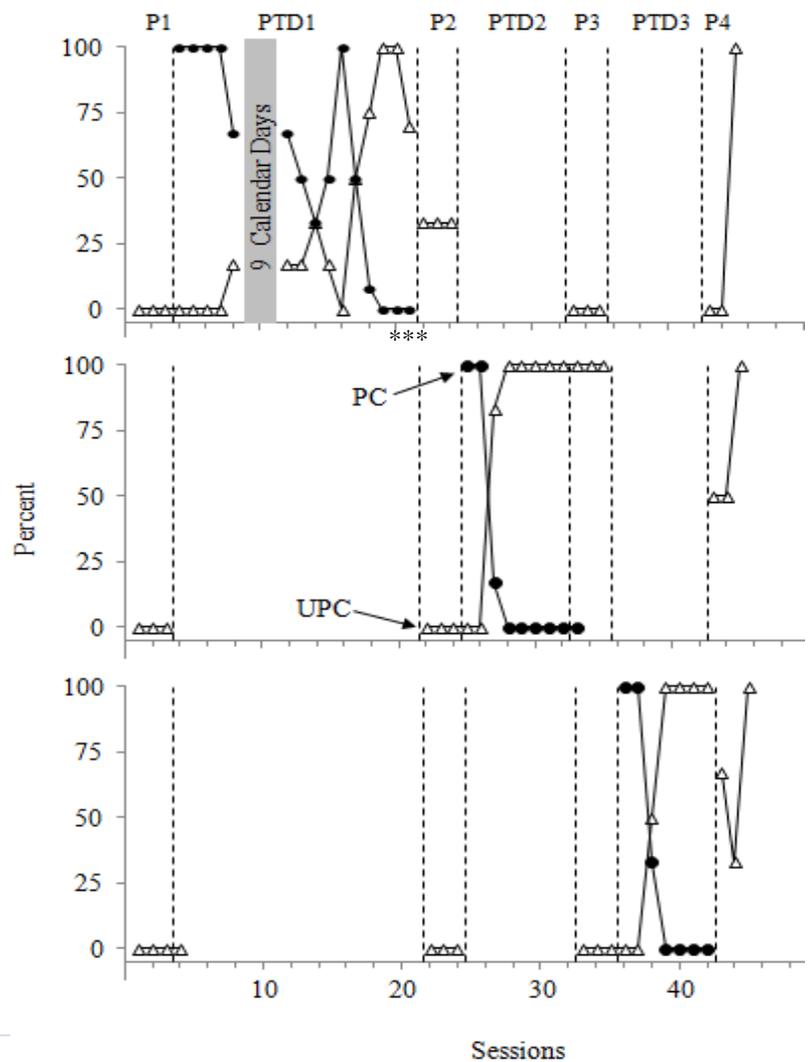


Figure 5. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Blair. Asterisks denote sessions during which Blair was asked to match target stimuli prior to responding to encourage attending.

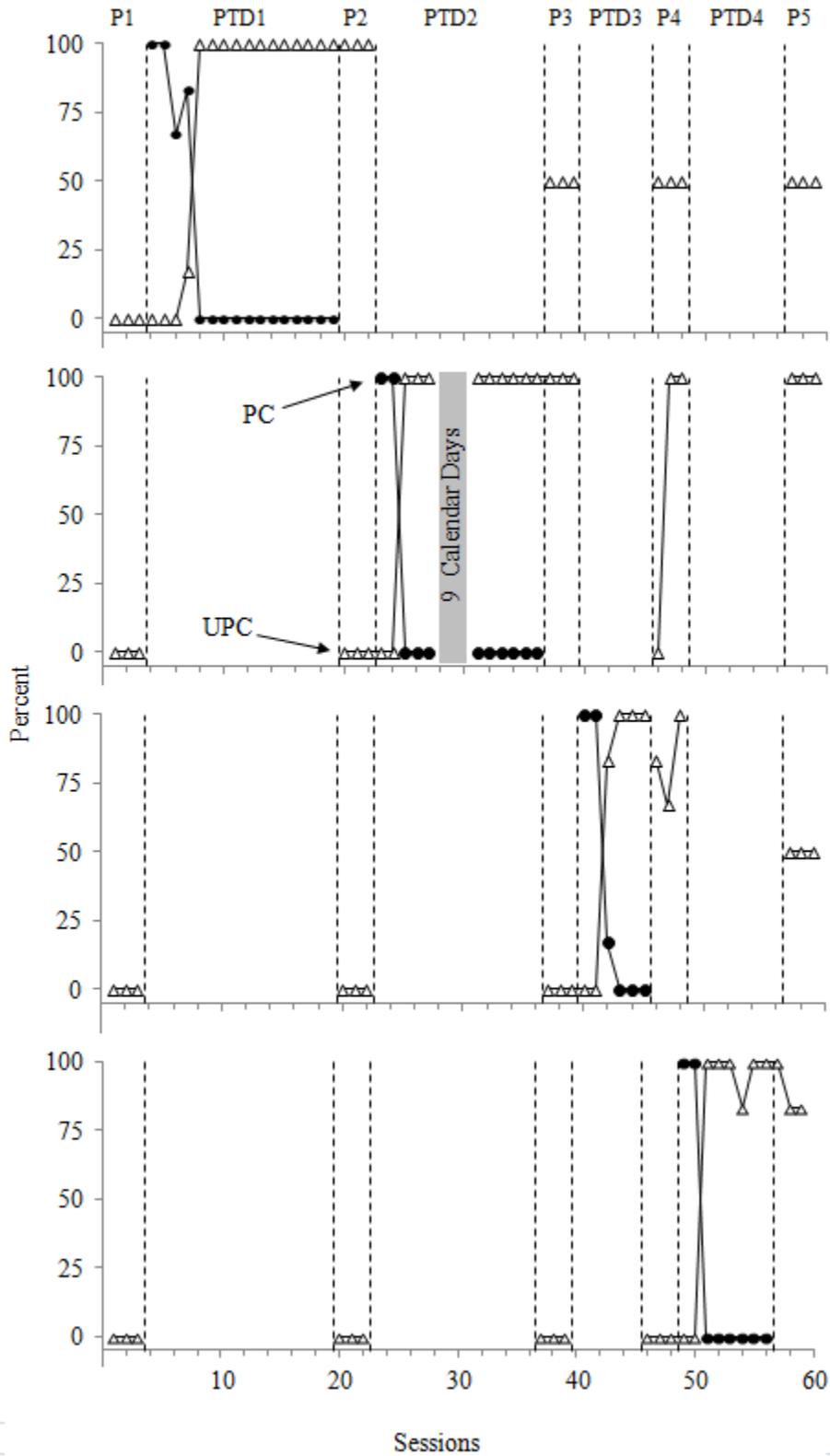


Figure 6. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Beck.

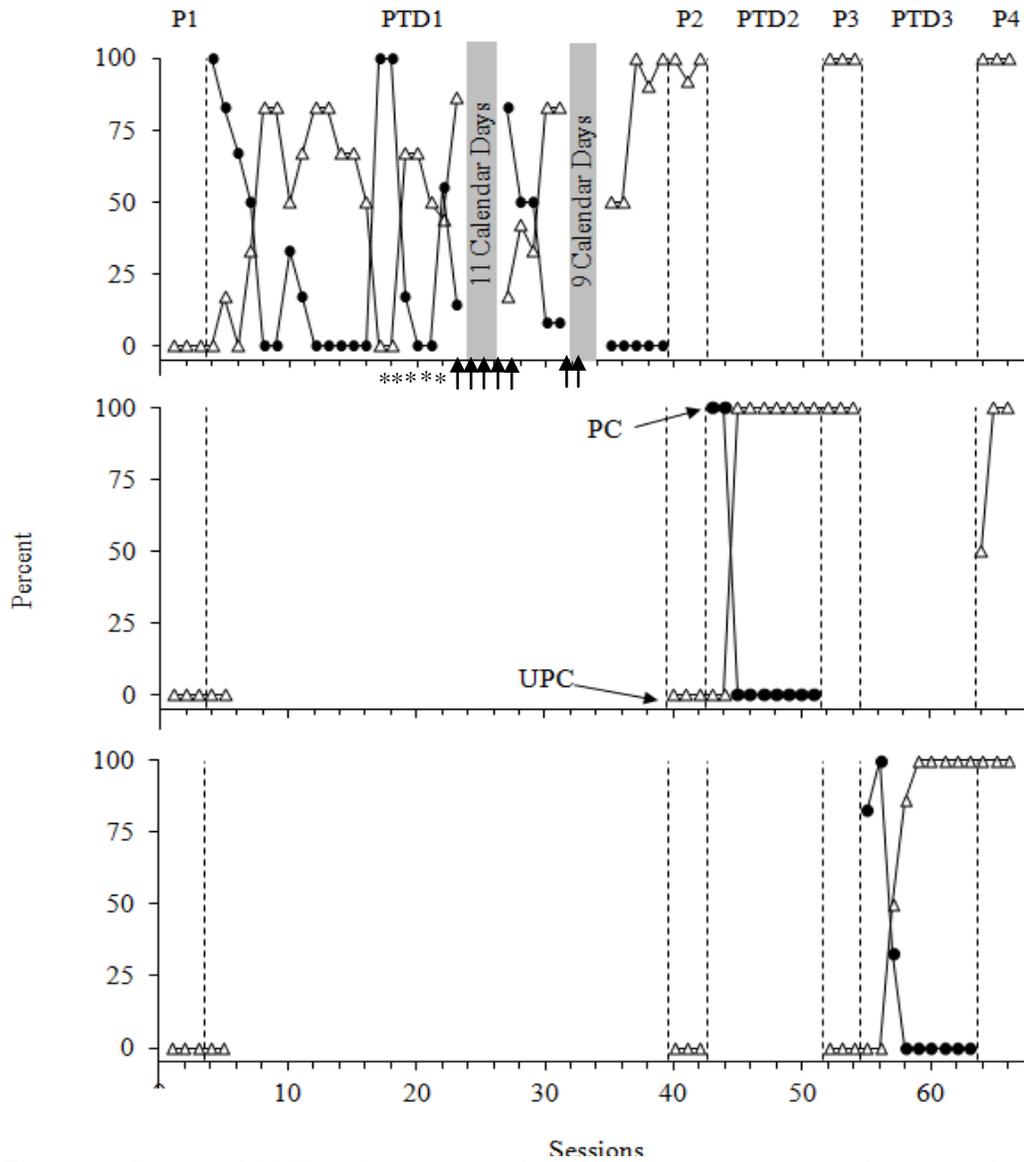


Figure 7. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Coby. Asterisks denote sessions during which participants were asked to match target stimuli prior to responding to encourage attending. Arrows denote sessions during which Coby was presented with extra trials (n=6) in an individual format prior to small group sessions.

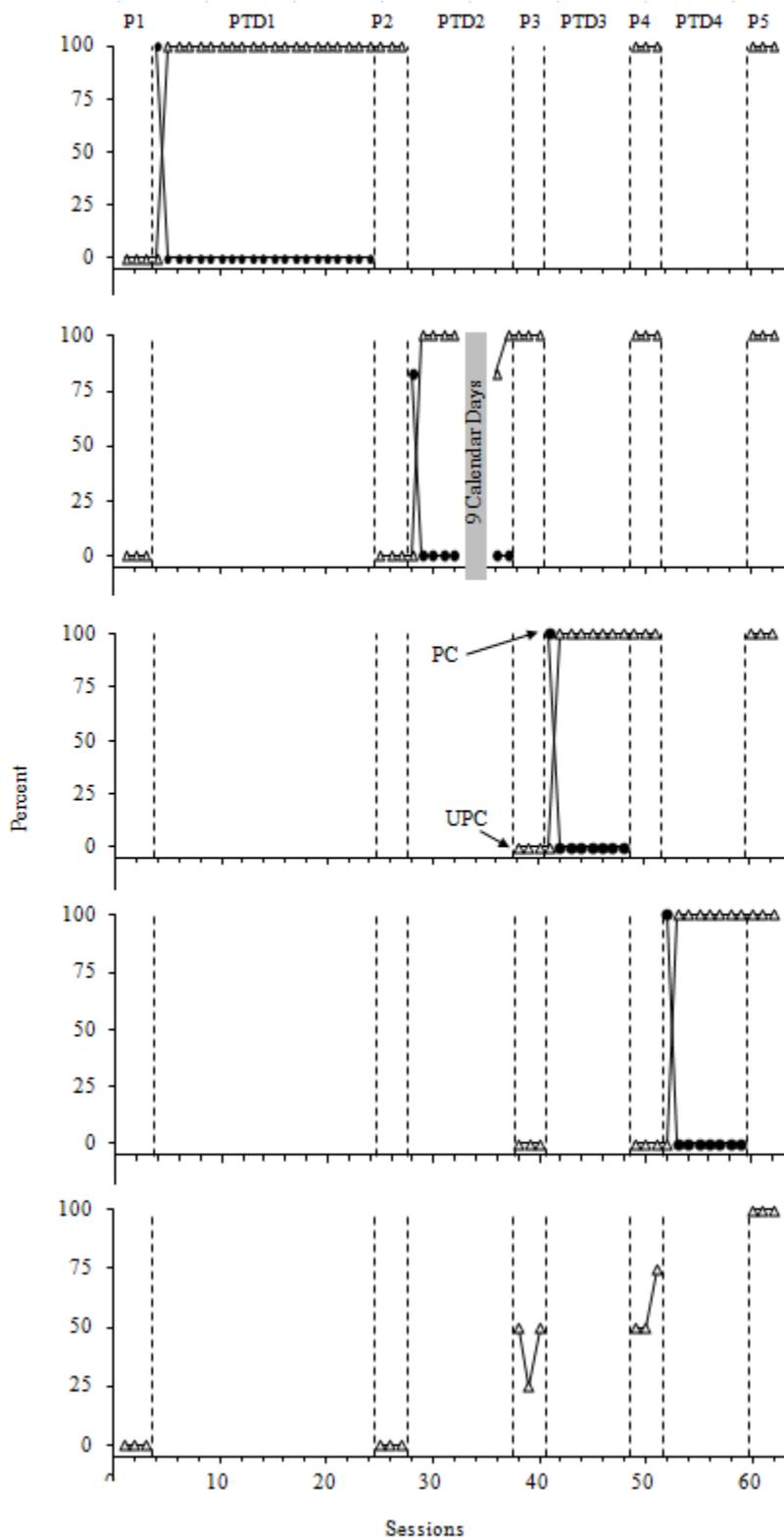


Figure 8. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Cade.

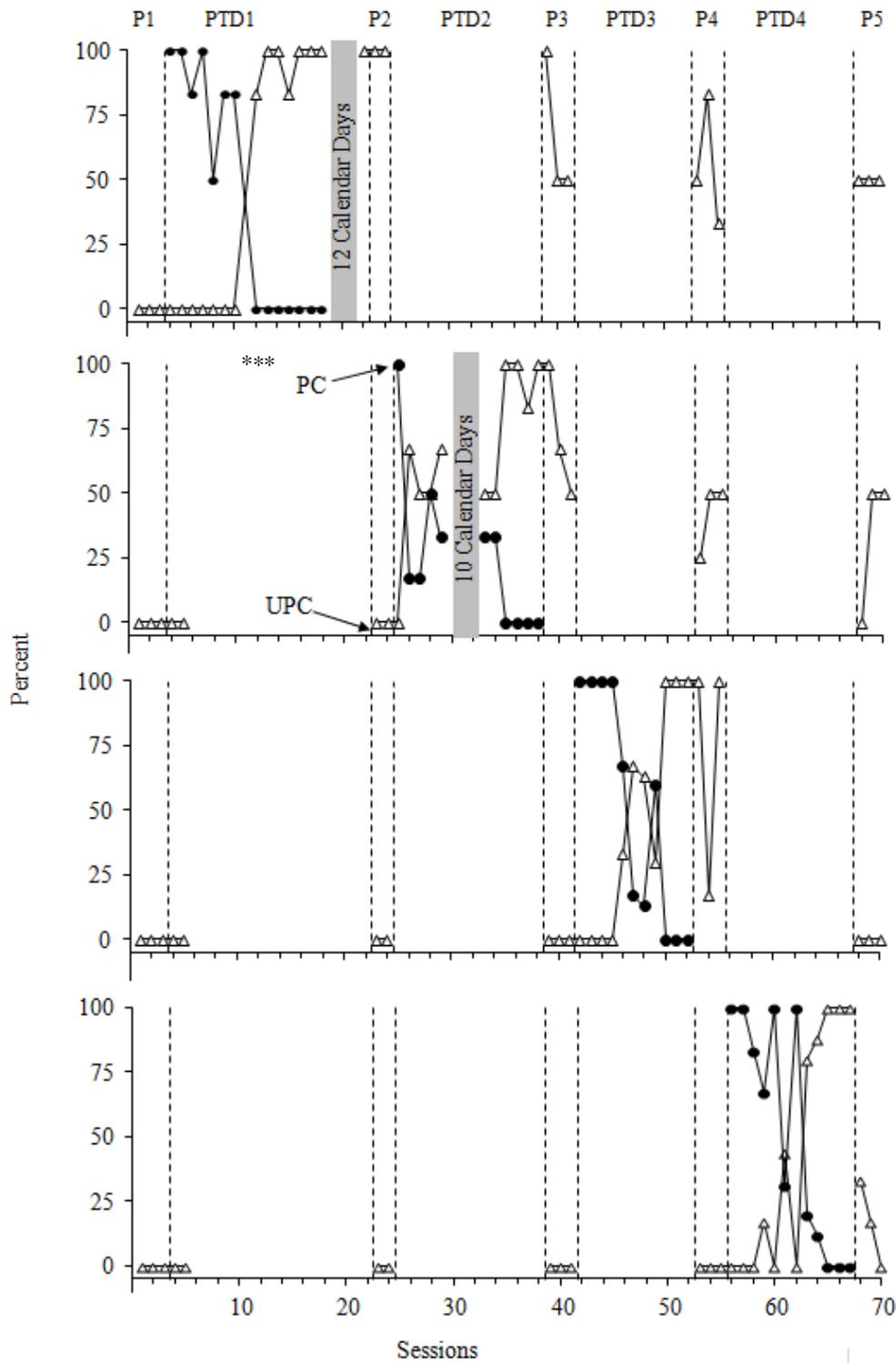


Figure 9. Prompted (PC) and unprompted (UPC) correct responses during probe (P) and instructional (PTD) conditions for Cain. Asterisks denote sessions during which Cain was asked to match target stimuli prior to responding to encourage attending.

The number of sessions required to reach individual criterion (3 consecutive sessions with average of 90% or higher for unprompted correct responding) systematically decreased for 7 of 9 participants (exceptions were Cade and Cain), and the average number of sessions (across participants) through criterion decreased from 12 during the first instructional condition to 6 during the final instructional condition. The number of sessions through criterion was at the minimum throughout the study for Cade; Cain's remained at around 10 sessions throughout the study. In addition, the average percentage of trials with errors was 7% across participants during teaching for the first behavior set; the average percentage of trials with errors was 3% across participants during teaching for the final behavior set. Thus, it appears that the majority of participants "learned to learn" from the PTD procedure, making fewer errors and requiring fewer trials to criterion over time (see Table 8 for number of sessions through criterion and percentage of errors made by each participant).

Table 8  
*Measures of Efficiency of Teaching Academic Behaviors by Participant*

Participant	<u>Sessions through</u>						<u>Percent of Errors Emitted</u>					
	<u>Criterion</u>						<u>Word Set</u>					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Average</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Average</u>
Alex	9	13	7	6	7	8.4	9.5	6.5	11.9	2.1	4.2	6.8
Ani	12	7	6	6	8	7.8	3.8	6.3	1.9	9.5	4.2	5.1
Adam	8	5	5	5	5	5.6	1.2	1.5	0.0	0.0	0.0	0.5
Brad	16	13	5	6	---	10.0	11.5	6.0	2.4	4.8	---	6.2
Blair	---	15	5	6	---	8.7	---	12.8	0.0	3.3	---	5.4
Beck	6	5	5	5	---	5.3	3.1	0.0	0.0	2.1	---	1.3
Coby	30	---	5	5	---	13.3	17.8	---	0.0	5.6	---	7.8
Cade	4	4	4	4	---	4.0	0.0	4.8	0.0	0.0	---	1.2
Cain	10	9	11	11	---	10.3	9.5	9.1	4.6	4.2	---	6.9

Despite criterion-level performance for all behavior sets across all participants, maintenance of learned behaviors averaged 72% during the final probe condition, and varied considerably by participant (32-100%); only 3 participants maintained more than 90% of taught behaviors and 2 participants maintained fewer than half of their target behaviors. This failure to maintain learned behaviors is likely due to the relative inexperience with direct instruction for most participants, the relatively lenient criterion used for acquisition, the use of continuous reinforcement schedule (FR1) throughout instruction, and the fact these behaviors were not used by participants after they acquired them.

With only one exception, all participants learned all behaviors in 15 or fewer sessions of approximately 5 min in duration (average duration by group, across behavior sets: 3.5 to 7 min). Coby required 30 sessions to reach criterion for his first word set. Following two extended absences due to planned family vacation and a week-long school closure, Coby responded with one stimulus name ("apple") for every trial, even when prompted to respond correctly. Thus, four days of instruction were conducted such that the presentation of one stimulus ("apple") was contingent on unprompted correct responses for the second stimulus ("milk"). During these sessions, a variable delay was used, starting at 0-s, increasing by half a second with each correct response for a specific stimulus, and decreasing by half a second with each incorrect response for a specific stimulus. In addition, trials with photos of his target words were interspersed to increase reinforcement opportunities for alternating between different responses in a single session. After he reached 100% unprompted correct responding during these individual sessions (Appendix K), group instruction was resumed.

**Research Question #2: Will preschoolers with and without disabilities learn to name their group mates' academic stimuli through observational learning?** All participants

learned at least some of the words taught to their group mates (Table 9). Prior to participation in the study, Cade identified many common words, including 13 of 16 words assigned to her group mates; she learned the remaining words during the time the study was conducted, but it is unlikely that she learned them during instructional sessions. She consistently "guessed" words correctly based on their association with other words during probe sessions (e.g., she initially read "slide" incorrectly; she named it correctly during one session when it immediately followed a trial during which "swing" was presented). Thus, it is not possible to assess observational learning of word-reading for Cade. For the remaining 8 participants, observational learning varied widely: (a) during probe conditions immediately following instruction of each set, the average percentage of behaviors learned was 41 (range: 14-77%), (b) during the final probe condition, the average percentage correct for behaviors assigned to group mates across behavior sets and participants was 37 (range: 2-83%). For 8 of 9 participants, the percentage of behaviors maintained (during the final probe condition) was only slightly different than the percentage learned based on probe sessions immediately following instruction (e.g., maintenance of observationally-learned behaviors was high). Brad did not maintain these behaviors—he correctly named approximately 30% of his group mates' stimuli immediately after they were taught, but only named 2% during the final probe condition. Again, the failure to maintain these learned behaviors is likely related to the relatively lenient criterion for acquisition; there were fewer opportunities to observe group mates correctly name the word and receive reinforcement. Only Coby exhibited systematic differential observational learning across word sets; he correctly named no words taught to his group mates during behaviors sets 1 and 2 but named 2 of 4 words assigned to behavior set 3 and 3 of 4 words assigned to behavior set 4.

Table 9  
*Observational Learning of Academic Behaviors*

<u>Participant</u>	<u>Word Set</u>	<u>Measurement Occasion</u>					
		<u>Probe 1</u>	<u>Probe 2</u>	<u>Probe 3</u>	<u>Probe 4</u>	<u>Probe 5</u>	<u>Probe 6</u>
Alex	1	0	75	54	57	58	50
	2	0	17	75	69	58	75
	3	25	8	16	44	33	43
	4	0	8	8	0	64	61
	5	0	---	---	0	25	75
Ani	1	0	42	46	33	33	50
	2	0	0	25	33	33	0
	3	0	0	0	21	50	0
	4	0	0	0	0	44	25
	5	0	---	---	0	0	71
Adam	1	0	79	83	100	42	100
	2	0	0	31	75	100	58
	3	0	0	0	100	83	83
	4	0	0	0	0	75	75
	5	0	---	---	0	17	100
Brad	1	0	50	8	0	0	---
	2	0	0	46	8	0	---
	3	0	0	0	17	0	---
	4	0	0	0	0	8	---
Blair	1	---	---	---	---	---	---
	2	---	0	17	25	25	---
	3	---	0	0	0	17	---
	4	---	0	25	25	25	---
Beck	1	0	75	42	50	67	---
	2	0	0	50	67	75	---
	3	0	0	0	50	50	---
	4	0	0	0	0	53	---
Coby	1	0	---	0	0	0	---
	2	0	---	0	0	0	---
	3	0	---	0	50	33	---
	4	0	---	0	0	47	---
Cade	1	100	100	100	100	100	---
	2	100	100	100	100	100	---
	3	75	100	100	100	100	---
	4	50	50	100	58	100	---
Cain	1	0	57	44	50	50	---
	2	0	0	27	33	50	---
	3	0	0	0	25	25	---
	4	0	0	0	0	0	---

*Note:* Shaded areas represent assessments prior to observational learning opportunities (peer instruction). Unshaded areas represent assessments following observational learning opportunities.

## **Sharing**

Sharing was measured during instruction for typically developing group mates and those with disabilities, in two concurrently-operating multiple baseline across participants designs. Generalization to art and snack activities was measured during 4-6 generalization conditions. The first generalization condition, for all groups, was conducted prior to any small group instructional sessions (pre-instruction). The remaining conditions for Group A were after small group instruction was initiated, and after TGMS sessions (post-sharing). For Groups B and C, an additional condition occurred after small group instruction was initiated but before TGMS sessions occurred (pre-sharing: condition 2, Group B; condition 3, Group C).

**Research Question #3: Is PTD effective for teaching participants without disabilities to share during small group instructional sessions?** Following TGMS sessions, all group mates without disabilities increased sharing of tokens from 0% during baseline (shown as data paths with unfilled triangles in Figure 10). Sharing by Ani and Adam increased to around 50% of opportunities for several sessions, then increased to 100% of opportunities and stayed near 100% for the remainder of instructional sessions. Anecdotally, it seemed as though Ani both had a difficult time remembering to share, and had a difficult time planning sharing behaviors (e.g., in early sharing sessions, Ani placed all 3 tokens on her board, then picked up two to share with group mates). Sharing by typically developing group mates in Groups B and C increased immediately to 100% after TGMS sessions were conducted and stayed near 100% for the duration of the study. Thus, Brad and Coby were recipients of an intervention with consistently higher fidelity compared with Alex's intervention, although the percentage of opportunities during which sharing occurred nearing the end of the study was high for all group mates without disabilities in all groups.

**Research Question #4: Will participants with disabilities share more often during instructional sessions when group mates without disabilities model sharing than in no-sharing (baseline) instructional sessions?** All participants with disabilities engaged in sharing during instruction for the majority of opportunities following a relatively short observational intervention (shown as data paths with filled circles in Figure 10). Alex started sharing during the 14th session after his typically developing group mates shared; during 6 of these sessions, his peers shared for each opportunity. Two modifications were instituted, during sessions 9 and 13, respectively. The first modification was praising two shares per session for each group mate without disabilities (post-TGMS sessions 9-12). The second modification was providing small matchbox cars for sharing (twice per session; post-TGMS sessions 13-17). Alex started sharing the session following the second modification. Provision of cars was decreased to once per session (1 of 6 trials) during post-TGMS sessions 18-46.

Brad started sharing in the same session during which his group mates began sharing. He shared for approximately 60-80% of opportunities for the first four sessions. Following a 9-day break and during two sessions in which only one group mate was present, Brad shared for 0% of opportunities. After these two sessions, he shared for the majority of opportunities for the remaining sessions (post-TGMS sessions 7-30), with no modifications made (e.g., no praise or reinforcement was provided).

Coby, like Alex, did not immediately begin sharing when his group mates did. During the first three sessions following TGMS, his group mates shared consistently and no praise or reinforcement was provided. During the fourth through sixth sessions, his group mates shared consistently and praise was provided contingent on sharing for group mates (twice per session per participant). Beginning with the seventh session, edibles were provided for sharing (twice per

session per participant). He started sharing during this session. However, Coby did not outwardly display behaviors (as his group mates did) that suggested that he understood the contingency (e.g., did not look to the teacher to get an edible after sharing). Edibles were provided on a VR-3 trials schedule during post-TGMS sessions 7-9; this was thinned to once per session during the remaining sessions (post-TGMS sessions 10-16).

It should be noted that some of both Alex's and Coby's sharing was requested by group mates (e.g., they held out their hands); although the researcher instructed typically developing group mates to "just wait" during TGMS sessions, she did not provide consequences for this behavior during instructional sessions. Brad typically engaged in sharing by placing tokens on his group mate's token boards; Alex and Coby typically engaged in sharing by placing tokens in their group mate's hands. Thus, sometimes Alex or Coby held out a token and waited on their group mates to accept it by holding out their hand. Other times, Alex or Coby gave a token after their group mate held out their hand. Likewise, group mates used both methods for sharing (i.e., placed tokens in hands of group mates or on their token boards); and typically-developing group mates also engaged in requested shares. Thus, like their typically developing group mates, all participants with disabilities shared for the majority of opportunities, although one participant required only observing sharing—the other participants required modifications designed to make sharing by their group mates more salient.

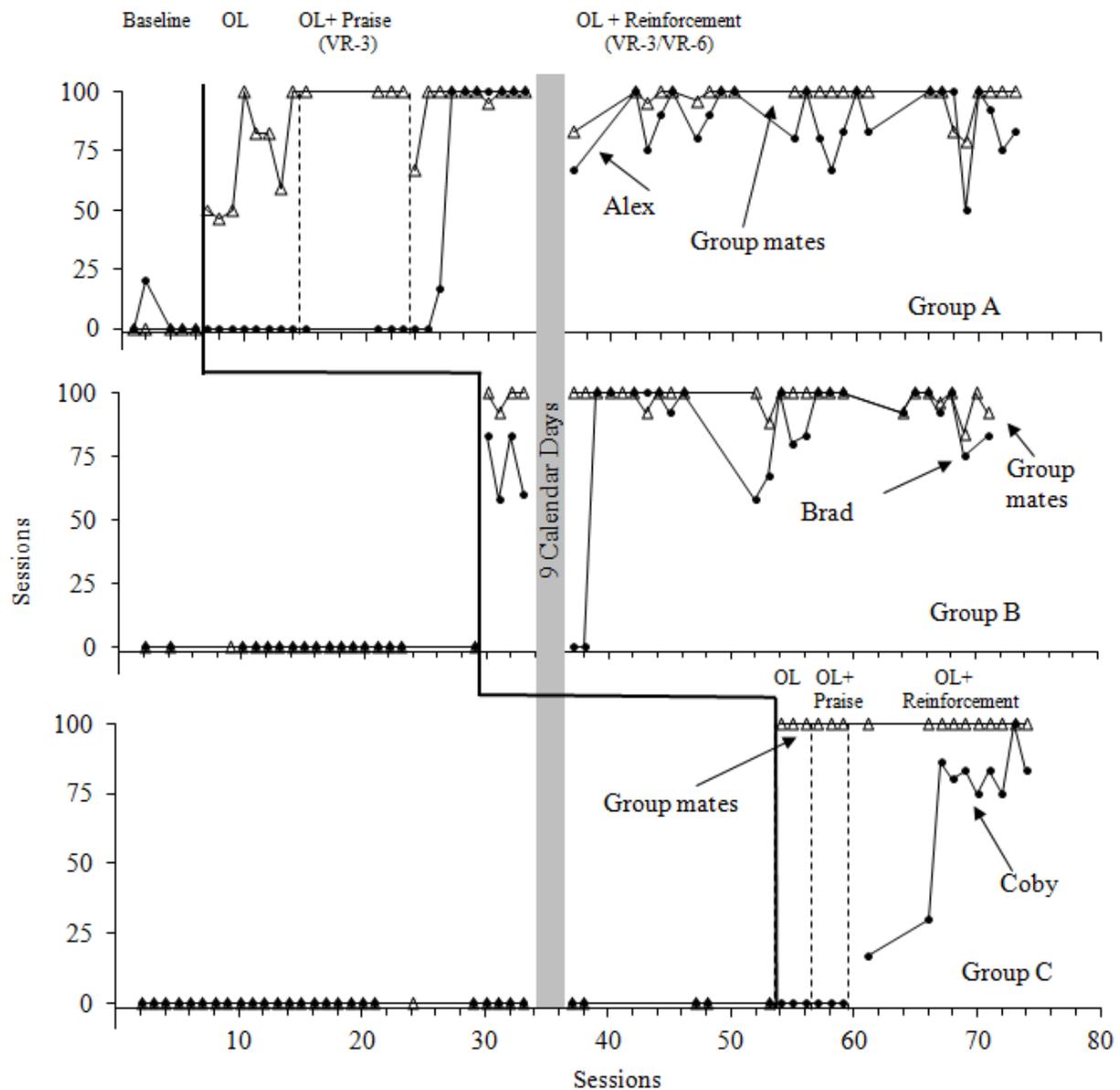


Figure 10. Acquisition of unprompted sharing behaviors during instruction by participants with disabilities (Alex, Brad, and Coby), and their group mates during baseline and observational learning conditions (OL, OL+Praise, OL+Reinforcement).

**Research Question #5: Will all participants share more in generalization contexts (art and snack) when specific opportunities to share existed and the instructor of the small group direct instruction sessions was absent? All procedures and materials for generalization sessions were identical throughout the study. However, the possibility of generalizing sharing**

was time-lagged across groups, as shown in Figures 11 and 12. During the first generalization condition, no group had received small group instruction and no typically-developing group mates had received sharing training in TGMS sessions (pre-instruction). For Group A, all remaining sessions occurred after small group instruction had started and after TGMS had occurred (post-sharing). For Group B, the second condition occurred prior to sharing instruction but following small group instruction (pre-sharing). The third and remaining conditions occurred after sharing instruction had been conducted (post-sharing). No data were collected for the second generalization condition for Group C (Coby had a planned extended absence; his peers participated in probe but not generalization sessions during this condition). The third condition occurred after small group instruction had begun, but before sharing instruction (TGMS) had been conducted (pre-sharing). The fourth and fifth conditions were occurred after TGMS sessions (post-sharing). Thus, although there is only one data point in some conditions for some groups, it is possible to assess generalization across time, both before and after small group instruction occurred and before and after sharing instruction occurred (TGMS). Though these data give more information than the more-typical pre- and post-instruction measurement, sufficient evidence does not exist to make conclusions regarding a functional relation between the intervention and generalization of sharing behaviors.

***Initial sharing behaviors.*** Initial sharing behaviors were defined as those occurring within 10 s of material acquisition—a conservative measure of sharing only including immediate shares of preferred items. During the initial four sessions (the first condition), none of the participants with disabilities made any initial shares with their group mates. The sharing by typically-developing group mates varied widely—75% of opportunities for Group A; 25% of opportunities for Group B, and 0% of opportunities for Group C. Thus, all participants with

disabilities were non-sharers prior to instruction; typically-developing group mates varied from non-sharers to relatively proficient sharers (data for group mates with and without disabilities shown in Figure 11).

For Alex, sharing increased during the next condition (post-sharing) from 0% of opportunities during the first condition to approximately one-third of opportunities. His sharing continued to increase—to 75% during conditions 3-5 and to 88% of opportunities during the final condition. Thus, there was an immediate change in level and an increasing trend after he had opportunities to observe his peers share during instruction. For Brad, sharing increased during the second condition (pre-sharing). There was no additional level change in conditions 3-5 (post-sharing). Coby did not engage in any initial sharing response during pre-instruction (condition 1), pre-sharing (condition 3) or during post sharing conditions (conditions 4 & 5).

For group mates without disabilities, results varied; this might be expected given the differences in initial sharing. For Group A, there was no immediate change in level following sharing training, but there was an increase in trend and both group mates shared for 100% of opportunities during conditions 4-6. For Group B, there was a change in level following small group instruction (pre-sharing) but no additional change following sharing training (post-sharing). Group C consistently shared for few opportunities across all conditions.

Conclusions include: (a) increases in initial sharing occurred for 2 of 3 participants with disabilities, with greater change for the participant who participated in a greater number of post-TGMS instructional sessions; (b) increases occurred for 2 of 3 groups of participants without disabilities; for one group the biggest change in level occurred after small group instruction occurred but before TGMS sessions.

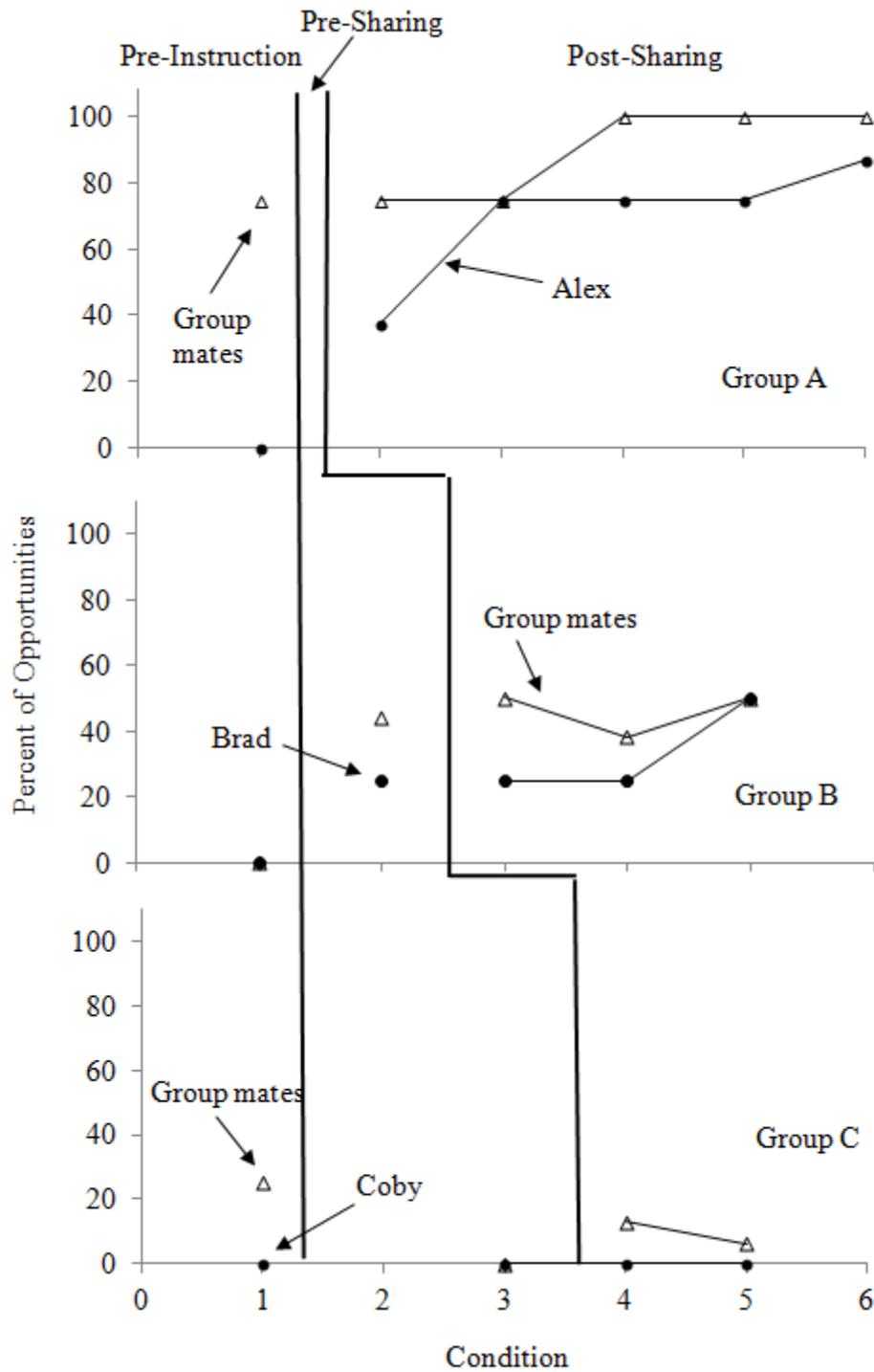


Figure 11. Percent of opportunities immediately (within 10 s) following material access during which children shared.

**Total shares.** In addition to measuring immediate shares, total shares were measured. These included (a) immediate shares of preferred materials, (b) shares of preferred materials after 10 s, (c) trading preferred or less-preferred materials with a group mate with agreement from that group mate, and (d) giving non-preferred items to a group mate. As with immediate shares, all participants with disabilities engaged in zero total shares during the first pre-instruction generalization condition. Total sharing differed among groups of typically-developing peers as well, following the same pattern seen for immediate shares: Many shares for Group A (12); very few for Group B (1); and some for Group C (6). Data for group mates with and without disabilities are shown in Figure 12.

For Alex, sharing increased during the first post-sharing condition (from 0 total shares during pre-instruction to 3 shares during the second condition). His sharing continued to increase—to 8 total shares during the final condition. Thus, there was an immediate change in level and an increasing trend in Alex's data. For Brad, sharing increased during the second condition (pre-sharing) from 0 to 6 total shares. Following sharing training there was a small additional change in level, increasing to 11 total shares during the final condition. Coby did not engage in any initial sharing response during either pre-instruction or pre-sharing conditions (conditions 1 and 3) or during the first post-sharing condition. He engaged in one share during the final generalization condition.

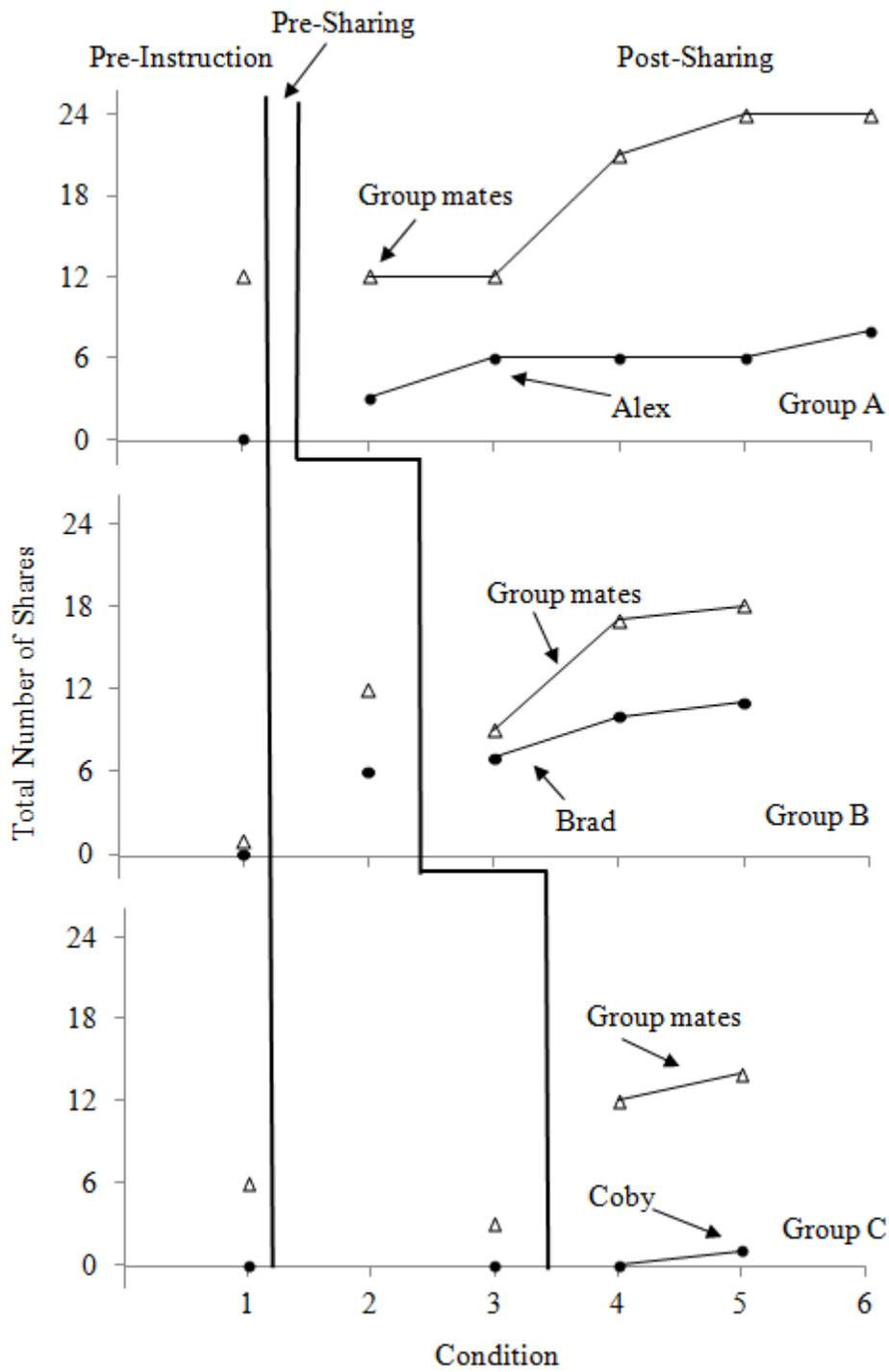


Figure 12. Total number of shares for group mates with and without disabilities during generalization sessions.

For group mates without disabilities, results varied; again, this might be expected given the differences in initial sharing. For Group A, there was no immediate change in level following sharing training, but there was an increase in trend and with 24 total shares during conditions 5 and 6. For Group B, there was a change in level following small group instruction (before sharing training was instituted) and an additional increase in level and trend following sharing training. Group C consistently shared for few opportunities across both pre-sharing conditions; total shares increased considerably following TGMS training (conditions 4 and 5).

### **Collateral Measures of Affiliation**

Three measures of affiliation were used: a direct count of social interactions among group mates during 12-min free play sessions, a direct count of the percentage of seconds during which each participant was in proximity to either group mate, and a self-report of peer preference using a paired-choice sociometric task. Direct counts of interaction and proximity were done during weekly sessions, occurring during typical free play times. Sessions were only conducted when all three group mates were present; absences were common, particularly for the groups who were instructed before and after the regular school day (Groups A and B). Because of this missing data, and because these data were not used to make decisions regarding changes between conditions, sufficient evidence does not exist to make claims regarding a functional relation. Scheduled week-long absences for two group mates and the attrition of a single typically-developing group mate in Group B precluded session scheduling during Weeks 2-4; these missing data points make comparisons between conditions difficult. Peer preference sessions were conducted using a pre- and post-test paradigm, before instruction on the first word set and following the fifth probe condition.

**Research Question #6: Following small group instruction with and without modeling of sharing by typically-developing group mates, will group mates with and without disabilities remain in proximity for longer durations during free play sessions?** The percentage of time participants in each group were proximal is shown in Figure 13. During initial pre-instruction free play sessions, all participants with disabilities spent a smaller percentage of the session in proximity with their typically-developing group mates than their group mates did with each other. The percentage of time spent in proximity to group mates varied considerably; Alex spent approximately one-third of the session with his group mates, Brad spent almost 75% of the session in proximity to the members of his group, and Coby spent only about 10% of the session proximal to group mates. All participants with disabilities spent a larger percentage of the session in proximity to their group mates over time. However, because relatively few data points exist, particularly for Groups A and B, conclusions should be viewed as tentative.

Data for typically-developing group mates show different patterns: Throughout the study, including during pre-instruction and pre-sharing sessions, the typically-developing group mates in Groups A and B consistently spent the majority of sessions in proximity to their group mates. Thus, although some variability was observed, large changes in level were not possible. Typically-developing group mates in Group C spent widely-varying amounts of time in proximity to one another during pre-instruction and pre-sharing sessions, ranging from near-zero levels of proximity to near 100% levels. Following sharing training, data were considerably less variable, with near 100% proximity across 4 sessions. Conclusions, though tentative, are that small group direct instruction with and without sharing results in increases in time spent near group mates for children who initially spend little or variable time in proximity to one another in baseline.

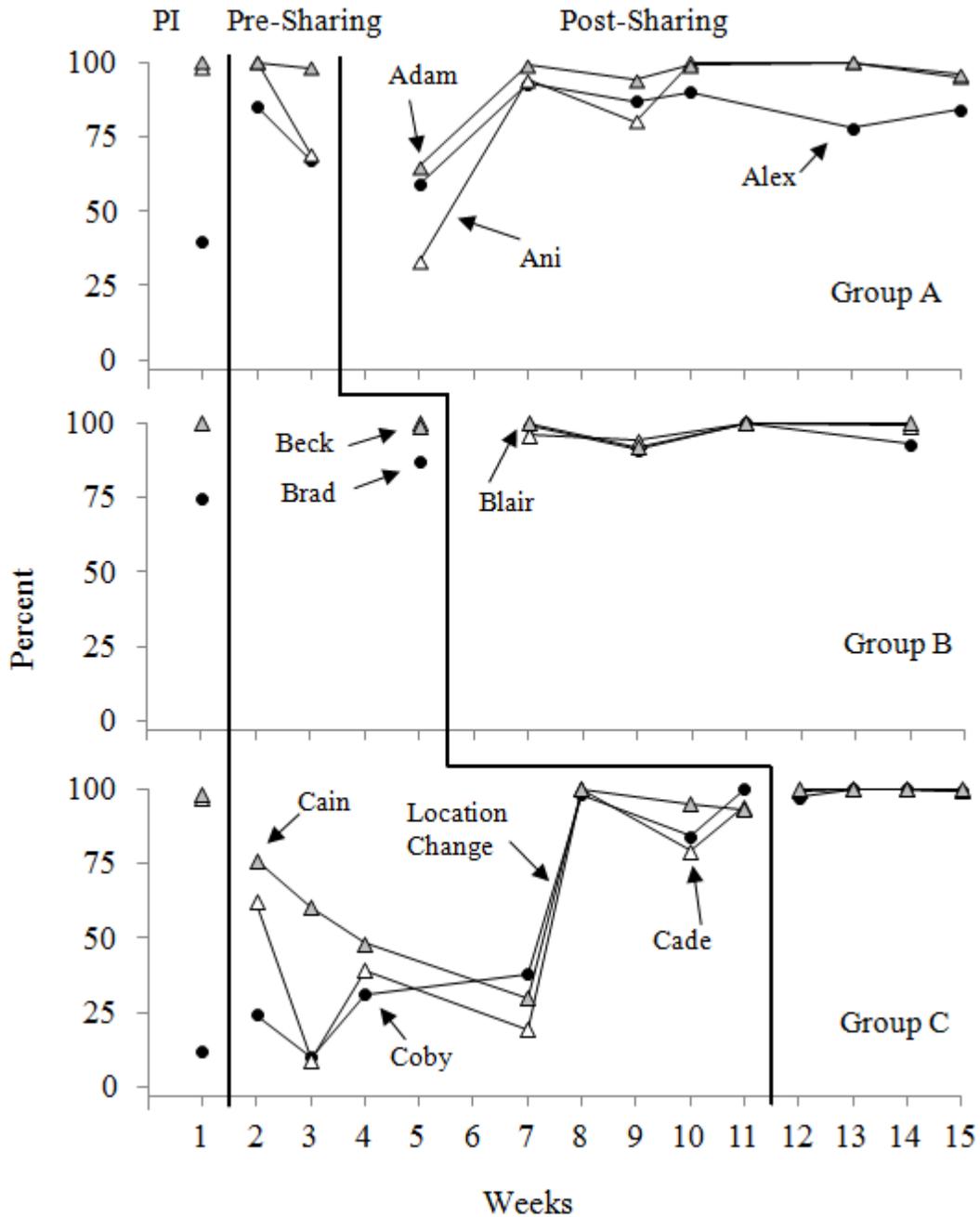


Figure 13. Duration of proximity to group mates for participants during free play sessions conducted prior to small group instruction (PI), before sharing training (Pre-Sharing) and following sharing training (Post-Sharing). For Group C, an arrow denotes a change in measurement location due to classroom assignment; the size of the center used changed.

**Research Question #7: Following small group instruction with and without modeling of sharing by typically-developing group mates, will group mates with and without disabilities engage in more interactions with each other during free play?** Social initiations and responses were measured for each group mate; the number of social interactions shown in Figure 14 are those occurring with group mates in each participants own group, excluding negative interactions (e.g., Alex's positive and neutral interactions with Ani and Adam; Ani's positive and neutral interactions with Alex and Adam). In addition to showing all interactions towards any group mate, to assess whether changes in interactions were between group mates without disabilities or among all group mates, interactions directed toward the participant with disabilities by his typically-developing group mates are shown in Figure 15.

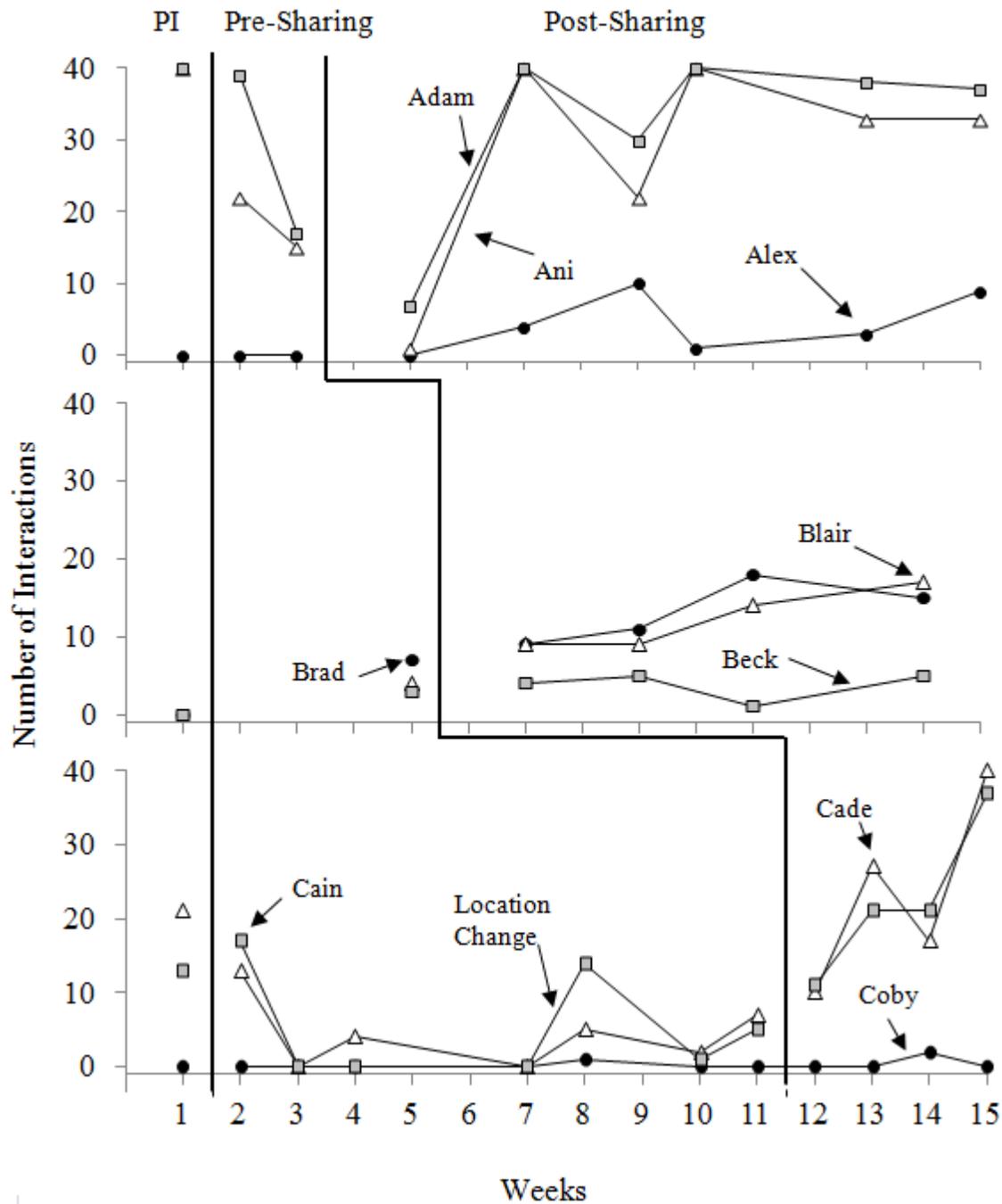


Figure 14. Social interactions among group mates during free play sessions conducted prior to small group instruction (PI), before sharing training (Pre-Sharing) and following sharing training (Post-Sharing). For Group C, an arrow denotes a change in measurement location due to classroom assignment; the size of the center used changed.

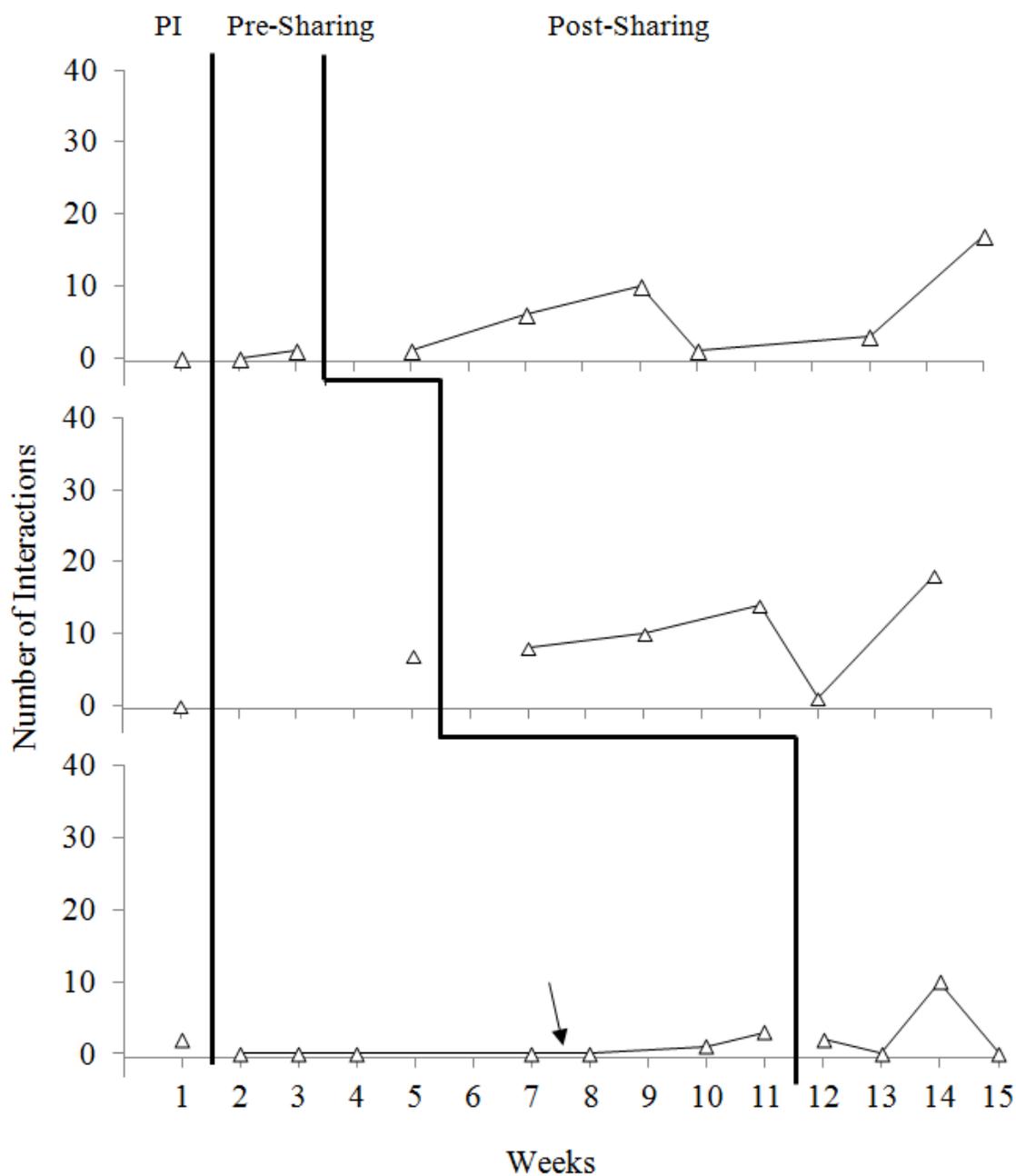


Figure 15. Social interactions directed towards group mates with disabilities by their group mates during free play sessions conducted prior to small group instruction (PI), before sharing training (Pre-Sharing) and following sharing training (Post-Sharing). For Group C, an arrow denotes a change in measurement location due to classroom assignment; the size of the center used changed.

Sharing and negative interactions occurred infrequently for all participants; Table 10 shows average number of each emitted by all participants in each session during each condition. With the exception of 8 negative interactions emitted by Adam during the first week, all participants had two or fewer total negative interactions (with an average of approximately one negative interaction per participant during 72-144 min of observation). Sharing also occurred relatively infrequently, although only two participants never exhibiting sharing behaviors (Beck and Coby). During the pre-instruction free play session, no participants shared. Some sharing occurred during pre-sharing and post-sharing sessions; the average number of shares during post-sharing was highest.

Table 10  
*Sharing and Negative Interactions by Condition*

<u>Participant</u>	<u>Shares per Session across Conditions (Total Number)</u>	<u>Shares per Session</u>			<u>Negative Interactions per Session across Conditions (Total Number)</u>	<u>Negative Interactions Per Session</u>		
		<u>Pre-Instruction</u>	<u>Pre-Sharing</u>	<u>Post-Sharing</u>		<u>Pre-Instruction</u>	<u>Pre-Sharing</u>	<u>Post-Sharing</u>
Alex	0.11 (1)	0	0	0.17	0.22 (2)	0	0	0.33
Ani	0.11 (1)	0	0.50	0	0.22 (2)	0	0.50	0.16
Adam	0.44 (4)	0	0.50	0.50	1.11 (10)	8.00	0.50	0.16
Brad	0.33 (2)	0	0	0.50	0.16 (1)	0	0	0.25
Blair	0.16 (1)	0	0	0.25	0.33 (2)	0	0	0.50
Beck	0.00 (0)	0	0	0	0 (0)	0	0	0
Coby	0.00 (0)	0	0	0	0.08 (1)	0	0	0.25
Cade	0.75 (9)	0	0.29	1.75	0 (0)	0	0	0
Cain	0.25 (4)	0	0.14	0.50	0.08 (1)	0	0	0.25

Adam and Ani, typically-developing group mates in Group A, interacted often throughout the study; this is consistent with teacher report of their behavior. During session 5, social interactions appear to be low for these participants; the video recording rules used during other sessions in the study were not used with fidelity in this session due to problem behavior emitted by Alex; thus, these data may not be representative of participant's actual behavior. Alex did not attempt to interact with either group mate during pre-instruction (Week 1) and pre-sharing sessions (Weeks 2, 3). The number of interactions increased in post-sharing sessions during Weeks 5 and later; his number of interactions varied from 1-10. Likewise, Ani did not attempt to interact with Alex during pre-instruction (Week 1) or pre-sharing (Weeks 2, 3); Adam attempted to interact with him only once during a pre-sharing session (Week 3). The number of interactions directed towards Alex increased beginning in Week 5 (post-sharing); the number of interactions during post-sharing sessions varied from 1 to 17 in a 10-min free play session (Data are shown in Figure 15). Thus, the number of interactions between Ani and Adam were consistently high throughout the study; their interactions with Adam, and his interactions with them, increased following TGMS sessions.

For Group B, few social interactions occurred during the pre-instruction session (Week 1; Figure 14), and a small increase in interactions occurred during the pre-sharing session (Week 5). During post-sharing sessions, interactions for Beck remained above zero (his pre-instruction level) and stable; there was no additional increase between pre- and post-sharing sessions. However, increases were shown for both Blair and Brad above the initial increase from pre-instruction to pre-sharing. As is shown in Figure 15, interactions with Brad consistently increased over time. Thus, the number of interactions emitted by Blair and Brad consistently increased throughout the study; the number of interactions emitted by Beck increased to a

smaller extent after small group instruction started, (above the level measured during the pre-instruction session), but after this change in level, his data were stable.

Participants in Group C engaged in highly variable numbers of interactions during pre-instruction (Week 1) and pre-sharing (Weeks 2-11). Data show that considerable increases in interactions occurred for both typically-developing group mates during post-sharing sessions (Weeks 12-15). Data shown in Figure 15 indicate that these increases were largely due to interactions between Cade and Cain, rather than with Coby, the group mate with disabilities, although some inconsistent increases in interactions directed towards Coby did occur. Thus, the number of interactions for Coby were near-zero for the duration of the study; the number of interactions for Cain and Cade were variable before TGMS and consistently high after TGMS.

**Research Question #8: Will participants with and without disabilities rate their group mates more favorably on a post-instruction peer preference assessment when compared with pre-instruction ratings?** Peer preference rankings for each participant are shown in Table 11. The peer chosen most often during each assessment is listed as the most preferred (Rank: 1) and the peer chosen least often during each assessment is listed as the least preferred (Rank: 4). During pre-instruction assessments, typically developing group mates Ani and Adam rated each other as most highly preferred; little change occurred during post-instruction assessments (Ani ranked Adam as her second-most preferred; Adam ranked Ani as his most preferred peer). Adam and Alex ranked each other more highly during the post-instruction sessions when compared with pre-instruction rankings; Alex and Ani each ranked the other as less-preferred. Because Blair was not the original group mate of Beck and Brad, peer preference assessments were not conducted with her. However, Beck and Brad both ranked each other more highly in post-assessments when compared with pre-assessments. Cade remained

Coby's most-preferred peer; Cain was ranked as his least preferred peer during pre-assessments, and moved up to his third most preferred peer during the post-assessment. Cade ranked Coby as her most preferred peer during post-assessments (compared with the third-most preferred during pre-assessments); as a result of this move, Cain moved from her most-preferred peer to her second-most preferred peer. Coby remained tied for least-preferred peer for Cain; Cade moved from Cain's second-most preferred peer to his most highly preferred peer.

Randomly selected peers with disabilities were consistently ranked as less-preferred (rank of 3 or 4; 83% of opportunities) and consistently moved in a negative direction or stayed in the least-preferred rank from pre- to post-assessments (83% of moves). In contrast, 3 of 5 moves for the participants with disabilities were positive; only one ranking was at the least-preferred position during post-instruction assessments (Cain ranked Coby as his least-preferred [4] during both pre- and post-assessments) and two were in the most-preferred position (Beck ranked Brad and Cade ranked Coby as most-preferred during post-assessments only). More data are needed but these preliminary data may suggest small group instruction with structured opportunities to engage in prosocial behaviors result in increased peer preference for participants with disabilities.

Table 11  
Peer Preference Rankings

<u>Participant</u>	<u>Peer</u>	<u>Rank</u>		<u>Rank change from pre- to post-instruction</u>
		<u>Pre-Instruction</u>	<u>Post-Instruction</u>	
Alex	RND 1	1	1	
	Ani	2	4	Negative; 2 to 4
	Adam	3	2	Positive; 3 to 2
	RND 2	4	3	
Ani	Adam	1	2	Negative; 1 to 2
	Alex	2	3	Negative; 2 to 3
	RD	3	1	
	RND	4	4	
Adam	Ani	1	1	No change
	RND	2	3	
	RD	3	4	
	Alex	4	3	Positive; 4 to 3
Brad	RND 1	1	2	
	Beck	2	1	Positive; 2 to 1
	RND 2	3	3	
Beck	RD	1	2	
	RND	2	3	
	Brad	3	1	Positive; 3 to 1
Coby	Cade	1	1	No change
	RND 1	2	3	
	RND 2	4	4	
	Cain	4	3	Positive; 4 to 3
Cade	Cain	1	2	Negative; 1 to 2
	RND	2	3	
	Coby	3	1	Positive; 3 to 1
	RD	4	4	
Cain	RND	2	2	
	Cade	2	1	Positive; 2 to 1
	RD	4	4	
	Coby	4	4	No change

Note: Peers are assigned the same rank if (a) each was chosen on the same number of trials and (b) one was not chosen more than the other for head-to-head trials. RND=Randomly selected peer with no disability. RD= Randomly selected peer with a disability.

## CHAPTER IV

### DISCUSSION

This study was designed to assess the acquisition of academic behaviors taught using a progressive time delay procedure in small groups of children with and without disabilities. In addition, children without disabilities were taught to share tokens received for correct responses, and children with disabilities were given opportunities to observe this behavior. Generalization of sharing to art and snack activities was measured for children with and without disabilities. Changes in affiliation, a potential side effect of small group instruction based on anecdotal teacher report in a prior study, also were assessed.

This study was conducted as a replication and extension of a study conducted previously (Ledford & Wolery, in press). As with the previous study, acquisition of academic behaviors was evaluated in the context of a multiple probe across behaviors design. In the present study, experimental control for sharing during instructional sessions also was established, using a multiple baseline across participants design. Positive changes occurred in acquisition of academic behaviors, acquisition and generalization of sharing, and peer affiliation measured via direct observation and self-reports. Changes in generalization contexts and in affiliation were measured in the context of a single case design, but changes in these behaviors were not used to make decisions related to changes in conditions (e.g., movement from baseline to intervention conditions). Thus, claims regarding functional relations between the independent variables and changes in these behaviors are not made.

## **Academic Behaviors**

Four findings are noteworthy regarding acquisition of academic behaviors by participants in the study. First, all participants learned all academic behaviors directly taught with progressive time delay. This replicates previous research on the use of response prompting procedures in small group arrangements with preschool children with disabilities (e.g., Alig-Cybriwsky et al., 1990; Chiara, Schuster, Bell, & Wolery, 1995; Holcombe, Wolery, & Snyder, 1994; Holcombe, Wolery, Werts, & Hrenkevich, 1993; Wolery, Werts, Holcombe, Billings, & Vassilaros, 1993; Wolery, Holcombe, Werts, & Cipolloni, 1993). It adds to a smaller body of research that suggests acquisition of discrete academic skills also occur when children with disabilities are taught together in a small group with typically-developing peers (Ledford & Wolery, in press; Venn et al., 1996).

Second, all participants learned at least some academic behaviors taught to their peers, although they were not directly taught. The average percentage of behaviors learned was lower than identified in a review of small group instruction using prompting procedures (Ledford et al., 2012), but more research is needed for observational learning of discrete academic behaviors for preschoolers. Many studies in the review that included preschool participants did not measure observational learning. Also, at least one study (Parker & Schuster, 2002) suggests including school-aged typically-developing peers who have acquired more academic skills than their group mates with disabilities (e.g., are taught more advanced skills than those group mates) may limit opportunities for observational learning for both participants with disabilities (these participants may learn fewer of these advanced behaviors) and typically-developing participants (these participants, like Cade, do not have the opportunity to learn behaviors from their peers). More

studies are needed to study acquisition of target and observational behaviors when instruction is conducted in small groups of young children with and without disabilities in inclusive settings.

The third finding is that most participants learned behaviors assigned to later tiers faster than they learned behaviors assigned to the initial tier of instruction. This replicates earlier research with response prompting procedures (Wolery, Holcombe, et al., 1992) and research with one-to-one arrangements with progressive time delay (Reichow & Wolery, 2011) that suggests that children "learn to learn", and that systematic prompting procedures become more efficient when children are taught multiple sets of behaviors over time. A related finding is that most participants emitted fewer errors during later versus earlier behavior sets. The overall average percentage of errors emitted (4.5%) is similar to that reported for young children in other studies (e.g., 4.0-6.3%, Holcombe et al., 1993). Error percentages were higher during instruction on the first behavior set; previous studies that did not teach multiple sets of behaviors to young children over time (e.g., when there were no opportunities to "learn to learn") reported similarly high levels of errors (e.g., 8.9%, Chiara et al., 1995; 16.2%, Wolery et al., 1993). These percentages are higher than those reported in some reviews of the use of prompting procedures (Wolery, Holcombe, et al., 1992). Further research is needed to determine whether higher error percentages during initial instruction is likely for young children who have limited experience with direct instruction or direct instruction in small groups, and, if so, what modifications are appropriate to reduce the likelihood of errors.

Fourth, participants maintained learned behaviors to some extent, but not to the same extent as that reported in the literature. It is likely that the lenient criterion for acquisition is to blame—previous studies on targeted academic behaviors taught in small groups of preschoolers show near-100% maintenance of behaviors, but these studies thinned the schedule of

reinforcement to a VR-3 schedule (Chiara et al., 1995) or both thinned the schedule and used a more stringent criterion (more sessions at criterion and 100% correct responding rather than 90%; Holcombe et al., 1994). Lower than expected maintenance of skills may have also occurred because the skills were chosen primarily for research purposes (e.g., the children would be unlikely to be taught to name stimuli outside of instructional sessions), and the children likely were not exposed to reinforcement for naming similar stimuli outside the context of the study. More functional behaviors may have been maintained to a greater extent.

### **Sharing**

Noteworthy findings related to sharing during instructional sessions include: (1) participants without disabilities learned to share tokens during TGMS sessions, generalized sharing to regular instructional sessions, and maintained sharing without continued instruction; (2) participants with disabilities learned to share tokens without prompting or directions to do so from an adult; although (3) two participants required modifications to increase the saliency of their group mates' sharing behaviors before they learned to share. These findings replicate those of the Ledford and Wolery (in press) study, although experimental control was established in the current study. In practice, it may be logical to praise sharing and perhaps reinforce sharing on an intermittent basis from the beginning of instruction. This recommendation, of course, has not been tested experimentally. Also, including children with disabilities in a few short training sessions with typically-developing peers, rather than using an adult as a proxy, may decrease time to acquisition, decrease variability, and increase the percentage of opportunities during which they share. Group mates with disabilities were not included in TGMS sessions in this study because we were interested in a pure test of observational learning with no adult prompting; in practice, including children with disabilities may be beneficial.

Generalization of sharing to contexts closely resembling typical classroom activities also was measured. However, these behaviors were not the primary variables driving the experimental designs used in this study. Thus, it is not possible to attribute changes to the independent variables confidently; no claims of functional relations are made. Although limitations exist, five tentative conclusions exist. First, two of three participants with disabilities made more immediate shares during pre- and post-sharing conditions when compared with the initial pre-instruction condition (no immediate sharing was exhibited by any participant with disabilities during the pre-instruction condition). Second, the number of total shares increased for all three participants with disabilities (no total shares occurred for any participant with disabilities during initial generalization condition), although magnitude of change varied across participants. The percentage of opportunities during which initial shares were made also increased across conditions for two of three pairs of group mates without disabilities and the percentage of opportunities during which initial shares were made also increased across conditions for two of three pairs of group mates without disabilities.

Additional research is needed to confirm that changes over time are related to small group instruction; a different type of activity-based measurement may be needed to provide frequent assessments of generalization. Coby did not consistently generalize sharing to art and snack activities, although he engaged in a single sharing behavior during the final generalization condition. Several reasons for this may exist; one is that he may not have become a fluent sharer during instruction because he had fewer opportunities than other participants with disabilities since his instruction began last (he was the third participant to receive the intervention in the context of a multiple baseline design). With more frequent measurement, the question of dosage can be answered: How many times do participants need to share in a simplified instructional

context before they generalize to contexts similar to typical classroom activities? The relative magnitude of changes in behavior from the initial to the final generalization condition was related to the number of post-TGMS (post-sharing) instructional sessions conducted for each group, with Group A participants engaging in the most shares and Group C participants engaging in the fewest shares during the final generalization condition.

A second moderator of generalization of sharing may be the proficiency of imitation of a participant. Given Coby's increase in observational learning across tiers, it may be that he learned to imitate his group mates as a consequence of small group instruction. He may not have been a proficient or fluent imitator; a comparison is needed to determine whether children with poor peer imitation differentially benefit from small group direct instruction with peer modeling of prosocial behaviors and whether small group direct instruction may prime poor imitators to learn to imitate their peers. This appeared to occur with Coby as evidenced by the number of his group mates' words he learned across behavior sets.

Although some inadequacies exist, data suggest peer modeling of prosocial behaviors during small group instruction not only results in increased sharing during instruction by children with disabilities, but also that this behavior may generalize to contexts similar to classroom activities. Because the researcher who conducted instructional sessions did not conduct generalization sessions, one possible alternate explanation was excluded (that the instructor was the discriminative stimulus for sharing). Thus, more confidence exists that changes in behavior are related to the independent variables used. The simplicity of the context (e.g., straightforward rules for when and what to share), salience and frequency of peer sharing, and frequent opportunities to practice sharing may all increase the likelihood that children with disabilities will acquire sharing and become fluent in these behaviors. Because fluent behaviors are more

likely to be generalized, peer modeling of behaviors during small group direct instruction may increase the likelihood of generalization when compared with teaching during typical contexts alone. Additional studies are needed to determine whether the acquisition and generalization of other social behaviors also occur when these procedures are implemented.

### **Collateral Measures**

Changes in affiliation, measured via direct observation and self report, were generally positive, with five noteworthy findings. The first is that the percentage of each session during which participants with disabilities remained in proximity to their typically-developing group mates increased from initial free play sessions conducted before small group instruction to sessions conducted after small group instruction started and increased again after sharing training (TGMS) was conducted. The second finding regarding proximity was that group mates without disabilities in two groups maintained proximity for the majority of sessions throughout the study; the proximity for the other group decreased in variability and stayed near 100% following sharing training. Making confident conclusions from these data, however, is impaired because few sessions were conducted for Group B and a change in measurement location occurred simultaneously with change in data for Group C. Research is needed to determine whether these preliminary findings are replicated when more frequent and consistent measurement is used.

In addition to changes in proximity, changes in social interactions also were noted. More social interactions occurred during post-sharing free play sessions, across groups, and more interactions were directed towards children with disabilities during post-sharing free play sessions, across groups (although the size of the change varied). The same limitations exist for changes in social interactions that were mentioned for proximity, including relatively few sessions and a limited number of sessions per condition. It is unclear whether increases in

proximity and social interactions are related to small group direct instruction alone, or if peer modeling of prosocial behaviors further increases the likelihood of peer proximity and interactions. Additional research is needed, with frequent measurement in typical contexts, to determine whether increases are differentially related to small group direct instruction, peer modeling of prosocial behaviors, or both.

Changes in affiliation measured via self report were variable but promising; 50% of changes in affiliation among group mates were positive and an additional 21% did not change. While non-group mate peers with disabilities were commonly ranked as non-preferred, and became less preferred over time (a finding consistent with previous research for children with disabilities; Kuhn & Weiner, 2000), group mates with disabilities were generally ranked as more-preferred during post-instruction assessments than during the pre-instruction assessments. The procedure used was a variation of the typical paired-choice preference assessment whose psychometric characteristics have not been evaluated. Several additional studies are needed to determine whether the procedures used are reliable and valid for young children with and without disabilities, whether they more closely reflect direct count assessments of peer affiliation, and if the assessment is sensitive to changes in affiliation.

### **Limitations**

Although the results of the study suggest that using peer modeling of prosocial behaviors during small group direct instruction is a promising procedure for increasing both academic and social behavior for children with disabilities, a few limitations are noteworthy. The first is that two of three participants required modifications to the observational learning procedure before increases in sharing were observed; a finding inconsistent with the previous study on observational learning of sharing (Ledford & Wolery, in press). It is likely that this resulted from

a procedural variation implemented to increase experimental control; specifically, that all groups engaged in sessions during which sharing was not reinforced but an incompatible behavior (placing all tokens on board) was likely reinforced both negatively (placement of tokens resulted in the end of a trial) and positively (by provision of reinforcers at the end of the session). The placement of tokens may have also become routinized and resulted in automatic reinforcement, particularly for Alex and Coby, who often engaged in routinized and inflexible behavior chains during typical classroom activities. Thus the lack of more immediate sharing for Alex and Coby may have been an artifact of the design used to evaluate the observational learning of sharing. Future research can avoid this limitation, in part, by measuring baseline sharing behavior intermittently. For instance, one or two trials per session could include the provision of multiple tokens while other trials could result in the presentation of a single token.

Measurement of generalization and changes in affiliation were not variables that drove the decisions behind the experimental designs used in the study. Thus, conclusions regarding functional relations between the independent variables and these dependent variables are not possible. Devising generalization sessions that result in sufficient number of opportunities for sensitive measurement while not consuming inordinate amounts of time in measurement remains an unsolved issue. Without controls for threats to validity, it is not possible to confidently rule out other explanations for behavior change, although the use of staggered intervention introduction and multiple measurement occasions makes this less likely when compared to the typical pre- and post-test measurement of generalization and collateral variables. Specifically, the following changes could be related to behavior changes in sharing or collateral social behaviors: All participants moved to new classrooms, with new teachers and at least some new peers, halfway through the study. Also, concurrent with the classroom change for Group C, a

change in free play measurement occurred. The new classroom blocks area was different in size than the area used during initial sessions. This change may have resulted in differences in the likelihood of maintaining proximity, separate from implementation of study procedures. Also, some sharing behaviors by participants were requested by peers during OL conditions; no requesting occurred during baseline conditions. Thus, it may be that requesting resulted in sharing. This seems unlikely for a number of reasons, namely that: (a) teacher report on pre-study behavior suggests participants with disabilities were unlikely to share, even when it was requested and (b) all participants with disabilities refused sharing requests during initial generalization conditions (e.g., said "no" or ignored peers who requested a preferred material).

### **Implications**

Although only two studies have been conducted to evaluate the use of peer modeling of prosocial behaviors during small group instruction, tentative results suggest that this procedure may result in acquisition of academic skills and may increase the use of prosocial behaviors in instructional and potentially generalization sessions. Additional research is needed to confirm these findings; specifically, future research studies should be conducted to determine whether (a) intermittent baseline measurement of sharing is feasible to decrease reinforcement of non-sharing during sharing baseline conditions, (b) indigenous implementers (e.g., classroom teachers) can effectively implement procedures in the context of ongoing activities, and (c) similar benefits occur for older children with disabilities (e.g., elementary school participants).

With regards to the small group academic instruction, results of this study show: (a) it is feasible to implement direct instruction with small groups of preschoolers with and without disabilities with varying pre-instruction academic skills; (b) it is feasible to conduct this instruction in typical, inclusive contexts, with probe or academic sessions occurring for

approximately 5 minutes per day; (c) total teaching time per child (approximately 1-2 min per session) was short but resulted in efficient acquisition of behaviors; and (d) instruction during these relatively short sessions also resulted in learning of behaviors taught to group mates for all participants with and without disabilities. Thus, for young children with disabilities who are imitative, evidence suggests small group direct instruction is a valid procedure to be used for teaching, in contrast to the widely-used models of 1:1 "pull-out" direct instruction (Bronson, Hauser-Cram, & Warfield, 1995; Eriksson, Welander, & Granlund, 2007; U. S. Department of Education).

Acquisition of academic behaviors, including those behaviors learned observationally is, alone, adequate reason to conduct small group instructional sessions in inclusive environments with children with and without disabilities. However, this study provides evidence that, in addition to increased academic learning, small group instruction with carefully planned opportunities for social interactions might also lead to increases in peer-related prosocial behaviors during instruction; might lead to increases in the same prosocial behaviors during typically-occurring non-instructional activities for some children; and might increase both the time spent with group mates and the number of social interactions with group mates for some children. These results may be due to the large number of opportunities provided during instruction; children not only acquired sharing behaviors, but may have had enough practice trials to become fluent. These findings are not in opposition to widely-held beliefs that social behaviors should be taught in typically-occurring activities like free play; rather, these findings suggest that providing additional structured opportunities during instructional sessions may result in increased efficiency of learning.

## Appendix A Glossary

### *Study Participants*

- **Group mates or Participants:** Children who were taught in a small group during instructional sessions (n=3 per group; 9 total). For the participant with disabilities, group mates were two typically developing children. For the participants without disabilities, group mates were one typically developing child and one child with a disability. Group mates could be:
  - **Group mates or Participants with disabilities:** Participants in the study (n=3) who had an identified disability and who participated in instructional sessions with two typically developing group mates.
  - **Group mates or Participants without disabilities:** Participants in the study (n=6) who did not have an identified disability and who participated in instructional sessions with one other participant without disabilities and one participant with disabilities.
- **Peers:** Classmates of the three group mates taught in instructional sessions who participated in peer preference assessments (n=18). These participants did not participate in any instructional or generalization sessions. These peers may or may have been present during free play sessions.
  - **Non-group mate peers:** Children who participated in peer preference conditions who did not participate in instructional conditions
  - **Group mate peers:** Children who participated in peer preference conditions who were group mates during instruction.
- **Classmates or Children:** Any group mates, peers, participants, or non-participants who were enrolled in the school.

### *Study Personnel*

- **Researcher:** Conducted instructional, probe, free play, and peer preference sessions.
- Also referred to as **instructor or author.**
- **Teacher:** Adults who were part of the typically-occurring classroom activities that happened simultaneously with research activities (e.g., classroom teacher, assistants, paraprofessionals, therapists).
- **Graduate student:** One of five researchers who conducted generalization sessions.
- **Adult:** Researcher or graduate student (when referring to either).

### *Study Sessions*

- **Instructional:** Small group sessions conducted by the author during which PTD was used to teach naming of academic stimuli. Prompting and reinforcement for correct academic responses was given. Instructional sessions were:
  - **No sharing (baseline) sessions:** Instructional sessions during which all group mates were given three tokens contingent on correct responding. These sessions occurred prior to training participants without disabilities to share. No in-session prompting or praise provided for sharing.
  - **Sharing (peer modeling) sessions:** Instructional sessions during which all group mates were given three tokens contingent on correct responding. These occurred after training sharing participants to share (sharing by participants without disabilities is expected). No in-session prompting or praise provided for sharing.
- **Probe:** Individual sessions conducted by the author during which participants with and without disabilities were separately tested on naming academic stimuli they had been or would be taught

and the stimuli that had been or would be taught to group mates. No prompting was provided; praise was given for correct responses.

- **Training typical participants to share (TGMS):** Sessions conducted by the author during which PTD was used to teach sharing of tokens to participants without disabilities in pairs.
- **Generalization (art):** Small group sessions conducted by a graduate student implementer during which group mates were given specific opportunities to share when the graduate student implementer gave multiple utensils (e.g., paintbrushes, markers) to a single group mate, and none to the other two group mates. No prompting or praise provided for sharing or other prosocial behaviors.
- **Generalization (snack):** Small group sessions conducted by a graduate student implementer during which group mates were given specific opportunities to share when the graduate student implementer gave multiple food items (e.g., 3 cookies) to a single group mate, and none to the other two group mates. No prompting or praise provided for sharing or other prosocial behaviors.
- **Free play:** Small group sessions conducted by the author during which group mates were initially directed to the blocks center in a classroom, and then allowed to play in or out of the center with group mates or non-group mates. No prompting or praise provided for sharing or other prosocial behaviors.
- **Peer preference:** Individual trials provided to three group mates in a single session. Trials were intermixed; children were participating in other playground activities when they were not engaging in a trial.

Appendix B  
Assessment of Inclusion Criteria

Participants	Dimension	Source	Criteria
All	Diagnosis	Teacher report	No diagnosis for typically developing peers; diagnosis of developmental delay or disability for children with disabilities
All	Age	Teacher report	Age at study onset: between 36-66 months
All	Verbal Imitation	Researcher-devised verbal imitation measure	Imitates or approximates 9/10 one-word verbalizations after first or second task direction
All	Motor Imitation	<i>Motor Imitation Scale</i> <sup>a</sup>	Imitates or approximates 12/16 motor movements after first or second task direction
All	Reinforcer Identification	Informal assessment, teacher report	Chooses at least one item more than others, teacher reports this item is likely to be reinforcing
All	Stimuli Available	Direct assessment during screening sessions	Child does not name at least 8 researcher-selected stimuli during screening sessions
All	Attendance	Teacher report	Teacher reports child has been in the classroom for most of the school day for 80% of days in the past 2 months
PD	Sharing	Teacher report	Teacher reports child does not share materials during typically-occurring classroom activities
TDP	Sharing	Teacher report	Teacher answers "yes" to question: "Does (child) generally share with his/her peers?"
TDP	Compliance	Teacher report	Teacher answers "yes" to question: "Does (child) generally comply with simple classroom directions?"
TDP	Class Assignment	Teacher report	Teacher nomination of peers in the same classroom or in the same group of children during early care (7:30-8:30 am) or late care (3:00-5:00 pm)

*Note:* PD=Participants with disabilities, TDP=Typically developing participants, <sup>a</sup>=adapted from Stone, Ousley, & Littleford (1997)

Appendix C  
Verbal Imitation Scale/Data Collection Form

Verbalization	Trial	
	1	2
Baby		
Daddy		
Water		
Push		
Up		
Swing		
Clap		
Nose		
Eat		
Go		

*Note: check=correct imitation, X=no response, /=attempted imitation/approximation*

Appendix D  
Motor Imitation Scale/Data Collection Form

Action	Trial	
	1	2
Shake noisemaker		
Open and close fist		
Place small block on head		
Walk hairbrush across table		
Wave hand		
Walk toy dog across table		
Bang spoon on table		
Scratch tabletop with fingers		
Push teacup across table		
Drum hands on tabletop		
Pull on earlobe		
Hold string of pop-beads behind neck		
Clap hands		
Pat cheek		
Bend index finger up and down		

*Note:* check=correct imitation, X=no response, /=attempted imitation/approximation

Appendix E  
 Implementer, Procedures, and Participating Children by Session Type

Session Type	Implementer	Description	Participating Children
Screening and Probe	Researcher	Sessions conducted by the researcher during which group mates with and without disabilities were tested individually on naming academic stimuli that had been or would be taught and the stimuli that had been or would be taught to group mates. No prompting was provided; praise and tokens was given for correct responses.	<ul style="list-style-type: none"> <li>• Group A (individually)</li> <li>• Group B (individually)</li> <li>• Group C (individually)</li> </ul>
Instruction	Researcher	<p>Sessions conducted by the researcher during which PTD was used to teach naming of academic stimuli. Prompting, praise, and tokens were given for correct academic responses. Sessions were:</p> <ul style="list-style-type: none"> <li>○ <b>No sharing (baseline) sessions:</b> Instructional sessions during which all group mates were given three tokens contingent on correct responding. These sessions occurred prior to training participants without disabilities to share. No in-session prompting or praise was provided for sharing.</li> <li>○ <b>Sharing (peer modeling) sessions:</b> Instructional sessions during which all group mates were given three tokens contingent on correct responding. These occurred after group mates without disabilities were trained to share. No in-session prompting or praise was provided for sharing.</li> </ul>	<ul style="list-style-type: none"> <li>• Group A (small group)</li> <li>• Group B (small group)</li> <li>• Group C (small group)</li> </ul>
Training Typical Participants to Share (TGMS)	Researcher (graduate student as proxy for student with disabilities)	Sessions conducted by the researcher during which group mates without disabilities were taught to share using PTD—conducted in a time-lagged fashion across pairs of group mates without disabilities.	<ul style="list-style-type: none"> <li>• Ani, Adam</li> <li>• Blair, Beck</li> <li>• Cade, Cain</li> </ul>

Session Type	Implementer	Description	Participating Children
Generalization	Graduate student	Sessions conducted by a graduate student implementer during which group mates were given specific opportunities to share when the graduate student implementer gave multiple utensils (e.g., paintbrushes, markers) or edibles (e.g., cookies) to a single group mate, and none to the other two group mates. No prompting or praise was provided for sharing.	<ul style="list-style-type: none"> <li>• Group A (small group)</li> <li>• Group B (small group)</li> <li>• Group C (small group)</li> </ul>
Free Play	Researcher	Sessions conducted by the researcher during which group mates were initially directed to the blocks center in a classroom, and then allowed to play in or out of the center with group mates or non-group mates. No prompting or praise was provided for sharing or other prosocial behaviors.	<ul style="list-style-type: none"> <li>• Group A plus any other classmates in proximity</li> <li>• Group B plus any other classmates in proximity</li> <li>• Group C plus any other classmates in proximity</li> </ul>
Peer Preference	Researcher	Trials provided to three group mates in a single session by a graduate student implementer. Children participated in other playground activities when they were not engaging in a trial.	<ul style="list-style-type: none"> <li>• Group A plus randomly selected peers Doug, Dan, and Drew.</li> <li>• Group B plus randomly selected peers Dave, Dora, and Drew</li> <li>• Group C plus randomly selected peers Dean, Dave, and Beck</li> </ul>

*Note:* Because many students in a single class were members of Groups A, B, or C; some members of these groups were also chosen as randomly selected peers for a different group. Randomly selected peers are not referred to as "participants" or "group mates" in text.

Appendix F  
Sharing Examples and Non-Examples for Generalization Sessions

Activity	Example	Non-Example
<i>Art</i>	P1 accepts materials from teacher, gives one pencil to each peer and keeps one for himself	P1 accepts chalk from teacher, draws with one, and keeps the other two in his lap ( <i>no share</i> )
	P1 accepts materials from teacher, keeps one pencil, and places the other two away from his materials, and within 6 inches of peers' papers	P1 accepts materials from teacher, draws with one, and puts the other two on the corner of his paper (other Ps take remaining pencils; <i>no share</i> )
	When P1 finishes with his marker, he gives it to P2	P1 gives one stamper to P3 and keeps two stampers ( <i>share</i> scored towards P3, <i>no share</i> towards P2)
<i>Snack</i>	P1 gives one cracker to each peer; keeps one.	P1 gives 1 fish cracker to P2, refuses to give to P3; keeps remaining crackers ( <i>share</i> scored towards P2, <i>no share</i> towards P3)
	P1 puts 2 crackers in reach of P2 and P3, away from his plate	

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*Note:* P1=Participant 1, P2=Participant 2, P3=Participant 3. For a participant to have an *initial share* recorded, he must complete the sharing response within 10 s following teacher giving the materials. All other shares are recorded as "total shares".

## Appendix G

### Rules for Proximity

**h (out of prox):** This is a duration code. Thus, you need to key h when the child leaves proximity and key h again when he returns. In proximity is defined as "in the same center/classroom area as another group mate". A child may be out of proximity but interacting with group mates if within camera area. If a child is off-camera, code as out of proximity (even if you think this is an error made by the video recorder)

Definitions of center areas:

#### **Group C: Weeks 1-7**

*Blocks*-All parts of child's body must be within 1 feet of boundaries made by shelves and wall (front boundary is equal to end of shelves). OR some part of body is within boundaries (1 feet of physical space) and child must be physically oriented towards center and interacting with toys or people in the center.

*DP, books, manipulatives*: All parts of child's body must be within boundaries made by shelves and wall (front boundary equal to end of shelves/closet/table) OR some part of body is within boundaries (1 feet of physical space) and child must be physically oriented towards center and interacting with toys or people in the center.

*Circle*: All parts of child's body must be on circle time carpet OR some part of body is within boundaries (1 feet of physical space) and child must be physically oriented towards center and interacting with toys or people in the center.

*Tables:* Sitting at or manipulating chairs to sit/stand at a table OR standing at table, interacting with table toys or people at table.

*Other:* Not in any of these centers

### **Groups A and B; Group C Weeks 8-15**

*Blocks-*All parts of child's body must be on green carpet (or in small 1-ft area directly in front of shelf not covered by carpet) OR some part of body is within boundaries (1 feet of physical space) and child must be physically oriented towards center and interacting with toys or people in the center (NOTE: to be considered in blocks, a child in the corner next to the wall must meet this part of the definition).

*DP, books, science, table in corner next to closet:* All parts of child's body must be within boundaries made by shelves and wall (front boundary equal to end of shelves/closet/table) OR some part of body is within boundaries (1 feet of physical space) and child must be physically oriented towards center and interacting with toys or people in the center

*Tables:* Sitting at or manipulating chairs to sit/stand at a table OR standing at table, interacting with table toys or people at table.

*Other:* Not in any of these centers

Appendix H  
Coding Definitions, Examples, and Non-Examples for Free Play Sessions

<u>Behavior</u>	<u>Definition</u>	<u>Example</u>	<u>Non-Example</u>
Share	Participant gives all or part of materials in his possession to one or more classmates; with or without a request; with or without reciprocation; given as reciprocation or not. Attempts to share are coded as shares (even if peer does not accept)	<p>1) P1 takes a container of blocks from the shelf, gives some to P2 and/or P3 (<i>share</i> for P1)</p> <p>2) P1 gives block to P2, P2 asks for a block in return, P1 gives (<i>share</i> for P1, P2)</p> <p>3) P1 says "Do you need it?"and holds out block. P2 ignores. (<i>share</i> for P1)</p>	<p>1) P1 and P2 play cooperatively with a set of blocks (<i>not coded</i>)</p> <p>2) P1 says "Hey, P2. Look!" (coded as <i>non-sharing interaction</i>)</p>
Interaction	Participant attempts to communicate with a group mate or other classmate, using verbal or non-verbal behaviors Telling child "Let's build" is an interaction; saying "build" while building is not (unless eye contact is made or name is used). Without name, secondary indicator is needed: 1) eye gaze at or near peer, 2) following logical stream of conversation or play, 3) immediately following and related to something a peer said or did. If you can't determine eye contact, but a peer responds, you can assume an interaction targeted towards the peer who responded. If targeted towards two peers at once, interactions towards both may be coded. Following a peer's play organizer direction is a social response (e.g., and is thus coded; when a peer says "Let's get the red ones, and the child starts getting red blocks).	<p>1) P1 says "Do you like this?" and looks at P2 (<i>interaction</i> for P1)</p> <p>3) P1 looks when P2 says "look!" (<i>interaction</i> for P1, P2)</p> <p>3) P1 says "Do you like this one?" P2 says no. (<i>interaction</i> for P1, P2)</p>	<p>1) P1 holds out an apple and an orange. P2 does not take one, verbalize, or look up (<i>share</i> for P1; <i>not coded</i> for P2).</p> <p>2) P1 says "Crash!!!" (describing his play) but without looking at a peer (including looking at camera; <i>not coded</i>)</p> <p>3) P2 joins in crawling like a cat (with P1 and P3, who are doing the same thing), but no verbal or non-verbal acknowledgement is given by any peer (e.g., eye contact, shared laughing; <i>not coded</i>)</p>

<u>Behavior</u>	<u>Definition</u>	<u>Example</u>	<u>Non-Example</u>
Negative	Any interaction including 1) name-calling, 2) cursing, or 3) aggression, 4) purposeful destruction of peer materials-- directed at a peer (e.g., pushing peer, knocking down tower with protest) or with 5) crying as presumed result of interaction. Aggression is defined as physical contact (pushing, hitting, pinching, scratching, grabbing) that results in an indication of unhappiness in the peer (whining, crying, yelling, or complaining).	1) P1 says to P2 "You're stupid" ( <i>negative</i> for P1) 2) P2 pushes P3 when P3 takes his block (P3 cries; <i>negative</i> for P2)	1) P1 does not respond verbally or by looking when P2 says "Look!" ( <i>not coded</i> ) 2) P1 takes block from P2. No name calling, crying, cursing, or aggression ( <i>not coded</i> )

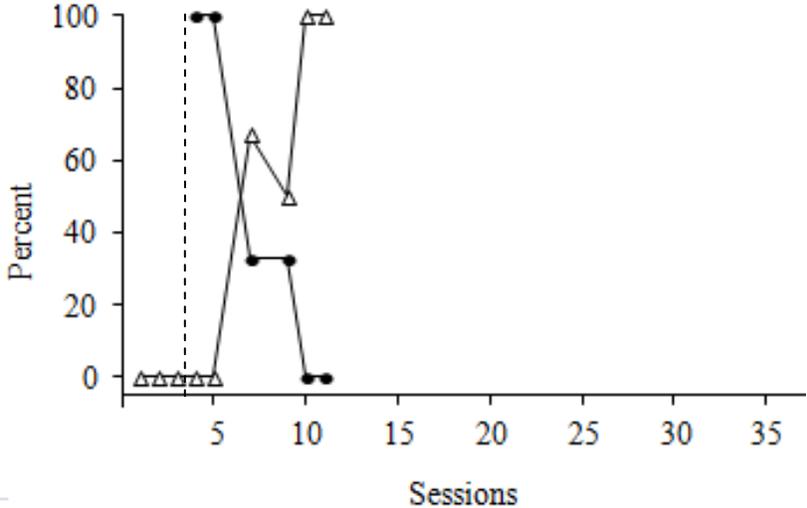
*Note:* P1=Participant 1, P2=Participant 2, P3=Participant 3. Each code is specific to recipient (e.g., when coding behaviors for P1, shares, interactions, and negative codes are recorded as directed towards P2, towards P3, or towards other peer). **No adult interactions are coded.**

Appendix I  
Examples for Segmenting Rules for Social Interactions during Free Play Sessions

Number of Coded Interactions	<u>Child Behaviors</u>
1	"Hey." (less than 1 s). "Hey!!!" (less than 1 s) "Hey, why aren't you talking to me?"
2	"Hey." (less than one sec). "Hey!!!" (Group mate says "What?") "Hey, why aren't you talking to me?"
2	"Hey!" (Group mate responds by looking). "Hey!!!" (less than 1 s). "Hey, why aren't you talking to me?"
3	"Hey!" (Group mate responds by looking). "Hey!!!" (more than 1 s). "Hey, why aren't you talking to me?"

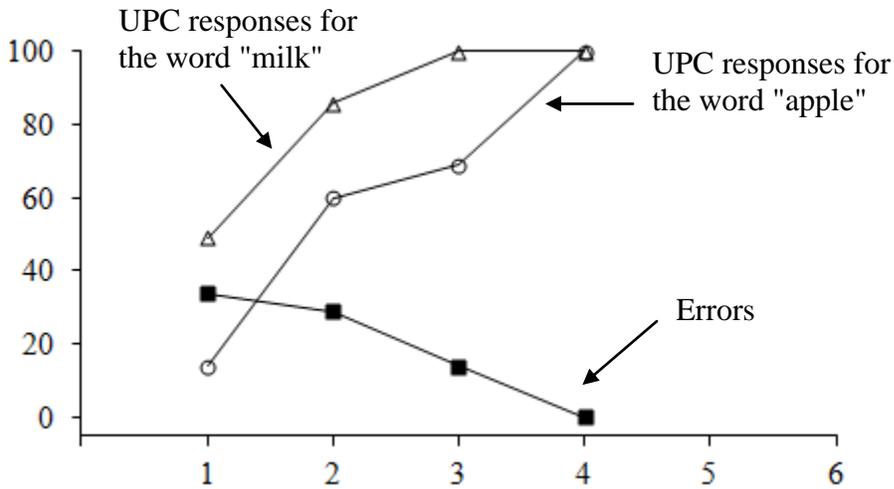
*Note:* Unless otherwise indicated, all verbalizations and actions are those emitted by a single participant.\*

Appendix J  
Data for Withdrawn Participant



Data are for an original typically-developing participant who participated in the study as a group mate in Group B. The participant was withdrawn from the study when he withdrew as a student from the participating early childhood center.

Appendix K  
Data from Individual Sessions with Coby



*Unprompted correct responses (UPC) and errors for individual sessions with Coby. Sessions occurred during instruction on Word Set 1, for five days immediately prior to criterion level performance shown on graph for group instruction.*

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