EFFECTS OF PRESESSION PAIRING ON THE
CHALLENGING BEHAVIOR AND ACADEMIC RESPONDING OF CHILDREN WITH AUTISM

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Presession pairing is an antecedent-based procedure in which an instructor engages with preferred items with a child for a few minutes before an instructional session. Although this procedure has been described in manualized treatment guidelines for working with children with autism, there are currently no direct investigations of whether this manipulation has a beneficial impact on target responding or the child’s social interactions. Functional analyses with three children with autism showed escape or attention and escape as reinforcers for their challenging behavior. Preference assessments identified highly and moderately preferred stimuli. In the context of a multiple baseline across participants design, the participants exhibited fewer challenging behaviors when instructional sessions were preceded by presession pairing than when they were not. Academic responding showed modest increases. Subsequently, in the presence of presession pairing with a novel task, the participants emitted no challenging behavior and similar or higher levels of accurate academic responding. One participant was available for a maintenance session without presession pairing 5 months later and showed near-zero levels of challenging behavior and comparable levels of accurate academic responding. The implications of the findings and future directions are discussed. Copyright © 2015 John Wiley & Sons, Ltd.

Many children with autism exhibit challenging behavior (e.g., aggression and verbal protests) during intensive instruction (McComas, Hoch, Paone, & El-Roy, 2000; Mildon, Moore, & Dixon, 2004). A functional analysis may verify that challenging behavior is specifically reinforced by escape from demands, as opposed to other reinforcers such as attention and tangible items (Ebanks & Fisher, 2003; Lomas, Fisher, & Kelley, 2010; O’Reilly, 1995). Therefore, this type of problem behavior is considered to be negatively reinforced by escape from demands. A common approach to reducing escape-maintained challenging behavior is differential reinforcement, and this can be

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implemented in many ways. One form is functional communication training in which a therapist teaches a child to emit communicative behavior (e.g., ‘Break please’) to request a brief break from demands; this behavior is negatively reinforced, and challenging behavior is not reinforced (Braithwaite & Richdale, 2000; Lalli, Casey, & Kates, 1995). A second form is differential reinforcement of alternative behavior in which a therapist reinforces academic behavior (e.g., writing words) with a brief break and does not reinforce challenging behavior (Piazza, Moes, & Fisher, 1996; Roberts, Mace, & Daggett, 1995). A third form is differential negative reinforcement of other behavior in which a therapist briefly removes demands contingent on a student not exhibiting challenging behavior for a set period of time (Kodak, Miltenberger, & Romaniuk, 2003; Roberts et al., 1995). These differential reinforcement approaches can dramatically reduce escape-maintained challenging behavior.

However, McGill (1999) suggested that under some conditions, differential reinforcement procedures may reduce challenging behavior but not alter the aversive antecedent. McGill (1999) recommended that in addition to manipulating behaviors and consequences, practitioners should alter the antecedents (i.e., task demands) to make them less aversive. McGill (1999) considered aversive task demands as reflexive conditioned establishing operations (CEO-Rs) presuming that they momentarily increase the value or magnitude of their removal and increase behavior that has produced their removal in the past (Michael, 1993, 2007). The CEO-R is equivalent to what historically has been referred to as a conditioned aversive stimulus exemplified by the so-called warning stimulus in a discriminated avoidance procedure (cf. Hineline, 1977). McGill recommended the alteration of task demands to weaken or abolish the CEO-R effect.

Carbone, Morgenstern, Zecchin-Tirri, and Kolberg (2010) provided a comprehensive review of strategies for manipulating task demands to make them less aversive. One approach is errorless teaching, which involves providing enough prompts from the outset of instruction to ensure correct responding (Ducharme, Harris, Milligan, & Pontes, 2003; Touchette & Howard, 1984; Weeks & Gaylord-Ross, 1981). A second approach is task variation and task interspersal in which a therapist presents many different types of demands, both easy and difficult, rather than just one type of demand (Benavides & Poulson, 2009; Neef, Iwata, & Page, 1980; Winterling, Dunlap, & O’Neill, 1987). Third, a fast pace of instruction can reduce challenging behavior and increase compliance (Carnine, 1976; Roxburgh & Carbone, 2013). A fourth antecedent-based approach to reducing challenging behavior and increasing compliance during instruction is neutralizing routines, which can take many forms, but an example is providing access to preferred activities 30–40 min before an instructional session (Horner, Day, & Day, 1997; Sprague & Thomas, 1997).

Another antecedent-based approach to reducing challenging behavior and increasing compliance during instruction that has similar features to neutralizing routines has been referred to as presession pairing (Barbera, 2007; Sundberg & Partington, 1998).
Sundberg and Partington (1998) described the procedure as approaching a child who is not engaged in a reinforcing activity, presenting a reinforcer, and participating in the consumption of the reinforcer with the child (e.g., playing with toys, enthusiastically narrating an activity, making eye contact, and narrating while consuming edibles). They suggested that the relationship between an instructor and a student is established when the instructor is consistently paired with the delivery of reinforcers and it is at that point that instruction should begin. Sundberg and Partington (1998) interpreted presession pairing in terms of establishing the instructor as a form of conditioned reinforcement for the child.

Two alternative interpretations of presession pairing should be considered. First, presession pairing may serve as an abolishing operation for (1) attention-maintained or (2) escape-maintained challenging behavior during instruction. In the former case, the provision of attention during presession pairing may temporarily reduce an reinforcing effects of social attention (McGinnis, Houchins-Juárez, McDaniel, & Kennedy, 2010); whereas in the second case, the presession delivery of reinforcers may counterbalance the aversive aspects of the academic demands, thereby abolishing the CEO-R (Lomas et al., 2010). Second, preceding the academic session with reinforcing, or high probability, activities may increase the student’s engagement with academic tasks in a manner similar to the compliance-increasing effects of the high-probability request sequence (Pitts & Dymond, 2012). For example, Bullock and Normand (2006) reported increased compliance to low-probability requests when either reinforced high-probability requests or comparable rates of noncontingently delivered reinforcing items preceded low-probability requests. Interpretations of such compliance-increasing effects include conditioned motivating operation (CMO) modifications (McGill, 1999) and behavioral momentum (Mace et al., 1988).

Presession pairing has appeal as it is easy to implement and may improve the social validity or acceptability of intensive instruction (Taylor & Fisher, 2010). Carr and colleagues demonstrated that pairing combined with other preventive interventions (e.g., providing choices and enhancing turn-taking) decreased demand-related problem behavior (Carr et al., 1999; Kemp & Carr, 1995; McLaughlin & Carr, 2005). We found no studies evaluating presession pairing alone. Therefore, the purpose of this study was to assess the effects of presession pairing on challenging behavior and academic responding during instruction with three children with autism.

**METHOD**

**Participants**

Three children with independent diagnoses of autism and informed parental consent participated. Ariel was a 9-year-old girl primarily educated in a self-contained
classroom. She communicated by gesturing or exchanging a few pictures (e.g., help, all done, and more). Her challenging behavior included high-pitched crying and self-injury in the form of bites to the wrist, face slaps, and table hits. The Assessment of Basic Language and Learning Skills (Partington & Sundberg, 1998) suggested that cooperation and reinforcer effectiveness, receptive language, motor imitation, and fine motor skills were areas of strength. Educational testing indicated significant delays in language processing, communication, and social skills.

Jonah and Suzanna were both 11 years old and received instruction in both a self-contained classroom and a general education, fifth grade classroom. Challenging behavior for Jonah included task refusal (e.g., pushing materials away), non-responsiveness (e.g., sitting still), and negative statements related to the task (e.g., swearing). More intense challenging behavior reported by his classroom teachers, including aggression, property destruction, and eloping, did not occur during the study. Educational testing indicated overall academic ability in the average range with strengths in decoding, reading, spelling, numerical operations, math reasoning, identifying items/concepts, explaining how items/concepts go together, and following directions. Areas of difficulty included reading comprehension, written expression, and oral expression.

Suzanna’s challenging behavior included task refusal (e.g., moving the materials or herself away), non-responsiveness (e.g., sitting still for 10 s), negative statements related to the task (e.g., ‘I hate this’), and property destruction (e.g., ripping tissues and breaking tips on markers). On educational tests, she scored in the above average range in word reading, pseudo-word decoding, and spelling; high average range in oral reading fluency and accuracy; and average range in listening comprehension, reading comprehension, math problem-solving, sentence composition, numerical operations, and math multiplication fluency. On psychological tests, Suzanna scored in the average range in verbal comprehension, perceptual reasoning, and working memory and borderline range in processing speed. Suzanna’s limited understanding of feelings and communication suggested difficulty using language to explain how to solve a problem, communicate needs, and persuade others.

Experimental Design

The study was comprised of three parts: functional analyses of challenging behavior, preference assessments, and presession pairing evaluation. The experimental design of the brief functional analyses was a multi-element design with four conditions: demand, attention, alone, and control (Wilder, Masuda, O’Connor, & Baham, 2001). Descriptive assessments suggested that challenging behavior occurred primarily during demands; therefore, the demand, attention, and alone conditions included work-related materials (e.g., blocks, number cards, letter tiles, and
flashcards; Tiger, Hanley, & Bessette, 2006). The preference assessments were brief free operant preference assessments (Roane, Vollmer, Ringdahl, & Marcus, 1998). Suzanna also completed a paired stimulus preference assessment (Fisher et al., 1992).

We evaluated the effects of presession pairing on challenging behavior and academic responding in a multiple baseline across participants design (Cooper, Heron, & Heward, 2007). This design included two conditions: (1) baseline, in which presession pairing did not precede each discrete trial teaching session, and (2) presession pairing, in which the experimenter engaged in preferred activities with the participant for 2–4 min prior to each discrete trial teaching session. During discrete trial teaching, we presented new targets when previous ones were mastered. We conducted an evaluation of presession pairing with a novel task with each participant. On average, sessions occurred three times per week. We conducted one maintenance session with Ariel 5 months after the preceding session that was identical to baseline.

Setting and Materials

The experimenter conducted sessions in an office space (3 x 5 m) in the participants’ school. The room contained two chairs, a table, and a ‘break space’ identified by a rug on the floor. For Ariel, instructional materials included letter tiles, picture cards, manipulatives, and flashcards. For Jonah and Suzanna, materials included flashcards with fractions, dry erase boards, and markers. All sessions began with all materials behind the desk.

Dependent Variables

Overview of Dependent Variables

The dependent variables in the functional analysis were the percentage of intervals with challenging behaviors for Ariel and the frequency of challenging behaviors for Jonah and Suzanna. In the evaluation of presession pairing, the dependent variables were the percentage of intervals with challenging behaviors and the percentage of instructions in which the participant emitted an accurate academic response. The procedure for measuring intervals with challenging behavior was 10-s partial interval recording. The procedure for calculating accurate academic responses was dividing the number of accurate responses by the number of instructions and multiplying by 100%. We reported challenging behaviors as a composite of multiple topographies. Accurate academic responses required latencies of no more than 5 s for Ariel and 10 s for Jonah and Suzanna.
Response Definitions

For Ariel, crying was defined as high-pitched vocalizations lasting three consecutive seconds or longer and bouts of short duration, high-pitched vocalizations lasting 10 s with no more than 1 s between occurrences. Self-injurious behaviors consisted of bites to the wrist, slaps to the face from a distance of 8 cm or greater, and elbow-to-table hits from a distance of 8 cm or greater. Jonah’s challenging behavior included non-compliance when presented with demands (for 10 s or longer), task refusal (i.e., moving the materials or himself away), negative statements related to the task (e.g., ‘This is stupid’), and swearing. Suzanna’s challenging behavior included non-compliance when presented with demands (10 s or longer), task refusal (i.e., moving the materials or herself away), negative statements related to the task (e.g., ‘I hate this’), and property destruction (e.g., ripping tissues and breaking tips on markers).

An accurate academic response for Ariel was correctly spelling a word using A–Z letter tiles (i.e., word construction) in the presence of a picture card of a consonant–vowel–consonant word and the experimenter sounding out the word phonetically. This could occur after the word was sounded out once or twice. Ariel’s novel task was matching manipulatives to number cards. An accurate academic response for Jonah and Suzanna was as follows: In the presence of fractions on a flashcard and the instruction to reduce, add, or subtract the fractions, Jonah wrote the accurate solution on a dry erase board without prompting or corrections. The novel task was the same for Jonah and Suzanna: Given a written sentence, correct academic responses were writing the nouns in blue and the verbs in black on a dry erase board.

Interobserver agreement

The experimenter calculated interval-by-interval interobserver agreement (IOA) for a randomly selected percentage of sessions across participants and conditions by comparing her measurements with those of trained behavior therapists who independently measured the dependent variables from video tapes. For challenging behavior in baseline for Ariel, Jonah, and Suzanna, mean IOA was 95% (range, 92–100%), 97% (range, 93–100%), and 100% in 50%, 40%, and 38% of sessions, respectively. For challenging behavior in presession pairing for Ariel, Jonah, and Suzanna, IOA was consistently 100% in 38%, 38%, and 40% of sessions, respectively. For Ariel, Jonah, and Suzanna, IOA for accurate academic responding was consistently 100% in 50%, 40%, and 38% of baseline sessions, respectively, and 38%, 38%, and 40% of presession pairing sessions, respectively.
Procedures

Functional Analysis

Prior to conducting a functional analysis, the experimenter used previous data, interviews, and descriptive assessments to generate hypotheses about the functions of challenging behaviors. The brief functional analyses based on Wilder et al. (2001) contained four conditions: demand, attention, alone, and control. We conducted two 10-min sessions of each condition for Ariel and Suzanna and three sessions of the attention and demand conditions with Jonah because of initial inconsistent results. We correlated each condition with a colored square taped to the door and to the corner of the table in separate rooms. The demand, attention, and alone conditions included work materials (e.g., blocks, number cards, letter tiles, and flashcards).

In the demand condition, the experimenter presented instructional demands, such as tracing letters, sorting coins, and multi-component instructions (e.g., ‘Color the giraffe orange’). Academic behaviors, such as gesturing towards items and asking questions, resulted in brief statements or answers. When the participant requested assistance, the experimenter provided support using least-to-most prompting. If a challenging behavior occurred, the experimenter said ‘Okay, this may be too hard for you. Take a break’ and removed the work materials for 30 s.

In the attention condition, the experimenter sat across from the participant without making eye contact, while the participant completed mastered work tasks. The task for Ariel was placing blocks of corresponding colors on a template. Suzanna and Jonah’s tasks were activity packets with word finds, crosswords, and activities with word banks. The experimenter responded to appropriate questions or statements with one-word answers. When challenging behaviors occurred, the experimenter made eye contact, leaned forward, and made a statement related to the behavior (e.g., ‘Stop it’, ‘Put your hands down’, and ‘No hitting’).

In the alone condition, the participant sat unaccompanied in a therapy room with work materials on the table. The experimenter monitored the participant through a window in the door that was too high for participant to see through. In the control condition, which contained no work materials, a familiar teacher sat across from the participant while asking the participant questions about conversational topics of interest (e.g., upcoming events). The teacher responded to appropriate interactions (e.g., responses to questions and bids for attention) with complete sentences and eye contact. Upon the occurrence of challenging behaviors, the teacher withdrew eye contact and did not speak for 30 s.

Preference Assessments

The experimenter interviewed the participants’ parents and teachers to identify a pool of at least 10 preferred items or activities and then conducted a brief free operant
preference assessment (Roane et al., 1998). First, an instructor with behavior analytic training placed the participant’s hand on each item and described or modeled appropriate manipulation of the item. After leaving the room for 1–2 min, the participant was free to manipulate items arranged in a circle on a table for 5 min. The top 2–3 items engaged with the most according to a 10-s partial interval recording were used in the presession pairing analysis. Because the brief free operant preference assessment did not adequately identify the preferences for Suzanna, a special education teacher conducted a paired-choice preference assessment (Fisher et al., 1992) with her. The assessment included six stimuli and 60 stimulus-pair presentations. For each trial, the teacher placed two items 15 cm in front of Suzanna, told her to ‘Pick one’, provided her with access to the item for 10 s, and removed the other item. If Suzanna refrained from selecting an item, her teacher prompted her to sample each for 5 s and then placed both items in front of Suzanna. If Suzanna still did not approach either item, the teacher started the next trial.

**Baseline**

Each session started with the experimenter and participant walking into the designated room and the experimenter directing the participant to a ‘break space’ on a rug on the floor (Table 1). The participant spent 3–4 min in the break space playing with neutral or slightly preferred toys, activities, or games (i.e., non-edible, tangible items selected in 10–30% of intervals during the preference assessments; Table 2; Figure 1). During this time, the experimenter sat at the work table and did not interact with the participant unless she or he made a statement or asked a question, to which the experimenter responded with one-word answers (e.g., ‘Oh’, ‘Yeah’, and ‘No’). At the end of the 3–4 min play period, the experimenter said ‘Come here’ while gesturing to the table. All instructional materials (data sheets, pens, timer, flashcards, picture cards, and tokens) and preference assessment-derived, moderately preferred items to be used as reinforcers (e.g., spiky ball for Ariel and Suzanna and fruit snacks for Jonah) were in plastic bins with lids out of sight of the participant.

Once seated at the table, the experimenter said ‘Tell me what you want to earn’ while holding up preferred objects or pictures representing those items. Once a participant selected, the experimenter put the item aside, started the 5-min timer, and placed the academic materials and token board on the table. While presenting instructional materials, the experimenter delivered instructions such as ‘Spell’, ‘Reduce’, and ‘Solve’. For Ariel, the experimenter presented a picture card and sounded out the word and said ‘Spell’; Ariel used letter tiles to construct words.
Table 1. Baseline and presession pairing procedural components represented in time (i.e., first ‘break space,’ then presession pairing, then discrete trial training).

<table>
<thead>
<tr>
<th>‘Break space’ on the rug*</th>
<th>Presession pairing†</th>
<th>Discrete trial training*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimenter brought the participant into the room and directed him/her to the ‘break space’ on the rug</td>
<td>Experimenter said ‘Tell me what you want to play with/talk about’ while holding up highly preferred items</td>
<td>Experimenter said ‘Tell me what you want to earn’ while holding up preferred items</td>
</tr>
<tr>
<td>Participant engaged with low preference items (selected in 10–30% of intervals in preference assessments) for 1–2 min</td>
<td>Experimenter engaged with the participant with the preferred activity or conversation topic for 2–4 min</td>
<td>Experimenter delivered instructional materials and instructions (e.g., ‘Do this’, ‘Reduce’, and ‘Spell’) for 5 min</td>
</tr>
<tr>
<td>Experimenter sat at the work table and did not engage with the participant</td>
<td>Experimenter made the interaction fun and positive and did not present demands</td>
<td>Correct responses produced praise and tokens; incorrect responses produced repetition of instructions, models, and no tokens</td>
</tr>
<tr>
<td>Ended with the experimenter saying ‘Come here’ while gesturing to the table</td>
<td>Ended with timer sounding and/or participant finishing a preferred activity</td>
<td>When timer sounded, session ended, and behavior therapist brought participant back to class</td>
</tr>
</tbody>
</table>

*= occurred every session.
†= occurred in only presession pairing sessions.
For Jonah and Suzanna, the experimenter presented a flashcard with a fraction (e.g., ‘15/30’) and instructed them to ‘Reduce’, or the experimenter provided a flashcard with a math problem (e.g., ‘2/4 + 3/4’) and instructed them to ‘Solve’. Jonah and Suzanna used dry erase boards, markers, and tissues to construct and erase their responses.

For correct responses, the experimenter provided positive social praise (e.g., ‘That’s right’ and ‘Way to go’) and a round, yellow token. Once participants obtained five tokens, the experimenter paused the timer and allowed them to exchange for a moderately preferred item. After consumption of the edible or 30 s with tangibles, the experimenter removed the item, restarted the timer, and presented the next

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**Table 2.** Percentages of intervals participants selected items in the brief free operant preference assessment.

<table>
<thead>
<tr>
<th>Ariel</th>
<th>Jonah</th>
<th>Suzanna</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beads on a string</td>
<td>77%</td>
<td>100%</td>
</tr>
<tr>
<td>Music on iPad™</td>
<td>73%</td>
<td>100%</td>
</tr>
<tr>
<td>Attention</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>Spiky ball</td>
<td>7%</td>
<td>Attention</td>
</tr>
<tr>
<td>Magnets</td>
<td>0%</td>
<td>Starbursts</td>
</tr>
<tr>
<td>Lacing cards</td>
<td>0%</td>
<td>Yogurt raisins</td>
</tr>
<tr>
<td>Dominoes</td>
<td>0%</td>
<td>Popcorn</td>
</tr>
<tr>
<td>Dry erase board</td>
<td>0%</td>
<td>Yahtzee™</td>
</tr>
<tr>
<td>Fruit snacks</td>
<td>0%</td>
<td>Uno™</td>
</tr>
<tr>
<td>Goldfish™</td>
<td>0%</td>
<td>Dry erase board</td>
</tr>
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</tbody>
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**Figure 1.** Percentage of opportunities Suzanna selected each item in the paired-choice preference assessment.
instruction. For incorrect responses, the experimenter stated ‘That’s not right, let’s try this together’, re-presented the instruction, and modeled the correct response. For Ariel, the experimenter held up a picture card, stated the word ‘sun’, sounded out the word ‘s-uh-n’, and then placed the corresponding letter tiles in the correct order. For Jonah and Suzanna, the experimenter held up the flashcard and wrote and stated aloud the steps for solving the equation. The participants imitated the model and did not receive a token. When the 5-min timer sounded, the participant finished a problem if he or she was in the middle and the behavior specialist escorted him or her back to class.

**Presession pairing**

The procedures were the same as baseline, except for events that occurred between the participant coming to the table and the experimenter delivering the first instruction. After the participant sat at the table, the experimenter stated ‘Tell me what you want to play with’ or ‘Tell me what you want to talk about’ while holding up preferred objects or pictures representing those items (identified through preference assessment; Table 2). Once the participant selected an item, the experimenter set a timer for 2 min. Ariel often requested beads on a string, as well as music (Lady Gaga, Rihanna, and Katy Perry) and Angry Birds™ on the iPad™. Jonah often selected the Who Wants to be a Millionaire™ board game; the experimenter also discovered that Jonah enjoyed and selected Plants vs. Zombies™ and Fruit Ninja™ on the iPad™. Suzanna often selected bouncing, rolling, or catching the spiky ball, as well as attention in the form of discussing or engaging with laminated Mario™ characters.

The experimenter playfully engaged with the participant with the selected activity or topic. When Ariel selected the string of beads, the experimenter gave her the string but kept the bowl of beads and freely offered them to Ariel. Sometimes, Ariel accepted the bead and threaded the string through it, and sometimes, she offered the string to the experimenter who threaded the string through before handing it back to Ariel. Preferred items and activities were continuously available on a noncontingent basis. During presession pairing, the experimenter spoke to each participant but did not expect him/her to talk back (e.g., ‘This is fun’ and ‘I really like playing this game’). If the participant selected listening to music and sang or danced, the experimenter also sang and danced. If the participant requested to change activities, the experimenter honored these requests. For example, when Jonah asked to switch to a single player game on the iPad, the experimenter allowed it and shifted the activity from playing with Jonah to commenting on the game Jonah played individually (e.g., ‘Oh, watch out!’ ‘Good one’, ‘Man, you are talented’, and ‘I bet you can’t beat my high score’).
The experimenter allowed for a natural end to the pairing activities by allowing participants to hear the rest of a song or complete the level on a game. Therefore, the duration of presession pairing ranged from 2 to 4 min. When the activity ended, or at the end of 2 min, the experimenter requested the preferred item from the participant and removed the item at a natural transition. For example, Suzanna often selected to roll and bounce a ball and to play catch. Rather than reaching out and taking the ball from Suzanna, the experimenter waited until the ball was rolled to her, caught the ball, and placed it in a bin. The experimenter then started the 5-min timer and presented the first instruction.

Procedural Integrity

A trained observer collected data on the procedural integrity of interactions during baseline and presession pairing sessions via task analyses. The trained observer reviewed the recordings for all three participants and recorded whether the experimenter completed the steps as written or whether she added, omitted, or completed the steps out of order. The observer assessed the integrity on 30% of sessions, which averaged 98.5% (range, 97–100%).

Social Validity

The experimenter conducted semi-structured interviews with school personnel impacted by the study: behavior specialist, special education teacher, paraprofessional, speech and language pathologist, and principal. In addition, the experimenter interviewed two of the participants. All respondents commented on the goals, procedures, and outcomes of the study.

RESULTS

For Ariel, challenging behavior was highest (90%) in both sessions of the demand condition (Figure 2). This is compared with the low, decreasing trend in the control condition ($M=5\%$; range, 0–10%). Challenging behavior occurred in 0% of intervals during the attention and alone conditions. For Jonah, challenging behavior was highest in the attention ($M=9$; range, 6–12%) and demand ($M=3$; range, 0–5%) conditions. Challenging behaviors did not occur during the control and alone conditions. For Suzanna, challenging behavior was highest in the attention ($M=6$; range, 3–9%) and demand ($M=3$; range, 2–4%) conditions. Challenging behaviors did not occur in the control and alone conditions. These results suggest that the functions of challenging behavior were escape for Ariel and attention and escape for Jonah and Suzanna.
Top ranking items for Ariel were playing with beads on a string (77%), listening to music on the iPad™ (73%), interacting with a familiar adult (i.e., attention; 10%), and playing with a spiky ball (7%; Table 2). Jonah selected interacting with a familiar adult (100%), playing the ‘Who Wants to be a Millionaire™’ board game (67%), and eating Starbursts™ (17%) and yogurt raisins (7%). Suzanna selected two activities: spiky ball (100%) and interacting with a familiar adult (73%). In the paired-choice preference assessment, Suzanna selected magnets (100%), Starbursts™ (80%), and the spiky ball (50%; Figure 1).
Presession Pairing Evaluation

Challenging Behavior

All three participants showed immediate decreases from an average of 49.6% of intervals with challenging behavior to an average of 10% with presession pairing (Figure 3). For Ariel in baseline, the percentage of intervals with challenging behavior averaged 54% (range, 40–66%). In presession pairing, challenging behavior reduced dramatically starting with the first session and averaged 16% (range, 0–69%). One outlier was the fourth presession pairing session (69%), which occurred 2 days after having surgery. Despite no specific data, challenging behavior topographies in baseline were crying, self-bites, banging elbow to table, and non-compliance, whereas there was only one instance of self-bites in

Figure 3. Percentage of 10-s intervals with challenging behaviors in baseline, presession pairing, and novel task for Ariel, Jonah, and Suzanna and maintenance for Ariel.
the presession pairing condition. With the novel task, Ariel’s challenging behavior was 0%. In the maintenance session, Ariel exhibited challenging behaviors in 3% of intervals.

Baseline data for Jonah’s challenging behavior had a steep, increasing trend ($M=42\%$; range, 30–69%). During presession pairing, Jonah’s challenging behavior decreased immediately and averaged 7% (range, 0–16%). During the novel task, challenging behavior was 0%.

Baseline data for Suzanna’s challenging behavior reflect steady, yet somewhat variable levels averaging 52% (range, 38–65%). During presession pairing, Suzanna’s challenging behaviors decreased to an averaging of 7% (range, 0–16%). During the novel task, Suzanna’s challenging behavior was 0%.

**Accurate Academic Responding**

Presession pairing produced modest increases in accurate academic responding (Figure 4). For Ariel, the percentage of accurate academic responses in baseline averaged 4% (range, 0–17%), whereas they averaged 12% (range, 0–40%) during presession pairing. Correct responding was 72% during the novel task and 16% in the maintenance session. For Jonah, correct responding in baseline reflected an initially increasing then sharply decreasing trend averaging 62% (range, 29–100%). Correct responding during presession pairing had a higher level compared with baseline with an average of 81% (range, 55–94%). Correct responding during the novel task probe remained high (88%). For Suzanna, correct responding averaged 40% (range, 25–67%) in baseline, 65% (range, 50–88%) in presession pairing, and 100% in the novel task probe.

**DISCUSSION**

With three children with autism, preceding instructional sessions with a short (2–4 min) interactive engagement between the experimenter and the participants in an experimentally determined preferred activity (presession pairing) led to a general reduction of challenging behavior during subsequent instruction. In all three cases, the reduction of challenging behavior occurred during the first experimental session and was sustained through the presession pairing condition (with the exception of one session with Ariel). The effects of presession pairing on levels of accurate academic responding were modest. In the presence of a novel task, all three participants emitted challenging behavior in 0% of intervals and accurate academic responding at or above previous levels. In the one maintenance session conducted with Ariel, she emitted zero challenging behaviors despite the absence of the presession pairing procedure. The
effects of presession pairing were consistent amongst the three participants despite different functional analysis results: Ariel’s challenging behavior was maintained solely by escape from demands, whereas Jonah and Suzanna’s problem behavior was maintained by attention and escape from demands. The teachers, administrators, and participants found the study to be socially valid suggesting that the intervention is not only efficacious but acceptable to stakeholders.

These data extend previous literature in two ways. First, although Carr and colleagues evaluated presession pairing as part of an intervention package (Carr et al., 1999; Kemp & Carr, 1995; McLaughlin & Carr, 2005), we found no studies evaluating only the presession pairing procedure described by Sundberg and Partington (1998) and Barbera (2007). The current data represent an initial study demonstrating
the efficacy of that procedure. Second, the data extend the literature on antecedent interventions for reducing challenging behavior emitted during demands, such as errorless teaching (Ebanks & Fisher, 2003; Weeks & Gaylord-Ross, 1981), task interspersal (Benavides & Poulson, 2009; Winterling et al., 1987), and fast pace of instruction (Carnine, 1976; Roxburgh & Carbone, 2012; see Carbone et al., 2010, for a review). Given replication, presession pairing may join this group of antecedent manipulations aimed at reducing challenging behavior emitted during demands.

There are at least four possible explanations for the effects of presession pairing in this study, and the mechanism should be elucidated in future research. First, Sundberg and Partington (1998) suggested ‘The main purpose of this procedure is to establish the instructor as a form of conditioned reinforcement for the child’ (p. 106). This explanation has face validity as the instructor pairs herself with strong reinforcers, thereby conditioning herself as a reinforcer. Future research may test this by pairing one instructor with reinforcers and not pairing another instructor with reinforcers. The experimenter could then conduct a preference assessment with the two instructors to determine which instructor a child selects or approaches (see McLaughlin & Carr, 2005, for a protocol). Alternatively, the reinforcing value of the two instructors could be evaluated by presenting them contingent on a behavior and measuring that behavior.

A second, related explanation is that presession pairing may have altered the instructor (or other stimulus elements of the instructional setting) from a CEO-R (or conditioned aversive stimulus, as described previously) correlated with a worsening condition characterized by a high rate of demands and a low rate of reinforcement to stimuli correlated with the delivery of positive reinforcers (Carbone et al., 2010; Hineline, 1977; McGill, 1999; McLaughlin & Carr, 2005; Michael, 2000). The immediate reduction in challenging behavior seems to support this hypothesis as presession pairing may have momentarily altered the aversiveness of stimuli associated with the instructional setting, a defining characteristic of the motivating operation (Michael, 2007). This explanation could be tested by measuring the effects of pairing with some adults and not others on evoking problem behavior or evaluating the effects of pairing and then ‘unpairing’ the same adult.

A third explanation is that presession pairing involves satiation and therefore functions as an abolishing operation. As attention reinforced Jonah and Suzanna’s problem behavior, providing attention during presession pairing may have decreased the value of attention during teaching sessions and abated the frequency of problem behavior that had produced attention in the past. O’Reilly and colleagues conducted a series of studies showing that presession access to attention or tangible reinforcers reduced problem behaviors sensitive to those reinforcers (O’Reilly, 1999; O’Reilly, Edrisinha, Sigafoos, Lancioni, & Andrews, 2006). Ingvarsson and colleagues used
noncontingent reinforcement with edibles to reduce escape-maintained problem behavior, suggesting that edibles abolished the value of escape (Ingvarsson, Hanley, & Welter, 2009; Ingvarsson, Kahng, & Hausman, 2008). A difference in their procedure from the current procedure was that edible reinforcers were delivered noncontingently throughout the demand session, as opposed to various reinforcers being delivered before the demand session. Horner et al. (1997) employed a version of satiation with children whose problem behavior was highest in the context of an unpleasant event (e.g., told a preferred event would be canceled) and demands. They reduced the problem behavior in this context using ‘neutralizing routines’, such as engaging in a preferred activity (e.g., drawing) 30–40 min before the demand session. Presession pairing may satiate a child on attention or tangible reinforcers. Satiation of attention is plausible for Jonah and Suzanna whose problem behavior was reinforced by attention, but not for Ariel whose problem behavior was not. Future research should test the satiation hypothesis by conducting functional/reinforcer analyses and isolating the delivery of certain reinforcers.

A final interpretation of the mechanism underlying the presession pairing effect relates to the metaphor of behavioral momentum (cf. Grace & Nevin, 2004). The basic experimental finding supporting the metaphor of behavioral momentum is that response classes associated with greater density of reinforcement are more persistent in the face of environmental distractors (Nevin, Mandell, & Atak, 1983). In a study with children with autism, Parry-Cruwys et al. (2011) showed that a richer schedule of reinforcement (variable interval [VI] 7 s) of tokens or edibles produced a higher rate of task responding (e.g., puzzle building and block building) following distracters (e.g., videos) than a leaner schedule of reinforcement (VI 30 s). Presession pairing may work because the participant’s cooperative behaviors inherent in the interactive presession activity are associated with a rich or dense schedule of reinforcement, and thus, cooperative behaviors in the presence of demands (i.e., distractors) may persist. Future research could rule out this mechanism by comparing the presession pairing procedure with the presession delivery of reinforcers mechanically or via another person. Another direction for future research is examining the possibility of multiple mechanisms compounding to achieve the presession pairing effects.

Although the present results are promising, the study is not without limitations. For example, Jonah’s baseline challenging behavior data demonstrated an increasing trend. It is possible that the novelty of the experimenter during the initial baseline sessions resulted in low levels of challenging behavior that eventually dissipated once the novelty wore off. Jonah’s baseline was terminated earlier than planned to address his increasing level of challenging behavior; because of this, only one baseline data point for Jonah overlapped with Ariel’s presession pairing data. Furthermore, the functional analyses did not contain a tangible condition with precluding conclusions regarding the responsibility of satiation of tangible reinforcers for reduced problem behavior.
behavior during the instructional sessions. Similarly, the contingency of turning away for 30 s contingent on a problem behavior in the control condition of the functional analyses may have confounded the results, as this could have negatively reinforced problem behavior. Finally, near absence of maintenance sessions testing the effects of presession pairing across time leaves the question of its durability in question. Ideally, follow-up sessions with all three participants should have been scheduled, but only Ariel remained available for this evaluation.

There are numerous questions for future research, such as how much pairing is needed before each session to see an effect, how would increased delays between presession pairing and academic demands impact the effect, and how potent must reinforcers be for pairing to work? We used a multiple baseline across participants design because we were concerned that once an instructor was paired, behavior may not reverse when the presession pairing procedure was withdrawn. Future research should explore the interplay between the maintenance of the presession pairing effect and the reversibility of presession pairing. Future research should examine these questions and whether or not the effect will generalize to other populations (e.g., children with different and potentially more severe forms of disabilities).

Presession pairing may represent an important procedure in the management of challenging behaviors during instructional sessions. Given that presession pairing reduced challenging behaviors maintained by either escape or attention and escape in the present study, the presession operation may represent a ‘first-order’ intervention prior to the implementation of a functional analysis. Ultimately, it may prove prudent to incorporate presession pairing into all instructional strategies.

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