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The Use of a Token Economy to Decrease Problem Behaviors and Increase Task Completion for a Pre-Schooler with Autism

Dyana Schneider
Lindenwood University, dschneider@psdr3.org

Robbie Hanson
Lindenwood University, rhanson2@lindenwood.edu

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Dyana L. Schneider

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College of Education and Human Services, Lindenwood University

Dr. Robbie Hanson

Author Note

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Abstract

The execution of a token economy has been shown to be effective to decrease problem behaviors and increase task completion, communication, and other skills for individuals with and without intellectual and developmental disabilities (Matson & Boisjoli, 2009). Although previous research has shown token economies to be effective, there remains criticisms regarding existing research, such as low experimental rigor, among others (Maggin et al., 2011). Additionally, although token economies embed evidence-based behavior-analytic strategies (Wong et al., 2015) there appears to be a disconnect between basic and applied research and implementation of token economies in a clinical context (e.g., relying on fixed versus variable schedules of reinforcement). Further, there remains little research examining token economy use with preschool children with autism. Therefore, the purpose of the current study was to examine the effectiveness of a token economy using a flexible approach to the token exchange via a variable ratio schedule of reinforcement system in a preschool setting with one young participant with autism. The results showed an increase in task completion and a decrease in problem behaviors following intervention, with the results replicated across return to baseline and return to intervention phases.

Keywords: token economy, autism, conditioned reinforcer

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A token economy is a method based on positive reinforcement in which generalized conditioned reinforcers (e.g., tokens, points, coins, etc.) are given for engaging in desired behavior and then exchanged/traded for preferred back-up reinforcers (Hackenburg, 2018). The execution of a token economy is often utilized to decrease problem behaviors and increase task completion, communication, and other skills for individuals with and without intellectual and developmental disabilities (Matson & Boisjoli, 2009).

For example, O'Leary et al. (1969) examined several different methods (e.g., praise, rules, token economy, etc.) to reduce disruptive behavior for second grade students. The results showed that disruptive behavior decreased for five of the seven students only when a token economy was introduced. Charlop-Christy and Haymes (1998) implemented a token economy to reduce off-task behaviors for three children (ages 7-9 years) with autism in an after-school setting in which they compared traditional tokens to "items of obsession" as the tokens that could be exchanged for other preferred items. The results revealed that performance improved when the tokens were the participants' object of obsession. Carnett et al. (2014) found similar results in that perseverative-based tokens were successful in reducing challenging behavior and for reinforcing on-task behavior when compared to traditional tokens for a 7-year-old boy with autism.

Hupp and Reitman (1999) examined the use of a token economy to improve sportsmanlike behavior with three children (ages 8-11 years) with attention-deficit/hyperactivity disorder (ADHD) and the results showed improvements across participants. Higgins et al. (2001) implemented a token economy to de-escalate troublesome behavior of an elementary school-

aged girl with learning disabilities. During the intervention, the participant received checkmarks for remaining seated and for refraining from speaking out of turn in which checkmarks could then be exchanged for free time. The results of the intervention revealed that not only was there a decline of the unwanted behaviors, but the target behaviors were sustained after the token economy ended. Although the token economy was effective, the study took place in an integrated classroom which obstructed the collection of data. Future research was recommended to occur in a separate classroom.

Hangen et al. (2023) compared the effectiveness of reinforcers, tokens paired with reinforcers, and tokens alone to increase task completion for children with and without autism (ages 3-5 years). The results showed that reinforcers were the most effective at increasing behavior followed by paired tokens. Beahm et al. (2023) examined the use of a token economy software program to increase participation in daily living and occupational tasks for six adults with developmental disabilities. Participants were given points for independently participating in relevant tasks and all six participants increased their participation and completed tasks after the introduction of the token economy. The results from this study resemble the findings from Krentz et al. (2016), May et al. (2021), and Natasi et al. (2020).

Although token economies have shown to be successful in previous studies, Hackenberg (2018) examined the existing research on token economies and noted that unfortunately, for an assortment of reasons, laboratory and applied research on the use of token systems appear to be disjointed. Although token reinforcement has shown success in applied settings, it is unclear as to what variables are instrumental for its effectiveness. Further, well known principles of behavior confirmed through basic research (e.g., use of variable schedules producing more consistent performance than fixed schedules) often do not appear to be considered when applied

research is conducted on this topic. Additionally, although it is typical for a token economy to have an established number of tokens before any exchange, Cihon et al. (2018), examined the use of a flexible approach to a level system (which can be conceptualized similarly to a token economy) with four elementary school children (ages 5-7 years) with autism to improve engagement with peers and results showed that intervention was successful across participants. However, this study was limited to participants with little challenging behavior. Further research was recommended to be conducted using varied participants. Fernandez et al. (2023) surveyed 225 board certified behavior analysts (BCBAs) on the practices they implemented when using token economies with participants having autism and other developmental disorders. Most participants agreed about the immense amount of time needed for token training, use of systematic evaluations to determine backup reinforcers, and to determine the generalized tokens to be traded to receive the backup reinforcers. It also displayed a lack of consistency in how token economies should be enforced. An important and revealing conclusion was that specific features of token economies implemented in practice often convey only a slight similarity to how they are recounted in textbooks.

Although previous research has shown token economies to be effective, there remains criticisms regarding existing research, such as low experimental rigor, among others (Maggin et al., 2011). Additionally, although token economies embed evidence-based behavior-analytic strategies (Wong et al., 2015) there appears to be a disconnect between basic and applied research and implementation of token economies in a clinical context (e.g., relying on fixed versus variable schedules of reinforcement). Further, there remains little research examining token economy use with preschool children with autism. Therefore, the purpose of the current study was to examine the effectiveness of a token economy using a flexible approach to the

token exchange via a variable ratio schedule of reinforcement system in a preschool setting with one young learner with autism.

Method

Participants and Setting

One African American boy with autism, aged 4 years and 7 months enrolled in an early childhood center participated. He qualified as a young child with developmental disabilities and was entitled to receive special education services. The participant was reported to be non-vocal, have trouble with proper social conduct, have difficulty following directions and rules, and was reported to possess limited daily-living skills. He was entitled to receive physical therapy, occupational therapy, and speech and language therapy, in addition to services provided by a BCBA. The participant had an Individual Education Plans (IEP) and attended an early childhood center for 2 years. At the time of the study, the participant took two forms of medication mixed into a liquid (e.g., soda, Gatorade, etc.). At the time of the study, the participant was prescribed 0.05 mg of Clonidine and 5 mg of Ritalin both twice a day. Prerequisite skills for the participant were assessed starting in December 2023 and continued to be assessed at the onset of the current study using the *Early Start Denver Model* (ESDM, Rogers & Dawson 2010) curriculum for young children with autism (see Appendix A). The participant was reported to and had been observed to engage in problem behaviors including task refusal, aggression, and property destruction.

All sessions were held independently in a self-contained classroom where the participant typically attended from 8:15 a.m. to 3:15 p.m. Monday through Friday. There were no other students in the classroom when sessions were conducted. The classroom contained one table and three chairs. The primary experimenter was positioned at a chair at the table across from the

student. The secondary observer sat in a chair directly to the right of the student for interobserver agreement (IOA) and treatment integrity (TI) purposes.

The experimenter met with the participant's parents/guardians to obtain written consent for their child's participation in the study in which the parents/guardians were encouraged to ask any questions. They were also informed that if their child's problem behaviors became too interfering during the study, their child would be terminated from the study and other options would be pursued. Further, they were informed that they would not receive any compensation for participation and had the authority to withdraw their child from the study at any time, for any reason without penalty. Assent was assessed before each session and was determined based on the participants' behavior (e.g., complying with directives to come to the table and remaining engaged with the experimenter in the absence of maladaptive behaviors). The university's institutional review board (IRB) approved all procedures before data collection occurred.

Materials

The materials used included six colored blocks (i.e., red, yellow, green block, orange, and blue), a desk and three chairs, and a cabinet where backup reinforcers were placed. Backup reinforcers included items the participant had shown a preference for during the school day. In addition, the experimenter spoke with the parent/guardian of the participant to determine preferred objects. The experimenter used a paper data sheet (see Appendix B), pen, and timer. Other materials included a token board (see Appendix C), and a book entitled *My First Book of Colors: Early Scholastic Learners* (see Appendix D).

Dependent Variable and Response Definitions

The primary dependent variables were the percentage of independent and correct responses for task completion and frequency of problem behaviors. Independent and correct

responses for task completion were defined as choosing and placing all six colored blocks (100% of blocks) in order on the desk from left to right corresponding to the experimenter's instructions. Both the correct colored block and correct placement of the block on the table must have occurred. An incorrect response was defined as choosing any of the six colored blocks that did not correspond to the experimenter's instructions and/or placing the blocks in the incorrect order. Problem behaviors included task refusal, aggression, and property destruction. Task refusal was defined as physically leaving the designated work area or physically dropping body to the ground. Aggression was defined as physically hitting others with an open or closed fist, kicking others with feet, biting, pulling hair, head butting others, scratching and/or throwing items at others. All successful aggressions and attempts were tallied together. This did not include physical contact with another person when appropriately engaged with learning materials, kicking a ball, taking food by the mouth, giving high fives/hugs, rocking body/head when excited, tripping and falling on a person, attempting to give or receive items from another person, or throwing items not at a targeted person. Property destruction was defined as physically swiping items off a surface, knocking over/tipping furniture, pulling out/grabbing items out of cubbies/shelves, and displacing them, and/or throwing objects within the participant's possession. Property destruction did not include items moved when appropriately engaged with learning materials and/or gathering items from a cubby/shelf with the intent to engage with them.

Prompts were faded over time by using a most to least prompting hierarchy. The experimenter used physical prompting to assist the participant with placing the correct blocks which were then faded to verbal/gestural prompting to assist the participant with the correct block until skills were demonstrated with complete independence. Prompting faded over three consecutive days with 80% accuracy.

Pre-Experimental Procedure

One week before the study, the participant received one coin (token) for staying seated during circle time. One coin could then be exchanged for an additional 2 min of free time. The purpose of this introduction to the token economy was to establish familiarity with the token economy exchange system.

General Procedure

There were three 1-min sessions each day Monday through Friday for 4 weeks. The participant attended sessions at 10:00 a.m., 12:00 p.m. and 2:00 p.m. The participant was exposed to conditions in the following order: baseline (week one), intervention (week two), no intervention (week three) and intervention (week four).

Baseline

Baseline began with the participant being guided to the "teacher table" and the participant being provided with a visual picture schedule to assist with transitions. The experimenter had the student sit at the table and provided the discriminative stimulus of, "Match block" while showing the participant a picture of the colored blocks as represented in the book (see Appendix D). The experimenter did not provide any feedback, prompts, or reinforcement for any responses during baseline. The experimenter waited for the participant to respond for 10 s before ending the trial. There were three trials per day during baseline sessions.

Intervention

Intervention began by having the experimenter guide the participant to the "teacher table" with the use of a visual schedule to help transition the participant. The experimenter pointed to a color from a book entitled *My First Book of Colors: Scholastic Early Learners* and simultaneously, the experimenter provided the discriminative stimulus of, "Match block." The

experimenter then used most to least prompting at a 0 s delay to prompt the participant to engage in the correct response. The experimenter delivered a token to the participant on their token board at a 0 s delay for every correct response. When the participant received an average of six tokens (variable ratio [VR] six), they were able to exchange them for any backup reinforcer in the cabinet.

Experimental Design

The study employed a reversal design to help rule out any irrelevant variables causing the change in the dependent variable. The participant was tested in a baseline condition (A), then tested in an intervention condition (B), then tested with a return to baseline condition (A), and finally tested with an intervention condition (B). This ensured the intervention was the cause of the change and increased the study's internal validity.

Interobserver Agreement and Treatment Integrity

A secondary observer collected interobserver agreement (IOA) and treatment integrity (TI) data across 33% of sessions and conditions. IOA was calculated by the number of agreements divided by the total of agreements/disagreements multiplied by 100. IOA averaged 95% (range, 85%-95%). TI was calculated by the number of correctly implemented trials during intervention divided by all trials multiplied by 100 (see Appendix E). TI averaged 90% (range, 80%-90%).

Results

Figure 1 shows the results of baseline and intervention across sessions. During baseline, the participant completed the matching task independently at an average of 25% (range, 0%-25%) and averaged 4.6 problem behaviors per session (range, 0-31). Problem behaviors during baseline mostly included hits or instances of property destruction. The highest number of

problem behaviors was 31 over a total of four 1 min sessions during the daytime early on within baseline. The participant completed the matching task during intervention independently at an average of 82% (range, 0%-100%) and engaged in an average of 3.6 problem behaviors (range, 0-7). Over the last three consecutive sessions during intervention, the participant was 100% successful in completing the task. During baseline reversal, the participant completed the task with an average of 15% (range, 0%- 15%) independence and an average of 5.1 of problem behaviors per sessions (range, 0-9). During the return to intervention phase, the participant averaged 98% independence during task completion (range, 75%-100%) and averaged 1.25 instances of problem behavior (range, 0-5).

Discussion

The purpose of the current study was to examine the effectiveness of a token economy using a flexible approach to the token exchange via a variable ratio schedule of reinforcement system in a preschool setting with one young participant with autism. The results showed an increase in independence for task completion and a reduction in problem behavior following the introduction of the intervention. During the reversal, problem behaviors increased and independence decreased. Once intervention was then again introduced, problem behaviors decreased and independence in task completion increased again. The results add to the research literature on the effectiveness of token economies and expand upon previous research by showing the effectiveness of a flexible approach to token exchange.

There were several limitations to this study that should be considered in future research. First, there was only one participant included and it is unclear if the results would be replicated with other participants. A second limitation included that the participant's behavior and independence for task completion could have been influenced by the medication he was

prescribed and actively taking during the course of the study. The participant's medication had been reported to cause this participant to become very lethargic and sleep for multiple hours throughout the school day, which then created an unpredictable schedule of sessions. Another limitation was an increase in illness during the time of the intervention which could have influenced the results.

Although there are several limitations, the current study adds to the research literature by showing that a flexible approach to a token exchange system can be effective for increasing task completion and reducing problem behaviors. Further, this may be of interest for those working within a school environment, as token systems/conditioned reinforcers in general as well as a flexible approach to token exchange may be more feasible for implementation, due to the limited resources and limited ability to conduct teaching within a one-to-one setting and on a dense fixed schedule of reinforcement.

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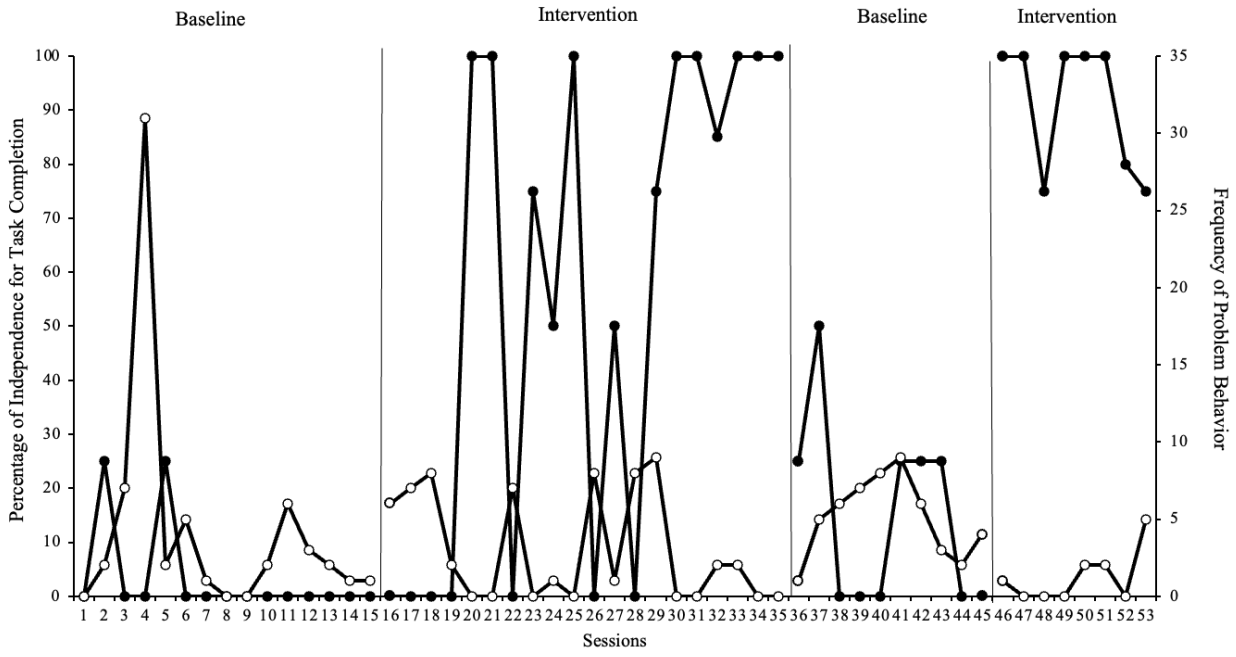
Figure 1

Percentage of Independence of Task Completion and Frequency of Problem Behavior Across Sessions



Appendix A

Participant ESDM Results

Participant	Age	Receptive language	Expressive language	Social play	Fine/gross motor	Imitation, cognition, adaptive and independence
A	4.7	4	3	8	9	8, 5, 6

Appendix B

Data Collection Sheet

Student: _____ Date: _____

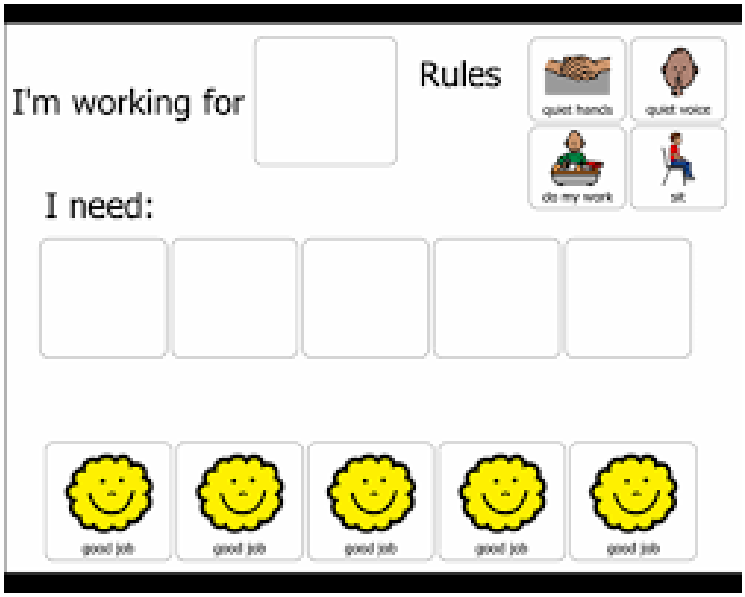
Setting: _____ Session #:_____

Beginning time:_____ End time:_____ Total time:_____

P - Full Prompt G/V- Gestural/Verbal Prompt + - Independent

Day Week of:	Session #	Task	Score	Score	Score	Score	Behavior Frequency Tally
Mon							
Tues							
Wed							
Thurs							
Friday							

Appendix C


I'm working for
Rules
quiet hands
quiet voice
do my work
sit
I need:
good job
good job
good job
good job
good job

Appendix D


Orange
balloon
orange
juice
carrot
T-shirt
fish
pumpkin
Yellow
chick
yo-yo
corn
chair
dump truck
button
bus

Appendix E

Treatment Integrity Checklist

Student: _____ Date: _____

Setting: _____ Session #:_____

Beginning time:_____ End time:_____ Total time:_____

Rating Scale: 0 = not demonstrated, 1 = partially done 2 = completely done

Initials	Questions	Mon.	Tues.	Wed.	Thurs.	Friday	Total	Percent (total ÷ 10a × 100)
	1. Did the experimenter have all materials out and accessible for participant?	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2		
	2. Did experimenter use appropriate prompting hierarchy?	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2		
	3. Did the experimenter help de-escalate any precursory behaviors?	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2		
	4. Did experimenter reinforce after all 5 tokens were provided to participant?	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2		
	5. Did experimenter take data?	0 1 2	0 1 2	0 1 2	0 1 2	0 1 2		