

# A Study to Measure The Effectiveness of Differential Reinforcement for Stereotypical Behavior in Autism Spectrum Disorder

K.M. MARIAM MINAZIR and M.O.T. KAVITHA

Department of Occupational Therapy, S.R.M University,  
Kattankulathur, Kanchipuram - 603203, India.

\*Corresponding author E-mail: mariamminazir28@gmail.com

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## ABSTRACT

Individuals with autism spectrum disorder frequently engage in stereotyped and repetitive motor movements. The Aim of the study was to evaluate the effectiveness of differential reinforcement in reducing stereotypical behavior in autism spectrum disorder. The Objective was to implement differential reinforcement on children with autism spectrum disorder having stereotypical behavior. To check the effectiveness of differential reinforcement in reducing stereotypical behavior in autism spectrum disorder. The Childhood autism rating scale was used as a screening tool to select the children with mild autism spectrum disorder. The study was undertaken with 14 children with autism spectrum disorder (11 male and 3 female). Parents of 14 children completed the RBQ-2 scale giving information on the repetitive behaviors seen in the children. Pre test and post test scores were collected to evaluate the effectiveness of differential reinforcement. The Result shows that there is a significant change in reducing stereotypical behavior in autism spectrum disorder using differential reinforcement. The study concluded that upon onset of the intervention the rate of the undesired behaviors reduced. Overall, the study supported the efficacy of differential reinforcement procedures in reducing the undesired behaviors in children with autism in applied facilities.

**Key words:** Autism spectrum disorder, stereotypical behaviors, differential reinforcement.

## INTRODUCTION

Autism spectrum disorders (ASD) affect an estimated 1 in 88 (Centers for Disease Control and Prevention, 2012) or as many as 1 in 50 (Blumberg et al., 2013) children today<sup>1</sup>. According to the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM5; American Psychiatric Association, 2013), an ASD diagnosis is given when a child has a deficit in social communication and social interaction, along with patterns of restricted, repetitive behaviors or interests. A person with mild ASD may be passionately interested in learning and talking about trains while individuals with more severe forms may constantly and violently bang their heads against the wall. Both are examples of "restricted, repetitive behaviors or interests", yet they clearly differ greatly in degree.

Repetitive behaviors in autism are frequently referred to as stereotypic behaviors. Stereotypy is defined as "frequent almost mechanical repetition of the same posture, movement or form of speech" (Merriam- Webster, 2006, p. 658). Stereotypic behavior can be verbal or nonverbal, it can involve gross motor movement or fine motor movement, and it can be simple or complex. (Cunningham & Schreibman, 2007)<sup>1</sup>. Children with ASD engage in repetitive behavior associated with play while their peers without ASD engage in fewer repetitive behaviors and more play. In many of these individuals, stereotypy interferes significantly with their learning and skill acquisition, as well as distracting others in their environment. Differences also exist in the nature of stereotypy among individuals with autism, depending on their developmental level and IQ.

For all of these reasons, it is important to intervene and attempt to eliminate, replace, or decrease stereotypic behavior. An important technique in behavioral interventions which is found effective is differential reinforcement. Differential reinforcement of alternate behavior (DRA) basically means that you put an undesired behavior on extinction, while simultaneously giving reinforcement to an appropriate behavior. DRA include DRO, Differential Reinforcement of Other Behavior, and DRI, Differential Reinforcement of Incompatible Behavior. Put simply, DRO means you give reinforcement as long as the child isn't engaging in the problem behavior. DRI means you reinforce appropriate behaviors that are incompatible with the problem behavior. The purpose of this project is to evaluate how differential reinforcement technique is helpful in tackling stereotypical behaviors in ASD. It helps in identifying the specific source of stimulation and preventing further occurrence so that the target behavior can be reduced and improve child performance.

### Methodology

Research method is quasi experimental with pre-test and post-test. Children with autism spectrum disorder (11 boys and 3 girls) of age 4 to 9 were selected from the clinical setup through convenience sampling. Children with physical dysfunction and with visual and hearing problems were not included. The purpose of data collection was explained to the parents of respective children with ASD and consent form was obtained. The childhood autism rating scale was administered for screening purpose. The repetitive behavior questionnaire-2 was administered with the help of parents and observation of the children with autism spectrum disorder.

Target behavior for each child was known through the RBQ-2 scale, where most children exhibited motor stereotypies. Reinforcement according to each child's interest was chosen.

Differential reinforcement technique was used on children in a clinical setup for 2 months receiving 3 sessions a week.

The childhood autism rating scale assesses behavior in 14 domains that are generally

affected by severe problems in autism, plus one general category of impressions of autism, with the aim of identifying children with autism, as differentiated from the other developmental disorders. The inter-rater reliability ICC=0.74 and the test re-test reliability ICC=0.81 and internal consistency =0.79 respectively<sup>2</sup>. Thus CARS has strong psychometric properties.

The RBQ-2 is a 20 item parental questionnaire that was designed to record repetitive behaviors which occur in children with autism. Questionnaire scores can be added to give a total repetitive behaviors score and can be also summarized into two factors (the motor-sensory and the restricted interests) and four factors (the motor, the rigidity, the preoccupation and the sensory). It has been found that RBQ-2 has good psychometric properties with high internal consistency of responses on all the items. With respect to the two factors solution, it has been shown that both factors have good reliability (Cronbach's alpha= 0.81 for the Factor 1 and 0.71 for the Factor 2; Arnott et al., 2010). For the four factor solution Arnott et al. (2010) found that internal consistency ranged from good (Cronbach's alpha = 0.82 for the Factor 1 and 0.74 for the Factor 2) to acceptable (Cronbach's alpha 0.64 for the Factor 3 and 0.51 for the Factor 4)<sup>3</sup>.

## RESULTS

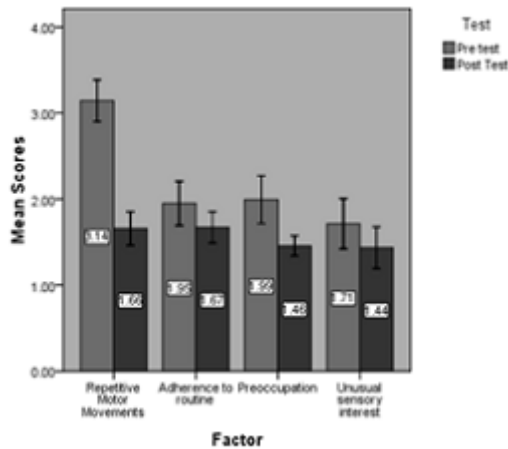
### Comparing pre and post test scores

Multivariate Analysis of Variance with repeated measures was used for analyzing the difference between the pre and post test scores of factors 1 – 6.

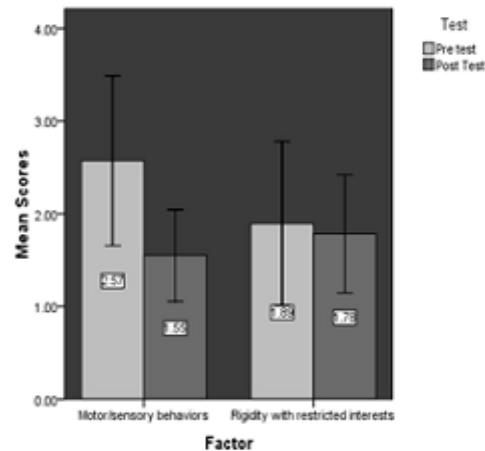
Multivariate analyses indicated that intervention had an effect collectively for all factors with pillai's trace  $F = 134.62$ ,  $d.f = 6$  and  $p$  value  $<0.001$ . Further, Univariate analyses showed that post test is effective for all factors at 5% level of significance.

## DISCUSSION

The main aim of the study is to evaluate the effectiveness of differential reinforcement in reducing the stereotypical behavior. The prognosis for children with autism is more favorable than



**Fig. 1: Shows the pre and post test values of RBQ 2**



**Fig. 2: Shows the pre and post test values of RBQ 2**

**Table 1: Shows the pre and post test values of RBQ**

Measure	Test	Mean	Std. Error	95% Confidence Interval		F	P value
				Lower Bound	Upper bound		
Repetitive_Motor_Movements	Pre Test	3.14	0.11	2.90	3.38	221.08	<0.001*
	Post Test	1.66	0.09	1.46	1.85		
Adherence_to_Routine	Pre Test	1.95	0.12	1.69	2.21	25.98	<0.001*
	Post Test	1.67	0.08	1.49	1.85		
Preoccupation	Pre Test	1.99	0.13	1.72	2.27	18.98	<0.001*
	Post Test	1.46	0.05	1.34	1.57		
Unusual_sensory_interest	Pre Test	1.71	0.14	1.42	2.01	20.07	<0.001*
	Post Test	1.44	0.11	1.19	1.68		
Motor_or_sensory_behaviors	Pre Test	2.57	0.12	2.31	2.84	119.91	<0.001*
	Post Test	1.55	0.07	1.41	1.69		
Rigidity_with_restricted_interests	Pre Test	1.89	0.12	1.64	2.15	10.62	0.006*
	Post Test	1.66	0.09	1.46	1.86		

\*Statistically significant at 5% level of significance

originally believed as a result of effective early intervention (Eikeseth, 2001; Lovaas, 1987)<sup>4</sup>. Because of these reasons children with age group 4 to 9 was chosen.

The stereotypical behavior was assessed using a repetitive behavior questionnaire (RBQ 2). RBQ-2 is a 20-item questionnaire with a total score of 60. The scores can be summarized into 4 factors (Repetitive motor movements, Rigidity/Adherence to routine, pre occupation with restricted patterns

of interests and unusual sensory interests) or 2 factors (motor/Sensory behaviors and Rigidity/Routines/Pre-occupation with restricted interests). Table 1 shows the pre and post test mean values and graph 1.1, 1.2 shows the difference obtained from the pre and post test values individually for the 6 sub-factors.

For most of the child verbal praise served as a good reinforcement. And for 1 child contingencies (healthy drinks like boost,fruit juice)

was used as reinforcement. For few other children preferred activity and leaving the child free for few minutes served as a good reinforcement.

An author named gangola leah c. did a similar study, "The influence of a DRO protocol with embedded token economy to reduce challenging behavior in children with autism" (2008)<sup>4</sup>. In this study they chose school aged children and treated on a weekly basis for feasibility purpose. When the target behavior occurred during the inter-response time an interval reset time was applied and verbal instructions were given. Token economy was used on a three to one ratio. The treatment was found to be efficacious for reducing target behavior and maintaining zero rates among children with autism.

Differential reinforcement also increases skill acquisition in children with autism. Amanda m. karsten did a study on "The effects of differential reinforcement of unprompted responding on the skill acquisition of children with autism". The purpose of the current investigation was to compare the delivery of high-quality reinforcers exclusively following both prompted and unprompted responses (non-differential reinforcement) on the skill acquisition of 2 children with autism. The study showed that differential reinforcement procedure was more reliable in producing skill acquisition<sup>5</sup>.

Result indicates that there is overall significant statistical difference in reducing the stereotypical behavior in ASD using the differential reinforcement. Thus statistical difference in each

component was checked individually, and it was significant for all the components with P value of <0.001 for the first five components (Repetitive Motor Movements, Adherence to Routine, Pre occupation, Unusual sensory interest, Motor or sensory behaviors) and P value of 0.006 for the last component (Rigidity with restricted interest).

## CONCLUSION

When examining differential reinforcement procedures, two distinctive advantages exist being that DR is relatively simplistic to use while straight forwardly working on an undesired behavior by reinforcing its absence. Results concluded that upon onset of the intervention the rate of the undesired behaviors reduced. Overall, the study supported the efficacy of differential reinforcement procedures in reducing the undesired behaviors in children with autism in applied facilities. Although DR is known to be fairly basic, practitioners are often resistant or reluctant to use the procedure because they lack experience using behavioral protocols. Further studies should be conducted to refine procedures in support of feasible, reinforcement based treatment options.

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