European Journal of Special Education Research
ISSN: 2501 - 2428
ISSN-L: 2501 - 2428
Available on-line at: www.oapub.org/edu

DOI: 10.46827/ejse.v7i2.3767 Volume 7 | Issue 2 | 2021

TEACHING A CHILD WITH AUTISM SPECTRUM DISORDERS TO TOLERATE DELAYED REINFORCEMENT

Anja Gajić[1i],
Bojana Arsić[2],
Dragana Maćešić-Petrović[3],
Aleksandra Bašić[4],
Ružica Zdravković Parezanović[5]
[1,2,3,4]University of Belgrade,
Faculty for Special Education and Rehabilitation,
Belgrade, Serbia
[5]Speech and Language Center Logopedilište,
Belgrade, Serbia

Abstract:
It is necessary to teach children with autism spectrum disorders (ASD) delayed reinforcement skills. The aim of the present case study was to examine the effectiveness of shaping procedure application in order to increase appropriate wait time with a six year old boy diagnosed with ASD. In this study we applied delayed reinforcement protocol, which is based on the shaping procedure. The procedure was applied during discrete trial training, natural environment teaching and in home environment by parents. Baseline data was collected regarding adequate wait time exhibited by a participant in three different sessions, where it was established that average wait time duration was four seconds. In eleven sessions, the child mastered the desired skill. A significant progress was related to the application of the protocol in home environment by the parents and the autonomous use of behavior self-regulation strategies. It is relevant to mention that the alternative activities delivered during the time delay were considered as neutral stimuli and after the application of this protocol, they have become preferred items. We believe that this case studies' biggest limitation is the need for applying this procedure at all in the context of preparing the child for taking on the desired passive role at school.

Keywords: shaping, delayed reinforcement, behavior regulation, self-regulation, autism spectrum disorders

[i] Correspondence: email anjuskagajic@gmail.com, bojana.arsic57@gmail.com

1. Introduction

Autism spectrum disorders (ASD) is a neurodevelopmental disorder characterized by impairments in social communication and restricted, repetitive patterns of behavior, interests or activities (APA, 2013).

Behavior self-regulation refers to postponing the predominant response in order to reach the desired aim (Kaljača, Dučić, 2016, according to Vohs et al., 2014). However, people with ASD often have difficulties when postponing pleasure and waiting (Autism Speaks, 2018), which implies executive functions deficit (Dučić, 2016). The process of waiting for tangibles or desired activities suggests the existence of possibility to postpone reinforcement (Day, Horner & O'Neill, 1994). Since people with ASD have difficulties in regulating their behavior by themselves (Dučić, 2016), it is necessary to teach them appropriate skills needed for behavior regulation in delayed reinforcement domain. It is also essential to implement the teaching procedure when the child indicates increased motivation towards the specific object or activity (Dixon & Cummings, 2001; Taylor & Fisher, 2010) and the waiting time should be gradually increased (Dixon et al., 1998; Dixon & Holcomb, 2000; Schweitzer & Sulzer-Azaroff, 1988) and it should commence with the therapist using a simple phrase, which would indicate to the child that the desired tangible will not be obtained immediately and that the wait period has begun (Muharib & Pennington, 2019).

Shaping procedure refers to differentiated reinforcement of successive approximations to the desired behavior, while we put previous responses on extinction (Skinner, 1953). This procedure was successfully used in previous research in different areas of treatment with children with ASD, such as increasing amount of food consumed (Hodges, Davis, Crandall, Ohipps, Weston, 2017), school task engagement (Athens & Vollmer, 2007), increasing functional communication responses (Ghaemmaghami, Hanley, Jessel & Landa, 2018), elevation of voice volume (Fleece et al., 1981) and increasing eye contact (Fonger & Mallot, 2018).

The aim of the present case study was to examine the effectiveness of teaching tolerating delayed reinforcement using shaping procedure with a six year old boy diagnosed with ASD.

2. Method

2.1. Participant

The case study focused on a boy diagnosed with ASD. Participant was 6 years old at the time of the procedure implementation. The sessions were conducted three times a week, one hour per session (total duration per week was three hours).

Sessions consisted primarily of Verbal Behavior Intervention (VBI) following Sundberg's *Verbal Behavior Milestones and Assessment protocol* (VB-MAPP, Sundberg, 2008), as well as pre academic skills. Practical skills were considerably more developed than social and conceptual skills, independence was slightly lower than the average peer's.

Tolerating delayed reinforcement was chosen as a goal as a part of school preparation, upon parental request. The participant demonstrated difficulties in regulating his behavior and exhibited motor restlessness while prolonged sitting at desk.

2.2. Procedure, materials and setting

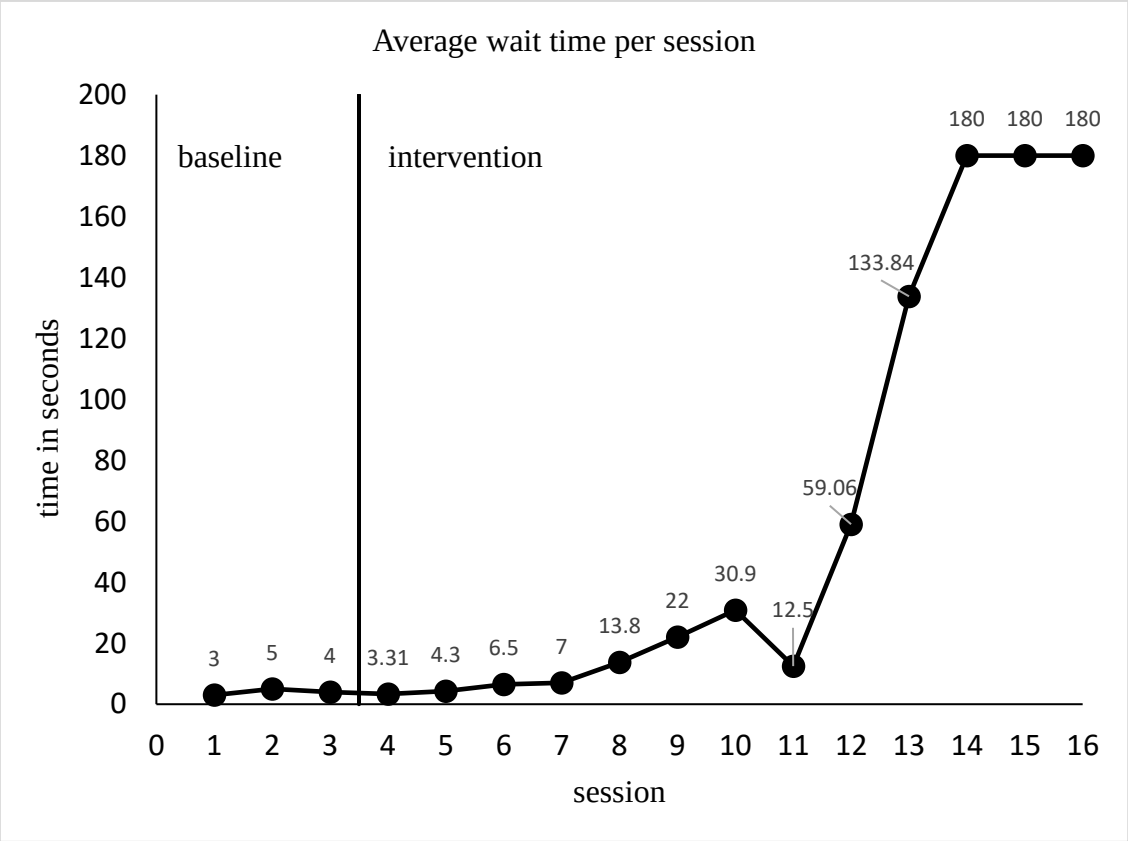
To increase the participants average wait time, delayed reinforcement protocol was implemented, which is based on shaping procedure application. When the participant indicated motivation to participate in a certain activity and/or indicated motivation to access a certain tangible, he was told to wait. If the participant waited for a predetermined number of seconds the adequate way, he would be verbally reinforced and then the access for a mentioned tangible or activity would be allowed. When the participant engaged in socially inadequate behavior before the predetermined interval passed, we noted the appropriate wait time, did not reinforce and he was given another opportunity for protocol application after a certain time period. Inadequate waiting behavior was defined as 'Repetitive verbal manding of a tangible or activity which results in temper tantrum', 'Physically reaching for a desired tangible or materials that constitute a certain activity', 'Motor restlessness that refers to getting up from a chair and pounding on a table' and 'Emitting high-pitched vocalizations'. If the predetermined approximation was not reached, wait time would be decreased to the last accomplished. Three correct consecutive responses led to increase in time delay onto the next approximation. Short delays that lasted up to 15 seconds were passive, while longer ones included providing the participant with self-regulation strategy, or rather giving the alternative activity that would alleviate the wait period. Each session, the protocol was applied ten times and the set goal time was 180 seconds. Approximations set as short term goals were measured in seconds (5, 10, 15, 30, 45, 60, 90 and 120).

The procedure was applied during discrete trial training (DTT), natural environment teaching (NET) and in home environment by parents. Materials needed for teaching included different reinforcers and activities that participant showed preference to. The dependent measure throughout all sessions was duration in seconds of adequate wait time exhibited by a participant.

3. Results and Discussion

Participants' abilities to adequately tolerate delayed reinforcement were probed during baseline by using a multiple-opportunity method (Cooper, Heron & Heward, 2007). Baseline data was collected regarding adequate wait time exhibited by a participant in three different sessions, where we established that average time delay was four seconds (Figure 1).

Figure 1: Average wait time per session



After only eleven sessions, the child mastered the desired skill and after mastering it, the next three consecutive sessions of repeating the mastered goal allowed us to stop with the protocol implementation. This result was expected, since the protocol was applied 10 times during each session, because during the process of teaching new skills to children with ASD, it is necessary to have numerous repetitions of the skill being taught (Humphreys, et al., 2013) in order for the child to master the desired skill. Additionally, a number of authors (Foxx, 2008; Lovaas, 1987; Sambandam, Rangaswami & Tamizharasan, 2014) emphasize the importance of intensity while teaching a certain skill.

In the beginning of the procedure implementation, increasing wait time did not result in success and the respondent could not master it, which implies that people with developmental disabilities can give inconsistent responses (Dučić, 2016). This could also be explained by the change in desired activities and tangibles that were offered to the participant, which constitutes a new limitation in self-regulation process. Whenever new reinforcing activities and tangibles have been introduced, the participant exhibited a decrease in time delay. The respondent showed a clear difficulty in behavior regulation when a desired stimulus is presented for the first time. This had an impact on the participant's progress and on reaching the next approximation.

It is relevant to emphasize that between sessions seven and eight 21 days has elapsed, therefore the significant decrease in wait time during session eight was noted.

Starting from ninth session, implementation of active time delay was introduced. Active wait times included providing the participant with different activities that would alleviate wait time, such as solving labyrinths, coping abstract geometrical shapes, connecting dots and different pen and paper matching activities, that were marked as neutral stimuli for the child. The use of these activities introduced participant with new strategies on how to cope with the reinforcement delay period and regulate his behavior. These paper and pen activities were selected, because of the possibility of their use during classes at school. These activities became high preference activities after implementation of this procedure, due to stimulus-stimulus pairing. During later preference assessments, the participant selected them, therefore they were later used as reinforcers. At the time, they are being used in school environment as reinforcers upon successful task completion by a child's teacher.

It is also important to highlight that prior to ninth session, parents started implementing this procedure in home environment and in different everyday activities, as they stated, four to five times a day, which we believe was responsible for the noted increase in wait time during mentioned session. The parental participation in interventions, as well as them implementing certain procedures in home environment can lead to increase in child's abilities (Kasari et al., 2015).

4. Conclusion

Shaping procedure was proven to be a successful as a behavior regulation teaching tool with children with ASD. These results are significant because the child will be able to use the acquired skill in new settings.

We highlight that mastering the desired goal would be more efficient, if the participants' parents applied this protocol in home environment from the start of procedure implementation. The large number of authors highlight the importance of parent involvement in teaching new skills to children with ASD (Levy, Kim & Olive, 2006; Marcus, Kunce & Schopler, 2005; Meadan, Ostrosky, Zaghlawan & Yu, 2009), therefore we emphasize the importance of parent involvement in their child's sessions (Arsić, Gajić, Maćešić-Petrović & Bašić, 2021). We emphasize that none of the maintenance probes were needed, because the child continued to use the acquired skill daily with success, as well as in school environment.

We believe that this case studies biggest limitation is the need for applying this procedure at all in this context. The traditional school system requires the students to sit quietly during classes and often children who do not oblige are socially excluded (Farmer & Hollowell, 1994). The majority of teachers use frontal teaching method in their classrooms which requires students to sit quietly, because they have a fear that if it were the opposite, they would lose control over children and their education process (Cardon, De Clercq, De Bourdeaudhuij & Breithecker, 2004). This implies that children being quiet and lacking movement during classes are predispositions for having a successful classroom environment, even though there is no research that confirms that (Winett & Winkler, 1972). Therefore, it is crucial to highlight that this procedure is not usually used

to teach passive behaviors. Nevertheless, application of this protocol gave the participant the opportunity to create new strategies for behavior self-regulation, which will be useful in his everyday life, especially in school setting. Another limitation of this study refers to the lack of inter observer agreement (IOA), which refers to the degree to which two or more independent observers report the same observed values after measuring the same events.

In conclusion, shaping procedure appears to be an effective procedure for teaching tolerating delayed reinforcement that represents a pivotal behavior. Future research might focus on applying this protocol with participants with different diagnosis, examining the effectiveness of this procedure application among two groups of participants with ASD, with one having more intensive sessions, as well as examining the effectiveness of this protocol implementation by the parents of children with ASD after being trained to apply it independently.

Conflict of Interest Statement

The authors declare no conflicts of interests.

About the Authors

Anja Gajić – Research assistant and teaching associate at University of Belgrade, Faculty for Special education and rehabilitation. Certified Registered Behavior Technician. Areas of interest: autism spectrum disorders, behavior analysis, early intervention, self-injurious behavior.

Bojana Arsić – Research assistant and teaching associate at University of Belgrade, Faculty for Special education and rehabilitation. Certified Registered Behavior Technician. Areas of interest: autism spectrum disorders, behavior analysis, early intervention, communication development, self-help skills.

Aleksandra Bašić – Teaching assistant at University of Belgrade, Faculty for Special education and rehabilitation. Areas of interest: methodology in special education, dance therapy, intellectual disabilities, Montessori Method, assistive technology.

Dragana Maćešić-Petrović – Full time professor at University of Belgrade, Faculty for Special education and rehabilitation, as well as University of Novi Sad, Medical faculty. Areas of interest: intellectual disability, hearing impairments, developmental neuropsychology, assistive technology, sensomotor integration, dance and movement therapy.

Ružica Zdravković Parezanović – PhD student at University of Belgrade, Faculty for Special education and rehabilitation. Working at speech and language center Logopedilište, Belgrade, Serbia. Certified psychomotor reeducation specialist. Areas of interest: burnout syndrome, assistive technology, sensomotor integration, creativity in teaching.

References

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition:* DSM-5. Washington, DC: Publisher.

Arsić, B., Gajić, A., Maćešić-Petrović, D., Bašić, A. (2021). The use of online technology in educating parents of children with autism spectrum disorders. XXVII Skup Trendovi Razvoja: "On-line nastava na univerzitetima", Novi Sad, 15 - 18. 02. 2021., 288-291.

Athens, E. S., & Vollmer, T. R. (2007). Shaping Academic Task Engagement with Percentile Schedules. *Journal of Applied Behavior Analysis, 40*(3): 475–488.

Autism Speaks (2018). *Autism and teaching patience.* Retrieved from: https://www.autismspeaks.org/expert-opinion/autism-and-teaching-patience-parents-seek-advice

Cardon, G., De Clercq, D., De Bourdeaudhuij, I., & Breithecker, D. (2004). Sitting habits in elementary schoolchildren: a traditional versus a "Moving school." *Patient Education and Counseling, 54*(2), *133–142.*

Cooper, J. O., Heron, T. E., & Heward, W. L. (2007). Applied behavior analysis (2nd ed.). Upper Saddle River, NJ: Pearson Education.

Day, H. M., Horner, R. H., & O'Neill, R. E. (1994). Multiple functions of problem behaviors: assessment and intervention. *Journal of Applied Behavior Analysis*, *27*(2), 279–289.

Dixon, M. R., & Cummings, A. (2001). Self-control in children with autism: response allocation during delays to reinforcement. *Journal of Applied Behavior, 34*(4), 491-495.

Dixon, M. R., & Holcomb, S. (2000). Teaching self-control to small groups of dually diagnosed adults. *Journal of Applied Behavior Analysis, 33*(4), 611–614.

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 BehaviorAnalysis, 31*(3), 203–210.

Dučić, B. (2016). *Samoregulacija kod osoba sa intelektualnom ometenošću* (Doktorska disertacija). Beograd: Univerzitet u Beogradu – Fakultet za specijalnu edukaciju i rehabilitaciju.

Farmer, T. W., & Hollowell, J. H. (1994). Social networks in mainstream classrooms: Social affiliations and behavioral characteristics of students with EBD. *Journal of Emotional and Behavioral Disorders, 2*(2), 143-146.

Fleece, L., Gross, A., O'Brien, T., Kistner, J., Rothblum, E., & Drabman, R. (1981). Elevation of voice volume in young developmentally delayed children via an operant shaping procedure *Journal of Applied Behavior Analysis, 143*(3), 351-355.

Fonger, A. M., & Malott, R. W. (2018). Using Shaping to Teach Eye Contact to Children with Autism Spectrum Disorder. *Behavior Analysis in Practice, 12*(1), 216–221.

Foxx, R. M. (2008). Applied behavior analysis treatment of autism: The state of the art. *Child and Adolescent Psychiatric Clinics of North America*, *17*(4), 821-834.

Ghaemmaghmani, M., Hanley, G. P., Jessel, J., & Landa, R. (2018). Shaping complex functional communication responses. *Journal of Applied Behavior Analysis, 51*(3), 502-520.

Hodges, A., Crandall, M., Phipps, L., & Weston, R. (2017). Using Shaping to Increase Foods Consumed by Children with Autism. *Journal of Autism and Developmental Disorders, 47*(8), 2471–2479.

Humphreys, T., Polick, A., Howk, L., Thaxton, J., Ivancic, A. (2013). An evaluation of repeating the discriminative stimulus when using least-to-most prompting to teach intraverbal behavior to children with autism. *Journal of Applied Behavior Analysis, 46*(2), 534-538.

Kaljača, S., Dučić, B. (2016). Odnos veštine samoregulacije i školskog uspeha kod učenika sa lakom i umerenom intelektualnom ometenošću. *Specijalna edukacija i rehabilitacija, 15*(1), 23-42.

Kasari, C., Gulsrud, A., Paparella, T., Hellemann, G., & Berry, K. (2015). Randomized comparative efficacy study of parent-mediated interventions for toddlers with autism. *Journal of Consulting and Clinical Psychology, 83*(3), 554–563.

Levy, S., Kim, A., & Olive, M. L. (2006).Interventions for young children with autism: A synthesis of the literature. *Focus on Autism and Other Developmental Disabilities*, *21*(1), 55–62.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55*(1), 3-9.

Marcus, L. M., Kunce, L. J., & Schopler, E. (2005). *Working with families*. In F. R. Volkmar, P. Rhea, A. Klin, & D. R. Cohen (Eds.), Handbook of autism and pervasive developmental disorders (1055–1086). New York, NY: John Wiley.

Meadan, H., Ostrosky, M. M., Zaghlawan, H. Y., & Yu, S. Y. (2009). Promoting social and communication behavior of young children with autism spectrum disorders: A review of parent-implemented intervention studies. *Topics in Early Childhood Special Education*, *29*(2), 90–104.

Muharib, R., & Pennington, R. C. (2019). My Student Cannot Wait! Teaching Tolerance Following Functional Communication Training. *Beyond Behavior, 28(2), 99–107.*

Sambandam, E., Rangaswami, K., & Tamizharasan, S. (2014). Efficacy of ABA programme for children with autism to improve general development, language and adaptive behaviour. *Indian Journal of Positive Psychology, 5*(2), 192-195.

Schweitzer, J. B., & Sulzer-Azaroff, B. (1988). Selfcontrol: Teaching tolerance for delay in impulsive children. *Journal of the Experimental Analysis of Behavior, 50*(2), 173–186.

Skinner, B. F. (1953). Science and human behavior. New York: Macmillan.

Sundberg, M. L. (2008). *Verbal behavior milestones assessment and placement program: The VB-MAPP.* Concord, CA: AVB Press.

Taylor, B. A., & Fisher, J. (2010). Three important things to consider when starting intervention for a child diagnosed with autism. *Behavior analysis in practice*, *3*(2), 52–53.

Vohs, K. D., Baumeister, R. F., Schmeichel, B. J., Twenge, J. M., Nelson, N. M. & Tice, D. M. (2014). Making choices impairs subsequent self-control: a limited-resource account of decision making, self-regulation, and active initiative. *Journal of Personality and Social Psychology, 94*(5), 883-898.

Winett, R. A., & Winkler, R. C. (1972). Current behavior modification in the classroom: be still, be quiet and be docile. *Journal of Applied Behavior Analysis, 5*(4), *499–504.*