

THE EFFECTS OF RESPONSE INTERRUPTION AND REDIRECTION  
ON VOCAL STEREOTYPY

BY

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EUN GI JOUNG

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### **Abstract**

The purpose of the current study was to examine the effects of Response Interruption and Redirection on automatically maintained vocal stereotypy of a ten year old boy with autism. The researcher hypothesized that RIRD strategy would decrease the vocal stereotypy and increase the use of appropriate verbalization. The study was conducted in an ABAB reversal design at a school setting and was implemented by one special education teacher and two paraeducators. Results indicated that RIRD was effective in reducing the vocal stereotypy. However, there were no significant changes in the occurrence of appropriate vocalization.

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## **CHAPTER I**

### **Introduction**

Autism is a broad spectrum of disorders caused by neurological impairments (Simpson, Myles, & LaCava, 1998/2008). In the Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition Text Revised; DSM-IV-TR; American Psychiatric Association (APA), 2000), these disorders are characterized by severe and pervasive impairment in several areas of development: reciprocal social interaction skills, communication skills, or the presence of restricted and stereotyped patterns of behavior, interests, and activities. The severity of each challenging condition varies within individuals making the term autistic “spectrum” most suitable label for the disorder (Rapin & Dunn, 2003).

Within the three distinct diagnostic criteria for autism, stereotypic behavior, also known as stereotypy, has been receiving the least attention compared to the social and communication deficiencies (Bodfish, Symons, Parker, & Lewis, 2000; Lewis & Bodfish, 1998). Due to the limited studies and research focused on the stereotypy in autism, important aspects such as its definition, terminology, classification, or function remain uncertain (Bodfish et al., 2000; Jones, Wint, & Ellis, 1990; Lewis & Bodfish, 1998). While it has been found through various research that stereotypic behaviors interferes with learning and positive social interaction, there are few studies related to appropriate treatments and interventions to address these behaviors (Cunningham & Schreibman, 2008 ; MacDonald et al., 2007).

Although stereotypies are common for individuals with developmental, psychiatric, and neurological disorders, it is most prominent among individuals with autism as it is one of the core features (Bodfish et al., 2000). The most commonly used definition for stereotypy is an exceedingly consistent, repetitive motor/vocal or posturing response which takes place at unreasonably high rates that serves no apparent social function (Ahearn, Clark, MacDonald, &

Chung, 2007; Jones et al., 1990; Liu-Gitz & Banda, 2010; MacDonald et al., 2007). However, growing research provides evidence that the function of stereotypy is driven by sensory automatic and socially mediated reinforcement contingencies (Cunningham & Schreibman, 2008; Jones et al., 1990).

Stereotypic behaviors are displayed in different forms such as verbal, nonverbal, fine motor- oriented, and gross motor-oriented. It can also be in forms of repetitive and stereotyped motor mannerisms or use of language (Cunningham & Schreibman, 2008). Commonly seen stereotypic behaviors among individuals with autism include hand flapping, body rocking, toe walking, spinning objects, sniffing, immediate and delayed echolalia (Cunningham & Schreibman, 2008). As a whole, a behavior can be defined as stereotypy when they involve repetition, rigidity, invariance, and are inappropriate in nature (Cunningham & Schreibman, 2008).

One of the most common stereotypic behaviors found in individuals with autism is echolalia (Lewis & Bodfish, 1998). Prizant (1983a) and Schuler (1979) reported that echolalia is a characteristic of at least 75% of verbal individuals with autism. By definition, echolalia is a repetition of speech spoken by others either in an immediate or delayed manner (Prizant & Rydell, 1984). Immediate echolalia is repetition of speech immediately or briefly after whereas delayed echolalia refers to speech repeated at a significantly later time (Prizant & Rydell, 1984). Echolalia may be spoken with or without communicative function, and it is maintained either by social contingencies or by automatic reinforcement (i.e. non-socially mediated behavior) (Cunningham & Schreibman, 2008; Jones et al., 1990; Lewis & Bodfish, 1998; Taylor, Hoch, & Weissman, 2005). Although it is true that echolalia interferes with social interaction, acquisition of skills, and on the individual's learning, some studies have suggested that echolalia can play an

important part in the development of functional speech if the appropriate environment and intervention were provided (Liu-Gitz & Banda, 2010).

Today, not many studies or research has been conducted that examines appropriate interventions for non-socially mediated echolalia as it is harder, by nature, to control the reinforcer intrinsic to the action itself. For example, an individual who continues to repetitively vocalize may be reinforced by the auditory stimuli produced by the vocalization itself. With the given challenge, studies have shown the importance in finding a more socially appropriate stimulus that matches or competes with the identified reinforcing properties. This way, while providing the individual with competing stimuli, the problem behavior will decrease over time (Taylor et al., 2005). An evidence based practiced which generalizes this idea is called Response Interruption and Redirection (RIRD) (Neitzel, 2009b).

RIRD is an intervention used to decrease interfering behaviors that are repetitive, stereotypic, and self-injurious in nature. This intervention is useful for behaviors that are not maintained by social contingencies (i.e. attention seeking or escape) but rather are maintained by sensory reinforcements. The intervention seeks to interrupt the learner from engaging in interfering behaviors and redirect them to more appropriate, alternative behavior that produces equally reinforcing sensory stimulus. The intervention also uses the differential reinforcement strategies where the individual receives social praise after successfully responding with an appropriate alternative behavior (Neitzel, 2009b).

The purpose of the current study is to evaluate whether the intervention RIRD is an effective method in decreasing vocal stereotypy in a student with autism. The experiment was conducted in a single-subject reversal design to demonstrate the effectiveness of RIRD. The researcher hypothesized that RIRD will help reduce the subject's stereotypic vocalization and

increase the use of a more socially acceptable vocalization. The study also focused on discovering whether or not the intervention would generalize to other environments (i.e. different location, activity, and person) when the intervention was removed.

## **CHAPTER II**

### **Literature Review**

In 1943, Dr. Leo Kanner of the Johns Hopkins Hospital introduced the term early infantile autism through the study of 11 children. A German scientist Dr. Hans Asperger, at the same time, introduced the disorder now known as Asperger syndrome. Today, these terms are more commonly referred to as autism spectrum disorder (ASD). These disorders are two of the five pervasive developmental disorders (PDD) listed under the Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition Text Revised [DSM-IV-TR]; American Psychiatric Association [APA], 2000). In a recent survey, estimates of 3.4 out of every 1,000 children ages three to ten are diagnosed with ASD (U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Mental Health, 2008). Three prominent features that characterize ASD are communication and social impairment and restricted, repetitive and stereotyped pattern of behavior (APA, 2000).

Stereotypic behavior, also known as stereotypy, is one of the diagnostic criteria for ASD. Stereotypy is characterized by repetitive motor and vocal response which is presumed by many as a behavior that serves no apparent social function (Ahearn, Clark, MacDonald, & Chung, 2007; Cunningham & Schreibman, 2008; Jones, Wint, & Ellis, 1990; Liu-Gitz & Banda, 2010). However, growing research provides evidence to suggest that a stereotypic behavior “comprises a class of operant behaviors maintained by reinforcement contingencies” (Cunningham & Schreibman, 2008, p.1). Although stereotypic behaviors occur during typical development, it is persistent in individuals with developmental disabilities, psychiatric disorders, and neurological conditions (Ahearn et al., 2007; Liu-Gitz & Banda, 2010). Stereotypic behaviors in children with

autism often persist until adulthood. It also interferes with learning and significantly limits the social interaction (Liu-Gitz & Banda, 2010).

One of the most common stereotypy found in individuals with Autism is echolalia (Lewis & Bodfish, 1998). Echolalia is classified into two different types: immediate and delayed echolalia. Once thought merely as a meaningless repetition of the speech of others, research has now identified echolalia as having a communicative intent for some students with ASD (Shuler, 1979). Just as any another stereotypic behaviors, echolalia serves and is driven by several different functions (Dyer & Hadden, 1981). Response Interruption and Redirection (RIRD) is an intervention that has been found to be useful in addressing stereotypic behaviors that are not maintained by social contingencies but rather are maintained by sensory/automatic reinforcements (Neitzel, 2009b).

For the purpose of this study, emphasis will be placed on the characteristics of autism, features of communication and stereotypic behaviors, echolalia and an in depth literary review on Response Interruption and Redirection (RIRD) strategy will be conducted. The review of literature was conducted using the search terms: RIRD, autism, stereotypic vocalization, delayed echolalia, immediate echolalia, stereotype behaviors, language disorders, communication of autism, automatic reinforcements, aberrant behaviors, response blocking, response interruption, matched stimuli, sensory extinction, noncontingent reinforcement, and differential reinforcement. The databases and journal articles were retrieved from Google Scholar, Eric, PubMed Central, Wilson OmniFile, Springer Link and Elton B. Stephens Company (EBSCO) host.

### **Characteristics of Autism**

Autism is a broad spectrum of disorders caused by neurological impairments (Simpson, Myles, & LaCava, 1998/2008). These disorders are characterized by social, communication, and



behavioral deficiencies. The severity of each challenging condition varies among individuals (Simpson et al., 1998/2008). The primary definition of autism that is used today comes from the clinical practice guide called the DSM-IV-TR (APA, 2000). In this context, autistic disorder, along with Childhood Disintegrative Disorder (CDD or Heller's), Rett's Disorder, Asperger Syndrome, and Pervasive Developmental Disorder- Not Otherwise Specified (PDD-NOS), is classified as a subcategory under the pervasive developmental disorder (PDD) (APA, 2000). Children diagnosed with PDD are known to have pervasive impairment in several areas of development which includes deficiencies in reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior, interests, and activities (APA, 2000). These behavioral patterns are displayed during the first three years of the child's life and are visibly abnormal in terms of the mental age or the developmental stage of the child (APA, 2000; Simpson et al., 1998/2008).

The DSM-IV-TR defines autism spectrum disorder (ASD) as individuals who display social interaction impairments; communication impairments; and repetitive, stereotypic, and restricted interests and activities prior to age three (APA, 2000). Social interaction impairments may include inability to use and understand nonverbal behaviors in social situations, lack of age appropriate peer relationships, absence of joint attention, and deficiencies in social or emotional reciprocity (APA, 2000). Communication impairments may include delays in, or an absence of spoken language, inability to initiate or sustain a conversation, atypical and stereotypical language, and deficiencies in age-appropriate spontaneous play (APA, 2000). Stereotypical and restricted patterns of behavior, activities, and interests may include restricted and stereotyped interest patterns and behaviors, obstinate adherence to nonfunctional rituals and routines,

stereotypic motor mannerisms, and persistent preoccupation with immoderate objects (APA, 2000).

The most current government survey on the rate of autism conducted in 2007 by Centers for Disease Control (CDC) states that the rate of autism spectrum disorder has increased compared to the studies conducted in the U.S. during the 1980s and early 1990s (National Institute of Mental Health (NIMH), 2008). Some debates exist about the accuracy of this study stating that the changes in the criteria used to diagnose autism and the increased recognition of the disorder may have contributed as a factor to this increased prevalence (NIMH, 2008). CDC estimates that between 1 in 80 and 1 in 240 with an average of 1 in 110 children in the United States have ASD (CDC, 2010). Studies have also found that ASD occur in all racial, ethnic, and socioeconomic groups but males have three to four times higher risk of being diagnosed with ASD compared to females (CDC, 2010).

**Characteristics of social interaction impairment.** Various observational research has identified the pervasive nature of the social deficiencies related to ASD. Social interaction deficits commonly seen in individuals with ASD include difficulty orienting to social stimuli, understanding facial expressions, and responding to another's distress. Other deficits include difficulty making eye contact when communicating, initiating interactions, using appropriate greetings, establishing joint attention, and comprehending conversational humor. Furthermore, Children with ASD show deficits in spontaneous play and initiation of pretend play (Weiss & Harris, 2001).

**Characteristics of communication impairments.** Early studies have indicated the significance of communication deficits prevalent to individuals with ASD. Kanner (1943), in his original description of children with ASD, pointed out the characteristics of language pattern

which includes: echolalia, pronoun reversal, utterances unrelated to the conversational context, unresponsiveness to questions, and lack of initiation to communicate either verbally or with gestures. Asperger (1944) had similar descriptions to that of Kanner's. In his description of children with higher functioning autism, Asperger added that the language of these children were idiosyncratic, verbose, and abnormal in terms of intonation and rhythm. Furthermore, Ogletree (1998/2008) states that individuals with ASD communicate either through nonverbal or emergent verbal means or through productive speech and language.

***Nonverbal communication.*** Bates (1979) referred to nonverbal communication as intentional nonsymbolic communication offered with knowledge of its effects on a listener. While typically developing children display nonsymbolic communication through conventional gestures (i.e. "isolated gestures characterized by contact with objects or persons") and vocalization (i.e. "limited sophistication characterized by infrequent use of consonants"), a person with ASD use both the conventional and unconventional (i.e. aberrant, self-injurious) communicative forms (Ogletree, 1998/2008, p.226). Furthermore, Prizant (1983b) stated that approximately 50% of children diagnosed with ASD develop some speech, whether it is echolalic or truly rule-governed language. Prizant suggests that 50% of children diagnosed with ASD will remain non-verbal even with intervention. However growing research has shown that with early intervention and effective instructional teaching methods, as many as 85%-95% of individuals with ASD learn to communicate verbally (Koegel, 2000).

***Emergent verbal communication.*** According to Ogletree (1998/2008) some individuals with ASD have emergent verbal communication abilities which can be developed through normal or atypical acquisition. Normal acquisition supports the theory that verbal communication in individuals with ASD emerges in a manner similar to the early patterns of

normal language development. An atypical acquisition of verbal communication of person with ASD, on the other hand, suggests that language emergence is acquired through atypical cognitive and linguistic growth. Echolalia has been viewed as the central piece in supporting this theory (Baltaxe & Simmons, 1977; Prizant & Duchan, 1981; Prizant, 1983b, Simon, 1975; Prizant & Rydell, 1984).

***Speech and language communication.*** Individuals with autism who develop speech and language abilities are marked by its highly complex nature (Ogletree 1998/2008). Ogletree suggests that an understanding of speech, language structure, and function is essential in reviewing these language abilities.

*Speech.* The speech pattern (i.e. articulatory or phonology) of individuals with autism are found to be a relative strength compared to other areas of communication and language (Ogletree 1998/2008). Several areas pertaining to the nature of voice may be impaired in individuals with autism. These areas include abnormalities of pitch, volume, stress, intonation, and timing (Ogletree 1998/2008).

*Language.* Expressive language, which includes form (i.e., morphology and syntax), content (i.e., semantics), and use (i.e., pragmatics) is another important area that needs to be reviewed. The form of expressive language in individuals with autism has been found to develop in a slow but typical pattern (Ogletree, 1998/2008). Language content, on the other hand shows greater impairment. Brook and Bowler (1992) found several semantic differences in individuals with autism which includes “problem encoding meaning relevant to conversation, literal interpretations of verbal messages, semantic confusion specific to temporal sequencing, and poor senses of semantic relationships” (Ogletree, 1998/2008, p. 233). Lastly, language use of individuals with autism has been viewed as the major area of communication deficiency

(Ogletree, 1998/2008). Tager-Flusberg (1981) supports these views as he stated that children with autism have relatively similar phonology, prosody, or syntax compared to children with language disorder; however, their ability to comprehend and use pragmatic language showed greater deficits.

*Function, reciprocity, and comprehension.* The function, reciprocity, and comprehension are also one of the prominent features of communication deficiency found in individuals with ASD regardless of the form and level of communication. The range of communicative function has been found to be restricted in children with autism who use intentional gestures and vocalization as means of communication (Ogletree, 1998/2008). Koegel (2000) emphasized the lack of development of the function of language in individuals with ASD regardless of the level of communication. She adds that the communication in individuals with ASD tends to be limited to requesting objects/actions and protesting.

Furthermore, Wetherby, Yonclas, & Bryan (1989) described reciprocity (discourse structure), as the use of an initiated or respondent communication act. Koegel (2000) emphasized the lack of spontaneous verbal and nonverbal initiations and added that spontaneous initiations seem to be the key factor that is missing in individuals with ASD which prevents socially competent interactions from taking place. Wetheby et al. (1989) suggested that individuals with ASD show greater deficiency in respondent communication compared to initiation. They pointed out the rigidity of communicative interactions and inconsistency in the usage of dialogue structure as the key deficiency in respondent communication. Lastly, Bartak et al. (1977) and Tager-Flusberg (1981) found that comprehension of speech were far below level compared to children with intellectual disabilities and normally developing children with matching non-verbal cognitive level.

**Characteristics of stereotypic behaviors.** Stereotypic behavior, also known as stereotypy is a broad term which refers to the restricted, repetitive, and stereotyped patterns of behaviors, activities and interests; therefore, a behavior can be labeled stereotypy when it is repetitive, rigid, invariance, and is developmentally and socially inappropriate (Cunningham & Schreibman, 2008). Stereotypic behaviors can be displayed in several different ways ranging from simple to complex forms. Simple forms of stereotypic behavior may include hand flapping, body rocking, toe walking, spinning objects, sniffing immediate and delayed echolalia, and running objects across one's peripheral vision. More complex forms of behaviors may include restricted and stereotyped patterns of interest or the demand for sameness of a ritual or routine (Cunningham & Schreibman, 2008; Liu-Gitz & Banda, 2010).

Stereotypic behaviors not only occur in individuals with autism but also in individuals with developmental disabilities (ex. Intellectual disabilities), psychiatric disorders, and neurological conditions (Bodfish, Symons, Parker, & Lewis, 2000; Cunningham & Schreibman, 2008). However, according to the study done by Bodfish et al., (2000), when compared to individuals with intellectual disabilities, stereotypic behaviors displayed by individuals with autism were more varied in forms and were more severe in terms of its intensity and frequencies. Moreover, stereotypic behaviors also occur in typical infants and toddlers and the behaviors can be similar to those of individuals with Autism across the lifespan (Cunningham & Schreibman, 2008). A research done by Smith and Van Houten (1996) showed that, when compared with children of matching chronological age, stereotypic behaviors in children with ASD were similar in terms of its percentage of occurrence and its variety of form but were rated more "bizarre" in that they displayed a higher level of obvious gross motor mannerism, visual intensity, and focus. With the given severity of form and rate, stereotypic behaviors in individuals with autism are

viewed as age-inappropriate in form, focus, context, duration and intensity (Cunningham & Schreibman, 2008). Due to this fact, stereotypic behaviors hinder individuals' involvement in community, interaction with peers and adults, and the ability to participate in educational settings (Cunningham & Schreibman, 2008; Liu-Gitz & Banda, 2010).

In order to successfully address this issue, research suggests the implementation of interventions based on the function of the stereotypic behavior. Once the function of the behavior is identified through functional analysis methodologies, intervention can focus on systematically manipulating the controlling environmental antecedents and consequences (Cunningham & Schreibman, 2008). There are several different theories on the function of stereotypic behavior (Ahearn et al., 2007; Cunningham & Schreibman, 2008; Jones, Wint, & Ellis, 1990; Lewis & Bodfish, 1998). The functional analysis perspective emphasizes the contingencies of social positive (ex. Attention, praise) and negative (ex. Escape or avoidance) reinforcements where the behavior is socially mediated (Ahearn et al., 2007; Cunningham & Schreibman, 2008; Jones et al., 1990; Lewis & Bodfish, 1998). The functional properties also include the sensory function of stereotypy where behavior is maintained by automatic reinforcements (Ahearn et al., 2007; Cunningham & Schreibman, 2008; Jones et al., 1990; Lewis & Bodfish, 1998). Similar to the automatic reinforcement theory, there are two different hypotheses driven from the self-stimulatory nature of stereotypic behavior. First is the perceptual reinforcement hypothesis. In this hypothesis, stereotypies are considered as "...learned, operant self-stimulatory behaviors for which the reinforcers are the perceptual stimuli automatically produced by the behavior" (Lewis & Bodfish, 1998, p.84). Another hypothesis is the sensorimotor integration hypothesis where the sensory deficits of the individual drive one to rely

on the kinesthetic (sensorymotor) feedback resulting from the motor output of the action (Lewis & Bodfish, 1998).

### **Vocal Stereotypy**

Vocal stereotypy can be displayed in variety of different forms ranging from repetitive utterance of unintelligible words or sounds to repetition of phrases from portions of conversation, videos, books previously heard (Taylor, Hoch, & Weissman, 2005). Some vocalizations have no apparent function and are not directed toward another individual. Some examples include echolalia, non-contextual laughing/giggling, non-contextual words/phrases, and non-recognizable words (Nietzel, 2009c).

One of the most common vocal stereotypy found in individuals with autism is echolalia (Lewis & Bodfish, 1998; Prizant, 1983b; Schuler, 1979). Echolalia refers to the repetition of utterance produced by another (Prizant & Rydell, 1984). Echolalia is a vocal stereotypy that fits in both of the diagnostic criteria of language delay and stereotypic behavior as it is a form of deviant language and is repetitive in nature (Prizant & Rydell, 1984). Although typically developing children also show some forms of repetition in language, echolalia in individuals with autism is significant in that it is evident in preschool and school age children and is characterized by “longer echoic utterance, a larger percentage of echoic utterances, delayed echolalia, and minimal mitigation” (Prizant & Duchan, 1981, p.241). Furthermore, echolalia spoken by individuals with ASD does not have clear evidence of communicative intent (Prizant & Rydell, 1984).

There are two different views regarding the presence of echolalia in children with ASD currently in debate. Some view echolalia as an undesirable behavior that needs to be eliminated for general behavioral progress to occur (Dyer & Hadden, 1981; Prizant & Duchan, 1981). In



this view, echolalia has been considered to be “meaningless parroting” that does not serve apparent function (Prizant & Rydell, 1984). On the other hand, there are those who consider echolalia as an important stage in acquiring primitive communication (Dyer & Hadden, 1981; Prizant & Duchan, 1981; Shuler, 1979). Such researchers believe that (immediate) echolalia is a primitive attempt to maintain social contact when he or she is at a situation where ones linguistic competence has reached its limits (Prizant & Duchan, 1981; Prizant & Rydell, 1984). There are two general categories of echolalia: immediate echolalia, which refers to the repetition of utterances of others immediately after their occurrence, and delayed echolalia which refers to the repetition of utterances of others sometime after their occurrence (Shuler, 1979).

**Immediate echolalia.** Much research has been conducted related to immediate echolalia regarding its structural linguistic considerations and its functions (Prizant & Rydell, 1984). Prizant and Duchan (1981), in attempt to find the function of immediate echolalia, conducted a systematic study by analyzing four students with autism who spoke with high rates of echolalic utterances. Through analyzing a videotape of 1,009 utterances produced by children during their interaction with familiar adults in school and at home during an 8 month period, authors were able to identify both the interactive and non-interactive nature of the echolalic speech. The authors were also able to see that some immediate echolalia was produced with evidence of comprehension while some were without. In the end, the authors categorized the function of immediate echolalia in seven different forms: nonfocused, turn-taking, declarative, yes-answer, request, rehearsal, and self-regulatory.

**Delayed echolalia.** Research conducted on delayed echolalia is limited due to the difficulties in making the correlation between normal language development as the context of the utterance most likely are not retained from the surroundings of the listener (Dyer & Hadden,

1981; Prizant & Rydell, 1984). Some studies have suggested that both immediate and delayed echolalia is an atypical cognitive and linguistic pattern that signals language emergence in individuals with ASD (Oggletree, 1998/2008). In support of this view, Baltaxe and Simmons (1977) conducted a study in attempt to understand the importance of delayed echolalia in language acquisition in children with autism. Through the collection of audio recordings of the bedtime soliloquies of an 8 year old girl with autism, they were able to conclude that the utterance was a delayed echolalia that did not have any communicative intent since it was produced in the absence of other people. After an in-depth analysis of the utterance, Baltaxe and Simmons concluded that some delayed echolalia are a type of linguistic practice as the child imposes structural changes through substituting, deleting, and conjoining segments of utterance to produce mitigated echolalia. They suggest that such practice may be the first step in acquiring rule-governed, generative linguistic system for children who speak using echolalia. Furthermore, Kanner (1973) theorized that delayed echolalia is an intermediate stage moving forward from immediate echolalia to a more flexible and creative form of communication.

Several studies have been conducted to analyze the function of delayed echolalia. Dyer and Hadden (1981), after an informal observation of students with autism, presented six functional categories of delayed echolalia: stereotypic, negativistic, egocentric, time-lag, transferred, and mitigated. Several other researchers have also defined some functions of delayed echolalia in a form of noncommunicative repetition, communicative repetition (Wolff & Chester, 1965), tact (label) (Ricks & Wing, 1975), and mand (request) (Simon, 1975).

Prizant and Rydell (1984) conducted the first systematic study in attempt to determine the function of delayed echolalia spontaneously spoken by individuals with autism. Through a systematic analysis of three boys with autism who displayed immediate and delayed echolalia,

they concluded that while some form of delayed echolalia clearly had communicative intent, some did not. Delayed echolalia in a form of clear communicative intent included requesting, protesting, labeling, calling, affirming, directing, and providing information. These forms coexisted with gaze between an adult and the desired object, repetition of utterance when adult did not submit to his wants, physical prompt by the child, and aggressive behaviors. Delayed echolalia that did not have any communicative intent were utterances driven by cognitive function (i.e. self-directive, rehearsal, noninteractive labeling), utterance driven by no clear function (i.e. nonfocused, no situational association) and utterance that served conversational or turn-filling function (i.e. turn taking, verbal completion). In conclusion, the authors pointed out that their findings cannot be generalized to all children with autism due to their limitations in terms of the small number of subject, their roughly equivalent linguistic status, and the unique nature of the usage of delayed echolalia by each individual. The authors also emphasized the importance of functional analyses of the communicative behavior of the student. They suggested that a successful intervention goals and intervention strategies come from understanding how the communicative system functions for each individual child (Prizant & Rydell, 1984).

### **Response Interruption and Redirection (RIRD)**

Response interruption/redirection (RIRD) is an intervention targeted to decrease interfering behaviors that are repetitive stereotypical, and self-injurious in nature (Neitzel, 2009c). RIRD is predominantly useful with behaviors that are not maintained by attention or escape but are likely maintained by sensory reinforcement. These behaviors are often resistant to intervention attempts, occur in a number of different settings and during variety of tasks, and are displayed even in settings where no one is around (Neitzel, 2009c). The components of the intervention includes the interruption of the problem behavior followed by the redirection to a

more appropriate alternative behavior (Neitzel, 2009c). During the interruption component, the teacher stops the student from engaging in the problem behavior with the use of physical or verbal blocking. The last component of the intervention is the delivery of reinforcement when student engages in appropriate behavior (Neitzel, 2009c).

RIRD is based on several studies that support the idea of reduction in stereotypic behaviors through sensory extinction (i.e. response blocking/ interruption) and functional matching (i.e. ones that, when manipulated, produce sensory consequences similar to those produced automatically by the target response). Several single-subject studies have found that intervention that removed the sensory component of stereotypy (i.e. response interruption, sensory extinction) and/or provide alternative but age-appropriate forms of matched stimuli in conjunction with other treatments (i.e. noncontingent reinforcement, differential reinforcement) resulted in the reduction of stereotypic behaviors that are maintained by sensory reinforcements for many individuals with autism (Goh, Iwata, Shore, DeLeon, erman, Ulrich, & Smith, 1995; Piazza, Adelinis, Hanley, Goh, & Delia, 2000; Rapp, 2006; Rapp, 2007; Rincover, 1978; Rincover, Cook, Peoples, & Packard, 1979; Lerman & Iwata, 1996; Reid, Parsons Phillips, & Green, 1993; Smith, Russo, & Le, 1999; Fisher, Lindauer, Alterson & Thompson, 1998; Sprague, Holland, & Thomas, 1997; Piazza, Hanley, & Fisher, 1996; Piazza, Fisher, Hanley, LeBlanc, Worsdell, Lindauer, & Keeney, 1998). See Table 1 for summary of these studies.

Effects of RIRD on vocal stereotypy will be discussed in depth for the purpose this study as it is the researcher's hypotheses that RIRD will reduce vocal stereotypy maintained by sensory contingencies. Today, there are only three studies about the effects of RIRD on vocal stereotypy (Ahearn, Clark, MacDonald, & Chung, 2007; Liu-Gitz & Banda, 2010; Miguel, Clark, Tereshko, & Ahearn, 2009).

Table 1

*Summary of studies that employed response blocking and/or matching stimuli for behaviors maintained by automatic reinforcements*

<b>Author(s) &amp; year</b>	<b>n</b>	<b>diagnosis</b>	<b>Behavioral topography</b>	<b>Hypothesis of behavioral function</b>	<b>Intervention(s)</b>	<b>Results</b>
Fisher et al., 1998	2	- Moderate ID - autism	Property destruction, stereotypy: - tapping objects - touching or manipulating string-like pieces of material	Destruction of materials to provide preferred materials for stereotypic behavior	- NCR of matched and unmatched stimuli - NCR of matched stimuli - response blocking	- availability of matched stimuli resulted in decreases in both property destruction and stereotypy, whereas unmatched stimuli were only minimally effective - response blocking reduced property destruction and increased manipulation of the toys that matched stimuli.
Goh et al., 1995	9	Profound ID	Hand mouthing	Hand stimulation	-NCR of matched stimuli - response cost	Reduction in hand mouthing to near zero.
Lerman & Iwata, 1996	1	Profound ID	Hand mouthing	Oral or hand stimulation	Response blocking	response blocking functioned as a punishment which resulted in decrease in behavior
Piazza, et al., 2000	3	- ADHD and severe ID - ADHD and severe ID - profound ID	- Dangerous acts (jumping from high places) - saliva play - hand mouthing	- Kinesthetic stimulation -manipulation of viscous substance - oral or hand stimulation	- NCR of matched stimuli - NCR of unmatched stimuli	Items matching the hypothesized sensory consequences of aberrant behavior were associated with lower levels of aberrant behavior during the preference assessment sessions relative to the levels of aberrant behavior associated with unmatched stimuli.
Piazza, et al., 1998	3	- Profound ID, - severe ID and autism, -autism, ADHD, moderate ID	Pica	Oral stimulation	- NCR of matched stimuli - NCR of matched stimuli plus response blocking	- NCR of matched stimuli reduced pica for two participants - one participant needed response blocking procedure with NCR of matched stimuli to reduce pica
Piazza, et al., 1996	1	Autism, severe ID	Pica of cigarette butts	Access to tobacco for nicotine consumption	- NCR of matched stimuli - response interruption	- NCR of matched stimuli did not reduce behavior - response interruption (i.e., eliminate the effects of nicotine consumption by preventing the response) reduced behavior

Rapp, 2006	1	- Autism - ID	Stereotypy (object tapping)	Tactile and auditory stimulation	- NCR of matched stimuli - response blocking	Stereotypy was always higher after response blocking than before response blocking and was always lower after access NCR of matched stimuli than before NCR.
Rapp, 2007	2	- Autism - ID	Vocal stereotypy	Auditory stimulation	- no intervention - NCR of matched stimuli - response blocking (contingent reprimands)	- Persistent reductions in stereotypic behavior followed by NCR phase and no intervention phase (noncontingent access to vocal stereotypy). - Although contingent reprimands decreased vocal stereotypy during intervention, the removal of reprimands was correlated with increased vocal stereotypy.
Reid et al., 1993	2	Profound mental and physical impairments	SIB (hand mouthing)	sensory stimulation	Response blocking	response blocking functioned as an extinction procedure which resulted in decrease in behavior
Rincover, 1978	3	- Autism - Autism - Profound ID	SSB	- auditory - visual - proprioceptive	Sensory extinction	self-stimulatory behavior decreased as the sensory consequence was removed and increased when the consequence was permitted
Rincover et al., 1979	4	DD	SSB	auditory, proprioceptive, or visual stimulation	Sensory extinction plus NCR of matched stimuli	- extinction in self-stimulatory behavior - increase in appropriate play and the suppression of self-stimulation were maintained
Smith, et al., 1999	1	DD	SIB (eye poking)	Sensory stimulation	Response blocking	response blocking functioned as an extinction procedure resulted in decrease in behavior
Sprague et al., 1997	2	- Severe ID, - legal blindness, - moderate hearing impairment, - chronic seizures	- SSB - SIB	Auditory, tactile stimulation	NCR of matched stimuli plus response interruption	- NCR of matched stimuli were more effective than traditional consequences such as praise or food in suppressing stereotypy and SIB behavior. - NCR of matched stimuli plus response interruption reduced SSB and SIB

*Note.* *n* = number of participants; ID = intellectual disabilities (studies have recorded this disorder as Mental Retardation); ADHD = attention deficit hyperactive disorder; SSB = self-stimulatory behavior; SIB = self-injurious behaviors; DD = developmental disabilities; NCR = noncontingent reinforcement

**Ahearn et al., (2007).** Ahearn et al., (2007) conducted the first study to find the effectiveness of RIRD on vocal stereotypy. The study had 4 participants (two boys and two girls, ages three to eleven) diagnosed with autism, who exhibited vocal stereotypy that interfered with their participation in educational activities or occurred at unacceptable levels outside class. The intervention sessions were conducted in a clinical setting on a one on one basis with the instructor. Vocal stereotypy was defined as any instance of noncontextual or nonfunctional speech and included singing, babbling, repetitive grunts, squeals, and phrases that were out of context. Functional analysis indicated that vocal stereotypy occurred at the highest level during the alone condition for 2 students. Vocal stereotypy on the other two students occurred at a high rate during independent play time. These results implied that vocal stereotypy for all 4 students were maintained by sensory contingencies.

The study was conducted in an ABAB withdrawal design. The intervention consisted of immediately interrupting noncontextual vocalizations and redirecting to other appropriate vocalizations. The teacher provided prompts for appropriate language until the student complied with three consecutive correct responses in the absence of vocal stereotypy. The teacher then delivered praise to the student for using appropriate language and honored requests if possible. Alternative vocalization consisted of answering social questions (i.e. “what is your name?”) for three students, and vocal imitation (i.e. “say ball”) for one subject. Baseline and intervention sessions were done in 5 minute duration. The teacher stopped the time clock every time RIRD was implemented and then restarted after the delivery of social praise following three consecutive instance of compliance.

Results showed that vocal stereotypy on all students were reduced while appropriate vocalization increased during the treatment session. Furthermore, during a follow up study, it

was noted that levels of vocal stereotypy in the natural environment were substantially lower in the postintervention probes than in the preintervention probes (student 1: pretreatment 33% and 44%, posttreatment 1% and 4%; student 2: pretreatment 24% and 77%, posttreatment 3% and 13%; student 3: pretreatment 54% and 78%, posttreatment 16% and 24%; student 4: unavailable). Furthermore, results indicated that RIRD is not only successful in decreasing the stereotypic vocalization but also resulted in the increase of appropriate vocalizations (i.e. mands, tacts, comments, and greetings).

**Miguel et al., (2009).** The second study was conducted by Miguel et al., (2009). They examined the effects of RIRD with and without a Selective Serotonin Reuptake Inhibitors (SSRIs) medication in the treatment of automatically reinforced vocal stereotypy displayed by a 4-year-old child diagnosed with autism. The Specific SSRIs medication used was sertraline (Zoloft™). Despite the intake of sertraline, the child was displaying high level of vocal and motor stereotypy. These behaviors were interfering with his learning, and prevented him from participating in a variety of activities with his peers. Vocal stereotypy was defined as any instances of noncontextual or nonfunctional speech and included sustained vowel sounds, varying pitches of a sound, and spit swooshing at an audible level. Appropriate vocalization was defined as the emission of a verbal utterance known to function as a mand or a tact. Functional analysis was conducted to conclude that the student's behavior was maintained by automatic reinforcement.

The study was evaluated using an ABABC reversal design in which A was sertraline only, B was RIRD plus sertraline and C was RIRD only. During baseline condition, sertraline was present and every instance of vocal stereotypy was interrupted by removal of any item with which the student was engaged. During the RIRD plus sertraline condition, RIRD was



implemented in the same procedure done by Adhearn et al., (2007). In the RIRD only condition, sertraline was systematically faded across 5 days while RIRD was implemented. During a follow up session, which was conducted after 2 weeks without sertraline, only RIRD was implemented.

The result of this study indicated that RIRD was effective in treating vocal stereotypy while sertraline was not. During the sertraline only phase, vocal stereotypy was present on an average of 49%. When RIRD was implemented, the average dropped to an average of 11.6%. While percentage of vocal stereotypy returned to original level (49%) during reversal condition, an immediate decrease in vocal stereotypy was present (8.8%) with the introduction of RIRD and remained the same during the follow up condition. The average rate of appropriate vocalization increased from 6.3 per session to 15.8. These results were similar to the study conducted by Ahearn et al. in that vocal stereotypy decreased while appropriate vocalization (i.e. mands) increased with the use of RIRD.

**Liu-Gitz and Banda (2010).** The last, and the most recent study by Liu-Gitz and Banda (2010), replicated the RIRD strategy to decrease vocal stereotypy in a student with autism who displayed vocal behaviors that ranged from high pitched yelling or whining to whistling, laughing, making burping noises, and making blowing sounds. The intervention was conducted at a special education classroom setting where a lead teacher and a co-teacher, along with five children, were present. Functional analysis was conducted and the researchers concluded that the stereotypic vocalization was maintained by automatic reinforcement.

An ABAB reversal design was used to determine the effectiveness of the RIRD strategy. The RIRD intervention consisted of interrupting stereotypic vocalization and redirecting student to a more appropriate vocalization through asking questions related to the student's topic of interest. During the baseline condition, the student displayed vocal stereotypy in a rate of 41%.

During the RIRD intervention session, vocal stereotypy decreased to 10%. During the reversal condition, the student's behavior increased to 51%. When RIRD was reintroduced, his vocal behavior decreased to 9%. The results showed effectiveness of RIRD strategy in decreasing vocal stereotypy in a more naturalistic setting; however, the study did not show whether an increase in appropriate vocalization was present.

### **Summary**

As presented by the studies above, RIRD is an effective intervention that can be employed to decrease vocal stereotypy maintained by automatic sensory reinforcement. The purpose of this study is to replicate the studies done above with an intention to add to the literature on the effectiveness of RIRD on vocal stereotypy. This study intends to answer the following questions:

1. Is RIRD an effective intervention to decrease vocal stereotypy maintained by automatic sensory reinforcement?
2. Will implementing RIRD increase appropriate vocalization in students with ASD?
3. Can RIRD be generalized to different settings when intervention sessions are removed from the student's schedule?

## CHAPTER III

### Method

Response Interruption and Redirection (RIRD) is based on the idea of reduction in automatically maintained stereotypic behaviors through sensory extinction and functional matching. The objective of the intervention is to remove the sensory component of the stereotypic behavior and provide alternative but age-appropriate forms of matched stimuli in conjunction with other treatments such as noncontingent or differential reinforcements. Only few studies are available today on the effects of RIRD on vocal stereotypy maintained by automatic reinforcement; thus, the current study was conducted to examine the effectiveness of RIRD on such behavior in order to contribute to the existing literature.

### Setting

The experimental sessions were conducted in the autism resource room during the regular school hours. The resource room had five children diagnosed with autism lead by one special education teacher with five paraeducators. The autism resource room had five office spaces divided by wooden walls. They were set up at an approximate distance apart from each other so that each student had their own independent work area. However, the cubicles were only separated by wooden boards which made it difficult to control the noise level when several students were in their independent area simultaneously.

### Participant

One participant, who will be referred to as “Larry” for the purpose of this study, was chosen as the subject for the current research. Larry was a 9-year-old boy diagnosed with autism. Larry’s total raw score on the *Childhood Autism Rating Scale*, second edition, (CARS2), was 53.5 (Schopler, Reichler, and Rennver, 2010). This score indicated that his diagnostic

categorized under the severe symptoms of autism spectrum disorder range. Larry received special education services at the public school which he attended. He was placed in the autism resource room for most of his school hours for one on one instruction with the special education teacher and paraeducators. He also received instructions in the inclusive setting at the general education classroom for some subjects such as science, social studies, music, art, and gym. Other special education services provided for him included speech therapy, music therapy, occupational therapy, and adapted physical education. Larry displayed several areas of strengths related to educational performance and showed evidence that he was capable of learning as long as it was taught in ways he understood best. He was aware of his environment and readily learned routines. He was able to transition independently and understood visual schedule and accurately followed them. His verbal communication was in the range of “moderately abnormal” range according to the description under CARS2. His speech consisted of some meaningful speech and some peculiar speech such as jargon, delayed echolalia, and vocal stereotypy. Peculiarities in meaningful speech included excessive questioning or preoccupation with particular topics. Furthermore, he was able to communicate verbally for the purpose of requesting specific items and activities, labeling, rejecting, greetings, and farewells with some prompting from the adult. He was also capable of answering basic social questions (i.e. “what is your name?”).

More recently, his special education and general education teachers became concerned regarding the severity level and frequency of his vocal stereotypy throughout his school hours. His behavior especially was not only interfering with his academics but was also disruptive to others especially during inclusive setting in the general education classroom. Consequently, most of his academic instructions had to take place in the resource room on a one on one basis with

the teacher or the paraeducator. His vocal stereotypy consisted of vocalizations that were not recognizable words and involved non-contextual laughing, giggling, words, or phrases. Majority of his vocalization were delayed echolalia which consisted of non-contextual repetition of phrases from his favorite cartoon “Veggie Tales.” Although some of his vocal stereotypy had functions (i.e. mand and tact), most of his responses had no apparent function and were not directed to anyone in particular. Teachers generally gave verbal reminders (i.e. “quiet voice!”) whenever vocal stereotypy was present; however, this strategy was only successful in silencing Larry for few seconds before he began to vocalize again. Functional behavior assessment was needed to support the hypothesis that his behavior was maintained by sensory stimulation. Also, an operational definition of Larry’s vocal stereotypy needed to be defined. Finally, an intervention was desperately in need in order for Larry to successfully be included in the general educational setting and for appropriate learning and social interaction to take place.

**Functional behavior assessment (FBA).** Informal measurement methods through direct observations by the teachers were carried out in order to analyze the function of Larry’s vocal stereotypy. The assessments used were Functional Analysis Screening Tool (FAST), Fifth Edition, (Florida Center on Self-injury, 2002), Motivation Assessment Scale (Durand and Crimmins, 1992), and Antecedent Behavior Consequence Response (ABCR) observation.

**Functional Analysis Screening Tool.** According to the FAST, Bob’s problem behavior’s potential source of reinforcement was sensory stimulation (Score = 3 points). Another possible reinforcement for Bob’s stereotypic vocalization was social reinforcement to gain attention or preferred activities (Score = 2 points). Bob’s behavior was unlikely due to pain attenuation or used for escaping a situation (Score = 1 points).

***Motivation Assessment Scale.*** Motivation Assessment Scale by Durand and Crimmins (1992), also showed that Bob's behavior was highly due to sensory stimulation. However, this assessment results indicated escape and tangible reinforcements as second highest possible motivation for the problem behavior. Also, unlike FAST, this assessment tool showed that Bob's problem behavior's least motivating reinforcement was to gain attention through his behavior.

***ABCR observation.*** Through the ABCR observation (Table 2 and 3), it was evident that Larry engaged in the target behavior during the "down time" or during a short transition time moving from one activity to another. When Larry was engaged in an activity, he was less prone to engage in the target behavior. He engaged in off task scripting when he was initially asked to perform a task but he stopped engaging in the behavior when his behavior was ignored or when he was prompted to have a quiet voice. It is unclear if the function of his behavior was to escape or avoid work because once he was engaged in the activity, he did not display the behavior.

***FBA data interpretation and target behavior hypotheses.*** Although Functional Analysis Screening Tool (FAST) and Motivation Assessment Scale showed some different results, sensory stimulation appeared to be the highest motivating reinforcement for Larry's vocal stereotypy. Thus, one possible hypothesis for Larry's vocal stereotypy was to gain sensory stimulation through constant vocalization. Furthermore, an analysis of ABCR observation indicated that the target behavior increased when more demands were placed on Larry; however, it was hard to conclude that the function of the behavior was escape because once he was engaged in an activity, his target behavior decreased. Also, the behavior did not seem to be attention seeking as his behavior decreased when they were ignored. Moreover, direct teacher observation indicated that escape and attention seeking was probably not the function of the behavior because the target behaviors were also present during preferred activities and alone

Table 2.

*A-B-C-R Observation during one on one instructional setting: Reading*

<b>Time</b>	<b>Setting/ Activity</b>	<b>Antecedent</b>	<b>Behavior</b>	<b>Consequence</b>	<b>Response</b>
9:07	Transition from reading a book to spelling.	The teacher is putting a book away and pulling spelling book out.	The student engages in off task scripting for 10 seconds.	The teacher ignores the student's behavior.	Stops displaying the behavior and continues to engage in teacher instructions.
9:18	Transition from spelling to reading a book.	The teacher shows a book to student and explains that they will be reading another book.	The student engages in off task scripting	The teacher ignores the student's behavior.	Stops displaying the behavior and continues to engage in teacher instructions.
9:22	Reading	Teacher asks to write a sentence about a book. He is asked to copy a sentence off a book that he just read.	The student engages in off task scripting for 30 seconds.	The teacher ignores the behavior and continues to prompt student to write.	The student stops displaying the behavior and follows teacher instructions.
9:24	Reading	Student is asked to read a book out loud.	Student engages in off task scripting for 5 seconds.	Teacher ignores the behavior.	Student stops displaying the behavior.
9:25	Reading	The teacher is talking about the book they just read together and asks student to write a sentence about the book.	Student engages in off task scripting.	Teacher ignores the behavior and continues working.	Stops behavior.
9:26	Reading	Teacher asks questions about the book after reading a page from the book.	The student engages in off task scripting by saying "ew~" out loud.	The teacher responds by saying "We're almost done!" "it's almost time for break!"	Student stops displaying the behavior.

Table 3

*A-B-C-R Observation during One on one instructional setting with Speech therapist*

<b>Time</b>	<b>Antecedent</b>	<b>Behavior</b>	<b>Consequence</b>	<b>Response</b>
1:05	Waiting for teacher to get the communication device ready.	Off task scripting	Ignores the behaviors then directs student to stop by saying "Quiet Voice."	Stops engaging in the behavior.
1:10	The teacher asks the student to point to the "first" item in the picture.	Off task scripting	Teacher directs the students to stop by saying "Quiet Voice."	Stops and asks teacher for "game"
1:14	The teacher asks the student to press the button that says "first" on his communication device.	Off task scripting	Ignores the behavior and continues to prompt student to press the button.	Stops and presses the button.
1:18	Transition: Teacher gets ready for next set of flashcards.	Off task scripting	Ignores student behaviors.	Stops engaging in the behavior.
1:19	The teacher asks student to point to the first item in the picture.	Off task scripting	The teacher says "quiet voice"	Stops and points to the answer.
1:20	The teacher gets ready to play the "memory game" with the student.	Off task scripting	Prompts student to help set up the cards.	The student stops engaging in the behavior and helps the teacher set up the cards.

time such as lunch, recess, and break time. Thus, the researcher hypothesized that Larry's vocal stereotypy functioned as a sensory stimulation in some way that satisfied his sensory needs. This hypothesis led the researcher to conclude that RIRD was the most appropriate intervention to address the target behavior.

**Operational definition of dependent variable.** Larry's vocal stereotypy was defined as any vocalizations that had no apparent function and are not directed toward other individuals.



FBA results indicated that these behaviors were maintained by sensory stimulation. Examples of Larry's vocal stereotypy included: vocalizations that were not recognizable words and are not direct response to teacher request for vocal response; non-contextual laughing or giggling that were not in response to interaction with materials or interaction with another person; non-contextual phrases such as delayed echolalia of scripts from cartoons; sustained vowel sounds; and varying pitches of sounds. A non-examples of vocal stereotypy included: crying; screaming; laughing in response to tickling; noises associated with a play action; smiling that does not produce an audible sound; approximations of word or request; immediate echolalia; or repetition of word or phrase in attempt to gain teacher attention or response (MacDonald, Green, Mansfield, Geckeler, Gardenier, Anderson, Holcomb, & Sanchez, 2007). Appropriate vocalization was defined as any verbal utterance known to function as a mand or tact that is not part of academic instruction. Examples include: making requests, labeling items, or phrases such as "all done," "no more," or "Happy?"

### **Intervention**

RIRD is an intervention targeted to decrease the vocal stereotypy maintained by sensory stimulation. Functional behavior assessment (FBA) was first conducted to determine the function of Larry's interfering behavior. Based on the FBA and direct student observation, operational definition of Larry's vocal stereotypy and appropriate vocalization was defined. Baseline data was collected to find out how often he was engaging in the interfering behavior. Response Interruption and Redirection Strategy was then implemented throughout the Larry's school day by the teachers and paraeducators. During this process, the teacher redirected Larry to use an identified alternative behavior by: a.) saying Larry's name in a neutral tone of voice; b.) establishing eye contact with the him, and c.) asking a social question to prompt Larry to use an

alternative vocalization. Alternative behaviors included teaching Larry to say, "I don't know," engaging Larry to a social communication by asking social questions (i.e. "where do you live?" or "What color is your shirt?") and directing him to say a more appropriate language. After redirecting Larry to the alternative behavior, the teacher redirected him to engage in the alternative behavior for a specified period of time. Then the teacher provided reinforcement immediately after Larry engaged in the alternative behavior for the specified amount of time. Reinforcements included: praise, edibles (chocolate chip, fruit snacks, Nerds), token, breaks, and hugs. The teacher monitored Larry's progress by collecting data to evaluate whether the interfering behavior decreases as a result of the intervention.

### **Experimental Design**

The effects of RIRD were demonstrated in an A (one week Baseline) - B (two weeks Intervention) - A (one week Baseline) - B (one week Intervention) single subject reversal design. A follow up session was conducted for one more week to analyze the effects of RIRD. The research design was used to demonstrate the experimental effect at three points in time through demonstration that the dependent variable (vocal stereotypy) change co-varies with manipulation (introduction and removal of RIRD) of the independent variable between Baseline and Intervention phases (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). The sessions took place daily at a natural learning environment (one on one setting) familiar to Larry during a set period of time (9:00-10:00, 10:00-11:30, and 12:20-1:45) and subjects (reading, writing, and math). The intervention was implemented by the adult who was responsible in teaching the selected subject area (special education teacher and two paraeducators) during a one on one instructional setting. There were no designated observers during the intervention, thus the adult teaching the subject implemented and recorded the data at the same time.

## **Procedure**

Prior to implementing the intervention, permission was granted from the University of Kansas Human Subject Committee- Lawrence (HSC-L) and the cooperating school district. After receiving an approval from the HSC-L and the cooperating school district, consent forms were sent home to Larry's parents. They agreed to take part in the study through sending back to the researcher the signed consent forms. Then the assent scripts were read to Larry and a verbal agreement to participate in the study was obtained. Prior to the implementation of the intervention, the special education teacher along with two paraeducators designated to take part in the study were trained on how to implement the RIRD strategy. The target behavior was discussed and the definition of vocal stereotypy was explained in detail. The steps for the intervention were verbally taught to each teachers and a written description of the steps were placed on Larry's folder so that they may have access to them whenever it was necessary. Finally, each teacher observed the researcher implement the strategy on Larry to see how the intervention was carried out.

**Baseline.** During the baseline condition, the teacher or the paraeducator was instructed to interact with Larry as they normally did during their lesson. The teacher and the paraeducator directed Larry to have a quiet voice when he engaged in the vocal stereotypy. The rate of vocal stereotypy was measured during the three selected periods (reading, 9:00-10:00; writing, 10:00-11:30; and math, 12:20-1:45). The data sheet was divided into five minute intervals, which had 48 blocks of five minute frames (see Appendix D). If the problem behavior was present any time in that five minute frame, then the teacher marked with a letter "V" to indicate that the behavior was present. If vocal stereotypy was not present in that five minute time frame, then the teacher marked with an "x." For example, if Larry displayed vocal stereotypy for a total number of eight

times during the selected periods (reading, 9:00-10:00; writing, 10:00-11:30; and math, 12:20-1:45), then the percentage was obtained by dividing that number by 48 then multiplying them by 100 (i.e.  $(8/48) \times 100 = 17\%$ ) to obtain the total rate of vocal stereotypy displayed during those periods. During the baseline condition, data on the number of instances of appropriate vocalization during the three selected periods (reading, 9:00-10:00; writing, 10:00-11:30; and math, 12:20-1:45) were also collected through writing down a tally mark each time the teacher observed Larry engaging in an appropriate communication. The frequency rate of appropriate communication was obtained by adding the total number of tally marks collected during the three selected periods divided by the total number of periods the data was collected from. For example, the initial baseline consisted of five days with four reading periods, four writing periods, and five math periods in which the data was collected from. The total number of appropriate vocalization collected from those 13 periods (4 reading + 4 writing + 5 math = 13 periods) were 77. The total rate of appropriate vocalization per period was obtained by dividing 77 by 13 which equaled to six appropriate vocalization per period.

**Response Interruption and Redirection.** The first time the RIRD was introduced, it was implemented daily for two weeks during three designated periods of time (reading, 9:00-10:00; writing, 10:00-11:30; and math, 12:20-1:45) of Larry's school day by the teacher and the paraeducator at a natural learning environment familiar to Larry. The second time it was introduced, it was implemented for one week. When Larry engaged in vocal stereotypy the following steps were implemented by the teacher. First, the teacher redirected Larry to use an alternative behavior by a.) calling his name in a neutral tone of voice; b.) establishing eye contact; and c.) asking a social question to prompt Larry to use an alternative vocalization by giving an answer appropriate to the question. Alternative behaviors included answers to questions related

to Larry's favorite cartoon characters and social questions that Larry could easily answer. For example when Larry began to engage in vocal stereotypy during work time, the teacher asked him questions such as "Where do you live?" or "What color is your shirt?" Larry was required to answer three consecutive questions appropriately without engaging in the vocal stereotypy before he was provided with reinforcement. Larry's preferred reinforcements included edibles, one minute break time with preferred toys, or tokens (ten tokens equaled to a five minute break). In addition, teachers were directed to praise any appropriate vocalization and honor those requests that could be accommodated. This naturally became a social reinforcement. During the RIRD condition, data was collected in the same method as it was done during the baseline condition to obtain the percentage rate of vocal stereotypy during the designated periods while RIRD was being implemented. However, data on appropriate vocalizations were not taken during the RIRD condition. The researcher concluded that data on appropriate vocalization would be a confounding variable that would not have communicated effectively if included in the RIRD condition.

### **Summary**

As Larry's vocal stereotypy increased in intensity and frequency, he was no longer able to participate in the general educational setting. His behavior was obviously interfering with his learning and social interaction. An indebt analysis was needed in order to understand Larry's behavior so that an appropriate intervention could be implemented. First, the operational definition of Larry's vocal stereotypy was defined as any vocalizations that had no apparent function and are not directed toward other individuals. Then an FBA was conducted to analyze the function of his behavior. The results of the analysis indicated that the behavior was potentially maintained by sensory stimulation, which led to a conclusion that RIRD would be an

appropriate intervention to address this behavior. An ABAB reversal design was used to conduct the study where the baseline conditions and the intervention phases were a week long each. The baseline data collection and the implementation of the intervention were conducted every day during the designated class periods.

## CHAPTR IV

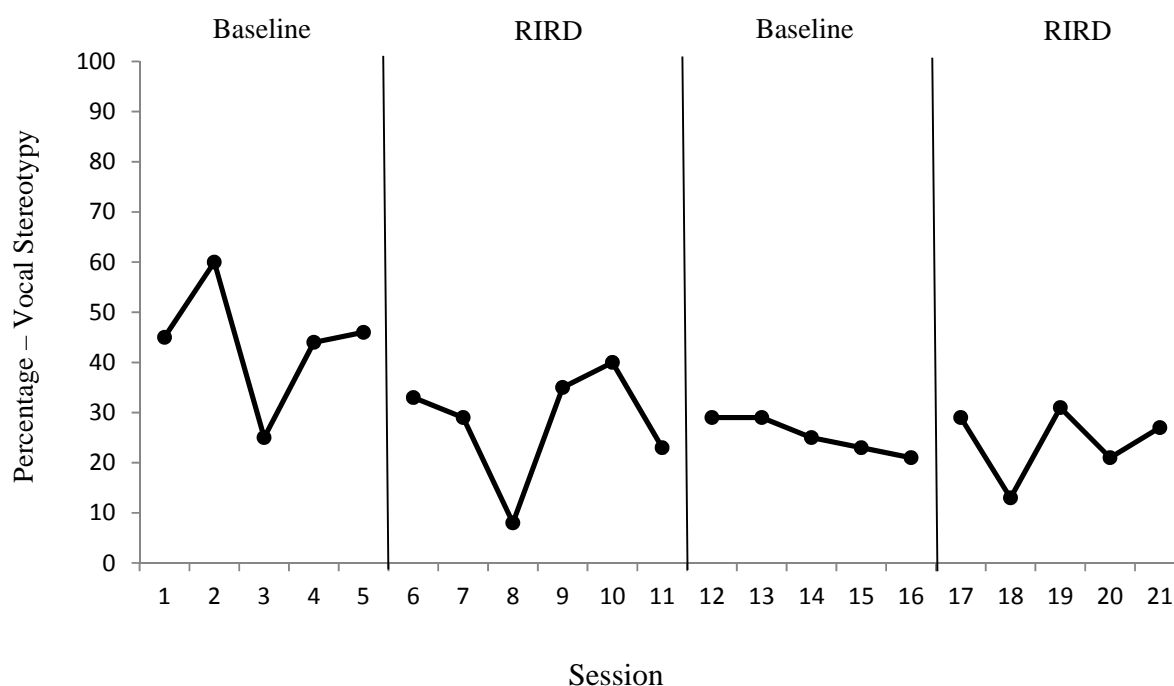
### Results

A study was conducted to evaluate the effects of Response Interruption and Redirection (RIRD) strategy on vocal stereotypy maintained by sensory stimulation. A single subject ABAB reversal design was used to conduct the study. Furthermore, the research was also conducted to evaluate the effects of RIRD on increasing appropriate vocalization.

#### Baseline and Intervention Results

As displayed in Figure 1, during the initial baseline condition, Larry engaged in vocal stereotypy on an average of 44% during the three periods of time selected for the purpose of this study (reading, 9:00-10:00; writing, 10:00-11:30; and math, 12:20-1:45).

*Figure 1.* Percentage of occurrences of Larry's vocal stereotypy behavior



Larry's appropriate vocalization during this condition was on an average of six instances per period. When RIRD was introduced, vocal stereotypy decreased to an average of 28%. When returned to the baseline condition, Vocal stereotypy decreased more to an average of 25% even without the implementation of RIRD. Though not significantly, there was an increase in appropriate vocalization from an average of six to an average of eight instances per period. After the reintroduction of RIRD, vocal stereotypy decreased by 1% (average of 24%). As a whole, Larry's vocal stereotypy decreased by 20% with the implementation of RIRD and his appropriate vocalization increased from six instances per period to eight instances.

### **Summary**

Data collected during the follow up session, which took place on the following week after the last intervention of RIRD, indicated that the overall rate of vocal stereotypy during the three selected periods were on an average of 29%, which is 15% less than the pre-intervention probes. This result along with the previous results mentioned above, indicated that RIRD was an effective method in decreasing Larry's vocal stereotypy. However, the data collected on appropriate vocalization indicated that RIRD was not successful in increasing Larry's appropriate vocalization. The data collected during the follow up study also supported the previous results as the frequency of appropriate vocalization remained as six instances per period which was the same average collected during the baseline condition.



## **CHAPTER V**

### **Discussion and Conclusions**

This study was conducted to examine the effects of Response Interruption and Redirection strategy on vocal stereotypy maintained by sensory stimulation. The researcher hypothesized that RIRD would decrease the vocal stereotypy for Larry and would increase appropriate vocalizations. Study results indicated that implementation of RIRD strategy decreased the rate of vocal stereotypy while significant changes were not visible in terms of Larry's appropriate vocalization.

#### **Discussion**

The current study verified the effectiveness of RIRD intervention in reducing Larry's vocal stereotypy. This result suggests two possibilities on how vocal stereotypy maintained by sensory stimulation could have decreased with the use of RIRD. First, the response interruption could have reduced the sensory consequence of vocal stereotypy thus resulting in extinction of behavior. Another possibility is that the appropriate vocalization could have been more reinforcing for Larry (Ahearn et al., 2007).

The RIRD intervention was profitable to Larry in many different ways. First of all, this intervention provided opportunities for Larry to respond with appropriate vocalization. Teachers and paraeducators were obligated to converse with Larry where without the intervention these occasions would have not been provided. Earlier studies have indicated the importance of vocal stereotypy in acquiring primitive communication (Dyer & Hadden, 1981; Prizant & Duchan, 1981; Shuler, 1979). These studies believed that vocal stereotypy is a primitive attempt to maintain social contact when he or she is at a situation where ones linguistic competence has reached its limits (Prizant & Duchan, 1981; Prizant & Rydell, 1984). Through the

implementation of RIRD, more opportunities were provided by the teachers for Larry to vocally express appropriate behavior. Furthermore, teachers were reminded of the importance of persistent communication with the students outside of the academic instructions.

In addition, RIRD intervention allowed teachers to take account of the student's interest when implementing the strategy. For instance, when prompting Larry to use a more appropriate verbalization, teachers asked questions that were related to Larry's favorite cartoon. Teacher and paraeducators reported that Larry's level of engagement in the intervention questions were very high, thus the intervention was easily implemented. Although the response interruption could have served as a punishment, the redirection to a more appropriate verbalization with the use of Larry's favorite topic could have served as reinforcement in itself.

Lastly, RIRD strategy encouraged teachers to acknowledge the appropriate verbalization by praise and reinforcements. Before the implementation of RIRD, the response interruption strategy was somewhat in place as the teacher stopped the behavior by saying "quiet voice." However, the redirection and reinforcing appropriate vocalization were not in place. Providing social attention and a temporary escape from the task demand may have played an important role in decreasing Larry's vocal stereotypy.

Although results indicated that Larry's appropriate verbalization remained the same compared to the initial baseline condition, teachers have reported that Larry's initiation of communication and expression of wants and needs have increased during the regular school hours during and after the implementation of RIRD. This can be due to several reasons. First, teacher praise for appropriate communication could have encouraged Larry to use appropriate words previously praised during the RIRD intervention. Second, teachers carried out Larry's requests when it was asked with an appropriate vocalization. This could have naturally taught

Larry to use specific words or phrases that were appropriate. Lastly, teachers were more intuitive to Larry's vocal stereotypy all throughout the school day thus encouraged him to use a more appropriate vocalization even when RIRD was technically not being implemented. Furthermore, teachers have reported that the decrease in Larry's vocal stereotypy provided a more effective learning environment and social interaction.

### **Limitation**

There were several limitations to this study which involved the functional behavioral analysis (FBA), single subject research design, inter-rater reliability, data collection and time limitation. First, the FBA conducted for the purpose of this study did not give enough evidence to conclude that Larry's vocal stereotypy was automatically reinforced by sensory stimulation. The nature of the behavior made it difficult to test the function and obtain the assurance behind the function of the stereotypy. It is also possible that Larry's vocal stereotypy was driven by multiple functions other than sensory reinforcement alone; however, due to the limitation of FBA, it was not possible to support such assumptions. Nevertheless, RIRD addressed multiple functions and decreased vocal stereotypy in the case of the participant this study (Liu-Gitz and Banda, 2010).

Another limitation is the single subject research design of this study. Although RIRD was effective on the participant of this study, its effects across multiple subjects are not provided. The results are limited to one participant, thus the validity of the effects of RIRD cannot be guaranteed for other individuals who display vocal stereotypy.

Furthermore, inter-rater reliability was not conducted for the purpose of this study. The accuracy of data collection on vocal stereotypy and appropriate vocalization could have been subjective thus providing inaccurate rates of occurrence. Moreover, not enough data was

collected to support the result of this study. Longer periods of baseline data collection and intervention sessions could have produced more sound results. Also, data collected on appropriate vocalization across the intervention phase would have given a more accurate result on the on appropriate vocalization in connection with RIRD.

Lastly, due to the nature of the setting (school environment), the intervention was implemented with time limitations. Initially, RIRD was not introduced to the teachers and paraeducators in depth due to lack of time. Also, due to time limitations, initial teacher trainings of specific strategies needed for RIRD implementation were not carried out with as much practice as the researcher would have liked.

### **Future Research**

Although this study was conducted to evaluate the result of RIRD in an educational setting rather a clinical setting, it was still restricted to a one on one instructional learning environment during a set period of time. It would be beneficial to conduct further studies on the effect of RIRD when it is implemented all throughout the school day by all the adults and peers who interact with the individual engaging in the vocal stereotypy. Furthermore, strategies on the effective ways to redirect vocal behaviors could be conducted to enhance the effects of RIRD. A study targeted to analyze the best and specific way to redirect different types of vocalizations could help individuals effectively implement this strategy.

### **Overall Conclusion**

Although vocal stereotypy is an important step in the acquisition of language in individuals with Autism, it is also true that this behavior can interfere with learning and social interaction. Thus, it is important to address this behavior in a fashion that does not seek to eliminate the behavior completely while encouraging the individual to pursue the exploration of

communication. The results shown in this study indicated that RIRD could possibly be an effective strategy that meets these requirements when dealing with vocal stereotypy. The RIRD strategy not only served as an intervention that in which decreased inappropriate verbal stereotypy, but also provided variety of different positive outcomes through the unique nature of the intervention strategy.

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## Appendices

### Appendix A. Human Subjects Approval- University of Kansas



12/17/10

HSCL #19003

Eun Gi Joung  
4100 W. 24th Pl., Apt. D18  
Lawrence, KS 66047

The Human Subjects Committee Lawrence has received your response to its full IRB review of your research project,

19003 Joung/Griswold (SPED) Effects of Response Interruption and Redirection Strategy on Vocal Stereotype

and found that it complied with policies established by the University for protection of human subjects in research. The subjects will be at minimal risk. Unless renewed, approval lapses one year after approval date.

The Office for Human Research Protections requires that your consent form must include the note of HSCL approval and expiration date, which has been entered on the consent form sent back to you with this approval.

1. At designated intervals until the project is completed, a Project Status Report must be returned to the HSCL office.
2. Any significant change in the experimental procedure as described should be reviewed by this Committee prior to altering the project.
3. Notify HSCL about any new investigators not named in original application. Note that new investigators must take the online tutorial at [http://www.rcr.ku.edu/hsc/hsp\\_tutorial/000.shtml](http://www.rcr.ku.edu/hsc/hsp_tutorial/000.shtml).
4. Any injury to a subject because of the research procedure must be reported to the Committee immediately.
5. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity. If you use a signed consent form, provide a copy of the consent form to subjects at the time of consent.
6. If this is a funded project, keep a copy of this approval letter with your proposal/grant file.  
Please inform HSCL when this project is terminated. You must also provide HSCL with an annual status report to maintain HSCL approval. Unless renewed, approval lapses one year after approval date. If your project receives funding which requests an annual update approval, you must request this from HSCL one month prior to the annual update. Thanks for your cooperation. If you have any questions, please contact me.

Sincerely,  
Jan Butin  
Associate Coordinator  
Human Subjects Committee - Lawrence

**Human Subjects Committee Lawrence**

Youngberg Hall | 2385 Irving Hill Road | Lawrence, KS 66045-7563 | (785) 864-7429 | Fax (785) 864-5049 | [www.rcr.ku.edu/hsc](http://www.rcr.ku.edu/hsc)

## **Appendix B. Participant Parent Consent Form**

### **The Effects of Response, Interruption, and Redirection Strategy on Vocal Stereotypy**

#### **INTRODUCTION**

The Department of Special Education at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish your child to participate in the present study. You may refuse to sign this form and not allow your child to participate in this study. You should be aware that even if you agree to allow your child to participate, you are free to withdraw at any time. If you do withdraw your child from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

#### **PURPOSE OF THE STUDY**

The purpose of this study is to find out the effects of Response Interruption and Redirection Strategy on vocal stereotypy. The intention is to use this strategy to decrease the vocal stereotypy during academic hours to create more effective learning environment for your child.

#### **PROCEDURES**

This project is targeted to decrease the vocal stereotypy of your child through the use of Response Interruption and Redirection Strategy. Functional behavior assessment will first be conducted to determine the function of your child's interfering behavior (vocal stereotypy). Then baseline data will be collected to find out how often your child is engaging in the interfering behavior. Then Response Interruption and Redirection Strategy will be implemented throughout your child's school day by the teachers and Para educators. During this process, the teacher will redirect your child to use an identified alternative behavior by: a.) saying your child's name in a neutral tone of voice; b.) establishing eye contact with your child and c.) asking a social question to prompt your child to use an alternative vocalization. Alternative behaviors may include: teaching your child to say, "I don't know," engaging your child to a social communication by asking social questions (i.e. "where do you live?" or "What color is your shirt?") and directing your child to say a more appropriate language. After redirecting your child to the alternative behavior, the teacher will redirect your child to engage in the alternative behavior for a specified period of time. Then the teacher will provide reinforcement immediately after your child engages in the alternative behavior for the specified amount of time. The teacher will initially redirect your child to use the alternative behavior for a minimal amount of time (2 to 3 seconds). As your child begins to use the alternative behavior more often than the interfering behavior, the teacher will increase the amount of time required of your child to engage in the alternative behavior (2-5 minutes) before providing the reinforcement. Reinforcements includes: edibles (chocolate chip, fruit snacks, Nerds), token, breaks, and hugs. The teacher will keep monitoring your child's progress to evaluate whether the interfering behavior is decreasing as result of the intervention.

## RISKS

The nature of this study does not involve any risks.

## BENEFITS

Through this study, we are hoping your child's vocal stereotypy will be replaced with a more appropriate verbalization. If this strategy is successful, your child will be able to participate better in both the classroom setting and one on one instruction times.

## PAYMENT TO PARTICIPANTS

Payments will not be made to any participants of this study.

## PARTICIPANT CONFIDENTIALITY

Your child's name will not be associated in any publication or presentation with the information collected about your child or with the research findings from this study. Instead, the researcher(s) will use a study number or a pseudonym rather than your child's name. Your child's identifiable information will not be shared unless required by law or unless you give written permission. Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your child's information, excluding your child's name, for purposes of this study at any time in the future.

## REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, your child cannot participate in this study.

## CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to allow participation of your child in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about your child, in writing, at any time, by sending your written request to: Eun Gi Joung (Jay). If you cancel permission to use your child's information, the researchers will stop collecting additional information about your child. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

## QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.



**PARTICIPANT CERTIFICATION:**

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my child's rights as a research participant, I may call (785) 864-7429, write to the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email mdenning@ku.edu.

I agree to allow my child to take part in this study as a research participant. By my signature I affirm that I have received a copy of this Consent and Authorization form.

---

Type/Print Participant's Name

---

Date

---

Parent/Guardian Signature

**Researcher Contact Information**

Eun Gi Joung  
Principal Investigator  
Special Education  
ejoung@ku.edu

Deb Griswold, Ph.D.  
Faculty Supervisor  
Special Education  
dgriz@ku.edu  
University of Kansas

**Appendix C. Participant Assent Script**

Larry, I am interested in finding out if you could work with a quiet voice by answering some questions that I or other teachers ask you while you work. This means that I or other teachers will ask you some questions anytime during “work” time. If you answer the question, then you will earn a token, a hug, or your choice of fruit snacks or nerds. If you don't want to answer that is okay too. Say “Yes” if you it’s okay for us to ask you some questions while you work. You can say “No” if you don’t want to answer any questions.

## Appendix D. Data Collection Form

**Date:** \_\_\_\_\_

		YES	NO			YES	NO			YES	NO
8:45	b			10:00	b			11:15	b		
8:50	b			10:05	b			11:20	b		
8:55	b			10:10	b			11:25	b		
9:00	b			10:15	b			11:30	b		
9:05	b			10:20	b			11:35	b		
9:10	b			10:25	b			11:40	b		
9:15	b			10:30	b			11:45	b		
9:20	b			10:35	b			11:50	b		
9:25	b			10:40	b			11:55	b		
9:30	b			10:45	b			12:00	b		
9:35	b			10:50	b			12:05	b		
9:40	b			10:55	b			12:10	b		
9:45	b			11:00	b			12:15	b		
9:50	b			11:05	b			12:20	b		
9:55	b			11:10	b			12:25	b		

12:30	b			1:45	b			3:00	b		
12:35	b			1:50	b			3:05	b		
12:40	b			1:55	b			3:10	b		
12:45	b			2:00	b			3:15	b		
12:50	b			2:05	b			3:20	b		
12:55	b			2:10	b			3:25	b		
1:00	b			2:15	b			3:30	b		
1:05	b			2:20	b			3:35	b		
1:10	b			2:25	b			3:40	b		
1:15	b			2:30	b			3:45	b		
1:20	b			2:35	b						
1:25	b			2:40	b						
1:30	b			2:45	b						
1:35	b			2:50	b						
1:40	b			2:55	b						

85  
- (Total Missing)  
(Total Possible)

(c) TOTAL = \_\_\_\_\_ / \_\_\_\_\_ = \_\_\_\_\_ %  
 (✓) TOTAL = \_\_\_\_\_ / \_\_\_\_\_ = \_\_\_\_\_ %  
Total Number / Total Possible

8/99 Five Minute Interval Recording