Research

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

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Study Confirms that the Origin of Autism is Likely Genetic

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Despite the ardent beliefs of many people that autism has a solely environmental cause such as vaccines, it has long been known that there is strong scientific evidence that autism has genetic origins. Early studies of twins suggested this may be the case and, more recently, Tick and colleagues (2016) conducted a meta-analysis of published research involving twins and estimated heritability (i.e., how well differences in people's genes account for differences in their traits) of autism to be in the range of 64% to 91%.

Though there are some known environmental origins of autism, such as pregnant mothers contracting rubella having a much higher probability of their child receiving a diagnosis of autism, environmental variables may play a fairly small role in the population etiology of the disorder. However, environmental variables have received much more attention than genetic variables.

In July, Bai and colleagues (2019) published a study suggesting that the heritability of autism was approximately 80%, indicating that the variation in autism occurrence in the population is mostly due to inherited genetic influences, with no support for contribution from maternal effects (i.e., how much of the phenotype of a child is influenced by the environment experienced by the mother). The researchers examined the medical histories of more than 2 million (non-twin) children born in Denmark, Finland, Sweden, Israel, and Western Australia between 1998 and 2012. All were tracked for a diagnosis of autism from birth and were followed until age 16. Autism diagnoses were obtained through their medical record. Of those studied, over 22,000 had an autism diagnosis, for a prevalence in the group of 1.1%. The authors then used Generalized Linear Mixed Effect Models to estimate genetic and environmental effects on the risk for autism to obtain the heritability estimate.

In an editorial accompanying the article, Jutla et al. (2019) state that "the disorder is strongly heritable, with environmental factors, although important, contributing relatively less to its variance than genetic factors." They then, by implication, suggest that this study may actually underestimate the contribution of genetic variables as it did not capture de novo (non-inherited) gene variations for which there are robust data suggesting such variations may contribute significantly to autism risk.✦

Bai, D., Yip, B.H.K., Windham, G.C., et al. (2019). Association of genetic and environmental factors with autism in a 5-country cohort. *JAMA Psychiatry*, 201976 (10), 1035–1043. https://doi:10.1001/jamapsychiatry.2019.1411.

Jutla, A., Reed, H., Veenstra-VanderWeele, J. (2019). The architecture of autism spectrum disorder risk: What do we know, and where do we go from here? *JAMA Psychiatry*, 201976 (10), 1005–1006. https://doi:10.1001/jamapsychiatry.2019.1375.

Tick, B., Bolton, P., Happé, F., Rutter, M., & Rijsdijk, F. (2016). Heritability of autism spectrum disorders: A meta-analysis of twin studies. *The Journal of Child Psychology and Psychiatry*, 57(5), 585-595. https://doi:10.1111/jcpp.12499.

NECC Published Research on Refinements of the Functional Assessment Process

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

Before an effective intervention for problem behavior can be developed or implemented, clinicians must first conduct a functional analysis (FA) to identify the cause of the behavior. Individuals diagnosed with autism spectrum disorder (ASD) may engage in problem behavior for a variety of reasons. Some of the most common causes for the occurrence of problem behavior are access to attention, preferred activities, or food, or breaks from demands or non-preferred activities (e.g., academic work or self-care tasks).

When problem behavior occurs as a means to get out of having to complete work or activities, it is referred to as ***escape-maintained problem behavior***.

Escape-maintained behavior is identified when higher levels of problem behavior are observed in the FA demand condition. This condition involves presenting demands that bring about or evoke the problem behavior. These demands are those that an individual typically encounters that are non-preferred.

Before conducting an FA to determine the cause of problem behavior, it is important to identify appropriate demands to include in the demand test condition. If the correct demands are not included in this functional analysis condition, then the cause of the problem behavior may be missed (Roscoe, Rooker, Pence, & Longworth, 2009). Because identifying appropriate tasks to include in the FA demand condition is essential, Roscoe, Rooker, Pence, and Longworth (2009) evaluated a demand analysis for this purpose. During the analysis, a therapist presented 10 to 12 tasks singly during sessions. If the participant had problem behavior, the therapist provided a 30 second break. For three of four participants, the inclusion of a problematic task identified from the demand analysis yielded a clear FA outcome showing escape-maintained problem behavior, whereas a less-problematic task identified from the demand analysis did not. These findings showed that a demand analysis is a useful method for identifying tasks that may evoke problem behavior.

Although conducting a demand analysis may enhance FA efficiency by identifying the correct demands to include in the FA demand condition, it can be time-intensive (it may take up to 2 hours to complete).

For clinicians with time constraints, an indirect assessment could offer a potential alternative to a demand analysis prior to conducting an FA. Indirect assessments include surveys or interviews to obtain information that can be included in an FA. An example of an indirect assessment tool that was developed to identify non-preferred or problematic demands is the Negative Reinforcement Rating Scale (NRRS; Zarcone, Crosland, Fisher, Worsdell, & Herman, 1999). The NRRS includes 14 caregiver questions about various demand categories (e.g., self-care tasks, academic work, house chores) that may be non-preferred, met with resistance, or precede problem behavior.

Given the potential utility of the NRRS as a time saving resource to a demand analysis, Wiggins and Roscoe (in press) extended previous research on the NRRS by evaluating its reliability and validity for five individuals with ASD who exhibited problem behavior. We assessed reliability by comparing NRRS outcomes across two informants. NRRS validity was assessed by including three reported problematic demands and three reported neutral demands, in a subsequent demand analysis. For reliability, agreement scores across informants were high for listing the same demand types or categories; however, the informants often did not list the same specific examples. For the validity analysis, results showed that at least one of the NRRS identified problematic tasks corresponded with demand analysis outcomes for four of five participants. This finding suggests that the NRRS may be a potential alternative to a demand analysis for identifying the best tasks to include in an FA demand condition.

Based on the findings of Wiggins and Roscoe, clinicians with time restrictions are encouraged to conduct an NRRS instead of a demand analysis when escape is hypothesized to be the cause

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of problem behavior. Following administration of the NRRS, multiple tasks reported to be problematic should be included in the FA demand condition to increase the likelihood that at least one will bring about escape-maintained problem behavior.

Additionally, if clinicians obtain FA outcomes that are inconclusive, it is recommended that they conduct an NRRS followed by a demand analysis, particularly when caregivers report that escape is a likely function for problem behavior. Conducting these additional assessments can facilitate identification of the cause of the problem behavior in a subsequent FA. Once we understand the cause of the problem behavior, we can then implement an individualized and effective treatment. ✦

Roscoe, E. M., Rooker, G. W., Pence, S. T., & Longworth, L. J. (2009). Assessing the utility of a demand assessment for functional analysis. *Journal of Applied Behavior Analysis*, 42, 819–825. https://doi.org/10.1901/jaba.2009.42-819

Wiggins, H. C., & Roscoe, E. M. (published in early view, 2019). Evaluation of an indirect assessment for identifying tasks for functional analysis. *Journal of Applied Behavior Analysis.* https://necc.box.com/s/locp7irn8dytz3yo3x9vc-94js5bqsca7

Zarcone, J. R., Crosland, K., Fisher, W. W., Worsdell, A. S., & Herman, K. (1999). A brief method for conducting a negative-reinforcement assessment. *Research in Developmental Disabilities*, 20, 107-124. https://doi.org/10.1016/S0891-4222(98)00036-5

Research at BABAT

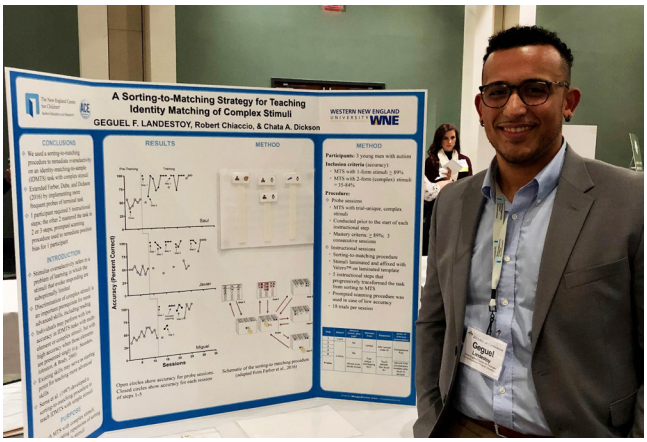
Staff from NECC presented 40 invited addresses, papers, symposia, workshops, and posters at the 40th annual convention of the Berkshire Association for Behavior Analysis and Therapy (BABAT) in Worcester, MA, October 2-4, 2019. The following are a sample of work presented.

A SORTING-TO-MATCHING STRATEGY FOR TEACHING IDENTITY MATCHING OF COMPLEX STIMULI

Landestoy, G.F., Chiaccio, R.P., & Dickson, C.A.

EDITOR'S NOTE: *An important step towards achieving independence involves teaching individuals with ASD important pre-requisite skills, such as matching objects that are identical to one another, before teaching more complex skills. The authors of the following poster describe a strategy for teaching an identity matching task to three adolescent boys with autism.*

Three adolescent boys with autism who attended a behaviorally based school participated in this study designed to remediate overselectivity in a tabletop compound identity matching task. A sorting-to-matching procedure was used to teach participants to match a two-stimulus sample to an identical comparison. We presented probe sessions following each step of the teaching procedure to determine whether some participants would reach criterion without completing all programmed steps. Performance on initial probes was consistent with stimulus overselectivity. Following training, performance on probes was at mastery level for all participants. Two participants met mastery criteria before the completion of all training steps. For one participant, we implemented a prompted scanning procedure due to position bias. Interobserver agreement and procedural integrity for all participants was 100%.



Geguel Landestoy

This study illustrates one way to expand attending to multiple features of a complex stimulus, and the results show that some learners may accomplish this outcome in fewer training steps than others. ✦

Research Selections

1. A sorting-to-matching strategy for teaching identity matching of complex stimuli
2. Evaluating consequences and their effects during instruction with individuals with special needs
3. Interventions to increase compliance with medial administration: A literature review
4. Concurrent DRA schedules in the treatment of escape- maintained problem behavior without extinction
5. Evidenced based practices in the treatment of individuals with autism spectrum disorder
6. The Autism Curriculum Encyclopedia®: A customizable curriculum for learners with autism spectrum disorder

EVALUATING CONSEQUENCES AND THEIR EFFECTS DURING INSTRUCTION WITH INDIVIDUALS WITH SPECIAL NEEDS

Sympoisum chaired by Johnson, C.

EDITOR'S NOTE: *Another consideration for developing effective teaching procedures is the delivery of valuable consequences for correct performance during skill acquisition. This symposium included four papers that addressed this topic. In the first paper, Looi and Johnson described a procedure for training teachers in Malaysia to deliver praise in their classrooms. In the second paper, Schaefer and Roscoe discussed a method for identifying preferred social reinforcers to use for promoting complex skills. In the third paper, Jackson et al. compared tokens versus praise following task completion. In the final paper, Silva and Johnson compared consequences for teaching students with autism different food categories.*

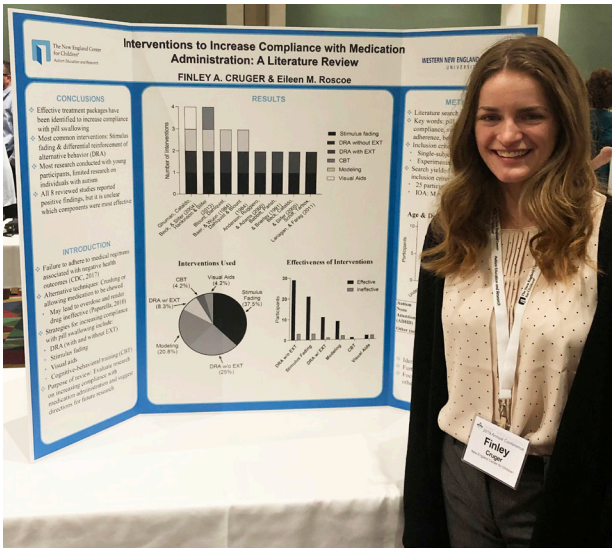
Effective instruction involves the careful arrangement of antecedent and consequent events. All papers in this symposium presented empirical evaluations of consequences. Looi and Johnson evaluated the effect of behavioral skills training and written feedback on the frequency of social praise by four Malaysian teachers and the collateral effects on preselected target behavior of 4 students. Results indicated that the training and feedback effectively increased all teachers' use of social praise and 2 of the students' target behaviors. Schaefer and Roscoe evaluated social consequences, identified by a pictorial paired-stimulus preference assessment in 3 reinforcer assessments. The preference assessment showed predictive validity; the more-preferred social consequence was more effective than the lower-preferred consequence or control. Jackson, Hough, Malagodi, and Bourret evaluated the relative reinforcing efficacy of brief (praise) and continually present (tokens) conditioned reinforcers. They found continually present conditioned reinforcers sustained more responding on progressive-ratio schedules. Silva and Johnson examined the effects of 3 outcome-specific consequences embedded in an arbitrary match-to-sample tabletop task that taught stimulus-stimulus relations from 3 food categories. They found that many other conditional discriminations/performances emerged without direct teaching, and these results were replicated with a second set of 3 food categories.✦

Jason Bourret, Joshua Jackson, Ali Schaefer, Eileen Roscoe, Cammarie Johnson, Daniela Silva, Irene Looi

INTERVENTIONS TO INCREASE COMPLIANCE WITH MEDICAL ADMINISTRATION: A LITERATURE REVIEW

Cruger, F.A., & Roscoe, E.M.

EDITOR'S NOTE: *An important skill for individuals with autism is cooperation with medical procedures, such as compliance with medication administration. The authors of this poster describe various behavior analytic strategies that can be used to increase compliance with individuals' pill swallowing.*



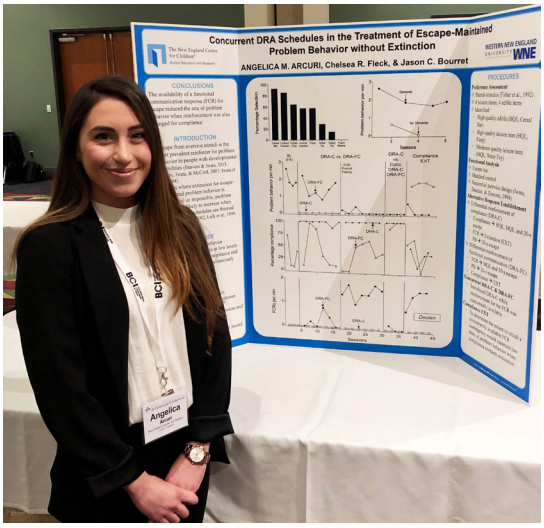
Finley Cruger

Failure to adhere to medical regimens is associated with negative health outcomes and increased mortality rate (CDC, 2017). However, individuals may struggle with swallowing pills, resulting in non-compliance and disruption during medication administration. As a result, medication administration techniques such as crushing medication or allowing pills to be chewed may be used. However, crushing or chewing some medications can cause patients to overdose or can render the drug ineffective. Past research has investigated the use of behavioral interventions such as differential reinforcement of alternative behavior (DRA) and stimulus fading as well as other interventions including modeling and visual aids to increase compliance with pill swallowing. The purpose of this literature review is to outline the efficacy and behavioral basis of interventions used to increase compliance with pill swallowing and discuss directions for future research. The keywords *pill swallowing* and *compliance* were used to identify relevant research. ✦

CONCURRENT DRA SCHEDULES IN THE TREATMENT OF ESCAPE-MAINTAINED PROBLEM BEHAVIOR WITHOUT EXTINCTION

Arcuri, A.M., Fleck, C.R., & Bourret, J.C.

EDITOR'S NOTE: *When individuals with autism exhibit interfering problem behavior, it is important to address this behavior prior to teaching educational skills. In this study, researchers conducted a treatment to decrease an individual's problem behavior that occurred to escape from work. The authors taught the individual to ask for a break and to complete work. Both responses resulted in a break from work; however, task completion also resulted in access to highly preferred activities.*



Angelica Arcuri

The most prevalent reinforcer for problem behavior in individuals with developmental disabilities is escape from aversive stimuli. Treatment for escape-maintained problem behavior often entails reinforcing a functional communication response (FCR) with escape. Differential reinforcement of alternative behavior (DRA) in the form of compliance, alternatively, may produce decreases in escape-maintained problem behavior and simutaneously increase compliance. Compliance DRA has been shown to be effective in treating escape-maintained problem behavior even when arbitrary reinforcers are used, and problem behavior is not on extinction. We evaluated concurrent schedules in which compliance resulted in escape plus high-quality positive reinforcers, break FCRs resulted in escape plus moderate-quality positive reinforcers, and problem behavior resulted in escape. Reinforcement for compliance and functional communication training were both independently effective at reducing aggression and increasing alternative responses. When FCT and compliance DRA were implemented concurrently, the participant continued to comply with 100% of demands with no problem behavior. During a treatment challenge (i.e., extinction of compliance), problem behavior remained at zero when the FCR was concurrently reinforced but occurred at baseline levels when the FCR was not available. Interobserver agreement was collected for 77% of sessions with 95% agreement. ✦

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Disseminating Research Abroad

The National Language Rehabilitation Summit Forum and the 3rd Child Language Rehabilitation Forum, Beijing, China

EVIDENCED BASED PRACTICES IN THE TREATMENT OF INDIVIDUALS WITH AUTISM SPECTRUM DISORDER

Shaalan, S.

Dr. Saleh Shaalan, MRC-NECC Director of Allied Health Services, discussed basic principles of evidence based practices and reviewed some common treatments used with individuals with autism. The audience of approximately 60 attendees included speech and language pathologists from China and other neighboring countries.

3rd International Conference on Educational Measurement and Evaluation, Abu Dhabi,UAE

THE AUTISM CURRICULUM ENCYCLOPEDIA® (ACE®): A CUSTOMIZABLE CURRICUCLUM FOR LEARNERS WITH AUTISM SPECTRUM DISORDER

Moulton, C.

Caitlin Moulton, MRC-NECC Educational Specialist and BCBA, provided a paper presentation on the utility of the ACE® ABA Software System as a tool for learners with ASD.

The ACE ABA Software System is a cloud-based online platform that provides the tools to effectively run an ABA classroom or program. More info can be found at www.acenecc.org.

Research

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