Research

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

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Autism Education and Research

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www.necc.org/research
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 affects 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 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, interaction, or question answering 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 elicit a target (label) or mand (request) for four different items. Prompts were systematically faded until participants consistently responded independently. Direct training of these verbal behaviors 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.

A significant amount of research on the behavioral characteristics of autism has been conducted examining how individuals with autism spectrum disorders (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 (Barbero & Dissnayake, 2009).

A recently published study by Moruchi, 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 showing measured eye gaze following 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 with autism. Their 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 Moruchi et al. (2017) study shows that children recently diagnosed with ASD do not seem to avoid eye contact, disrupting a long held belief.
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Ahearn, Ahearn, Clark, and Masalski (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 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 unexpected outcome for three of the four children was an increase in appropriate communication.

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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 avoidance or indifference to eye contact (Barbaro & Dissanyake, 2009).

A recently published study by Moruchi, 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 followings 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 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 for 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 also 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 conceptualization of the social behavior of persons with autism, Dubé, 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.


Comparing Procedures for Training Staff to Create Single-Subject Design Graphs Using GraphPad Prism
Berkman, S., Roscoe, E.M., & Bourret, J.C.

At NECC, we implemented empirically validated interventions based on the principles of applied behavior analysis to effectively treat problem behavior. However, even when 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.

An Analysis of Academic Work Completion During Psychotropic Medication Titrations in Individuals Diagnosed with Developmental Disabilities
Maley, A., & Bourret, J.C.

Increasing Adherence to Medical Exams for Individuals with Autism
Fredericks, D., Roscoe, E.M., & Marra, J.

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 have been found 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 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

Increasing Adherence to Medical Exams for Individuals with Autism

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 for both participants. 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.
Comparing Procedures for Training Staff to Create Single-Subject Design Graphs Using GraphPad Prism

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

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 Analysis of Academic Work Completion During Psychotropic Medication Titrations in Individuals Diagnosed with Developmental Disabilities

Malley, A., & Bourret, J. C.

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 individuals 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.

Increasing Adherence to Medical Exams for Individuals with Autism

Stoesser, H., & Roscoe, E. M.

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 involves 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 and 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.

Increasing Adherence to Medical Exams for Individuals with Autism

Stoesser, H., & Roscoe, E. M.

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.

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