

# The use of stimulus-stimulus pairing procedure in inducing vocal speech with nonverbal child with autism spectrum disorders

Anja Gajić\*, Bojana Arsić, Sara Vidojković, Dragana Maćešić-Petrović, Aleksandra Bašić

Faculty for Special education and rehabilitation, University of Belgrade, Belgrade, Serbia

\*Corresponding Author: [anjuskagajic@gmail.com](mailto:anjuskagajic@gmail.com)

## ABSTRACT

Stimulus-stimulus (ss) pairing procedure can be used in a variety of ways in treatment of people with autism spectrum disorders (ASD), however it is mostly used in inducing vocal speech in nonverbal children. Research shows that using this procedure is more efficient for increasing the number of emitted words when compared to other procedures. Therefore, the aim of this case study is to examine the effectiveness of the use of ss pairing procedure in order to induce vocal speech with a nonverbal child diagnosed with ASD. At the very first session of the procedure implementation, the child spoke clear words, while in the last session, the number of spoken words per session was 192. Having in mind the effectiveness of the implemented procedure, as well as data that parents of children with ASD can be successfully trained to use this procedure in their home environment, it is important to train them to implement it correctly. This is of great importance because the majority of the children with ASD are nonverbal, and lack of communication correlates with problem behavior.

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## INTRODUCTION

Stimulus stimulus (ss) pairing involves pairing a neutral stimulus with specific stimuli in order to elicit conditioned response. This was proven in the experiments of Pavlov, where he saw that dogs salivated prior to receiving food, meaning that they salivated on a ring of a bell, because the bell was paired with food (Rehman et al., 2017). However ss pairing can occur if the time elapsed between the presentation of those two stimuli is minimal or simultaneous (Rehman et al., 2017). Even though today these experiments are considered unethical, his research was of great significance in behavioral science (Clark, 2004). Also, his findings are used daily in the treatment of children with developmental disabilities (DD), as well as with children with autism spectrum disorders (ASD) with great success (Bitterman, 2006), as well as with the neurotypical population.

As one of the first possibilities of using ss pairing procedure, early researchers (Kelleher & Gollub, 1962) determined the possibility of developing generalized conditioned reinforcers. An example of a generalized conditioned reinforcer is a praise that for all of us is a reinforcer, because of the history of feeling good when receiving praise from someone valuable to us. Since praise is not something that is initially valuable to children with ID and ASD, it is important to pair it with other reinforcers that the specific child values in that particular moment. The process of pairing a specific reinforcer with praise happens whenever we give a child a specific reinforcer and by saying praise at this same time (Longano & Greer, 2006; Vandbakk et al., 2019).

When a majority of children come to a first session with the new therapist, they are not willing to cooperate. Therefore, it is recommended that from that very first session the therapist starts pairing procedure with that child. The therapist should ensure that all favorite items of that specific child are out of his reach and that he or she would be the one providing those items to the child. This ensures that the therapist pairs himself with something that the child wants and values, which consequently increases compliance (Ingvarsson et al., 2008). However, ss pairing can be used to pair something with unpleasant stimuli. Powell & Azrin (1968) conducted a study where they showed that ss pairing can lead to smoking cessation in neurotypical population, by pairing cigarettes with some unpleasant stimuli for each individual.

However, the most applied use of ss pairing procedure, that is believed to bring the most positive and significant change in lives of children with ID and ASD is vocal speech development. SS pairing is done by pairing the child's vocalizations with objects or activities that are reinforcers for that specific child, which consequently leads to increasing vocalizations and spoken words (Byrne et al., 2014). There is a great number of research conducted in the 21st century that shows that children that were once nonverbal can develop vocal communication skills by using ss pairing procedure (Carrol & Klatt, 2008; Esch et al., 2005; Esch et al., 2009; Miguel et al., 2001; Normand & Knoll, 2006; Takahashi et al., 2011; Vallinger-Brown & Rosales, 2014) and there is also research that shows that this procedure is more successful in doing that compared to any other procedure (Stock et al., 2008).

In order to perform ss pairing procedure with success, it is necessary to determine participants' preferences toward certain objects or activities. In order to do that, a preference assessment procedure is used, whose goal is to determine the hierarchy of preferences towards certain reinforcers of each individual child (Cannella et al., 2005). The aim of this case study is to examine the efficiency of ss pairing procedure in order to induce vocal speech with a nonverbal child diagnosed with ASD.

## **METHODS**

### ***Participant***

Participant is a 12 year-old boy diagnosed with ASD. The participant did not emit any words, only sometimes humming a song melody. He exhibited high rates of self-injurious behavior and did not have any means of communicating with the environment. At first we started implementing a picture exchange communication system (PECS) with the participant. However, when we began implementing the third phase of PECS, the participant exhibited picture discrimination problems, which enabled him to master the third phase. Therefore, we decided to implement the SS pairing procedure. The sessions were conducted by a therapist in a home environment.

### ***Preference assessment***

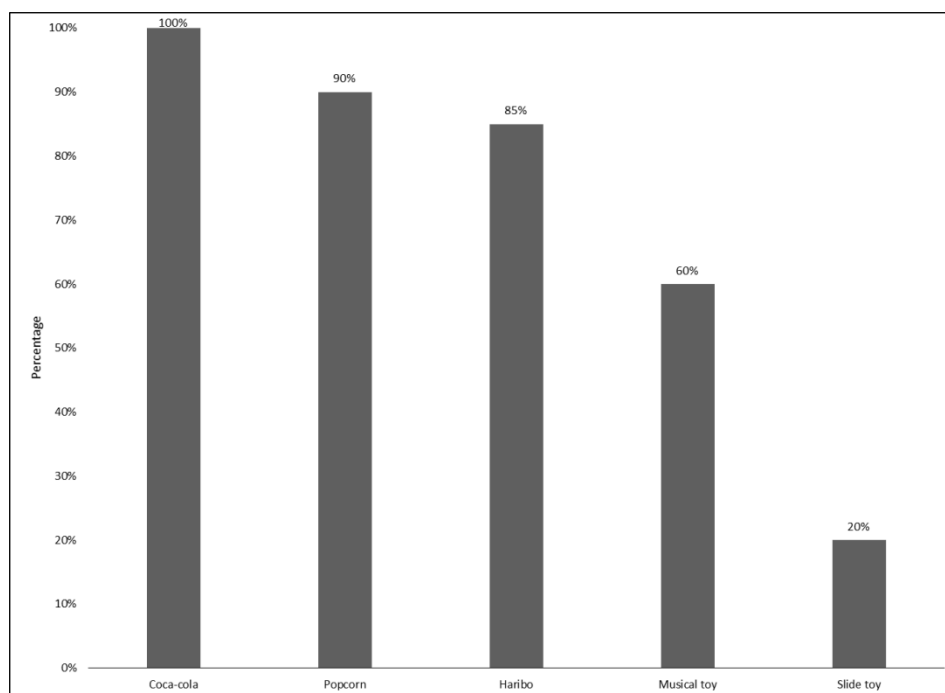
We conducted a multiple stimulus without replacement preference assessment and the results are presented in Figure 1.

### ***SS pairing procedure***

The SS pairing procedure used with our participant consisted of the therapist playing music on a musical toy (which was the fourth item of preference according to preference assessment). After the music was being played for 10 seconds, the therapist would pause it. At the same time, the participant was presented with a flashcard that contained a picture of a certain object that was placed in front of the participant's face and the therapist would name the item from the flashcard.

If the participant repeated the word, the therapist would play music again and parallel give the participant one of the first three items from the preference assessment (popcorn, haribo candy or sip of Coca-Cola). The items were varied in order to prevent reinforcer satiation.

If the participant did not repeat the word after the therapist, the music only was played and the procedure would be repeated all over again. Besides naming objects from flashcards, the therapist did not give any demands to the participant.



**Figure 1.** Preference assessment results

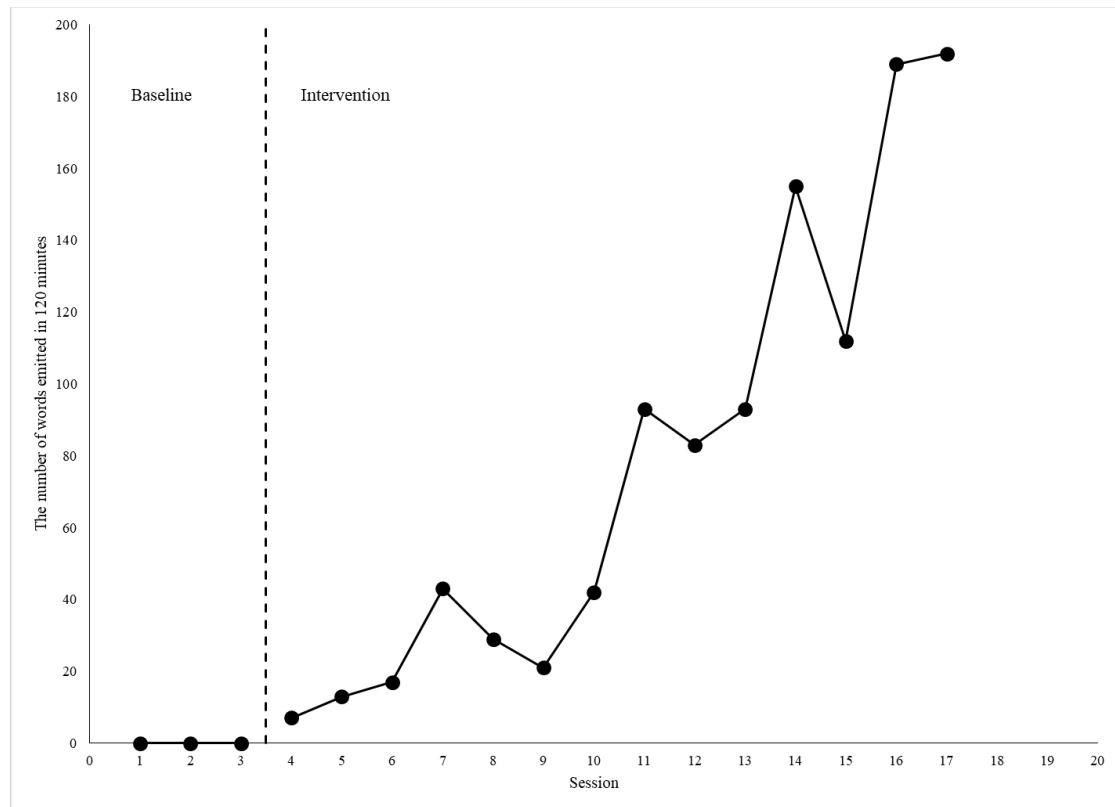
## RESULTS AND DISCUSSION

The results of the use of ss pairing procedure are shown in Figure 2. X axis represents sessions, while Y axis represents number of spoken words during one session (120 minutes). Baseline consisted of the frequency of spontaneously emitted words by the participant during one session and as shown in the Figure 2, the participant did not pronounce any words.

In the first session of the use of ss pairing procedure, significant increase in spoken words was visible, with the participant emitting seven words. After that in the next sessions, a sudden increase in spoken words was noted, while the number of spoken words in the last session of implementing the ss pairing procedure was 192.

It is important to highlight that the ss pairing procedure is still conducted with our participant, even after those 17 sessions. However, not in the same intensity, but it is combined with other participants' IEP goals. Also, it is important to note that the procedure is now conducted by his shadow teacher, after receiving training on how to implement it correctly.

Research shows that even parents of children with ASD can be successfully trained to implement ss pairing procedure (Barry et al., 2019), as well as to conduct preference assessments (Cameron et al., 2021). Having that in mind, it is of crucial value to train parents of children with ASD to implement these procedures independently in their home environment, in order for them to be able to develop their children's communication skills from an early age. Also, having in mind that majority of children with ASD being nonverbal or minimally verbal (Koegel et al., 2020), as it was the case with our participant, as well as knowing the fact that absence of communication skills correlates with problem behavior (Charlop-Christy et al., 2002; Hoffman & Falcomata, 2014; Wacker et al., 2013), it is of crucial value to train special educators that work with children with ASD in the process of early intervention to implement this procedure.



**Figure 2.** Intervention results

## CONCLUSION

Research shows that using this procedure is more efficient for increasing the number of emitted words when compared to other procedures. In the very first session of the procedure implementation, the child spoke clear words, while in the last session, the number of spoken words per session was 192. Having in mind the effectiveness of the implemented procedure, as well as data that parents of children with ASD can be successfully trained to use this procedure in their home environment, it is important to train them to implement it correctly. This is of great importance because the majority of the children with ASD are nonverbal, and lack of communication correlates with problem behaviour.

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