Research in Autism Spectrum Disorders 9 (2015) 182–192

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

An investigation of the effectiveness of Behavioral Momentum on the acquisition and fluency outcomes of tacts in three children with Autism Spectrum Disorder☆

Laura Kelly, Jennifer Holloway *

School of Psychology, National University of Ireland, Galway, Ireland

ARTICLE INFO

Article history:
Received 8 October 2014
Accepted 10 October 2014
Available online 14 November 2014

Keywords:
Fluency training
Behavioral Momentum
Tacts
Verbal behavior
Autism Spectrum Disorder

ABSTRACT

The study aimed to evaluate the effectiveness of the fluency intervention, Behavioral Momentum (BM), on acquisition of tacts and associated fluency outcomes in three children with Autism Spectrum Disorder (ASD). A multiple probe design across stimulus sets was utilized to investigate the outcomes of Behavioral Momentum for the acquisition, retention, stability, endurance, and application of tacts learned to a fluency aim. In the intervention phase, children were required to complete a Behavioral Momentum exercise consisting of the presentation of a sequence of high probability tacts followed immediately by the presentation of low probability tacts delivered within 1 min timings. The results demonstrated positive fluency outcomes on low probability tacts across all children. The practical implications of the study are discussed in terms of the use of Fluency Training for children with ASD within the educational setting.

1. Introduction

Individuals diagnosed with Autism Spectrum Disorder (ASD) often present with a myriad of language deficits which extend across expressive and receptive repertoires (Forde, Holloway, Healy, & Brosnan, 2011). Within educational settings, communication goals become the pivotal focus of the child's Individual Education Plan (IEP). To this end, there is a breath of studies which demonstrate the application of behavior analysis to teaching verbal behavior to children with ASD. From Skinner's (1957) seminal work on verbal operants, many procedures have been empirically developed including but not limited to, manipulation of establishing operations to teach verbal operants (Sundberg & Partington, 1998), Discrete Trial Instruction (DTI; Koegel, Russo, & Rincover, 1977), echoic to tact or mand training (Greer & Ross, 2007), incidental teaching (e.g., McGee, Krantz, & McClannahan, 1986), and the Natural Learning Paradigm (NLP; Koegel, O'Dell, & Koegel, 1987). Some children with ASD continue to present with difficulty acquiring certain verbal operants and research continually strives to investigate methods for teaching verbal operants that have lasting and generalized outcomes.

More recently, there has been a growing body of research investigating the effects of fluency building interventions on educational targets for children with ASD. Behavioral fluency is the combination of accuracy and speed of a target response that characterize competent performance (Binder, 1996). The goal of fluency training is to teach performance of a mastered

☆ This research was conducted by the first author under the supervision of the second author in partial fulfillment of the requirements for her MSc degree in ABA at NUI, Galway.

* Corresponding author. Tel.: +353 91 495773; fax: +353 91 521355.
E-mail address: jennifer.holloway@nuigalway.ie (J. Holloway).

http://dx.doi.org/10.1016/j.rasd.2014.10.007
1750-9467/

skill so that it can be demonstrated at a rapid rate similar to typically developing peers (Shinn, 1989) or adults (Binder, 1996). Promoters of fluency building procedures argue that quality of performance changes as a function of rate and in order to acquire and smoothly attain skills, one must first achieve accuracy and speed on the pre-requisites or component skills (Binder, 1993). Furthermore, Behavioral Fluency (BF) involves free operant performance, or responding at a rate controlled by the learner. It can be both a method of instruction (e.g., Fluency Training) as well as an outcome (Kerr, Smyth, & Mcdowell, 2003). Evidence from research using Fluency Training (FT) predicts outcomes of retention, endurance, application and stability (Binder, 1993).

Fluency Training procedures involve teaching to a pre-determined fluency aim rather than teaching to an accuracy criterion in order to produce 'true mastery' (Kubina & Wolfe, 2005). Achieving fluent performance results in a number of additional outcomes, namely retention, endurance, application and stability. Retention refers to the ability to maintain high levels of responding for a specified period of time in which there is no instructional opportunity to emit the target behavior (Binder, 1996). Endurance refers to the ability to engage in a skill for prolonged periods of time without fatiguing (Fabrizio & Moors, 2003). Essentially, it is the ability to emit and perform the behavior for the length of time that would be expected in real world situations (Johnson & Street, 2013). Application refers to the ability to combine certain skills to produce composite response classes (Binder, 1996) and use the skill in the real life context in which it is required (Johnson & Street, 2013). Stability refers to the ability to perform in the face of distracting stimuli and environments (Fabrizio & Moors, 2003).

There have been many studies demonstrating the positive educational outcomes associated with fluency training in typically developing children. Chiesa and Robertson (2000) implemented a 12 week program for five children experiencing difficulty with the math curriculum within a general education classroom. Following intervention, four of the participants' out-performed all but one of their classmates on the target math skills. Furthermore, Hughes, Beverley, and Whitehead (2007) also demonstrated positive outcomes by increasing rate of reading words for five students experiencing difficulty with reading. In addition, the researchers demonstrated positive increases on standardized reading assessments post-intervention. Beverley, Hughes, and Hastings (2009) conducted further research evaluating the effects of an intervention, Say All Fast 1 Minute Each Day (SAFMEDS). To teach statistical concepts to psychology undergraduate students who were performing below the class group average. Students in the SAFMEDS condition maintained higher scores in all weekly tests and achieved a statistically significant gain in post-intervention performance in comparison to the treatment as usual group.

There are quite a number of empirical studies demonstrating the positive outcomes associated with Behavioral Fluency (BF) in neurotypical individuals (Hughes et al., 2007; Reutzel & Hollingsworth, 1993). Students with ASD present with fluency deficits that are exhibited in a variety of ways such as longer latencies to respond, poor motor responses (Weiss, Pearson, Foley, & Pahl, 2010) and deficits in application and retention of skills (Roest, 2008). Such deficits can have negative impacts for students' learning rates and overall academic progress. There is emerging support for the use of BF to improve educational outcomes for children with ASD (Holding, Bray, & Kehle, 2011; Nopprapun & Holloway, 2014; Singer-Dudek & Greer, 2010), however further research is very much warranted. Research has been conducted with individuals with developmental delays to establish fluent behavior using a variety of fluency building procedures such as, Taped Problems (TP; McCallum, Skinner, & Hutchins, 2004), Cover, Copy, and Compare (CCC; Stading, Williams, & McLaughlin, 1996), Interspersal Procedure (Volkert, Lerman, Trosclair, Addison, & Kodak, 2008), and Behavioral Momentum (Wehby & Hollahan, 2000). However the research is limited in each of the interventions and warrants further investigation with participants with ASD.

Behavioral Momentum (BM) is a fluency building procedure through which the fluency task presentation is modified so the student contacts reinforcement more frequently. This is achieved by modifying the task so less effortful responses (i.e., high probability response sequences) occur prior to the more difficult responses (i.e., low probability response sequences), and therefore students will contact reinforcement early, which will increase the likelihood that they will engage in the more challenging tasks that follow (Burns et al., 2008). Nevin (1996) highlighted that operant behavior that occurs at a frequent rate and contacts frequent reinforcement is likely to persist over time. Research has been conducted to show that high probability request sequences can be applied to increase compliance (Lee & Laspe, 2003; Mace et al., 1988), as well as to improve academic skills (Ardoin, Marens & Wolf, 1999). Wehby and Hollahan (2000) found that BM request sequences increased compliance to begin math tasks and also demonstrated a slight increase in task engagement for a student presenting with a learning disability. There is limited research within this area.

BM has shown beneficial outcomes for learners in a variety of academic domains (Belfiore, Lee, Vargas, & Skinner, 1997; Burns et al., 2008; Lee & Laspe, 2003), it is therefore possible that this intervention involving task manipulations would be successful for teaching tacts to fluency for those with ASD. There is limited research dedicated to evaluating the effectiveness of fluency building procedures for those with ASD and to inform practitioners of effective practice within this area. The current study aims to add to the literature on fluency in children with ASD and to specifically investigate the outcomes associated with a BM fluency procedure.

2. Method

2.1. Participants and setting

Three children aged between 3 years and 6 months to 4 years and 11 months, with diagnoses of Autism Spectrum Disorder as defined by the American Psychiatric Associations *Diagnostic and Statistical Manual of Mental Disorders* (2000,