



Research

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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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Seeking Improvements in Diagnosing Autism

Bill Ahearn, PhD, BCBA-D, LABA, Director of Research, NECC



Numerous studies have identified differences in the brains of persons with autism spectrum disorder (ASD) relative to persons without an ASD diagnosis. Neuroimaging work has found that children with ASD, aged 2 to 4, had larger brains with more cerebral and cerebellar white matter and more cerebral cortical grey matter than typically developing children of the same age (Courchesne et al., 2001). Additionally, Carper and colleagues (2002) found that children with ASD gain substantially less grey and white matter in the frontal lobes from early to late childhood relative to the grey and white matter gained by typically developing children during that time span. Taken together, such findings of abnormal timing and amount of brain growth was suggested by Acosta and Pearl (2003) as possible evidence of “genetically determined prenatal alterations in brain development” occurring in those diagnosed with an ASD. Furthermore, Courchesne and colleagues (2011) conducted a post-mortem tissue analysis and found that children with an autism diagnosis had 67% more neurons in the prefrontal cortex than typically developing control children.

A recently published study by Bosl and colleagues (2018) aimed to determine whether an analysis of brain activity via electroencephalography (EEG) could predict a diagnosis of ASD. Siblings of a child with ASD are considered at high risk of developing autism and they were studied along with children at a low risk of ASD. EEG measures electrical activity in the brain and is typically used to detect seizure activity. These researchers performed analyses of the EEG waves aimed at identifying atypical activity for predicting an ASD diagnosis. Study participants received an EEG analysis at multiple points in time from 3 months through 3 years of age (i.e., at 3, 6, 9, 12, 18, 24, and 36 months) but not every child was measured at each age. The results of the study suggested that EEG analyses, even at 3 months of age, could distinguish between the children who would subsequently receive an ASD diagnosis and those who would not. These results are preliminary but interesting. EEG is a relatively simple and inexpensive test. If future research replicates these findings it may be possible to diagnose ASD and access treatment at a very early age.

Acosta, M.T. & Pearl, P.L. (2003). The neurobiology of autism: New pieces of the puzzle. *Current Neurology and Neuroscience Reports*, 3, 149-156.

Bosl, W.J. et al. (2018). EEG analytics for early detection of autism spectrum disorder: A data- driven approach. *Scientific Reports*, 8, 6828. doi.org/10.1038/s41598-018-24318-x

Carper, R.A. et al. (2002). Cerebral lobes in autism: Early hyperplasia and abnormal age effects. *Neuroimaging*, 16, 1038.

Courchesne, E. et al. (2001). Unusual growth patterns in early life in patient with autistic disorder. *Neurology*, 57, 245-254.

Courchesne, E. et al. (2011). Neuron number and size in prefrontal cortex of children with autism. *The Journal of the American Medical Association*, 306 (18), 2001. doi.org/10.1001/jama.2011.1638.

research

Teaching Essential Discrimination Skills in Children with Autism

Eileen Roscoe, PhD, BCBA-D, LABA
Director of Behavior Analytic Research, NECC



Individuals with autism often have difficulty communicating, engaging in academic and vocational tasks, or following a schedule effectively. Each of these important skills requires the foundational skill of discrimination. Discrimination involves understanding the relations between stimuli and allows one to tell the difference between things that are similar and different. Many children with autism learn to communicate with non-vocal means, such as by touching pictures on a board or electronic device. However, before individuals can effectively communicate in this manner, they need to learn the discrimination skill of matching the pictures to the corresponding objects. Therefore, discrimination is an essential stepping stone for communication and increased independence. Examples of discrimination learning are matching pictures to objects in the environment, matching printed words to corresponding objects in the environment, or responding appropriately when viewing an open sign and a closed sign.

Dr. Becky MacDonald and Sue Langer, MS, BCBA, LABA, of The New England Center for Children, recently published a book on how to implement a comprehensive discrimination curriculum. In the book, the authors provide step-by-step instructions in an easy to follow format for parents and teachers. The curriculum sequence is based in part on the [Autism Curriculum Encyclopedia® \(ACE®\) ABA Software System](#) and begins with teaching simple discrimination to more complex skills. First, they review the use of discrete trial teaching to promote learning. Conducting teaching sessions

in this manner allows for the teacher to initiate learning opportunities so that they can occur more frequently. The authors review important features of discrete trial learning including getting the child's attention, presenting the instruction, and delivering a consequence following a child's response. The authors provide easy to follow instructions with tables and figures for assessing a child's current set of skills. By first assessing what skills the child already has, the parent or teacher can focus on the next step in the curriculum. Although the curriculum outlines a specific training sequence, the approach is individualized to the needs of the student. In addition, the authors suggest methods for troubleshooting common problems that can arise and offer remedial strategies, such as stimulus control fading, if the child is making frequent errors.

When learning discrimination skills, individuals with intellectual disabilities may exhibit error patterns due to overselective stimulus control. This occurs when there are too few controlling stimuli occasioning behavior. An example is when individuals attend to only the initial sounds of a word rather than the entire word. When this occurs, individuals may make errors in discrimination of words that begin with the same sounds. As a result, overselective stimulus control can interfere with learning academic and communication skills.

In a recent paper published by NECC researchers, Farber, Dickson, and Dube (2017) addressed overselective stimulus control that occurs when teaching matching-to-sample skills. In a typical matching-to-sample learning trial, sample

stimuli are presented first and then comparison stimuli are presented, one of which is correct in relation to the samples. The authors of the study evaluated an intervention to increase observing behavior of the sample stimuli to facilitate decreases in overselective stimulus control. This intervention involved teaching the participants a differential observing response (DOR) task for the sample stimuli prior to viewing the comparison stimuli. The DOR involved embedding an additional matching-to-sample task that taught participants to attend to and select correct comparison stimuli for each of the sample stimuli. For the 19 participants who received the DOR intervention, 16 showed substantial improvement in correct performance on the matching-to-sample task as a result. In a subsequent experiment, the authors found that the DOR intervention could be gradually faded while accurate performance on the matching-to-sample task maintained. These findings demonstrate an effective approach for decreasing overselective stimulus control in the context of skill acquisition.

MacDonald, R.P.F., & Langer, S. (2018). [*Teaching Essential Discrimination Skills to Children with Autism: A Practical Guide for Parents and Educators*](#). Bethesda, MD; Woodbine Press.

Farber, R.S., Dickson, C.A., & Dube, W.V. (2017). [Reducing overselective stimulus control with differential observing responses](#). *Journal of Applied Behavior Analysis*, 50, 87-105.

Research at ABAI

EDITOR'S NOTE:

Sixty-six NECC staff attended the 44th annual Applied Behavior Analysis International (ABAI) conference in San Diego, CA., in May, and 38 staff presented 15 papers, 17 posters, and 2 workshops as well as participated as Chairs and Discussants. Listed below are a few examples of research presented. The full list of research presentations can be found [here](#).

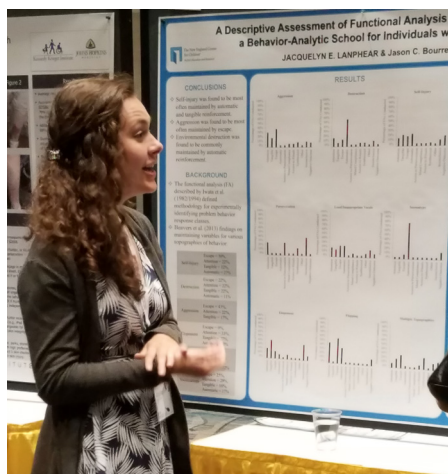
- **A DESCRIPTIVE ASSESSMENT OF FUNCTIONAL ANALYSIS METHODOLOGY AT A BEHAVIOR-ANALYTIC SCHOOL**
- **DIFFERENCES IN PERFORMANCE OF CRITICAL FOUNDATIONAL SKILLS IN CHILDREN WITH AND WITHOUT ASD**
- **A VIDEO MODELING APPROACH TO TRAIN ABDUCTION PREVENTION SKILLS**
- **DECREASING ENERGY USAGE THROUGH THE USE OF FEEDBACK, PROMPTS, AND REWARDS**
- **INCREASING PHYSICAL ACTIVITY FOR CHILDREN DIAGNOSED WITH AUTISM**

A DESCRIPTIVE ASSESSMENT OF FUNCTIONAL ANALYSIS METHODOLOGY AT A BEHAVIOR-ANALYTIC SCHOOL FOR INDIVIDUALS WITH AUTISM

Lanphear, J. E., & Bourret, J. C.

EDITOR'S NOTE:

An important step toward increasing NECC students' independence requires the development of effective function-based treatment for decreasing interfering problem behavior. NECC researchers conduct state-of-the-art functional assessment by conducting functional analysis, an empirically-based form of assessment that allows one to identify the maintaining variable of problem behavior. In this poster, NECC researchers reported the frequency and type of functional analysis conducted at NECC, the problem behavior assessed, and the behavioral functions commonly identified.



Jacquelyn Lanphear

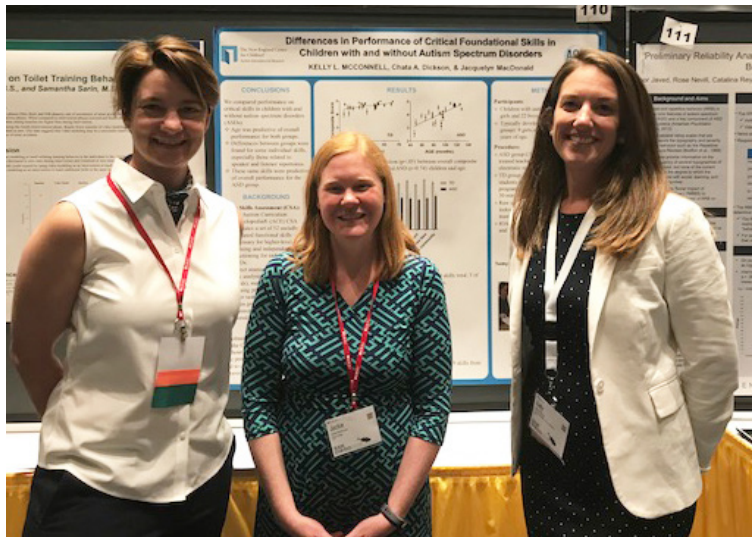
The functional analysis (FA) described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) defined methodology for experimentally identifying problem behavior response classes. Since the time of that publication, hundreds of research articles on functional analysis have been published and a large variety of methodological variations have been developed. To add to the literature describing current behavior analytic practice with regard to functional analyses, we conducted a descriptive assessment of the functional analysis methods at a large, behavior-analytic school for children diagnosed with autism. Out of the 344 FAs conducted, the most common behavior topographies examined were self-injurious behavior (27%) and aggression (24%). Examination of these FAs will also add to the literature surrounding the common maintaining variable(s) for these response topographies, as was previously summarized by Iwata et al (1994). On average, 4 functional analyses were conducted for each student with 18 sessions per FA. The most common dependent variable was response rate and the most common variables tested were attention and escape from demands.

DIFFERENCES IN PERFORMANCE OF CRITICAL FOUNDATIONAL SKILLS IN CHILDREN WITH AND WITHOUT AUTISM SPECTRUM DISORDER

McConnell, K.A., Dickson, C.A., & MacDonald, J.

EDITOR'S NOTE:

An important goal for NECC students is to promote their independence. This is achieved by teaching them important skills that serve as prerequisites for higher-level learning. In this abstract, NECC researchers presented data on an NECC-developed assessment, the Core Skills Assessment®. This assessment allows clinicians to evaluate student performance on more than 50 socially important skills for children with ASD.



Chata Dickson, Jacquelyn MacDonald, Kelly McConnell

The Core Skills Assessment® (CSA) evaluates a set of 52 socially validated foundational skills necessary for higher-level learning and independent functioning for individuals with autism spectrum disorder (ASD) and related disabilities. Understanding how performance of these skills in children with ASD compares to typically developing children may help educators and clinicians better understand the impact of skill deficits, prioritize skills to teach, and may help in generating questions for future research. The CSA was administered to 24 typically developing children and 24 children diagnosed with ASD in their typical school environments. Significant differences between groups were found ($p < .05$) for 9 skills, and 5 of these skills were related to speaker and listener repertoires. Performance on all 9 of these skills in the ASD group was correlated with overall performance on the CSA for these children, further suggesting their importance as critical foundational skills and the need for prioritization in treatment.

what is the core skills assessment?

The New England Center for Children - Core Skills Assessment® (NECC-CSA) is an assessment tool that allows teachers and clinicians to identify and prioritize foundational skills to address during intervention. The NECC-CSA includes 52 skills within various domains including discrimination, communication, social, self-help, recreation and physical education, community, and health and safety. The list was formulated from research published in peer-reviewed journals on learning and individuals with autism, and from the clinical expertise of senior professionals at NECC. This assessment tool incorporates direct observation and consistent measures, allowing for development of individualized intervention for facilitating progress and promoting independence.

A VIDEO MODELING APPROACH TO TRAIN ABDUCTION PREVENTION SKILLS

Priebs, J., & Ahearn, W.H.

EDITOR'S NOTE:

In addition to teaching a variety of academic, social, and leisure skills, researchers at NECC are also committed to conducting research on important safety skills for individuals with ASD. In the paper below, NECC researchers presented data on an intervention that included video modeling to teach abduction prevention skills across a variety of settings.



Jonathan Priebs

Childhood abduction by nonfamily members affects approximately 58,200 families each year (Sedlak, Finkelhor, Hammer, & Schultz, 2002). These abductions can cause devastating effects, which may be attenuated through proper execution of stranger awareness strategies to at-risk populations. With social-communicative deficits present in persons with autism spectrum disorder (ASD) it would be prudent to investigate successful teaching methods for those with ASD. Many have evaluated teaching programs for teaching abduction prevention to typically developing children but fewer have evaluated teaching these skills to those with disabilities. The goal of the current study is to attempt to further previous research into video modeling for training abduction prevention skills by evaluating them with children diagnosed with ASD. A multiple probe across contexts design was used to evaluate abduction prevention skill performance for participants with ASD. Training videos depicted target responses of 1) saying no to a stranger's lure, 2) walking away, and, 3) reporting the lure to a trusted adult. Results indicated that video modeling was sufficient at training the abduction prevention skills in one participant for all three contexts and video modeling with a short contingency review was sufficient for another participant. However, in-vivo training was necessary to produce the abduction prevention skills to the final two participants.

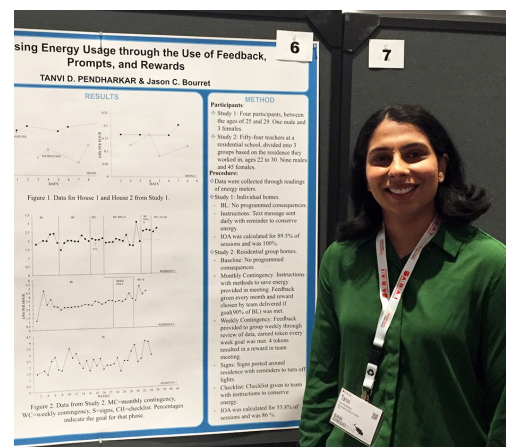
DECREASING ENERGY USAGE THROUGH THE USE OF FEEDBACK, PROMPTS, AND REWARDS

Pendharkar, T., & Bourret, J.C.

EDITOR'S NOTE:

Although much of NECC research is devoted to promoting independence in students, there is also research on increasing staff performance. In this poster, the authors presented data on a treatment package for increasing energy conservation in group homes. Although a treatment package was ineffective in decreasing energy usage, an intervention of daily text instructions was found to be effective in two private homes.

The energy used to produce electricity contributes to almost half of the total energy used in America. Many individual companies have programs designed to decrease the amount of energy used by homeowners and business owners by providing additional incentives for saving energy each month. It is important to identify an effective intervention to decrease energy usage across a variety of settings, including when the people using the energy do not directly pay for it or when homeowners are not involved in incentive programs. The participants in this study were employees at a residential school. The purpose of Study 1 was to identify an effective intervention to decrease energy usage in group homes using a combination of incentives, prompts, and feedback. The purpose of Study 2 was to evaluate the treatment package from Study 1 in individual homes. The results of Study 1 indicate that incentives, prompts, and feedback were ineffective in decreasing energy usage in a group home. The results of Study 2 indicate that the daily presentation of a rule was effective in decreasing energy usage in two homes. Interobserver agreement was collected for 54% of sessions. The mean agreement was 85.9%.



Tanvi Pendharkar

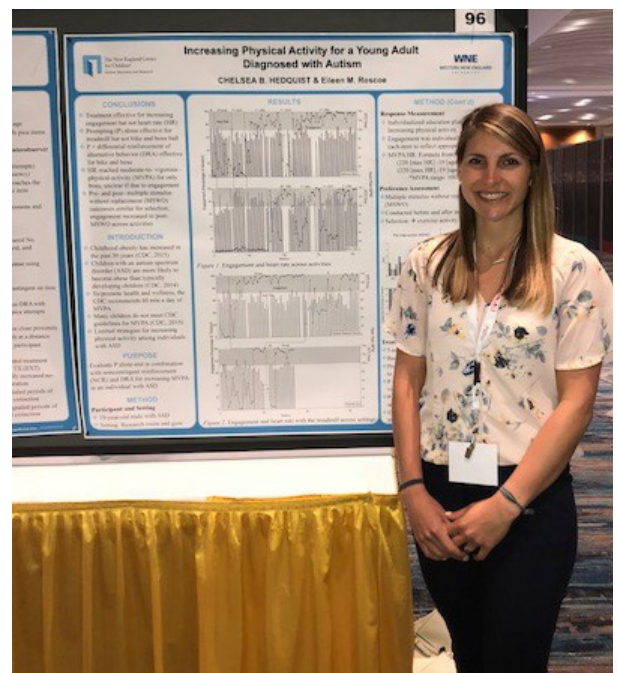
INCREASING PHYSICAL ACTIVITY FOR CHILDREN DIAGNOSED WITH AUTISM

Hedquist, C. & Roscoe, E.M.

EDITOR'S NOTE:

Another important goal for NECC students is to foster their engagement with leisure activities that promote health and wellness, such as increasing their level of physical activity. In the poster below, NECC researchers presented data on an intervention that was successful in increasing an NECC student's physical activity across a variety of exercise tasks, such as stepping up and down on a Bosu® ball, pedaling on a stationary bike, and walking on a treadmill.

Children with autism spectrum disorder (ASD) are more likely to be obese than their typically developing peers (CDC, 2014). One way to combat obesity is to increase physical activity. Although there are numerous recommended strategies for increasing leisure item engagement among individuals with ASD, there is limited research on increasing physical activity among this population. In the current study, a progressive treatment approach for increasing physical activity engagement was evaluated in an individual with ASD. Multiple baseline across exercise activities and reversal designs were used to demonstrate experimental control. Treatment conditions included prompting alone, prompting combined with noncontingent reinforcement (NCR), and prompting combined with differential reinforcement of alternative behavior (DRA). Dependent variables included activity engagement, stereotypy, and heart rate. Prompting combined with DRA was most effective in increasing activity engagement with two activities (pedaling on a stationary bike and bouncing on a Bosu® ball), whereas prompting alone was sufficient for increasing physical activity engagement with one activity (walking on a treadmill). Minimal differences in stereotypy and heart rate measures were observed across conditions for all activities. Interobserver agreement was calculated for 33% of sessions and averaged over 95% across dependent variables.



Chelsea Hedquist

upcoming research

Dr. Bill Ahearn and Brandi Todaro are starting a project aimed at determining the most effective method of instruction to teach novel staff how to correctly implement an educational class, more specifically a task analysis.

Dr. Jess Sassi, NECC Clinical Director, and Meline Pogojana are collaborating with Dr. Louis Hagopian of the Kennedy Krieger Institute on an extension of his Competing Stimulus Assessment (CSA) project.

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