# Research

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## News and Notes About Scientific Research on ASD and Other Developmental and Behavioral Disorders


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The New England Center for Children®
*Autism Education and Research*

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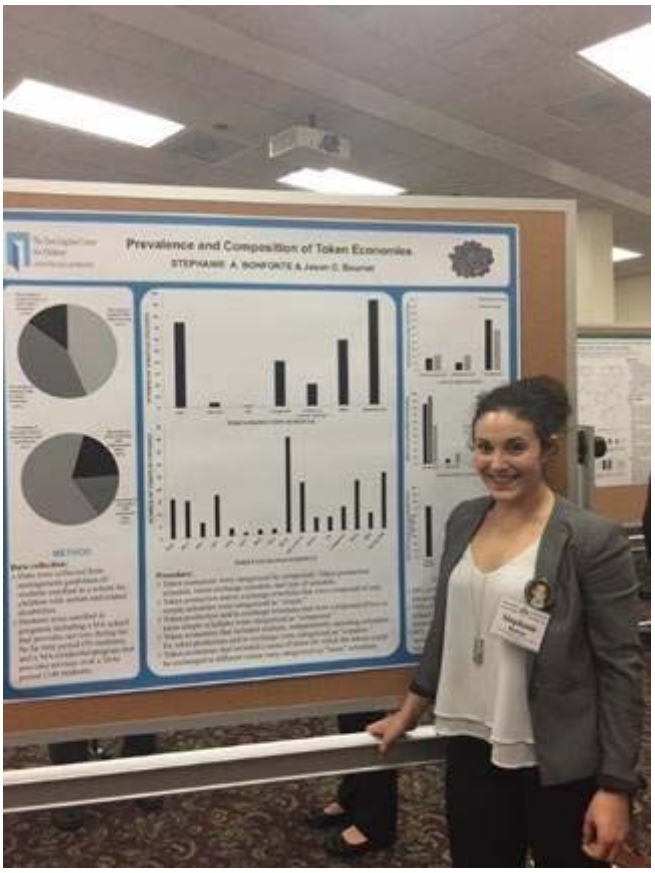
# Current Research on Treatment of Automatically Reinforced Problem Behavior at The New England Center for Children




An ongoing area of NECC® research involves identifying effective interventions for treating automatically reinforced problem behavior. A common behavior problem among individuals with autism spectrum disorder (ASD) and one that often afflicts NECC students is persistent stereotypy. Stereotypy is repetitive responding that serves no adaptive purpose and can often be disruptive and interfere with educational programming and social interaction. Stereotypy is typically maintained by automatic reinforcement (i.e., it occurs because of the stimulation directly produced by the behavior). For this reason, stereotypy is often challenging to treat. However, some recent research conducted by Dr. William Ahearn's research group at NECC shows an effective intervention approach for successfully reducing this problem behavior.

Given the positive outcomes obtained with this approach, Dr. Ahearn and his research group disseminated their findings and offered best practice recommendations for treating vocal stereotypy maintained by automatic reinforcement by publishing two articles highlighting this treatment procedure. Ahearn, Clark, MacDonald, and Chung (2007) evaluated response interruption and redirection (RIRD) for treating vocal stereotypy in four individuals with ASD. After conducting a functional analysis that showed that vocal stereotypy was not maintained by social consequences, RIRD was evaluated to see if it could successfully decrease vocal stereotypy. RIRD involved having a teacher present a vocal prompt or a question following each occurrence of vocal stereotypy. Participant compliance included appropriate vocal behavior, imitation, or question answering that the participant had in their repertoire. RIRD continued until the participant complied with three demands consecutively in the absence of vocal stereotypy. RIRD produced levels of vocal stereotypy substantially lower than those observed in baseline. An untargeted outcome for three of the four children was an increase in appropriate communication.

Colon, Ahearn, Clark, and Masalsky (2012) extended the work of Ahearn et al. (2007) by evaluating a verbal operant training procedure prior to implementing RIRD for three participants who exhibited high levels of automatically reinforced vocal stereotypy. The verbal operant training procedure allowed for direct teaching of appropriate vocal verbal behavior. Training involved presenting vocal prompts to emit a tact (label) or mand (request) for four different items. Prompts were systematically faded until participants consistently responded independently. Direct training of these verbal operants resulted in increases in appropriate vocalizations and slightly lower levels of stereotypy for all participants. RIRD was subsequently implemented with two of the three participants and was found to be successful in decreasing their vocal stereotypy to low levels. Taken together, these two studies demonstrate that RIRD is a successful intervention for decreasing vocal stereotypy. In addition, the study by Colon et al. demonstrated the utility of verbal operant training in conjunction with RIRD for increasing appropriate vocalizations while concurrently decreasing vocal stereotypy.

Ahearn, W. H., Clark, K, MacDonald, R., & Chung, B. I. (2007). Vocal stereotypy: Assessing and treating acontextual vocalizations in children with autism. *Journal of Applied Behavior Analysis, 40*, 263-275.

Colón, C. L., Ahearn, W. H., Clark, K. M., & Masalsky, J. (2012). The effects of verbal operant training and response interruption and redirection on appropriate and inappropriate vocalizations. *Journal of Applied Behavior Analysis,* 45, 107-120.

# Do Persons with ASD Avoid Eye Contact?

Bill Ahearn, PhD, BCBA-D, LABA

A significant amount of research on the behavioral characteristics of autism has been conducted examining how individuals with autism spectrum disorder (ASD) engage in social interaction. Children with ASD typically demonstrate early communicative and social deficits, and investigators have revealed some interesting findings that distinguish the behavior of persons with ASD from typically developing peers. These behavioral differences are particularly apparent in the nature of stimuli (social and non social) that are salient to persons with autism. Individuals with ASD have long been known to respond differently to social stimuli (Kanner, 1943). One well studied difference involves discrimination involving human faces.

There are studies showing differences in persons with ASD on facial discrimination tasks but these differences are not necessarily deficits. People with ASD do not identify faces as well as typically developing persons but do respond as well or better than typically developing persons with non social stimuli like objects. Langdell (1978) found that young adults and adolescents with ASD readily identified the faces of peers but the facial features attended to during the task were lower facial features such as the mouth rather than the eyes. One noteworthy aspect of this study was that subjects with ASD performed better than their peers when identifying inverted faces. For typically developing people, poor facial discrimination during inversion is likely indicative that the face as a whole is more salient than any aspect of it. On the other hand, certain tasks involving facial stimuli have been associated with deficits for people with ASD. For example, Boucher and Lewis (1992) found that persons with ASD performed more poorly on facial discrimination tasks of unfamiliar faces than they did on discrimination tasks of unfamiliar buildings. A common conclusion in the research literature is that individuals with ASD show a lack of attention to faces, lack of typical affect in social situations, and aversion or indifference to eye contact (Barbaro & Dissanayake, 2009).

A recently published study by Moriuchi, Klin, and Jones (2017) more closely examined eye contact with other people by children with ASD. In the first experiment, researchers presented a series of videos and measured eye gaze responses in typically developing children and children recently diagnosed with ASD. Before each video was shown, there was a picture that appeared on the screen for a brief moment. The picture disappeared and was replaced by a set of eyes. All subjects looked at the picture and then the eyes. If eye contact was generally avoided by the children with ASD, they would be expected to look away from the eyes. However, this did not occur. The children with ASD continued to look straight at the eyes as did their typically developing peers.

In a second experiment, the researchers presented a variety of videos with varying levels of socially meaningful eye contact. The children with ASD looked less often at other people's eyes than did their peers without autism. This interesting finding suggests that children with autism do not actively avoid eye contact but that the eye gaze of others in their environment does not hold the same significance to children with autism. There is extensive evidence that children with autism are more likely to look at mouths than their typically developing peers, but they can and will look at eyes. One of the possibilities is that although children with ASD will look at eyes, they do not attend to where the eyes are looking. This would result in children with ASD being less likely to look at what others are looking at and thus be less likely to share in the experience of others in their social environment. In a conceptual analysis of the social behavior of persons with autism, Dube, MacDonald, Mansfield, Holcomb, and Ahearn (2004) suggested that deficits in eye-gaze following directly impact learning from others in their social environment. One practical conclusion from these studies is that it may be possible to effectively teach eye-gaze following by starting with eye contact and pairing eye contact with reinforcers and then gradually establish the following of a person's shift in eye gaze to produce those reinforcers.

It should also be pointed out that many adults with autism self-report that they find eye contact aversive. Although the verbal report of these persons is certainly not to be questioned, there are many life events that may explain why eye contact becomes aversive for some individuals. For example, if eye contact was associated with unpleasant experiences (which are likely to occur when one has atypical social behavior), then eye contact may become an aversive event. That said, the Moriuchi et al. (2017) study shows that children recently diagnosed with ASD do not seem to avoid eye contact, disputing a long held belief.


Barbaro, J., & Dissanayake, C. (2009). Autism spectrum disorders in infancy and toddlerhood: A review of the evidence on early signs, early identification tools, and early diagnosis. *Journal of Developmental and Behavioral Pediatrics, 30*, 47-459. doi:10.1097/DBP.0b013e3181ba0f9f

Boucher, J., & Lewis, V. (1992). Unfamiliar face recognition in relatively able autistic children. *Journal of Child Psychology and Psychiatry, 33*, 843-859.

Dube W.V., MacDonald, R.P.F., Mansfield, R.C., Holcomb, W.L., & Ahearn, W.H. (2004). Toward a behavioral analysis of joint attention. *The Behavior Analyst, 27*, 197-207.

Kanner, L. (1943). Autistic disturbances of affective content. *Nervous Child, 2*, 217–250.

Langdell, T. (1978). Recognition of faces: An approach to the study of autism. *Journal of Child Psychology and Psychiatry, 19*, 255-268.

Moriuchi, J., Klin, A., & Jones, W. (2017). Mechanisms of diminished attention to eyes in autism. *American Journal of Psychiatry, 174*, 26-35. appi.ajp.2016.1 doi:10.1176/appi.ajp.2016.15091222

# Research at NECC

Editor's Note

*Staff from NECC recently presented several papers at the 43rd Annual Applied Behavior Analysis International conference in Denver, CO. Listed below are a few examples of currently conducted research that was disseminated at this conference.*

## Comparing Procedures for Training Staff to Create Single-subject Design Graphs Using GraphPad Prism

Berkman, S., Roscoe, E.M., & Bourret, J.C.

Editor's Note

*An important skill required of applied behavior analysts is constructing graphs for data analysis and program review. In the presentation below, NECC researchers trained 39 NECC staff members to create publication-quality graphs for clinical decision-making and research purposes. Two cost-effective training procedures – video modeling and enhanced written instructions – were compared and found to be equally effective for increasing skill acquisition. These findings suggest that self-directed training procedures can be used to teach staff to create high-quality graphs for program evaluation and research dissemination.*

An important skill for behavior analysts is creating graphs that clearly convey intervention outcomes. Prior research has documented the shortcomings of Microsoft Excel (e.g., Su, 2008; Vanselow & Bourret, 2012). GraphPad Prism allows for editing that aligns with graphing conventions, but initial training is needed. Two effective self-directed training methods are video modeling (VM; e.g., Collins, Higbee, & Salzberg, 2009; Moore & Fisher, 2007) and enhanced written instructions (EWI; e.g., Graff & Karsten, 2012), but no single-subject studies have compared the efficacy of the methods.

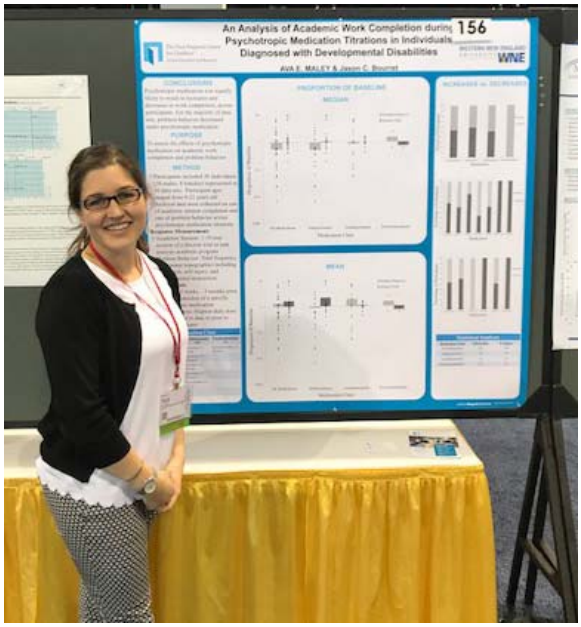
In this study, we compared the efficacy and social validity of EWI and VM for training staff to create graphs using Prism. In Study 1, a single-subject design was used to compare the effects of the methods on the individual performance of 11 graduate students. In Study 2, a group design was used to compare the effects of the methods across a greater number of graduate student participants (n = 28). EWI and VM were both found to be effective, and no significant differences in accuracy or speed were found. Mean interobserver agreement for both studies was above 95%.

## An Analysis of Academic Work Completion During Psychotropic Medication Titrations in Individuals Diagnosed with ASD

Maley, A., & Bourret, J.C.

Editor's Note

*At NECC, we implement empirically validated interventions based on the principles of applied behavior analysis to effectively treat problem behavior. However, even with state-of-the art treatment, psychotropic medications (e.g., anti-psychotics, anti-depressants and psychostimulants) are sometimes prescribed for students who exhibit severe problem behavior. In the study below, NECC researchers analyzed previously collected data on academic work completion and problem behavior for 30 NECC students with an ASD who had been prescribed psychotropic medications. Although differences in work completion were not observed across dosages, consistent decreases in problem behavior occurred for the majority of participants during medication titrations.*



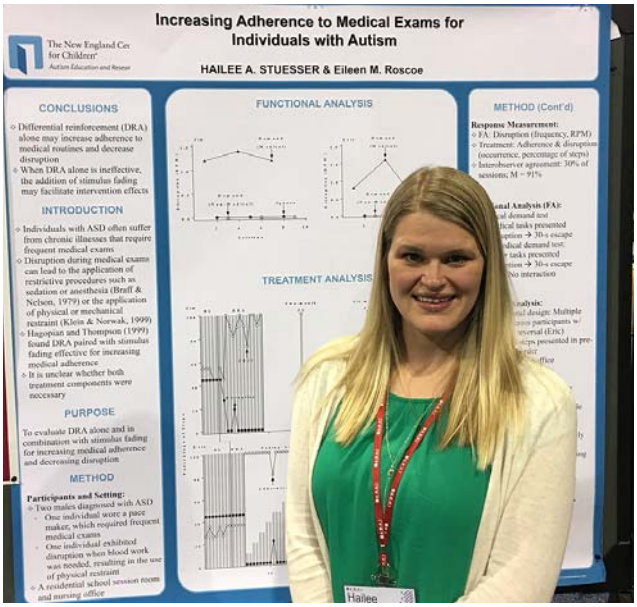

A variety of psychotropic medications are used to treat a number of symptoms associated with ASD and other related disabilities. Oftentimes the efficacy of these medications is assessed using indirect measurement methods such as ratings scales or parent report. For school aged children, it may be beneficial to measure academic work completion during psychotropic medication titrations, in addition to challenging behavior such as aggression and self-injury, to provide a more comprehensive analysis of effectiveness. This poster displays archival data collected during medication titrations on a number of academic sessions conducted per day during baseline and each subsequent dose. Participants include students who experienced a titration of a psychotropic medication while attending a residential school for students with ASD and other related disabilities. Data include measures of work completion (mean sessions per day) and challenging behavior (rate of self-injury, aggression, and environmental destruction) across specified doses. Figures display the proportion of baseline comparing rate of session completion during baseline and terminal dose. Additional figures display the percentage of participants for whom an increase or decrease in work completion was observed and the relation between rate of problem behavior and work completion during medication titrations.

## Increasing Medical Adherence for Individuals with Autism

Stuesser, H., & Roscoe, E.M.

**Editor's Note**

*Another important step toward increasing NECC students' independence requires training NECC students to tolerate medical procedures in the absence of problem behavior. In the study below, NECC researchers developed an intervention that included differential reinforcement of alternative behavior (DRA) alone or in combination with stimulus fading to increase adherence to routine medical exams. Two individuals with ASD who often exhibited interfering problem behavior during routine medical exams participated. Following intervention, both participants tolerated the entire medical exam in the absence of problem behavior. In addition, extinction (continuation of demands following problem behavior) was not required to achieve this outcome.*



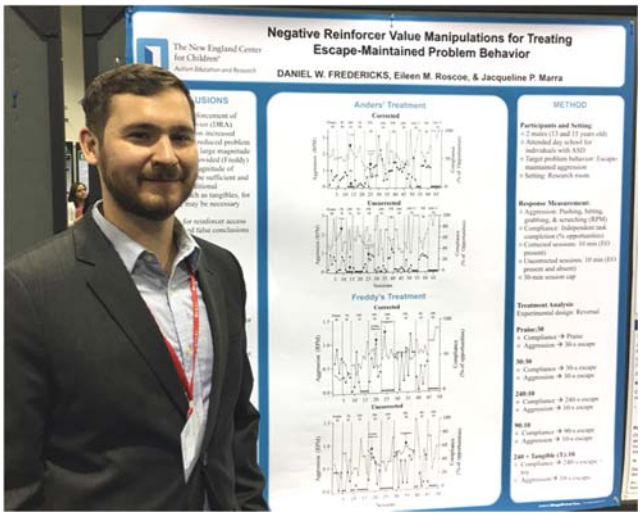

Medical procedures such as routine physicals and bloodwork are often associated with nonadherence and problem behavior in individuals with developmental disabilities. Although DRA is often effective in increasing compliance and decreasing escape-maintained problem behavior, it typically includes an extinction component. Because extinction can be difficult to implement consistently or cannot be used with some individuals, it is important to identify interventions that can be effective when extinction is not in effect. The purpose of this study was to evaluate DRA without extinction alone and in combination with fading for increasing adherence and decreasing disruptive behavior during routine medical exams in two individuals with ASD. An indirect assessment was conducted to identify steps included in medical exams as well as those that may evoke disruptive behavior. A functional analysis (FA) was conducted to ensure that disruptive behavior was maintained by escape from medical demands. DRA without extinction alone or in combination with fading increased adherence and decreased disruptive behavior for both participants. Interobserver agreement was completed for 33% of sessions and was at least 90% for both participants.

## Negative Reinforcer Value Manipulations for Treating Escape-maintained Problem Behavior

Fredericks, D., Roscoe, E.M., & Marra, J.

**Editor's Note**

*An important step toward increasing NECC students' independence requires the development of effective treatment for decreasing interfering problem behavior. NECC researchers conduct state-of-the-art interventions that focus on the variables maintaining problem behavior. One such technique involves differential reinforcement of appropriate behavior (DRA). A concern with conducting DRA is that extinction (continuation of demands following problem behavior) is not always an acceptable treatment option. In the study below, DRA without extinction was conducted to increase compliance and decrease problem behavior in two NECC students. After results of a functional analysis showed that participants' problem behavior was maintained by escape from work, NECC researchers conducted DRA in which escape was provided for compliance and problem behavior. However, a longer duration of escape was provided for compliance relative to that provided for problem behavior. This modification resulted in decreases in problem behavior and increases in compliance.*




Differential reinforcement of an alternative response (DRA) without extinction may have clinical utility when practitioners cannot successfully implement extinction (Hagopian & Thompson, 1999). DRA for compliance without extinction, when both compliance and problem behavior result in equal durations of escape, has been found to be ineffective (Lalli et al., 1999). By contrast, the use of longer durations of escape for compliance relative to problem behavior has been found successful in increasing compliance and decreasing problem behavior for one participant (Athens & Vollmer, 2010). Given the potential utility of this approach in increasing compliance and decreasing problem behavior without the use of arbitrary reinforcers, we sought to further evaluate this approach. Specifically, we evaluated the effects of manipulating large versus small differential escape durations during DRA without extinction for two participants with escape-maintained problem behavior. Results for both participants showed successful treatment outcomes during the large differential escape duration condition. These findings indicate that increasing the escape duration for compliance relative to problem behavior may facilitate treatment of escape-maintained problem behavior when implementing DRA without extinction. Reliability was collected for 33% of sessions and averaged 95% for problem behavior.

# Research

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