

EXTINCTION

CHARACTERISTICS OVERVIEW CHART

Verbal Skills	Grade Levels	Cognitive Level	Areas Addressed
<input checked="" type="checkbox"/> Nonverbal <input checked="" type="checkbox"/> Mixed <input checked="" type="checkbox"/> Verbal	<input checked="" type="checkbox"/> PK <input checked="" type="checkbox"/> Elementary <input checked="" type="checkbox"/> Middle/High	<input checked="" type="checkbox"/> Classic <input type="checkbox"/> High Functioning	<input type="checkbox"/> (Pre)Academic/Cognitive/Academic <input checked="" type="checkbox"/> Adaptive Behavior/Daily Living <input checked="" type="checkbox"/> Behavior <input checked="" type="checkbox"/> Communication/Speech <input checked="" type="checkbox"/> Social/Emotional

BRIEF INTRODUCTION

Extinction refers to an applied behavior analysis (ABA) procedure whereby formerly reinforced behavior is no longer reinforced. Extinction can occur when teachers withhold identified reinforcers for a target behavior that was previously reinforced.

DESCRIPTION

According to Miller (2006), extinction occurs when an event that follows a behavior is systematically stopped and the rate of the behavior decreases. In other words, extinction involves withholding or terminating the consequence of previously reinforced behavior to weaken an undesired behavior. Extinction has been used to decrease the occurrence of a variety of problem behaviors.

Extinction procedures may take different forms. The first form of extinction procedure is related to positive reinforcement (Cooper, Heron, & Heward, 2007). For example, a child with autism (AU) drops his pencil in order to get attention from the teacher. If the teacher picks up the pencil and smiles at the child, he may be reinforcing the behavior and the behavior is likely to increase. If the teacher ignores the behavior, the child will eventually stop dropping his pencil.

When behaviors are maintained by negative reinforcement, the form of extinction procedure is different. For example, Mike spit on his worksheet when he did not want to do his work. When

this happened, Ms. Smith would send him to a thinking chair as a punishment. However, for Mike, sitting in the thinking chair was an opportunity to avoid completing the worksheet. Ms. Smith realized that his problem behavior was designed to escape the task. When, instead, Ms. Smith ignored his negative behavior (extinction) and reinforced him for completing problems on his assignment, Mike's spitting behavior was gradually decreased.

During the extinction process, extinction bursts may occur. An extinction burst is a temporary increase in the frequency, intensity, or duration of the undesired behavior as soon as extinction begins. It is critical that the teacher truly continue the extinction process that has been developed. Otherwise, the undesired behavior may remain at the increased level of intensity.

STEPS

Teachers can use extinction procedures as follows:

1. *Identify the relationship between reinforcer and the reinforced behavior.* Problem behaviors can be reinforced by negative reinforcement, positive reinforcement, or automatic reinforcement. It is important to differentiate reinforcers for the problem behavior.
2. *Discontinue the previously provided reinforcers.* After identifying reinforcers, teachers need to analyze the function of reinforcers. By removing the reinforcers or by preventing a removal of aversive stimuli, teachers can disconnect the relationship between reinforcers and problem behaviors so that the target behavior can be reduced.
3. *Monitor the rate of problem behavior.* The child's problem behavior must be observed and the progress of the extinction procedure must be monitored. It is important to know that all members involved in the procedure share and follow the rules. Once the child connects the relationship between his behavior and reinforcers, it takes even longer to disconnect the reestablished connection.

BRIEF EXAMPLE

Mr. Reid, a second-grade teacher, had difficulty dealing with Logan’s interrupting behavior during class. Logan asked several irrelevant questions while Mr. Reid was lecturing. Mr. Reid realized that he answered Logan whenever he asked questions in class, and through a functional behavior assessment found that Logan’s interrupting behavior was to obtain the teacher’s attention.

Mr. Reid began to ignore Logan’s irrelevant questions and reinforced appropriate questions. After one week, Logan’s interrupting behavior gradually decreased. Finally, Logan stopped asking irrelevant questions while Mr. Reid was lecturing.

SUMMARY

Extinction is a procedure in which reinforcement for a previously reinforced behavior is discontinued. The extinction procedure itself is not an approach to prevent the occurrence of a problem behavior. Basically, the environment is changed through the extinction procedure so that the rate of problem behavior is decreased.

RESEARCH TABLE

Number of Studies	Ages (year)	Sample Size	Area(s) Addressed	Outcome
4	2-15	58	Social consequence, sleep problems, aggressive behaviors, problem behavior, self-injurious behavior, disruptive behavior, finger picking, appropriate vocal responses, inappropriate verbalizations, transitions, and sorting, food refusal, picky eating	+

STUDIES CITED IN RESEARCH TABLE

1. Cuvo, A.J., Godard, A., Huckfeldt, R., DeMattei, R. (2010). Training children with autism spectrum disorders to be compliant with an oral assessment. *Research in Autism Spectrum Disorders, 4*, 681-696.
This study reported the results of an evaluation of the effects of a behavioral intervention package (preference assessments, stimulus fading, distraction, extended baseline exposure to aversive stimuli, video priming, prompting (i.e., verbal instructions, photo, gestural, physical), differential reinforcement, and escape extinction) to improve the compliance of 5 young boys with ASD during dental exams. The package was successful in increasing compliance with all steps in the dental exam for 4 of the participants, and for all but one exam step for the 5th boy.
2. Najdowski, A.C., Wallace, M.D., Reagon, K., Penrod, B., Higbee, T.S., Tarbox, J. (2010). Utilizing a home-based parent training approach in the treatment of food selectivity. *Behavioral Interventions, 25*, 89-107.
This study reported the successful use of a DRA/Extinction/Demand fading procedure to reduce food refusal in 3 children under 4 (2 with ASD). Parents were trained to implement the intervention, and did so with a high degree of treatment integrity. A multiple-baseline-across-participants design demonstrated that food acceptance only increased following parent implantation of the treatment package.
3. Tarbox, J., Schiff, A., Najdowski, A.C. (2010). Parent-implemented procedural modification of escape extinction in the treatment of food selectivity in a young child with autism. *Education and Treatment of Children, 33(3)*, 223-234.
This study reports the successful use of extinction to reduce the food refusal of a 3-yr old boy with autism. An ABAB reversal design was used to demonstrate that food refusal only decreased when extinction was used. The intervention was implemented by the boy's mother following training from the authors.
4. Valdimarsdottir, H., Halldorsdottir, L.Y., Sigurdardottir, Z.G. (2010). Increasing the variety of foods consumed by a picky eater: Generalization of effects across caregivers and settings. *Journal of Applied Behavior Analysis, 43(1)*, 101-105.
This study reports the successful use of a differential reinforcement of alternative behavior + extinction procedure to increase the variety of foods eaten by a 5-yr-old boy with ASD. In a multiple-baseline-across settings design caregivers at home and school were taught to use the intervention procedure and consumption of non-preferred food increased following intervention in both settings.
5. Waters, M. B., Lerman, D. C., & Hovanetz, A. N. (2009). Separate and combined effects of visual schedules and extinction plus differential reinforcement on problem behavior occasioned by transitions. *Journal of Applied Behavior Analysis, 42*, 309-313.
The separate and combined effects of visual schedules and extinction plus differential reinforcement of other behavior (DRO) were evaluated to decrease transition-related

problem behavior of two 6-year-old boys with autism. Visual schedules alone were ineffective in reducing problem behavior when transitioning from preferred to nonpreferred activities. Problem behavior decreased for both participants when extinction and DRO were introduced, regardless of whether visual schedules were also used.

6. Smaby, K., MacDonald, R.P.F., Ahearn, W. H., & Dube, W. V. (2007). Assessment protocol for identifying preferred social consequences. *Behavioral Interventions, 22*, 311-318.
Three children with autism aged 4 to 7 participated. The study described a method for rapidly identifying social reinforcers and assessing relative preference among social consequences for young children with autism. Participants' free-operant behavior was analyzed in three social consequence conditions that alternated with an extinction condition. The results identified social consequences that functioned as reinforcers and others to which the child was relatively indifferent.
7. Higbee, T. S., Carr, J. E., Patel, M. R. (2002). The effects of interpolated reinforcement on resistance to extinction in children diagnosed with autism: A preliminary investigation. *Research in Developmental Disabilities, 23*, 61-78.
In the present study, extinction was examined in four young children with autism (ages 4 to 6) were taught sock sorting using intermittent and continuous reinforcement. Extinction occurred more quickly when intermittent reinforcement was used.
8. Ringdahl, J. E., Vollmer, T. R., Borrero, J. C., & Connell, J. E. (2001). Fixed-time schedule effects as a function of baseline reinforcement rate. *Journal of Applied Behavior Analysis, 34*, 1-15.
The authors evaluated fixed-time (FT) schedules that were either similar or dissimilar to a baseline reinforcement schedule and extinction. Results suggested that both schedules and extinction resulted in decreased responding in two individuals with autism spectrum disorder (ages 4, 5) However, reinforcement was more effective in reducing response rates if the reinforcer rate was dissimilar to baseline reinforcer rates.
9. Schreck, K. A. (2001). Behavioral treatments for sleep problems in autism: Empirically supported or just universally accepted? *Behavioral Interventions, 16*, 265-278.
The study investigated the effectiveness of applied behavior analysis for treating sleep problems in children with autism through a computer search of the relevant literature. Six articles were found, collectively comprising 27 children with autism, aged 2-12. The articles revealed four basic themes of behavioral techniques for treating sleep disorders in children with autism: bedtime routines, extinction, stimulus fading, and faded bedtimes. Results showed that of the ABA methods, only research on extinction provided sufficient evidence for a possibly efficacious intervention for sleep problems in children with autism.
10. Braithwaite, K. L., & Richdale, A. L. (2000). Functional communication training to replace challenging behaviors across two behavioral outcomes. *Behavioral Interventions, 15*, 21-36.
The study examined the effectiveness of an intervention that included extinction and functional communication training to reduce multiply controlled, self-injurious, and aggressive behaviors in a 7-year-old boy with autism in a school setting. Analysis of

behavioral antecedents and consequences suggested that self-injury and aggression served the dual behavioral outcomes of escape from difficult tasks and access to preferred objects. Treatment consisted of teaching the boy an alternate request while challenging behaviors were concurrently placed on extinction. Results showed that challenging behaviors with different behavioral outcomes can be replaced with functionally equivalent communication.

11. Hagopian, L. P., Crockett, J. L., van Stone, M., DeLeon, I. G., & Bowman, L. G. (2000). Effects of noncontingent reinforcement on problem behavior and stimulus engagement: The role of satiation, extinction, and alternative reinforcement. *Journal of Applied Behavior Analysis, 33*, 443-448.
Four children aged 4 to 13 participated in a study that examined the effects of noncontingent reinforcement with and without extinction on problem behavior and stimulus engagement. Results showed that noncontingent reinforcement without extinction can be effective in reducing problem behavior if the alternative sources of free reinforcement are adequately dense.
12. Richman, D. M., Wacker, D. P., Asmus, J. M., Casey, S. D., & Andelman, M. (1999). Further analysis of problem behavior in response class hierarchies. *Journal of Applied Behavior Analysis, 32*, 269-283.
A functional analysis identified the reinforcers for two participants' problem behavior (8-years old with ADHD, mental retardation and autism 4-year-old with developmental delay and autism) who had mild problem behaviors. Extinction was used which confirmed that the same reinforcer identified in the initial functional analysis maintained more severe topographies of problem behavior (e.g., aggression).
13. Mace, A.B.M., Shapiro, E. S., & Mace, F. C. (1998). Effects of warning stimuli for reinforcer withdrawal and task onset on self-injury. *Journal of Applied Behavior Analysis, 31*, 679-682.
A 7-year-old girl with autism participated in the study, which investigated the effects of warning stimuli for reinforcer withdrawal and task onset on self-injury. Results of a functional analysis of self-injurious behavior showed that the child's behavior was maintained by access to preferred objects and escape or avoidance of task demands. Extinction and noncontingent reinforcement treatments were supplemented by presenting a statement combined with a picture cue at 30-second intervals, indicating that a preferred object would be removed or a task would be presented. Results showed that warning stimuli in combination with extinction and noncontingent reinforcement reduced self-injurious behavior to acceptable levels. The frequency of self-injurious behaviors remained comparatively high in a control condition consisting of a 2-minute delay to onset of reinforcer removal or task demands.
14. Freeman, K. A., & Piazza, C. C. (1998). Combining stimulus fading, reinforcement, and extinction to treat food refusal. *Journal of Applied Behavior Analysis, 31*, 691-694.
The study combined fading, reinforcement, and escape extinction using guided compliance to increase food consumption while maintaining low rates of disruptive behavior at mealtime for a 6-year-old girl with autism. Results indicated that intake increased and

compliance with prompting procedures remained relatively stable despite the requirement that food consumption increase.

15. Hardman, M. A. (1979). Reduction of inappropriate verbalizations in an emotionally disturbed adolescent. *Mental Retardation, 17*, 251-252.
A 15-year-old female with autism participated in the study, which compared the effectiveness of timeout vs. extinction with regard to speech dysfluency. Results supported the efficacy and practicality of the timeout procedure in that control was markedly improved over extinction; besides, it was obtained rapidly.

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RESOURCES AND MATERIALS

- Autism Internet Modules. Extinction: <http://www.autisminternetmodules.org/>.
- The Autism Webcourse. Extinction Module: http://cdd.unm.edu/swan/autism_course/modules/behavior/extinction/index.htm
- Children’s Intervention Learning and Development: <http://www.childmdim.com/resources/sub-page-2/aba-approach/>
This link takes the user to a page that defines and gives an example of using extinction; contains resources for parents and educators.
- National Professional Development Center on Autism Spectrum Disorders. Evidence-Based Practice: Extinction: <http://autismpdc.fpg.unc.edu/content/extinction>

- Teaching Children with Autism: <http://www.polyxo.com/discretetrial/difficultbehaviors.html>
Here the user will find a succinct summary of extinction as well as other ABA strategies.

GENERAL RESOURCES

- Autism Internet Modules (AIM) www.autisminternetmodules.org. The Autism Internet Modules were developed with one aim in mind: to make comprehensive, up-to-date, and usable information on autism accessible and applicable to educators, other professionals, and families who support individuals with autism spectrum disorders (ASD). Written by experts from across the U.S., all online modules are free, and are designed to promote understanding of, respect for, and equality of persons with ASD.
- The Autism Web Course: http://cdd.unm.edu/swan/autism_course/about/index.htm. This web course was developed out of materials from the Interactive Collaborative Autism Network (ICAN). The Autism Programs at the University of New Mexico has updated and added information to this web course.
 - Characteristics
 - Assessment
 - Academic Interventions
 - Behavioral Interventions
 - Communication Interventions
 - Environmental Interventions
 - Social Interventions
 - Family Support Suggestions
- Indiana Resource Center for Autism (IRCA) <http://www.iidc.indiana.edu/irca/fmain1.html>. The Indiana Resource Center for Autism staff's efforts are focused on providing communities, organizations, agencies, and families with the knowledge and skills to support children and adults in typical early intervention, school, community, work, and home settings.
 - IRCA Articles: <http://www.iidc.indiana.edu/index.php?pageId=273>
- Texas Statewide Leadership for Autism www.txautism.net. The Texas Statewide Leadership for Autism in conjunction with the network of Texas Education Service center with a grant from the Texas Education Agency has developed a series of free online courses in autism. Please check the training page, www.txautism.net/training.html, for update lists of courses, course numbers and registration information. Current courses include the following:
 - Asperger Syndrome 101
 - Augmentative and Alternative Communication and the Autism Spectrum
 - Autism for the General Education Teacher
 - Autism 101: Top Ten Pieces to the Puzzle
 - Classroom Organization: The Power of Structure for Individuals with ASD
 - Communication: The Power of Communication for Individuals with ASD
 - Futures Planning for Students with Autism Spectrum Disorder

- Navigating the Social Maze: Supports and Interventions for Individuals with ASD
- Solving the Behavior Puzzle: Making Connections for Individuals with ASD