Effects of Pre-session Pairing on Preference for Therapeutic Conditions and Challenging Behavior

Ashley M. Lugo² · Paige E. McArdle³ · Melissa L. King⁴ · John C. Lamphere⁵ · Janelle A. Peck¹ · Hanna J. Beck¹

Published online: 13 June 2018
© Association for Behavior Analysis International 2018

Abstract

The current study examined child preference for pre-session therapeutic conditions. A 4-year-old female diagnosed with autism spectrum disorder (ASD) was exposed to three conditions in a concurrent-chains arrangement: pre-session pairing (PSP) prior to the onset of discrete-trial instruction (DTI), free play (FP) prior to DTI, or immediate onset of DTI. Initial link selections in the concurrent-chains arrangement suggested a relative preference for the PSP condition across multiple therapists. Negative vocalizations decreased across all conditions following implementation of the concurrent-chains arrangement with no differentiation between therapeutic conditions.

Keywords Concurrent chains · Early intervention · Pre-session pairing · Rapport

Rapport-building procedures, such as pairing one's self with preferred stimuli, are commonly recommended in early intensive behavioral intervention (Barbera, 2007; Sundberg & Partington, 1998). The objective of pairing is to establish a

Research Highlights

- Building rapport by pairing one's self with preferred stimuli is a commonly recommended practice in early intensive behavioral intervention.
- When allowed to choose, the child consistently selected to participate in DTI with a therapist who conducted PSP prior to sessions rather than the other conditions.
- The preference for PSP was evident even though the other conditions included the same access to toys and delay to onset of DTI, suggesting that the preference was for the PSP interactions and the therapist who had been paired with highly preferred items.

✉ Ashley M. Lugo
alugo@semo.edu

¹ Department of Psychology, Munroe-Meyer Institute, University of Nebraska Medical Center, Omaha, NE, USA

² Department of Educational Leadership and Counseling, College of Education, Southeast Missouri State University, One University Plaza MS 5575, Cape Girardeau, MO 63701, USA

³ Department of Educational Psychology, College of Education, University of Georgia, Athens, GA, USA

⁴ University Autism Center, Southeast Missouri State University, Cape Girardeau, MO, USA

⁵ Potential, Inc., Newtown, PA, USA

positive therapeutic relationship (i.e., rapport) between therapist and client through the delivery of preferred tangible and/or edible stimuli, attention, and activities in the absence of demands (Barbera, 2007; Sundberg & Partington, 1998). Recent literature has examined the effects of pairing on client behaviors (Kelly, Axe, Allen, & Maguire, 2015; Shillingsburg, Bowen, & Shapiro, 2014) and established technological procedures for pairing interventions (Lugo, King, Lamphere, & McArdle, 2017).

Shillingsburg et al. (2014) evaluated the effects of pairing on social avoidant behaviors (i.e., elopement, latency to sit, crying, out-of-seat behavior) for two children with autism spectrum disorder (ASD). Pairing was described as a zero-demand, high-density reinforcement session during which preferred items were freely available. Following the pairing intervention, both participants exhibited fewer social avoidant behaviors during discrete-trial instruction (DTI) with a therapist who conducted the intervention than with a therapist who did not. Unfortunately, this evaluation did not include a control condition or a report on the specific criteria for implementation of the pairing procedures.

Kelly et al. (2015) further evaluated the effects of pairing on behaviors exhibited during DTI. Kelly et al. (2015) measured challenging behavior and accurate responding and demonstrated reductions in challenging behavior when pre-session pairing (PSP) was conducted prior to the onset of DTI. Moderate increases in accurate academic responding were also observed after implementation of PSP. Similar to

Shillingsburg et al. (2014), the authors suggested PSP produced a stimulus change that affected that momentary value of certain stimuli as reinforcers (i.e., motivating operation). However, the design employed in the study was not sufficient to confirm the hypothesis that PSP is a motivating operation manipulation rather than a function-altering procedure.

Although Kelly et al. (2015) and Shillingsburg et al. (2014) evaluated the effects of pairing procedures on several relevant topographies of behavior, their procedures did not systematically isolate components of the interventions that may have been responsible for behavior change. These studies did not control for ancillary procedural components that may affect child behavior during DTI, such as access to tangibles during the pairing sessions and the delay of onset to DTI when pairing is conducted prior to a DTI session.

Previous research on pairing has generally neglected the social validity of the procedures themselves, despite an ethical obligation to include clients in program planning (Code 4.02; Behavior Analyst Certification Board, 2016). Acknowledging and assessing for learners' preference for similarly effective procedures can be useful to further inform clinicians of factors that may influence the efficiency and effectiveness of chosen interventions. Hanley (2010) proposed the use of an experimental arrangement to examine participant preference for behavioral interventions. The concurrent-chains procedure is arranged such that arbitrary stimuli (e.g., colored poster boards) serve as initial links correlated with different behavior-change procedures. Dependent variables are measured across procedures to reflect the relative efficacy of the procedures. The number of selections of initial links by the participant reflects the relative preference for these procedures (Hanley, 2010; Hanley, Piazza, Fisher, Contrucci, & Maglieri, 1997).

The purpose of the current investigation was to utilize the systematic PSP implementation protocol outlined in Lugo et al. (2017) to examine (a) how antecedent manipulations affect preference for therapeutic conditions, including PSP and an alternative free-play (FP) condition designed to control for pre-session access to preferred tangibles and delayed onset of DTI, and (b) how PSP affects disruptive behavior exhibited during DTI.

Method

Participant and Setting

The participant was a 4-year-old female diagnosed with ASD who previously received early intervention services at a clinic located in the Midwest. The participant had been observed to engage in disruptive behavior during DTI, including negative vocalizations and noncompliance with academic instructions. Results from the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008) indicated the participant had met a majority of milestones in Levels 1

and 2 and was acquiring Level 3 milestones. Areas of relative strength included mand, tact, motor imitation, and receptive skills.

All sessions took place in a section of the clinic separated by room dividers to create a 1.5 m by 0.7 m session area.

Materials

Preferred items identified via a multiple-stimulus without replacement (MSWO) preference assessment (DeLeon & Iwata, 1996), data sheets, and DTI materials were used during sessions. Initial link stimuli for the concurrent-chains evaluation were 4 cm by 8 cm black-and-white profile pictures of therapists conducting the sessions.

Dependent Measures

Initial Link Selections We recorded each instance of initial link selections. Link selections were scored if the participant made contact with one initial link stimulus with any part of the hand.

Negative Vocalizations Negative vocalizations were scored if the child emitted a high-pitched screech accompanied by negative affect (e.g., grimace, frown, tears) or vocal refusal to complete tasks (e.g., "No!"). Negative vocalizations were recorded using 10-s partial-interval recording.

Design

A modified concurrent-chains arrangement with a baseline phase was used. Each concurrent-chains session consisted of two phases: concurrent-chains training and preference evaluation. Once differentiation of initial link selections was established in the preference evaluation, contingencies were reversed across therapists. Reversals across therapists were conducted to demonstrate that behavior change was due to the antecedent manipulation and not the therapist themselves. The contingency reversal consisted of assigning initial links and associated therapists to new terminal link conditions. Three reversals were conducted after differentiation was established in the first concurrent-chains session.

Procedure

Preassessments An MSWO was conducted to determine a ranking of preferred items to deliver during DTI and pre-session conditions. Moderately preferred items (i.e., stimuli that were ranked lower on the MSWO hierarchy) were delivered contingent on responding during DTI sessions. Highly preferred items (i.e., stimuli that were ranked highest on the MSWO hierarchy) were used during the antecedent PSP and FP antecedent conditions. A paired-choice preference assessment (Fisher et al., 1992) was conducted with

initial link stimuli (i.e., pictures of therapists) to identify three moderately preferred therapists to conduct all therapeutic conditions. The participant was instructed to select one picture, and there were no programmed consequences for selection of either picture. Ten mastered tasks were identified from the participant's previous VB-MAPP (Sundberg, 2008). Mastered tasks, rather than novel tasks, were selected because the purpose of the evaluation was to examine the effects of PSP on child preference rather than its effects on the acquisition of new skills. Mastered tasks were identified from the participant's list of maintenance targets. Tasks were restricted to those the participant could be physically prompted to complete (i.e., gross and fine motor imitation, receptive identification, matching, imitation with objects).

Baseline Baseline procedures were identical across all three conditions, and each therapist was assigned to one condition. Upon entering the session room, the therapist instructed the participant to sit down and delivered 10 trials of mastered tasks in a DTI format. Compliance, defined as a correct response emitted within 5 s of an instruction, resulted in praise delivered on a continuous reinforcement schedule and a moderately preferred toy delivered on a fixed-ratio two (FR2) schedule. Three moderately preferred toys identified during the MSWO were randomly rotated within sessions.

Three-step guided compliance was used to prompt the participant to engage in target responses during DTI. If the participant erred or did not correctly respond within 5 s of the instruction, the therapist modeled the correct response. If the participant erred or did not correctly respond within 5 s of the modeled prompt, the therapist physically prompted the correct response using the minimal amount of force necessary. There were no programmed consequences for disruptive behavior during baseline or treatment conditions. Therapists were instructed to ignore disruptive behavior and to continue with procedures.

Concurrent-Chains Therapeutic Conditions Consistent with baseline sessions, one therapist was assigned to each terminal link condition. The first terminal condition, DTI only, was identical to baseline. The second terminal condition, PSP, consisted of 2 min and 30 s of PSP (Lugo et al., 2017) with the therapist prior to DTI (also identical to baseline). During PSP, highly preferred toys were present in the session area and were freely available to the participant. The therapist engaged in child-directed interactions using the PSP steps outlined by Lugo et al. (2017): (a) maintaining proximity to the participant, (b) delivering behavior-specific praise contingent upon appropriate play, (c) repeating or commenting on participant vocalizations, (d) imitating appropriate play, (e) describing appropriate play, (f) offering toys, and (g) modeling novel ways to engage with toys.

The third terminal condition, FP, consisted of 2 min and 30 s of uninterrupted free access to the same preferred toys used in the PSP condition, followed by DTI (also identical to baseline). During FP, the therapist was present in the session room but did not interact with the participant. Any bids for attention (e.g., questions, physical contact) were ignored. The purpose of this condition was to control for the access to toys and delay to the onset of DTI that were components of the PSP condition.

Concurrent-Chains Training Procedural components of the concurrent-chains sessions were systematically replicated from Hanley et al. (1997). Each concurrent-chains session consisted of one phase of concurrent-chains training and one phase of concurrent-chains evaluation. During training, the participant was physically prompted to select an initial link (i.e., therapist picture) and then entered the corresponding terminal link condition. Prompted selections were randomly ordered and counterbalanced. The participant was exposed to each condition twice during each training phase, totaling six trials per training phase. A training phase was performed at the start of each concurrent-chains session in an effort to promote exposure to conditions.

Concurrent-Chains Evaluation After each concurrent-chains training phase, the participant was verbally instructed to select an initial link (i.e., "Pick one."). Following an independent selection of one initial link, the participant entered the corresponding terminal condition with the therapist associated with that condition. Each trial constituted a new opportunity to select an initial link. Five trials were conducted in each evaluation phase, after which a new concurrent-chains session was initiated with another training phase.

After differentiation was achieved (i.e., one initial link was selected for at least four of the five evaluation trials), contingencies were reversed and each initial link and therapist were reassigned to a novel condition. An exception occurred during the first arrangement of therapists, during which an additional concurrent-chains session was inadvertently conducted following differentiation. During contingency reversals, each therapist's initial link followed him or her to the new condition. A concurrent-chains training phase was conducted at the start of each reassignment to expose the participant to the new contingencies.

Interobserver Agreement and Treatment Integrity

Interobserver agreement (IOA) was collected for initial link selections and negative vocalizations. IOA for initial link selections was collected for 100% of trials with 100% agreement. Total-interval IOA for negative vocalizations was calculated by dividing the number of intervals for which two observers indicated negative vocalizations occurred by the total number of intervals and multiplying the quotient by 100. IOA for negative vocalizations was collected across

Fig. 1 Cumulative link selections across concurrent-chains evaluation trials. A break in a data path denotes a new evaluation session, prior to which a training session was conducted. A dotted phase line indicates when a new concurrent-chain session was initiated. A solid phase line

indicates a contingency reversal across therapists. Discrete-trial instruction only (DTI) is denoted by open circles, free play (FP) is denoted by closed diamonds, and pre-session pairing (PSP) by closed squares

42% of sessions and mean agreement across conditions was 97.3%. Treatment integrity for DTI sessions and PSP were collected for 57% of sessions. Treatment integrity for the DTI portion of the conditions was calculated by dividing the number of steps exhibited correctly by the total number of steps and multiplying the quotient by 100. The steps for DTI were to first present discriminative stimulus to sit, then prompt using three-step guided compliance and provide appropriate consequence for compliance to sit. This was then followed by

the implementer delivering a discriminative stimulus for a task, following the appropriate prompting hierarchy for the task, and then providing appropriate consequence for the task. Research implementers were required to follow a 3- to 5-s intertrial interval. Treatment integrity for the DTI portion of the conditions was 99.5%. Treatment integrity was also calculated for the PSP antecedent manipulation. The total number of PSP behaviors exhibited was divided by the total number of PSP behaviors stipulated in the protocol (i.e., three PSP

Fig. 2 Percentage of intervals with negative vocalizations across baseline, concurrent-chains training, and concurrent-chains evaluation phases. Phase labels abbreviated as Train indicate the concurrent-chain training phases. Phase labels abbreviated as Eval indicate the concurrent-chain evaluation phases. Solid phase lines indicate a contingency reversal across therapists. Discrete-trial instruction only (DTI) is denoted by open circles, free play (FP) is denoted by closed diamonds, and pre-session pairing (PSP) by closed squares

behaviors per category) and the quotient was multiplied by 100. Research implementers were required to exhibit three of each of the PSP behaviors during the 2.5-min PSP antecedent condition (i.e., praise, reflect, imitate, describe, initiate, create) and were required to be within arm's length of the participant (i.e., proximity) for 100% of 30-s whole intervals. Treatment integrity for the PSP antecedent condition was 97.5%.

Results and Discussion

Figure 1 depicts the cumulative link selections across concurrent-chains evaluation trials. The first arrangement of therapists required three concurrent-chains sessions (i.e., three training phases and three evaluation phases) to achieve differentiation. During the third concurrent-chains evaluation phase, the participant exclusively picked the PSP condition. Despite meeting criterion for differentiation, a fourth session was inadvertently conducted with the same arrangement of therapists, during which the participant continued to select the PSP condition. When therapists and conditions were reversed during each of the three subsequent concurrent-chains sessions, the participant continued to exclusively select the initial link associated with the PSP condition.

Figure 2 depicts the percentage of intervals with negative vocalizations across baseline, concurrent-chains training, and concurrent-chains evaluation phases. Negative vocalizations were initially variable across all conditions, followed by decreases to zero after the first concurrent-chains session. Differentiation among conditions was not observed.

Consistent selection of the PSP condition across therapist reversals suggests a preference for the antecedent manipulation rather than the therapist associated with the conditions. Moreover, the participant selected the therapeutic PSP when the FP condition was concurrently available. The FP and PSP conditions were identical except for the interactions that took place during pairing, providing evidence it was the interactions delivered during PSP that were preferred rather than the delay to onset of DTI or access to preferred tangibles.

The lack of differentiation in negative vocalizations between conditions may suggest multiple treatment interference as a result of the multielement design used in the concurrent-chains procedure. A functional analysis was not conducted as part of this study, but it is possible the decrease was a result of prolonged exposure to DTI sessions in which negative vocalizations, which may have served a socially mediated function (e.g., escape or attention) in the past, were placed on extinction. Future studies should include a functional analysis of challenging behavior to examine differences in the efficacy of PSP across functions of behavior. Furthermore, future

research should modify the experimental procedure such that challenging behavior is negatively reinforced to examine how the antecedent conditions can influence responding in the absence of additional components that may influence negatively reinforced behavior (e.g., three-step guided compliance).

Future research should aim to systematically replicate the concurrent-chains procedure used in the current study to further evaluate child preference. Procedural modifications should be made to provide additional empirical support for the use of PSP as an antecedent intervention to reduce challenging behavior during DTI, as the current investigation did not produce differentiated responding across conditions. Moreover, a traditional multielement or reversal design may be more appropriate to examine effects on challenging behavior than the design used to evaluate preference in this study.

Compliance with Ethical Standards

Conflict of Interest No authors have a conflict.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

- Barbera, M. L. (2007). *The verbal behavior approach: How to teach children with autism and related disorders*. London, UK: Jessica Kingsley Publishers.
- Behavior Analyst Certification Board. (2016). Professional and ethical compliance code for behavior analysts. Retrieved from <https://www.bacb.com/ethics/ethics-code/>
- DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis*, 29, 519–533. <https://doi.org/10.1901/jaba.1996.29-519>.
- Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe and profound disabilities. *Journal of Applied Behavior Analysis*, 25, 491–498. <https://doi.org/10.1901/jaba.1992.25-491>.
- Hanley, G. P. (2010). Toward effective and preferred programming: a case for the objective measurement of social validity with recipients of behavior-change programs. *Behavior Analysis in Practice*, 3, 13–21. <https://doi.org/10.1007/BF03391754>.
- Hanley, G. P., Piazza, C. C., Fisher, W. W., Contrucci, S. A., & Maglieri, K. A. (1997). Evaluation of client preference for function-based treatment packages. *Journal of Applied Behavior Analysis*, 30, 459–473. <https://doi.org/10.1901/jaba.1997.30-459>.
- Kelly, A. N., Axe, J. B., Allen, R. F., & Maguire, R. W. (2015). Effects of pre-session pairing on the challenging behavior and academic responding of children with autism. *Behavioral Interventions*, 30, 135–156. <https://doi.org/10.1002/bin.1408>.

- Lugo, A. M., King, M. L., Lamphere, J. C., & McArdle, P. E. (2017). Developing procedures to improve therapist-child rapport in early intervention. *Behavior Analysis in Practice. Advance online publication.*, 10, 395–401. <https://doi.org/10.1007/s40617-016-0165-5>.
- Shillingsburg, M. A., Bowen, C. N., & Shapiro, S. K. (2014). Increasing social approach and decreasing social avoidance in children with autism spectrum disorder during discrete trial training. *Research in Autism Spectrum Disorders*, 8, 1443–1453. <https://doi.org/10.1016/j.rasd.2014.07.013>.
- Sundberg, M. L. (2008). *VB-MAPP: Verbal behavior milestones assessment and placement program*. Concord, CA: AVB Press.
- Sundberg, M. L., & Partington, J. W. (1998). *Teaching language to children with autism and other developmental disabilities*. Pleasant Hill, CA: Behavior Analysts, Inc..