# SELF-CONTROL IN CHILDREN WITH AUTISM: RESPONSE ALLOCATION DURING DELAYS TO REINFORCEMENT

MARK R. DIXON

SOUTHERN ILLINOIS UNIVERSITY

AND

ANNE CUMMINGS

WESTERN MICHIGAN UNIVERSITY

This study examined the use of a progressive-delay schedule of reinforcement to increase self-control and decrease disruptive behavior in children with autism. When initially given the choice between an immediate smaller reinforcer and a larger delayed reinforcer, all participants chose the smaller reinforcer. When access to the larger reinforcer required either no activity or engaging in a concurrent task during the delay, all participants demonstrated both self-control and preference for a response requirement. Disruptive behavior decreased during delays that required a concurrent task compared to sessions without an activity requirement.

DESCRIPTORS: self-control, delayed reinforcement, choice, concurrent activities, autism

---

To promote self-control in individuals with disabilities, Dixon et al. (1998) and Dixon and Holcomb (2000) used interventions that progressively increased the delay to a larger reinforcer (Schweitzer & Sulzer-Azaroff, 1988) and required concurrent responding during the delay (Mischel, Ebbesen, & Zeiss, 1972). It is unclear, however, under what conditions participants might prefer to simply wait during the progressively longer delays or engage in a concurrent task before obtaining a larger reinforcer. The issue is important because a procedure that encourages self-control by concurrent responding may also decrease problem behaviors that can occur otherwise. We examined whether exposure to a concurrent fixed-duration/progressive-duration schedule of reinforcement would increase self-control and decrease problem behavior in children with autism. We also assessed preferences for responding or not responding during the delay preceding identical larger reinforcers.

## METHOD

### Participants, Target Behaviors, Setting, and Reinforcer Identification

Three children with autism served as participants. All children were able to follow simple instructions, speak in two- and three-word phrases, comment spontaneously (not always in full sentences), and make requests. Hondo was a 6-year-old boy who exhibited self-injury. This target behavior was scored when Hondo's hands touched his face or head with force. Rico was a 5-year-old boy who exhibited slamming on the floor and self-biting. This target behavior was scored when any portion of Rico's body other than his feet was touching the floor or if his

mouth made contact with his arms or hands. Chaz was a 7-year-old boy with a diagnosis of temporal lobe seizures who exhibited self-injury and aggression. This target behavior was scored when Chaz's hands touched his face or head with force, or he advanced toward the experimenter. All sessions were held during home-based therapy; the child and experimenter sat facing one another across a small table.

A stimulus preference assessment without replacement was conducted using preferred items identified by teachers and parents. The most preferred item was the one chosen first for three consecutive sessions and was used throughout the study. Hondo's most preferred item was a meringue cookie. Rico's was popcorn, and Chaz's was access to a toy guitar. The quantities or duration of these stimuli used throughout the study were half a cookie, half a bag of popcorn, or 30 s of guitar access for the smaller reinforcer, and one cookie, one bag of popcorn, or 60 s of guitar access for the larger reinforcer.

### Procedure

*Natural baseline.* The large reinforcer was placed in full view on the table. The experimenter then told the child to "wait as long as you can before eating [playing with] —" During this condition, the duration the child waited before consuming the item, along with any emission of the problem behavior, were recorded. Once the boy stated he could wait no longer, the experimenter delivered the chosen item, and the session ended. This condition remained in effect until the amount of time each child waited before consuming the item remained relatively stable.

*Choice baseline: Part 1.* During the first part of this condition each child was asked to choose between a small immediate and large delayed reinforcer. The child was asked, "Do you want the small [item] now, or would you like the big [item] after wait-

ing for a while?" Accompanying this verbal description of the possible choices, the actual reinforcers (or symbols depicting the actual reinforcers in the case of Chaz's guitar access) were displayed. Position of these items and their verbal descriptions was alternated across sessions to control for position bias.

If the child chose the large item, the experimenter said "Since you picked that one, you will need to wait for a while before I can give it to you." If the child attempted to take the item or asked "How long?" the experimenter said, "Please wait." The actual time requirement for access to the large delayed item was 12 times that of the baseline mean waiting time. Each session ended when the child selected the preferred item and consumed it, or fulfilled the delay requirement and then consumed the item. Part 1 of the choice baseline ended when the child selected the smaller quantity of the two items during four consecutive sessions.

*Choice baseline: Part 2.* Both small and large quantities of the items were available immediately in this phase. Each session began by the experimenter asking the child "Do you want the small [item] now or do you want the big [item] now?" After the child made a choice, the experimenter delivered the item. Each session ended once the child had consumed the item. Part 2 of the choice baseline ended after each child selected the large item during four consecutive sessions.

*Self-control training.* During each session the child was asked to choose between three alternatives: (a) a small immediate item, (b) a larger delayed item without a response requirement during the delay, and (c) a larger delayed item with a response requirement during the delay. The response requirement for each child was to identity match a sample stimulus card (a 7.6 cm by 12.7 cm colored card) to an array of comparison stimuli. The following instructions were given at the onset of each session to describe the three

possible choices: "Do you want the small [item] now, do you want the big [item] in a little while, or do you want the big [item] after working on your program?" The actual reinforcers (or symbols) were displayed as the experimenter described the choices. No other instructions were given. To ensure that the child had adequate experience with each response alternative, a block of three forced-choice trials (one response alternative per trial) was presented following every 10 free-choice trials during this condition. The experimenter presented the one option to the child and said, "Pick the card."

If the child selected the small item, the experimenter delivered it immediately. However, if the larger item was selected, incremental delays, along with either a concurrent activity or no activity, were imposed before the child was allowed to consume it. The initial delay was determined as the average of that participant's natural baseline waiting duration and was then gradually increased during subsequent sessions. A session terminated when (a) the child selected the small item and consumed it, (b) the child selected and consumed the large preferred item after fulfilling the delay contingency, (c) the child selected the large preferred item without fulfilling the delay contingency (in which case no reinforcer was delivered or consumed), or (d) the child failed to emit the concurrent activity during the delay for 5 s following the initial request to engage in the relevant behavior. This condition remained in effect for each participant until the delay was equal to 12 times the mean natural baseline duration.

*Interobserver agreement.* A second observer was present on 25% of all sessions for all participants. Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Agreement was 100% for selection between the large and small items, 100% for the time

in seconds that the child waited or engaged in activity during the delay ($\pm 3$ s), and 98% for instances of emission of the targeted problem behavior.

## RESULTS AND DISCUSSION

Figure 1 shows choice preferences and problem behaviors across baseline and training conditions for each participant. Mean natural baseline waiting durations were 9 s for Hondo, 12 s for Rico, and 13 s for Chaz. This resulted in performance goals of 108-s, 144-s, and 156-s delays to obtain the larger reinforcer for each participant, respectively. At that same time, emission of problem behavior during the delay to reinforcement occurred at a mean of 3.5 for Hondo, 3.7 for Rico, and 4.5 for Chaz.

During choice baseline (Part 1), all children selected the small immediate item over the larger delayed items in all sessions. When conditions were changed such that both consequences were available immediately (choice baseline, Part 2), they chose the larger reinforcer. During the free-choice sessions of the self-control training condition, all participants showed a preference for the larger reinforcer associated with an activity contingency over the same larger reinforcer without an activity contingency and the smaller reinforcer (range, 90% to 98%). This preference remained in effect as delay values to gain access to the larger reinforcer increased over sessions until the 12-fold increase from natural baseline had been met.

During free-choice trials with an activity contingency, no problem behavior occurred. When the no-activity option was selected (ranging from 2% to 10% of all trials), problem behaviors were observed. During forced-choice trial blocks that required exposure to all three response options, problem behavior returned to high levels for all 3 participants during the no-activity trial option. Mean numbers of problem behaviors emit-
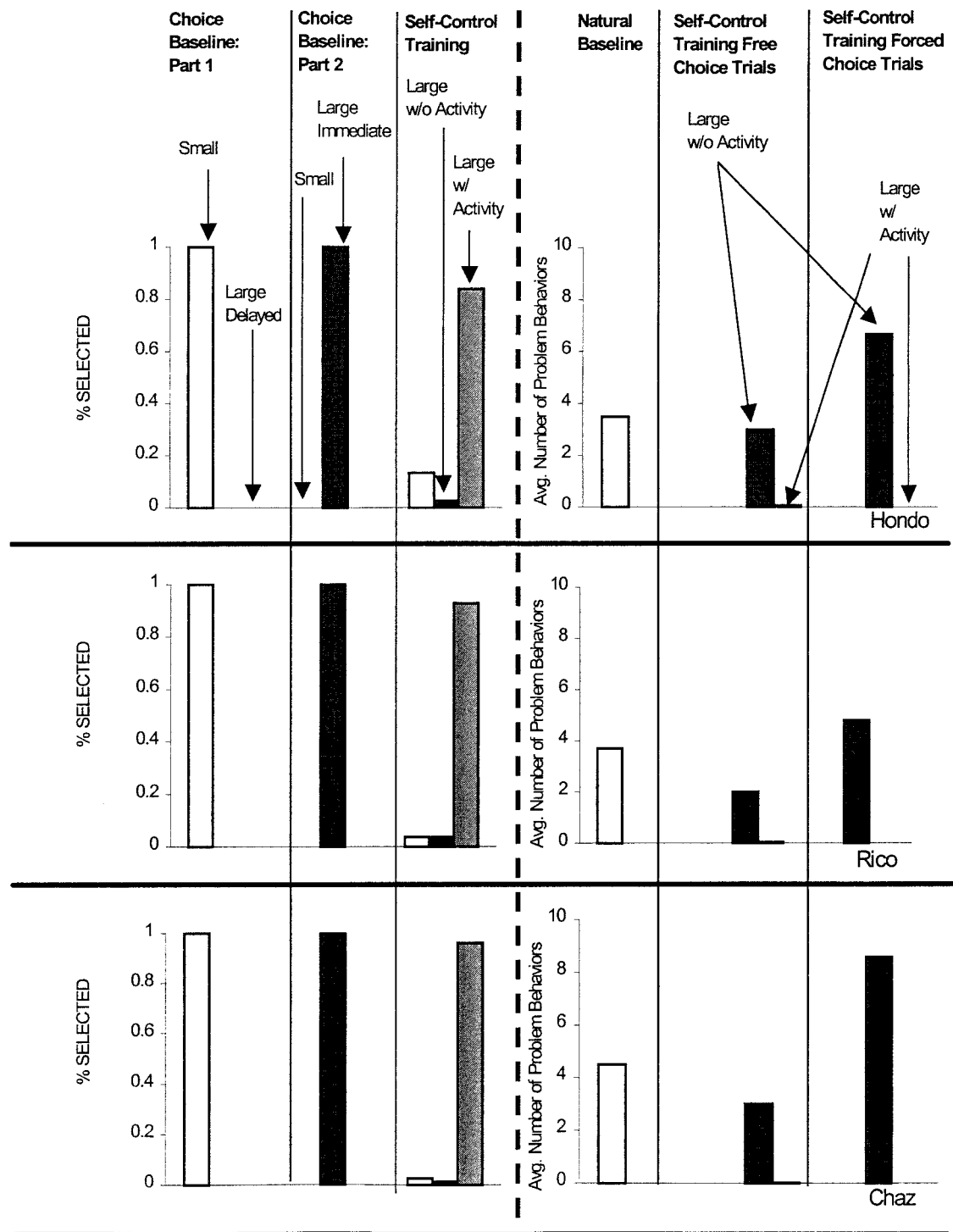
Figure 1.   The left side shows the percentage of choices for each response alternative during choice baselines (Parts 1 and 2) and self-control training conditions. The right side shows the average frequency of problem behavior during natural baseline and self-control training conditions (free and forced choice). Choice baseline data are omitted because no problem behaviors occurred during these conditions.

ted during these forced-choice trials were higher than baseline and free-choice trial averages due to the increasing amount of time that was required to gain access to the larger reinforcer.

The present results show that self-control may be increased by establishing a history in which participants are gradually exposed to progressive delays to gain access to a larger reinforcer and are concurrently given the choice to engage in an intervening activity during that delay. These results further support those of Dixon et al. (1998), Dixon and Holcomb (2000), and Schweitzer and Sulzer-Azaroff (1988), who have shown that self-control may be increased through progressive delays for participants with disabilities. Future research may wish to examine whether a progressive schedule associated with the larger reinforcer is necessary to achieve self-control, or if similar results could be obtained by gradually introducing a concurrent task on a fixed delay.

## REFERENCES

Dixon, M. R., Hayes, L. J., Binder, L. M., Manthey, S., Sigman, C., & Zdanowski, D. M. (1998). Using a self-control training procedure to increase appropriate behavior. *Journal of Applied Behavior Analysis, 31,* 203–210.

Dixon, M. R., & Holcomb, S. (2000). Teaching self-control to small groups of dually diagnosed adults. *Journal of Applied Behavior Analysis, 33,* 611–614.

Mischel, H. N., Ebbesen, E. B., & Zeiss, A. R. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology, 16,* 204–218.

Schweitzer, J. B., & Sulzer-Azaroff, B. (1988). Self-control: Teaching tolerance for delay in impulsive children. *Journal of the Experimental Analysis of Behavior, 50,* 173–186.