



TEACHING SHOELACE TYING TO A CHILD WITH AUTISM SPECTRUM DISORDER

PODUČAVANJE DETETA SA POREMEĆAJIMA SPEKTRA AUTIZMA VEZIVANJU PERTLI

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ABSTRACT

Children with autism spectrum disorders (ASD) have difficulties in independent performance of everyday tasks, therefore the aim of this study was to teach a child with ASD to tie shoelaces by using a total task chaining procedure.

The participant was a ten year old boy diagnosed with ASD and the procedure used was total task chaining. The task analysis was divided into 13 steps and the teaching procedure was divided into two phases. Independent performance and generalization probes were also conducted.

Total task chaining procedure was proven to be successful as a independence skills teaching tool, as the child mastered this skill in only 15 sessions with 100% success. These results are particularly significant in light of the demonstration of generalization by the participant, as he will be able to use the skill in present and future.

Key words: total task chaining, shoelace tying, autism, independence.

SAŽETAK

Deca sa poremećajima spektra autizma (PSA) imaju teškoće u samostalnom izvođenju svakodnevnih zadataka, otuda je cilj ove studije slučaja podučavanje deteta dijagnostikovanog sa PSA samostalnom vezivanju pertli korišćenjem *chaining* procedure.

Ispitanik je desetogodišnji dečak i veština vezivanja pertli je podeljena u 13 koraka, a procedura podučavanja je podeljena u dve faze. Sprovedene su i probe samostalnosti u izvođenju zadatka, kao i probe generalizacije.

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Rezultati ukazuju da se *chaining* procedura pokazala uspešnom u podučavanju veština samopomoći kod ispitanika sa PSA, jer je dečak za samo 15 tretmana ovladao podučavanom veštinom sa 100% uspešnosti. Ovakav rezultat je posebno od značaja imajući u vidu generalizaciju naučene veštine, pogotovo jer će ispitanik biti u mogućnosti da datu veštinu koristi u svakodnevnom životu, ali i u budućnosti.

Ključne riječi: chaining procedura, vezivanje pertli, autizam, samostalnost.

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). Children with ASD have difficulties in independent performance of everyday tasks (Taylor & Seltzer, 2011) and those difficulties are often related to the diagnosis itself, comorbid conditions and their distinct cognitive profile (Hume, Boyd & Hamm, 2014).

There are many known treatment methods used for ASD, but one that has proven to be successful in treatment of ASD is Applied Behavior Analysis (ABA). One of the ABA procedures that is widely used for increasing independence of children with ASD and teaching them necessary skills is response chaining procedure. Response chaining refers to teaching appropriate behavior and skills by breaking down the tasks into small discrete steps and training in a systematic and precise way (Medavarapu, Marella, Sangem & Kairam, 2019). A task is broken down into its component parts by using task analysis and then teaching each component individually (Slocum & Tiger, 2011). There are three ways to teach a skill by using this procedure and they are total task chaining, forward chaining and backward chaining (Cooper, Heron & Heward, 2007). Total task chaining refers to teaching entire skill and giving the learner support only for challenging steps.

Chaining procedure was proven to be a successful tool in teaching children with ASD different skills required for their independence, such as food preparation (Rehfeldt, et al., 2003; Schuster, Gast, Wolery & Gultinan, 1988; Taber-Doughty et al., 2011), self-feeding (Hagopian, Farrell & Amari, 1996), internet usage (Jerome, Frantino & Sturmey, 2007), shopping skills (Gulnoza & Taber-Doughty, 2013), performing house chores (Shipley-Benamou, Lutzker & Taubman, 2002), leisure skills (Schleien, Wehman & Kiernan, 1981), or verbal skills (Valentino, Conine, Delfs & Furlow, 2015).

The aim of this study was to teach a child with ASD to tie shoelaces by using a total task chaining procedure.

MATERIAL AND METHODS

Sample of participant

This case study focused on a boy diagnosed with ASD. Participant was ten years old at the time of the procedure implementation. The participant receives 10 hours of ABA per week by a licenced RBT (Registered Behavior Technician) and nine hours of ABA by his own mother, after she finished parent training in the area of the participants individualised educational plan (IEP). His IEP consisted of Verbal Behavior Intervention (VBI) following Sundberg's

Verbal Behavior Milestones and Assessment protocol (VB-MAPP, Sundberg, 2008), as well as teaching everyday independence skills following the protocol *Essential for Living* (McGreevy, Fry & Cornwall, 2012, 2014).

Sessions were conducted five times a week in a duration of two hours by a RBT in morning hours and mother performed sessions five times a week for a duration of one hour (on the same days as RBT performed session) in the evening and twice a week for a duration of four hours, on the weekends during the day with every session being two hours long.

Prior to this task being taught this skill, boy never tied his own shoelaces. Parents never tried to teach a child this skill and when going out of the house, the parents tied his shoelaces. When the shoelace would become loose, the child asked the parents to tie it, by pointing finger on it, or by verbally manding.

Method of conducting research

We used total task chaining procedure to teach a child how to tie shoelaces. We divided this skill into 13 steps (*Table 1*).

Table 1 – Step description

Step number	Step description
1	Straighten white shoelace on the left side of the sneaker and black shoelace on the right side of the sneaker
2	Cross shoelaces
3	Lift shoelaces up in the part where they cross,
4	Put white shoelace through the hole
5	Pull shoelaces tight
6	Make a loop with white shoelace
7	Make a loop with black shoelace
8	Cross the loops so you make a letter X, with black loop being behind the white one
9	On the crossing point hold the letter X with your left hand
10	Pull the black loop through the hole
11	Take the black loop with your right hand
12	Take the white loop with your left hand
13	Pull shoelaces tight

While teaching task analysis to a child, we used most to least prompting procedure, with the most intrusive prompt being full physical, then partial physical and then gestural prompt. Vocal prompts were never used.

Materials needed for teaching included a sneaker (red shoe) with two different pairs of shoelaces (black and white), as well as participant's sneakers that were white with white shoelaces.

Independence was considered when a participant tied his own shoelaces with 100% success in three consecutive sessions with a therapist in contrived conditions and generalization was performed with 3 different people (therapist, mother and father of a child), as well as in three

different settings (classroom, at home while sitting at couch and at home while being in the hallway) and with three different shoes that the participant owned.

Generalization sessions included child's independent performance with 100% success three times a day while going out of the house in five consecutive days. If a participant did not demonstrate 100% accuracy, the plan was to complete an additional training session in the training setting.

Measuring instruments

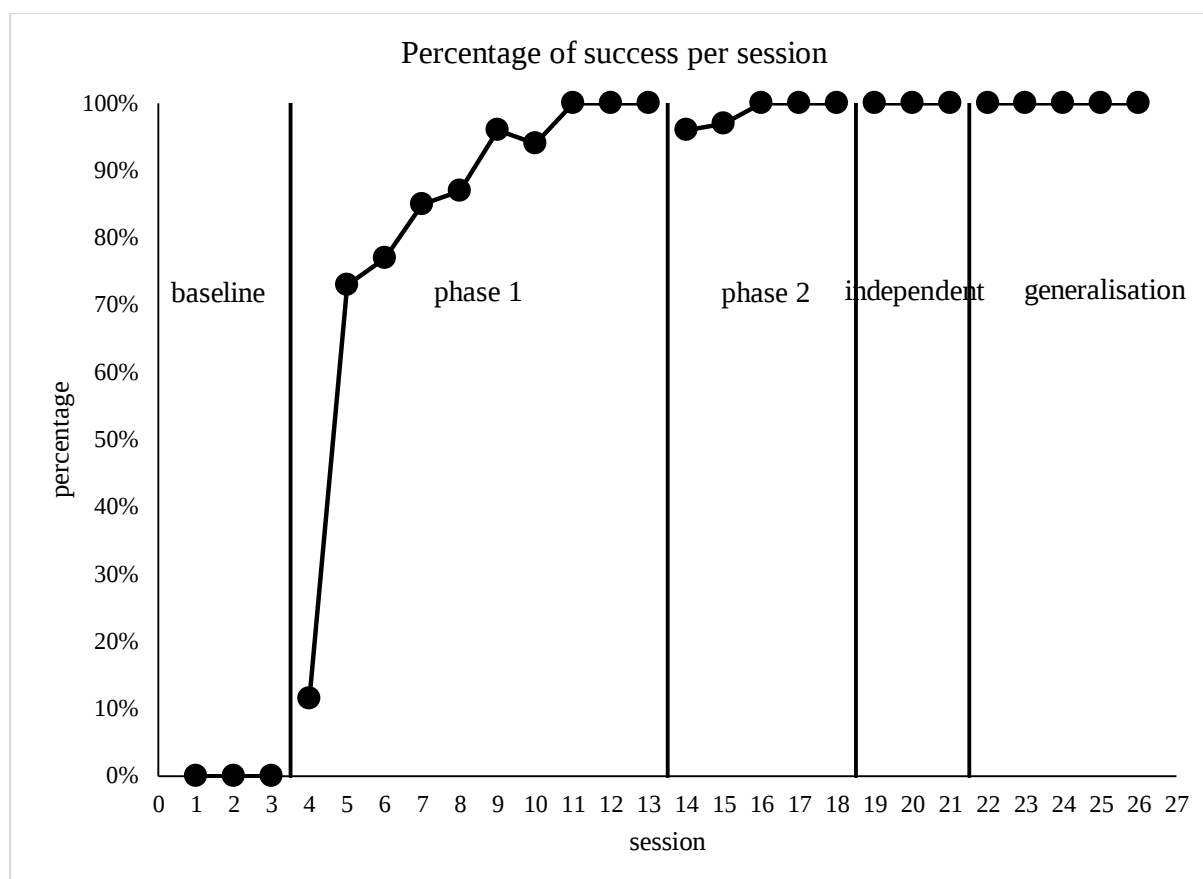
Participants' abilities to complete the chained task were probed during baseline by using a multiple-opportunity method (Cooper, Heron & Heward, 1987). Baseline data was taken in three consecutive days in three consecutive attempts and at the beginning of each baseline session, a participant was given the verbal instruction 'Tie your shoelaces' and by calculating the number of steps successfully performed. If the participant did not respond after 3 seconds, the performance was marked as unsuccessful.

The teaching procedure was divided into two phases. Phase one consisted of teaching with using a red sneaker with two different colored shoelaces (white being on the right side of a sneaker and black one being on the left), while phase two included teaching mentioned task analysis with a same sneaker, but with same color shoelaces (both black). Criteria for mastering each phase was independent performance of 100% of the task analysis steps in three consecutive days. Each session included ten repetitions of the task, all performed between different IEP goals. Each of those phases was conducted while the child was sitting at a table with the shoe in front of him and the orientation of the sneaker was the same as if the participant was wearing it.

RESULTS AND DISCUSSION

During baseline, the child was playing with his own shoelaces in a way of lifting them up and down and after a while asking the therapist to tie them in the same ways as described as he does with his parents, by pointing the finger on shoelaces and verbally asking the therapist to tie them. The child did not perform any of the steps during baseline on all three sessions, so his mean percentage of success was 0%.

Phase one lasted ten sessions, but after only seven sessions, the child was able to complete the task independently (*Graph 1*). The child had most difficulty with steps number eight, nine and ten (see *Table 1*), so most of the prompted steps during the first seven sessions referred to those three.



Graph 1 – Percentage of success per session

Phase two lasted only five sessions, with the child mastering it after only two sessions. We believe that the child mastered this phase so quickly, because of so many trials and sessions during phase one, so the skills performance became automatic.

Independent performance of the task occurred in three consecutive sessions in contrived conditions, so we moved on to generalisation probes. The participant had troubles with tying shoelaces on a boot that he owned, because the shoelaces were too short, so we swapped it for another sneaker and he performed successfully. Also, the problem was parents who could not spare enough time for independent performance when the child was going to school in the morning, so one of the generalisation probes included tying shoelaces at home after school, without the child going anywhere afterwards. It is of crucial value that parents should allow children to perform certain tasks independently and not to be too intrusive and parental behaviors in that aspect predict longterm outcomes of children with ASD (Siller, Hutman & Sigman, 2013). Therefore, the parents got suggestions after stating this that the child must tie his shoelaces on his own and to wake him up more early in order to have enough time.

CONCLUSION

Total task chaining procedure was proven to be successful as a independence skills teaching tool, as the child mastered this skill in only 15 sessions. These results are particularly significant in light of the demonstration of generalization by the participant, as he will be able to use the skill in present and future. Future research might focus on the efficacy of chaining procedure in teaching different independence skills, as well as with participants with different diagnosis.

Although it was occasionally necessary to prompt parents to conduct the teaching method in their everyday setting and to prompt them to wake up more early in order to have time to allow the participant to tie shoelaces himself prior to going to school, parents stated they found chaining procedure to be effective and implied they would use it more frequently to teach their child some other independence skills, which was listed in his teaching program afterwards. With proper education, the parents can use this method effectively and deliver proper training to their children (Adams et al., 2013; Arora, 2003; Duvall, Ward, Delquari & Greenwood 1997; Ensign, 2000; Kasari et al., 2015; Kidd & Kaczmarek, 2010; Meadan, Ostrosky, Zaghlawan & Yu, 2009; Wetherby et al., 2014), therefore we emphasize the importance of conducting parent trainings in the area of teaching certain procedures used in ABA, because interventions that involve interaction between therapist and a parent can lead to increased competence in parents in performing certain interventions (Arsić, Gajić, Maćešić-Petrović & Bašić, 2021). Also, we emphasize that none of the maintenance probes were needed, since the child continued to tie his own shoelaces daily with success.

The main limitation of this study is lack of interobserver agreement (IOA), which refers to the degree to which two or more independent observers report the same observed values after measuring the same events. This is because the home environment was a dominant setting in teaching a child this skill (fourteen hours in contrast to ten hours in contrived conditions with a therapist) and parents did not make a video recording of each trial. But we emphasize that all therapist sessions were recorded.

In conclusion, chaining procedure appears to be an effective and efficient training procedure for teaching skills that are crucial for independent living, which is one of the main parental concerns if they have a child with any type of diagnosis.

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