



Reducing Vocal Stereotypic Behavior in a Child with Fragile X Syndrome by Implementing the Response Interruption and Redirection (RIRD) Method

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REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Foreword

Submitted in partial fulfillment of the requirements of the BSc Psychology degree, Reykjavik University, this theses is presented in the style of an article for submission to a peer-reviewed journal.

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Abstract – English

The study sought to reduce vocal stereotypy of a boy with Fragile X syndrome. This was done by utilizing the response interruption and redirection (RIRD) method and adding reinforcers and a negative punisher to the original method. The vocal stereotypy was targeted in two different situations; playtime with an iPad and breakfast. In the iPad situation a reinforcer and a punisher were added to the RIRD method but in the breakfast situation a reinforcer and a conditioned reinforcer were added to the method. There was a visible decrease in vocal stereotypy in both situations, which suggests that adding reinforcers and a punisher works well with the original RIRD method. Experimental control was demonstrated with a mixture of changing criterion design and multiple baseline design by keeping the data stable at a close to zero slope while increasing the criterion. Since previous studies have almost solely focused on autistic individuals, this study adds to the knowledge of whom the treatment benefits.

Keywords: Fragile X syndrome, vocal stereotypic behavior, response interruption and redirection (RIRD) method

Abstract – Icelandic

Markmið rannsóknarinnar var að minnka steglda hljóðhegðun (e. *vocal stereotypy*) drengs með heilkenni brotgjarns X (e. *Fragile X syndrome*). Rannsóknin nýtti aðferð sem kallast hegðunartruflun og endurstýring (e. *response interruption and redirection*) en styrkjum og sekt var bætt við aðferðina. Inngrip var framkvæmt í tveimur aðstæðum; leiktíma með spjaldtölvu og morgunmat. Í rannsókninni var einliðasniði beitt, nánar tiltekið blöndu af sniði með breytilegu viðmiði (e. *changing criterion design*) og sniði margþætts grunnskeiðs (e. *multiple baseline design*). Í spjaldtölvu aðstæðunum var styrki og sekt bætt við hegðunartruflunar- og endurstýringar aðferðina en í morgunmatar aðstæðunum var bæði skilyrtum styrki og styrki bætt við aðferðina. Sjáanleg minnkun var á stegldri hljóðhegðun í báðum aðstæðum sem gefur til kynna að styrking og refsing séu mögulega góð viðbót við upprunalegu aðferðina. Stjórn á aðstæðum var greinileg þar sem hegðun var nánast engin þó að kröfur væru auknar. Þar sem fyrri rannsóknir hafa nánast einungis einblínt á einhverfa þá bætir þessi rannsókn við þekkingu um það hverjir hafa gagn af aðferðinni.

Lykilorð: Fragile X syndrome, stegld hegðun, hegðunar truflun og endurstýring

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Reducing Vocal Stereotypic Behavior in a Child with Fragile X Syndrome by Implementing the Response Interruption and Redirection (RIRD) Method

Vocal Stereotypic Behavior

Vocal stereotypic behavior is a form of repetitive behavior that appears as non-communicative vocalizations (Van Santen, Sproat, & Hill, 2013), which can be everything from clear words or phrases to shrieking, babbling, or grunting (Ahearn, Clark, MacDonald, & In Chung, 2007; Colón, Ahearn, Clark, & Masalsky, 2012). In general, vocal stereotypy is believed to cause self-reinforcing sensory stimulation by the sound or vibration consequences that are produced by engaging in the behavior (Ahearn et al., 2007; Rapp & Vollmer, 2005; Taylor, Hoch, & Weissman, 2005; Wolery, Kirk, & Gast, 1985). Vocal stereotypic behavior has not been researched to a great extent due to the general misconception that the behavior serves no purpose other than gaining social reinforcement and is, therefore, often ignored (Taylor et al., 2005).

Vocal stereotypic behavior prevails for a long time and can hinder the development of new skills and interfere with positive social interactions (Dunlap, Dyer, & Koegel, 1983; MacDonald et al., 2007; Mayes & Calhoun, 2011; Wolery et al., 1985). Interfering with vocal stereotypic behavior can improve social functioning and is, hence, an important research subject (Ahearn et al., 2007; Dickman, Bright, Montgomery, & Miguel, 2012).

The Response Interruption and Redirection (RIRD) Method

Ahearn et al. (2007) first described response interruption and redirection (RIRD) which has proven to be an effective treatment for vocal stereotypic behavior (Ahrens, Lerman, Kodak, Worsdell, & Keegan, 2011; Cassella, Sidener, Sidener, & Progar, 2011; Dickman et al., 2012; Liu-Gitz & Banda, 2010; Martinez & Betz, 2013; Miguel, Clark, Tereshko, & Ahearn, 2009; Schumacher & Rapp, 2011). RIRD is a form of response blocking where the

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therapist interrupts the subject's response by placing some form of demand and redirects the individual to emit an incompatible and more appropriate behavior response (Ahearn et al., 2007). For example a child makes an "uhhh uhhh" humming sound (vocal stereotypic behavior) and the therapist interrupts the behavior by delivering a social question which the child can easily answer (demand) thus requiring the child to stop the vocal stereotypic behavior and use an appropriate form of vocalization (redirection). Ahearn et al. (2007) showed the efficacy of the RIRD method by reducing vocal stereotypy in four children on the autism spectrum. They implemented the RIRD approach by using an ABAB design. They managed to reduce vocal stereotypic behavior for all four children compared to baseline measures as well as increasing appropriate vocalization of words for three of the four children.

The mechanism responsible for the RIRD method's effectiveness is still unclear. By implementing the RIRD method, Ahrens et al. (2011) found that the decrease of vocal stereotypic behavior was consistent with the function of a positive punisher since the method was more effective as the amount of response blocking increased. This is inconsistent with a previous study on behavioral blocking by Smith, Russo and Le (1999) which indicated that the behavior decrease is due to extinction by stopping the reinforcement of the automatic sensory reinforcement.

Liu-Gitz and Banda (2010) did a systematic replication of the RIRD method on a 10 year old with autism, who had vocal stereotypy. The method successfully managed to reduce the vocal stereotypy, thus increasing the generalizability of Ahearn et al.'s (2007) findings. To evaluate the immediate and subsequent effect of RIRD on vocal stereotypy Schumacher and Rapp (2011) used a multielement design on two autistic children. Their findings indicated that RIRD method produced an immediate decrease in the vocal stereotypy of both participants and did not result in a subsequent increase.

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Although many studies have focused on vocal stereotypy reduction, most have only included autistic research subjects. Consequently, the literature is short of answers regarding which individuals could benefit from treatment (Ahearn et al., 2007; Dickman et al., 2012; Liu-Gitz & Banda, 2010; Martinez & Betz, 2013; Schumacher & Rapp, 2011).

Additions to the Original RIRD Method

Martinez and Betz's (2013) review of studies implementing the RIRD method showed that many therapists add reinforcers to the RIRD method. A study by Love, Miguel, Fernand and LaBrie (2012) suggests that by adding reinforcers or decreasing access to them during the RIRD intervention one can increase the effectiveness of the RIRD method.

When implementing the RIRD method to reduce vocal stereotypic behavior of a 5 year old, Dickman et al. (2012) reported that when a token economy was implemented the vocal stereotypy decreased even more and appropriate vocalizations increased. Love et al. (2012) compared the RIRD method to access to matched stimulation, which includes access to objects that produce the same stimulation as the stereotypic behavior. They found that for one participant a greater suppression of vocal stereotypy occurred if both methods were used simultaneously. On the contrary, Ahearn et al. (2007) suggested that by adding reinforcers one loses the ability to assess functional control of the behavior. Adding reinforcers and punishers to the RIRD method is, hence, a topic which needs more research in order to conclude how RIRD can be implemented in the most successful manner.

Untargeted Stereotypic Behavior

When stereotypic behavior is reduced there are odds that response reallocation occurs and not necessarily to a more appropriate behavior (Lanovaz, Robertson, Soerono, & Watkins, 2013; Pastrana, Rapp, & Frewing, 2013; Rapp, Vollmer, St Peter, Dozier, & Cotnoir, 2004). In response to this problem, Lanovaz et al. (2013) recommended that when a certain stereotypic behavior is targeted clinicians should aim to strengthen an alternative

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appropriate behavior to replace the stereotypy. This makes the RIRD method a preferable treatment option since it redirects the targeted behavior to a more appropriate behavior.

The Current Study

The RIRD method is a relatively new treatment for stereotypic behavior and is, therefore, in need of systematic replications as well as replications which add reinforcers and punishers. It is still unclear whether adding reinforcers or punishers to the method is beneficial, and what variation of the RIRD method is most effective. Furthermore, to enhance the method's generalizability it needs to be utilized on children with other disorders than autism. This study aims to add to the knowledge regarding the utilization of the RIRD method as well as trying to answer some of the questions that previous studies have left unanswered. The current study is done on a boy with Fragile X syndrome, which has similar symptoms as autism but is a different form of disability (Garber, Visootsak, & Warren, 2008). In addition, the current study will both add reinforcers and remove reinforcers to see whether such extensions are a suitable addition to the RIRD method. Based on previous findings, the following hypotheses are presented; A) The RIRD method with added reinforcers and a punisher will visibly reduce the vocal stereotypic behavior in a boy with Fragile X syndrome during a play time situation with an iPad, B) The RIRD method with an added reinforcer and a conditioned reinforcer will visibly reduce the vocal stereotypic behavior in a boy with Fragile X syndrome during breakfast situation.

Method

Participant

The participant in this study was a five year old boy in preschool who had the genetic disorder Fragile X syndrome, which causes mental retardation and features that resemble autism such as impaired social skills, stereotypic behavior and avoiding eye gaze (Garber et al., 2008).

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The participant received the pseudonym Isaac to protect his anonymity. Isaac lived in Iceland with his parents during the study. He was of a Scottish origin and lived previously in the United States, which he moved back to at the end of the study.

Isaac received behavior therapy training in preschool eight hours a day during workdays. Isaac was one of a few special needs children in the preschool who were included as much as possible in activities with other normally developing children. During the day he had a behavioral therapist accompanying him at all times.

Isaac participated in multiple stereotypic behaviors, for example stone kicking and paper ripping. His vocal stereotypy (grunting) was very frequent in all situations in preschool, which was considered to interfere with his use of words and initiative in communication. Isaac had a wide vocabulary but usually needed to be prompted in order to speak. He was able to answer multiple social questions (e.g. how old are you?). The majority of his spontaneous communicative attempts were to request desired items.

Settings

The first intervention was conducted during Isaac's time on the iPad and was referred to as situation A. In situation A the measures were conducted in a training room which was only used for behavior therapy sessions. The room was large, long and bright and had many windows. There were four tables in the room with chairs on both sides so the trainer and child faced each other. In the training room there were two large spaces that were filled with toys where the children spent their breaks. Isaac always received individual behavior therapy at the table closest to the door. Sometimes other children were being trained at the same time in the training room.

The second intervention, referred to as Situation B, was conducted during breakfast. Situation B was conducted in a classroom which was a bit larger than the training room. It was bright and had multiple large windows. The room had several tables and chairs as well as

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a large mat with a seating chart and play material shelves. Situation B was conducted during breakfast and Isaac always sat in the same seat at his table, which was located closest to the bathroom and furthest from the door. Usually there were about five girls eating at his table during breakfast time. The class consisted of 28 girls and Isaac, who was one of two special needs children in that class. The school is gender separated but Isaac got special permission to spend most of his time with the girls since he found it easier to play with them and generally seemed happier. Isaac also participated in some activities with the boys, but none that were included in this study.

Materials

One iPad with puzzle and car games was used as a reinforcer in both situations. Apple pieces were also used as a reinforcer in situation A. These reinforcers were used because Isaac most frequently asked for them. A yellow clicker with a black button which was six centimeters long and four centimeters wide was introduced and connected to the iPad during situation A and used as conditioned reinforcer in situation B.

During the notation of the target behavior, an iPad app called Catalyst was used which specializes in behavior therapy data collection and analysis ("Catalyst," n.d.).

Experimental Design

A mixture of changing criterion design and multiple baseline design was utilized in both situations to establish experimental control. The changing criterion design features included an initial baseline observation on a single target behavior, which is followed by implementation of a series of treatment phases (Hartmann & Hall, 1976). Each phase of treatment served as a baseline for the following phase and each phase of treatment included a stepwise change of criterion for the targeted behavior. This study aimed to demonstrate experimental control by keeping the data stable at a zero slope (Hartmann & Hall, 1976). The multiple baseline design features were that both situations consisted of three phases;

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baseline, intervention and gradual withdrawal. The intervention in situation B started when control of the behavior had been established in situation A and a change in situation B was only witnessed when the intervention started.

The two situations in the study differed in reinforcers (iPad, clicker or apple) and location (classroom or training room).

Independent Variable

The independent variable was the RIRD method. In situation A, Isaac was playing on the iPad but if the targeted vocal stereotypy occurred then the iPad was removed (negative punisher), the trainer said “no” (response stopping), and asked him a well-known social question, for example “what’s your name?” (redirection) and then asked him “what do you want?” (redirection), to which he always responded “more iPad please”. If the vocal stereotypic behavior did not occur for a specific amount of time he received a reinforcer in the form of apple pieces. The negative punisher was only used since it was necessary to remove the iPad in order to get contact with Isaac and implement the RIRD method.

During situation B, Isaac was reinforced for not using vocal stereotypy with the iPad and/or a clicker that was a conditioned reinforcer connected to the iPad. If the target behavior occurred during situation B, the trainer said “no” (response stopping) and asked a well-known social question, for example “how are you?” (redirection). Furthermore the protocol was to remove the iPad (reinforcer) also in situation B if the targeted behavior occurred, however this did not happen during this study.

Dependent Variable

The dependent variable was the frequency of the grunting sound (vocal stereotypy). The topography of the vocal stereotypic behavior was described as any instance of repetitive grunts, which sounded like “uhhhh”. No other form of vocal stereotypic behavior was observed. The target behavior had to occur for longer than two seconds to count as a behavior

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and five seconds had to pass between grunts for it to be counted as a new behavior. Each occurrence of the target behavior during situation A was noted in an iPad using the behavior therapy app Catalyst (“Catalyst,” n.d.). Each occurrence of the target behavior during situation B was noted on a counting sheet (see Appendix A).

Function of the Vocal Stereotypy and Inter-Observer Agreement

A formal functional analysis was not utilized to reveal what function maintains the vocal stereotypic behavior for three reasons. First, the baseline of all the situations during Isaac’s preschool day contained a high frequency of vocal stereotypy suggesting that it was not higher or lower depending on situations such as alone play time or group time. Second, the literature suggests that vocal stereotypy is generally performed as sensory stimuli (Ahearn et al., 2007; Rapp & Vollmer, 2005; Taylor et al., 2005; Wolery et al., 1985). Third, Isaac’s behavior was not socially reinforced since his previous school in The United States ignored his vocal stereotypy in all situations which revealed no visible improvement.

Inter-observer agreement measure for frequency of vocal stereotypy was obtained for situation B from two observers by dividing the number of sessions with agreement by the total number of sessions. The agreement was 91.6%.

Procedure

Authorizations were obtained by the BSc psychology course committee of Reykjavik University, The National Bioethics Committee of Iceland (VSNb2014100024/03.07) and the Data Protection Authority (S7056/2014). Approvals were furthermore obtained from the parents (see Appendix B), the preschool principal (see Appendix C) and the local preschool committee (see Appendix D).

The study lasted from September to December 2014. The baseline measures and the intervention in situation A started out as a part of Isaacs’s regular therapy session, where permission was received from his parents, according to the preschool’s protocol. All permits

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to conduct an experiment and publish its results were received as soon as possible. Isaac's parents received this paper as a summary report as soon as it was ready.

Sessions in situation A were conducted during breaks from training. Each session consisted of 10 minutes, three times a day. Sessions in situation B were from 8:30 to 9:15 am. Baselines for both situations were measured at the same time in September. Intervention in situation A started September 30th and intervention in situation B started October 21st, when the behavior in situation A had been zero for four consecutive days. Situation A and situation B were chosen due to high frequencies of the target behavior observed when baseline measures were obtained for multiple situations during Isaac's preschool day. During baseline measures one trainer followed Isaac around all day only measuring the frequency of vocal stereotypy while another trainer took care of Isaac. Both trainers who participated received two days of measurement training. In addition, both trainers received written and vocal instructions regarding the measures of the vocal behavior and the interventions.

Intervention was implemented in situation A when the baseline was stable. During the intervention Isaac received reinforcement according to a differential reinforcement of other behavior (DRO) schedule. Time intervals between reinforcers were increased when the target behavior had reached zero for one or more days. First Isaac had the iPad for 5 minutes each time and received reinforcers according to DRO 30 s, then DRO 1 min, then Isaac got to spend 10 min on the iPad and DRO 2 min. Then DRO was increased to 3 min, DRO 4 min, DRO 5 min, DRO 6 min, and finally DRO 7 min. The iPad was removed if the vocal stereotypic behavior occurred and the RIRD method was implemented. If the behavior occurred the required time needed to pass in order for the positive reinforcer to be delivered was set back to zero.

In situation B the intervention was implemented when the baseline was stable and situation A was under control. Situation B was during breakfast and the iPad was used as a

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reinforcer every time the behavior did not occur for a certain amount of time. If the behavior occurred during that time, the time needed to pass in order for the positive reinforcer to be delivered was set back to zero. In situation B, a conditioned reinforcer in a form of a clicker which had previously been paired multiple times with the positive reinforcer was introduced. Isaac always got a click according to a variable DRO time reinforcement schedule. In the beginning Isaac got a click if the behavior had not occurred for 15 seconds, with the iPad following according to a variable ratio schedule of 2, which means that the iPad followed the click on average every other time. Then the time between clicks was increased to 30 s and then to 1 min. Next, the variable ratio schedule of reinforcement was increased to 3. Then the time was increased to 75 s and then the variable ratio schedule was increased to 4 and click every 90s. Finally the time was increased by 15 s until it reached 3 min. Again, time length and requirements were increased gradually when the behavior had reached zero or remained zero for some time (DRO).

Results

Isaac received reinforcers according to a differential reinforcement of other behavior (DRO) schedule in situation A, which was the iPad situation. The intervention was implemented by giving him a piece of apple when the grunting sound had not occurred for a specific amount of time and removing the iPad and applying the RIRD method when the target behavior occurred. The sessions in situation A were at first only 5 minutes and then

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increased to 10 minutes in intervention phase C (see Figure 1).

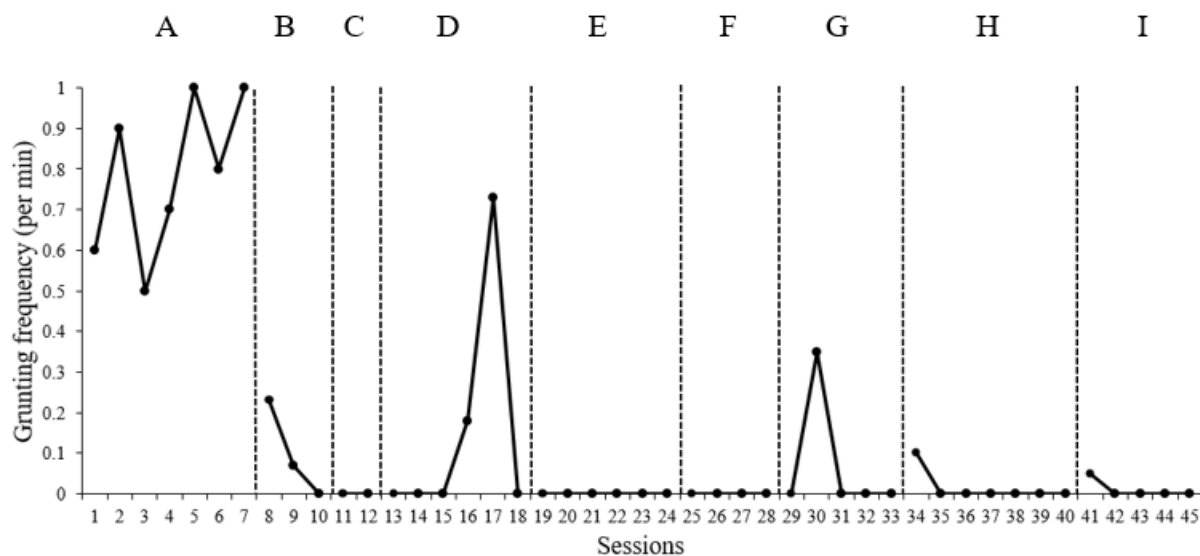


Figure 1. Grunting frequency per minute in each session across interventions in situation A (the iPad situation). Intervention was in the form of the RIRD method. The intervention phases represent: A = baseline measure, B = had the iPad for 5 min each time and reinforcers according to DRO 30 s, C = DRO 1 min, D = had the iPad for 10 min and DRO 2 min, E = DRO 3 min, F = DRO 4 min, G = DRO 5 min, H = DRO 6 min, I = DRO 7 min.

Isaac's vocal stereotypy in situation A occurred frequently in the baseline measures (Figure 1). In the seven measured days the grunting sound occurred on average from 0.5 – 1.0 times per min ($M = 0.8$). The vocal stereotypic behavior immediately dropped during the first intervention phase (B), when a DRO time reinforcement schedule, the RIRD method and the negative punishment were introduced. The criterion was increased in each phase by increasing the time between reinforcers and thus gradually thinning out the reinforcement. Figure 1 shows that the intervention was able to keep the target behavior fairly linear at a zero slope with the exception of phases H and F where the behavior appears in low frequency when the criterion is increased. According to Lerman and Iwata (1995), extinction bursts can occur as a part of an extinction process and in phase D there is an obvious extinction burst since the targeted behavior jumped from zero in one session to 0.2 in the next session and then to 0.7 in

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the session after that and went down to zero again in the very next session. It should be noted that in phase D both the duration of sessions was increased as well as time between reinforcements which might affect the spontaneous burst of behavior in that intervention. An extinction burst can also be seen in phase G where the vocal stereotypic behavior went from zero per minute in the first measured session to 0.4 per minute in the next measured session and then dropped to zero again in the session after.

The results in Figure 1 reveal that the RIRD method with an added reinforcer and a negative punisher clearly had a controlling effect over the vocal stereotypic behavior. This is evident since the changing criterion design was able to show how the intervention maintained the vocal stereotypic behavior at a very low or even zero frequency even while increasing the criterion with a DRO schedule.

In situation B, the breakfast situation, each session lasted for 45 min (see Figure 2). During baseline (A) the average frequency of the grunting varied from 0.3 - 4.5 times per min ($M = 1.37$). The intervention started when the targeted behavior stabilized around 1 time per min and remained around that frequency for five days.

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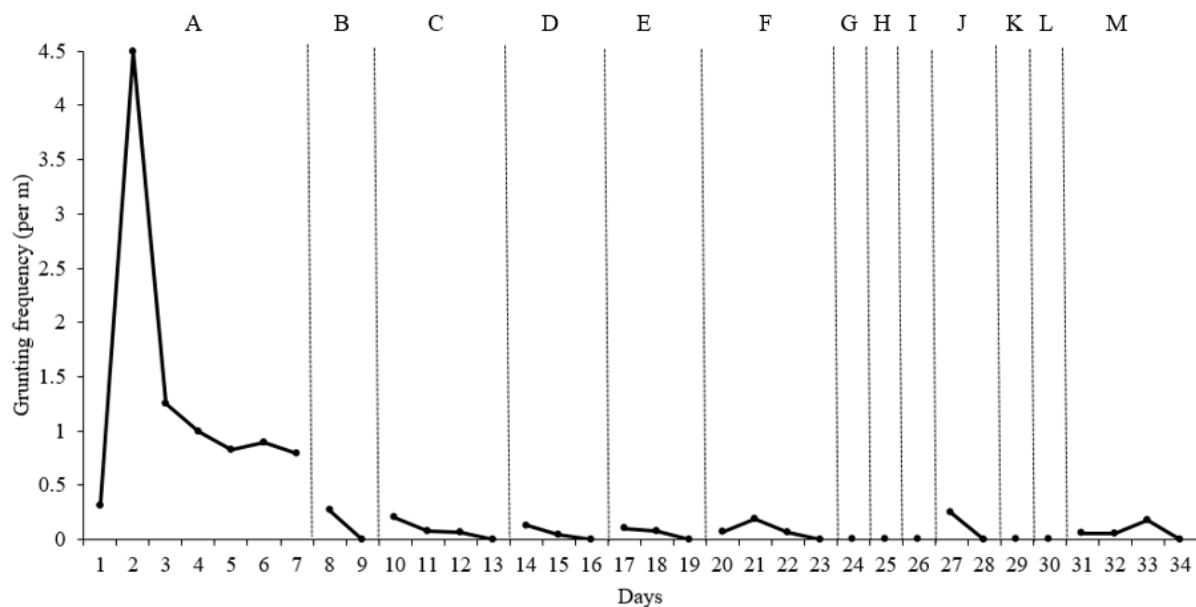


Figure 2. Grunting frequency per minute in each session across interventions in Situation B (the breakfast situation). Intervention was in the form of the RIRD method. Reinforcement was in the form of a click and or an iPad. The intervention phases represent; A = baseline, B = click: DRO 15 s and iPad – variable ratio schedule of 2, C = click: DRO 30 s, D = click: DRO 1 min, E = iPad – variable ratio schedule of 3, F = click: DRO 75 s, G = iPad - variable ratio schedule of 4, click: DRO 90 s, H = click: DRO 105 s, I = click: DRO 2 min, J = click: DRO 135s, K = click: DRO 150 s, L = click: DRO 165 s M = click: DRO 3 min.

During situation B, Isaac received reinforcers according to a differential reinforcement of other behavior (DRO) procedure that was implemented by giving him only a click or a click and the iPad when the grunting sound had not occurred for a specific amount of time. The results of situation B reveal that the average frequency of Isaac’s grunting was high during baseline (A) (0.3 - 4.5 times per min). In phase B the intervention started and a conditioned reinforcer (clicker) was provided if the grunting had not occurred for 15 s exactly (IRT = 15 s) and the iPad followed every other time. It only took one day of intervention (phase B) for the behavior to drop to zero. After that the reinforcement was gradually thinned out when the behavior reached zero. In the 12 interventions phases it took one to four days (M

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= 2.25) for the target behavior to reach zero. The decrease in the behavior remained fairly stable with small increases in the target behavior when the criterion was increased (see phases; C, D, E, F, J and M). No sudden increases were observed.

Results in Figure 2 demonstrate that the RIRD method with added reinforcements clearly had a controlling effect over the vocal stereotypic behavior since the behavior remained at a close to zero linear slope. This consequently reveals that it is possible to thin out the reinforcement schedule and still maintain the vocal stereotypic behavior at a very low frequency.

Discussion

The current study was able to confirm hypothesis A which was that the RIRD method with added reinforcers and a punisher would visibly reduce the vocal stereotypic behavior in a boy with Fragile X syndrome during a play time situation with an iPad. This was done by utilizing a mixture of changing criterion design and multiple baseline design. With increased criterion the targeted behavior remained low and at close to zero slope throughout the intention phases with the exception of two extension bursts which can spontaneously occur as a part of extinction (Lerman & Iwata, 1995).

Hypothesis B was that the RIRD method with an added reinforcer and a conditioned reinforcer would visibly reduce the vocal stereotypic behavior in a boy with Fragile X syndrome during a breakfast situation. This hypothesis was also confirmed since the RIRD method quickly reduced the behavior to a near zero occurrence and the target behavior maintained at a low frequency even if the criterion was increased.

The current study's findings increased the generalizability of Ahearn et al.'s (2007) RIRD method as a treatment option to reduce vocal stereotypic behavior which is in agreement with findings of previous studies (Ahrens et al., 2011; Cassella et al., 2011; Dickman et al., 2012; Liu-Gitz & Banda, 2010; Martinez & Betz, 2013; Miguel et al., 2009;

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Schumacher & Rapp, 2011). The current study also effectively decreased vocal stereotypy in a subject with a diagnosis other than autism thus increasing the generalizability of the RIRD method as treatment option for individuals with other types of disabilities.

This study supports Smith et al.'s (1999) finding that the RIRD method is a form of an extinction process which stops the sensory reinforcement the target behavior provides, since there was an extinction burst in situation A. Furthermore, findings support previous studies that indicate that adding reinforcers to the original RIRD method is effective to decrease vocal stereotypic behavior (Dickman et al., 2012; Love et al., 2012).

Using a negative punisher (removing the iPad) was deemed necessary in situation A to get the attention from Isaac needed to implement the RIRD method. This addition to the RIRD method worked well. Adding a punisher is however a limitation to this study and future studies should try to design situations where any sort of punishment is unnecessary since the RIRD method on its own has proven to be a sufficient treatment option (Ahrens et al., 2011; Cassella et al., 2011; Dickman et al., 2012; Liu-Gitz & Banda, 2010; Martinez & Betz, 2013; Miguel et al., 2009; Schumacher & Rapp, 2011). Further limitations to the current study were that implementing the intervention in more situations would have increased the generalizability of the findings. Follow up measures would also have been preferable to see whether the effect remained for a longer time. However, the changing criterion design does not require such a measure. These last two limitations would have been possible to mend if the subject not moved away after the end of the study. Multiple studies also measure increases in functional language which would have been a good addition to this study if time had permitted (Ahearn et al., 2007; Dickman et al., 2012).

Future studies should address whether the RIRD method is more effective with or without added reinforcers in order to find the best plausible treatment option. Other studies

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should also try the RIRD method on more diverse subjects with a diagnosis other than autism in order to further increase the method's generalizability.

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Appendix A
Counting sheet

Date	
Amount of time measured	
Frequency of grunts	
Amount of received clicks	
Amount of times receiving the iPad	
Date	
Amount of time measured	
Frequency of grunts	
Amount of received clicks	
Amount of times receiving the iPad	
Date	
Amount of time measured	
Frequency of grunts	
Amount of received clicks	
Amount of times receiving the iPad	
Date	
Amount of time measured	
Frequency of grunts	
Amount of received clicks	
Amount of times receiving the iPad	

REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Appendix B
Informed consent form for the parents



HÁSKÓLINN Í REYKJAVÍK
REYKJAVÍK UNIVERSITY

Reykjavik, 9 October 2014

Dear Parents

I the undersigned, Dagbjört Una Helgadóttir, a second year psychology student at Reykjavik University, hereby request the permission to have your child participate in a research. The research will be done in order to reduce his vocal stereotypic behavior. I am working on a research for my final thesis under the supervision of Þorlákur Karlsson, Ph.D., Associate Professor in Psychology at Reykjavik University.

The purpose of the research is to perform an intervention in multiple situations in order to reduce vocal stereotypic behavior. The boy uses the behavior to isolate himself when social situations become overwhelming. It was therefore decided that reducing the behavior might help him socially.

The intervention will occur in a situation where the boy is playing with an Ipad. In this situation he gets positive reinforcement for not producing the behavior and penalty will be conducted when the behavior occurs, by removing the Ipad and prompting the boy to use words to answer a social question. An intervention will also be implemented in other situations such as group time and breakfast time. In those situations the intervention will occur by reinforcing him when the behavior does not occur with a clicker that has been linked with an Ipad reinforcement. The behavior will also be stopped when it occurs and the boy will be asked a social question, e.g. how old are you, in order to stop the behavior which is self-reinforcing. Hopefully we will encourage him to use words by prompting him to answer when the behavior is stopped.

All information collected during the research is strictly confidential and no one who is unauthorized will have access to the data regarding the research. When the thesis will be published it will in no way be possible to trace the results back neither to the preschool nor your child.

The estimated time of the research is from the end of October to the end of December 2014. A more particular time will be decided in cooperation with the preschool.

If you consent to your child participating in this research but wish to withdraw him from the research after it begins, then you are free to do so whenever you want and without further explanation. If you want any further information, we will be happy to give it to you and please address it to the email mentioned below. If you give your consent then please write your name and your child's name on the consent form below and return it to the preschool.
Best regards

Dr. Þorlákur Karlsson, Associate Professor
Thesis and research supervisor

Dagbjört Una Helgadóttir
BSc student in psychology/Researcher
Email: dagbjorth12@ru.is

Informed consent**Reducing stereotypic voice behavior in a child with fragile x syndrome**

Dr. Þorlákur Karlsson, Associate Professor

Dagbjört Una Helgadóttir

Thesis and research supervisor

BSc student in psychology/Researcher

I have read the information regarding this research and the supervisor and researcher have given me the information that I have asked for. I know my participation in this research is a choice and that I can withdraw my child from it whenever I want, without giving a reason and without it affecting my legal rights. I understand the purpose of the research and was not forced to participate. I hereby give a willing and informed consent that my child;
 _____ participates in this research.

 Name of parent:

 Date:

 Signature

 Name of parent:

 Date:

 Signature

 Name of the person presenting the consent form:

 Date:

 Signature

REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Appendix C
Informed consent form for the preschool principal

HÁSKÓLINN Í REYKJAVÍK
REYKJAVÍK UNIVERSITY

Reykjavík, 9 October 2014

To the principal

I the undersigned, Dagbjört Una Helgadóttir, a second year psychology student at the Reykjavik University, hereby kindly request permission to train a boy in XX preschool. The training will be done in order to reduce the boy's vocal stereotypic behavior. I am working on a research for my final thesis under the supervision of Þorlákur Karlsson, Ph.D., Associate Professor in Psychology at the Reykjavik University.

The purpose of the research is to perform an intervention in multiple situations in order to reduce vocal stereotypic behavior. The boy uses the behavior to isolate himself when social situations become overwhelming. It was therefore decided that reducing the behavior might help him socially.

The intervention will occur in a situation where the boy is playing with an Ipad. In this situation he gets positive reinforcement for not producing the behavior and punishment will be conducted when the behavior occurs, by removing the Ipad and prompting the boy to use words to answer a social question. An intervention will also be implemented in other situations such as group time and breakfast time. In those situations the intervention will occur by reinforcing him when the behavior does not occur with a clicker that has been linked with an Ipad reinforcement. The behavior will also be stopped when it occurs and the boy will be asked a social question, e.g. how old are you, in order to stop the behavior which is self-reinforcing. Hopefully we will encourage him to use words by prompting him to answer when the behavior is stopped. I hereby ask for the cooperation of the other trainers that work with boy in order to help with the Ipad situation.

All information collected during the research is strictly confidential. The parents of the child will also be asked to sign an informed consent form where they will be told about the purpose of the research and their right to withdraw from the research at any time. When the thesis will be published it will in no way be possible to trace the results back neither to the preschool nor the participant.

The estimated time of the research is from the end of October to the end of December 2014. A more particular time will be decided in cooperation with the preschool.

With this letter I hereby ask for your permission to conduct the above mentioned research at your preschool.

Best regards

Dr. Þorlákur Karlsson, Associate Professor
Thesis and research supervisor
Menntavegur 1, Reykjavík

Dagbjört Una Helgadóttir
BSc student in psychology/Researcher

REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Informed consent

Signature

Date

REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Appendix D

Informed consent form for the preschool commissioner of X



HÁSKÓLINN Í REYKJAVÍK
REYKJAVÍK UNIVERSITY

Reykjavík, 9 October 2014

To the preschool commissioner of X

I the undersigned, Dagbjört Una Helgadóttir, a second year psychology student at the Reykjavik University, hereby kindly request permission to train a boy in X. The training will be done in order to reduce the boy's vocal stereotypic behavior. I am working on a research for my final thesis under the supervision of Þorlákur Karlsson, Ph.D., Associate Professor in Psychology at Reykjavik University.

The purpose of the research is to perform an intervention in multiple situations in order to reduce vocal stereotypic behavior. The boy uses the behavior to isolate himself when social situations become overwhelming. It was therefore decided that reducing the behavior might help him socially.

The intervention will occur in a situation where the boy is playing with an Ipad. In this situation he gets positive reinforcement for not producing the behavior and punishment will be conducted when the behavior occurs, by removing the Ipad and prompting the boy to use words to answer a social question. An intervention will also be implemented in other situations such as group time and breakfast time. In those situations the intervention will occur by reinforcing him when the behavior does not occur with a clicker that has been linked with an Ipad reinforcement. The behavior will also be stopped when it occurs and the boy will be asked a social question, e.g. how old are you, in order to stop the behavior which is self-reinforcing. Hopefully we will encourage him to use words by prompting him to answer when the behavior is stopped. I hereby ask for the cooperation of the other trainers that work with boy in order to help with the Ipad situation.

All information collected during the research is strictly confidential. The parents of the child will also be asked to sign an informed consent form where they will be told about the purpose of the research and their right to withdraw from the research at any time. When the thesis will be published it will in no way be possible to trace the results back neither to the preschool nor the participant. The researcher will also apply for permission from the The Data Protection Authority (Persónuvernd) and The Bioethics committee (Vísindasiðanefnd).

The estimated time of the research is from the end of October to the end of December 2014. A more particular time will be decided in cooperation with the preschool.

With this letter I hereby ask for your permission to conduct the above mentioned research at X.

Best regards

Dr. Þorlákur Karlsson, Associate Professor
Thesis and research supervisor
Menntavegur 1, Reykjavík

Dagbjört Una Helgadóttir
BSc student in psychology/Researcher

REDUCING VOCAL STEREOTYPY WITH THE RIRD METHOD

Informed consent

Signature

Date