

# Behavioral Treatment for Children with Autism

Paulina Peng-Wilford, PhD, Xuejun Kong, MD

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## ABSTRACT

Autism is a complex neurodevelopmental disorder representing a heterogeneous group of individuals with similar symptomatologies and multiple biologic etiologies. More children will be diagnosed with autism this year than with AIDS, diabetes & cancer combined. Government statistics suggest the prevalence rate of Autism is increasing, around 10-17 percent annually. Autism costs the nation over \$35 billion per year, a figure that is expected to increase significantly in the next decade. In efforts to remedy this devastating epidemic, many treatments and interventions are being developed. Among these interventions, Applied Behavioral Analysis (ABA) is probably the best-known and best-researched treatment available for autism spectrum disorders. This article will very briefly describe the ABA behavioral treatment process for children with autism, and review several key studies on its effectiveness. Due to the complexity of ABA principles, techniques, and their application, this article is not intended to be a detailed or definitive explanation on the subject.

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## INTRODUCTION TO AUTISM AND APPLIED BEHAVIORAL ANALYSIS

Autism is characterized by abnormalities in social interaction, communication, and restricted repertoire of activities and interests. Moderate to severe behavioral problems such as irritability, aggressiveness, non-compliance, and self-injurious behavior are often present. According to the Mayo Clinic, symptoms of autism set in before the age of three. For reasons currently unknown, the

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(Corresponding Author)

**Paulina Peng-Wilford, PhD**

Executive Director of Multicultural Neurobehavioral Rehabilitation Center and Global Alliance for Healthcare, 146 Martin Street, Carlisle, MA 01741

**Xuejun Kong, MD**

Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA

incidence of autism appears to be rising. Once thought to be very rare, autism spectrum disorders are estimated to occur in as many as 1:110 (one in every 110 people).<sup>1</sup>

Currently, the exact causes of Autism are unknown, and physicians have no cure for autism; however, with appropriate treatment and education, many children with the disorder can learn and develop. Specially, early interventions often can reduce challenges associated with the disorder, lessen disruptive behavior, provide some degree of independence, and improve the quality of life for children with autism. According to Dr. Rogers' conclusion in "Evidence-Based Comprehensive Treatments for Early Autism": early intervention programs are indeed beneficial for children with autism, often improving developmental functioning and decreasing maladaptive behaviors and symptom severity at the level of group analysis.<sup>2</sup>

Although there is no single treatment protocol for all children with autism, among the many methods available for treatment and education of people with autism, applied behavior analysis (ABA) has become widely accepted as an effective treatment option. The National Institute of Child Health and Human Development lists Applied Behavior Analysis among the recommended treatment methods for autism spectrum disorders. A Report of the Surgeon General states, "Thirty years of research demonstrated the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior in people with Autism".<sup>3</sup>

Applied behavior analysis, according to Drs. Baer Wolf and Risley, is the process of systematically applying interventions based upon the principles of learning theory to improve socially significant behaviors to a meaningful degree, and to demonstrate that the interventions employed are responsible for the improvement in behavior.<sup>4</sup>

Applied behavior analysis is one of the three major branches of behavioral analysis (the other two branches are behaviorism and the experimental analysis of behavior). Behavior analysis can be traced back to John B. Watson and what became known as Watsonian behaviorism or stimulus-response psychology. B.F. Skinner is credited, though, as being the founder of the experimental analysis of behavior. The science of behavior analysis focuses on principles about how behavior works, or how learning takes place. For example, one principle of behavior analysis is positive

reinforcement. When a behavior is followed by something that is valued (a "reward"), that behavior is likely to be repeated. Through decades of research, the field of behavior analysis has developed many techniques for increasing useful behaviors and reducing those that may be harmful or that interfere with learning. Applied behavior analysis (ABA) is the use of those techniques and principles to address socially important problems, and to bring about meaningful behavior change.<sup>5</sup>

The field of applied behavior analysis grew in the 1950s and 1960s as researchers began to apply methods of experimental analysis of behavior to determine if principles of behavior demonstrated in laboratory settings with nonhumans could be replicated with humans in naturalistic settings. Applied behavior analysis as it is now known can be traced to the work of Ayllon and Michael in 1959.<sup>6</sup> The field began to expand and two significant events in 1968 marked the formal beginning of contemporary applied behavior analysis: (1) the publication of the *Journal of Applied Behavior Analysis* and (2) the publication of "Some Current Dimensions of Applied Behavior Analysis," by Baer, Wolf, and Risley.<sup>7</sup>

Baer provided recommendations for applied behavior analysis which later became the field's defining characteristics. These defining characteristics state that applied behavior analysis should be applied, behavioral, analytic, technological, conceptual, effective, and capable of generalized outcomes. As the field of applied behavior analysis continues to grow and is applied to a wide variety of problems additional characteristics have been suggested, but the original defining characteristics as proposed by Baer et al. remain the standard.<sup>8</sup>

Dr. Ivar Lovaas first applied Behavioral Analysis techniques to autism patients at the Psychology Department of UCLA. His idea was that social and behavioral skills could be taught, even to profoundly autistic children, through the ABA method.<sup>8</sup> Since that time, a wide variety of ABA techniques have been developed for learners with autism in building useful skills in communication, social, academic, and community living skills, and adaptive living skills including gross and fine motor skills, personal self-care, home and community orientation and work skills.

## **FUNCTIONAL BEHAVIORAL ANALYSIS OF AUTISM**

Due to difficulties with communication skills, social skills, and narrow interests, children with autism often exhibit challenging behaviors including noncompliance, aggression, and repetitive actions that interfere with daily life. These behaviors, which appear meaningless, unproductive, or even dangerous, can be stopped or modified.

How does ABA intervention effectively stop or modify these maladaptive or dangerous behaviors?

All behaviors serve a purpose for an individual, and problematic behaviors can serve such purposes or functions as:

- To gain attention from someone in the environment.
- To gain a tangible consequence: a treat, a token, money, a favorite toy or video.
- To gain a sensory consequence: to get warmer if one is cold, or cooler if hot, to gain some tactile, auditory, visual, proprioceptive, or vestibular consequence.
- To self-regulate one's emotions: to calm down if agitated, to raise one's arousal level if it is depressed.
- To escape from or avoid an undesirable situation. Typically these behaviors are in response to or anticipation of requests to work, play, or communicate, or a means to avoid environments which may have uncomfortable stimuli.

Modification of the problematic behaviors is most effective if the purpose or motivation behind the behaviors can be determined, because, once that motivation is known, once the need that the child is trying to fill is ascertained, a replacement behavior can be taught to meet that need more effectively and appropriately.

Thus, ABA program first starts with a functional behavioral assessment, a well-established behavioral assessment tool that uses a variety of methods to define a target behavior and determine the underlying causes of it.<sup>9</sup>

The assessment is conducted by a trained therapist and the process starts with carefully observing and precisely describing the behavior that the child is exhibiting and the events and stimuli in the environment both before and after that behavior. Often, this process is referred to as identifying the ABCs of a particular behavior:

- Antecedent - the stimulus or stimuli to which the child responds, for example, a directive or request for the child to perform an action.
- Behavior - the behavior that we see exhibited by the child, for example, a response from the child - successful performance, noncompliance, or no response.
- Consequence - the stimulus or stimuli that the child receives as a result of his behavior, the consequence is defined as the reaction from the therapist, which can range from strong positive reinforcement (ie. a special treat, verbal praise) to a strong negative response, "No!"

The therapist will observe and describe the behavior across a broad sample of environments and occasions. The data that are collected from these observations will be analyzed; the therapist will look for trends in the occurrences of that behavior, for stimuli that may be evoking it or the needs that the child is attempting to fill by exhibiting this behavior. The therapist then forms hypotheses about the motivation or purpose that maintains the occurrence of problem behavior,

and finally formulates a treatment plan and recommends intervention options to modify the problem behavior.

### ABA BEHAVIORAL INTERVENTION METHODOLOGY

Functional behavioral assessment yields useful information for designing intervention strategies or techniques that are likely to be effective. Many techniques are used for behavioral intervention in an ABA program; however, the most common and distinguishing type of intervention is Discrete Trial Teaching (DTT). It is what people most often think of when you say "ABA" or "Lovaas Method".<sup>10</sup>

Discrete Trial Teaching is a specific ABA teaching technique used to maximize learning and enables the learner to acquire complex skills by first mastering the subcomponents of the targeted skill.

DTT breaks down skills into small sub-skills and teaches each sub-skill intensely, one at a time. It involves repeated practice with prompting and fading of prompts to insure the child's success. DTT then uses reinforcement to help shape and maintain positive behaviors and skills.

Specifically, DTT is a procedure, or a single cycle of a behaviorally-based instruction routine. A particular trial may be repeated several times in succession, several times a day, over several days (or even longer) until the skill is mastered. There are four parts, and an optional fifth, to a discrete trial:

- the discriminative stimulus (SD)-- the instruction or environmental cue to which the teacher would like the child to respond
- the prompting stimulus (SP) - a prompt or cue from the teacher to help the child respond correctly (optional)
- the response (R) - the skill or behavior that is the target of the instruction, or a portion thereof
- the reinforcing stimulus (SR) - a reward designed to motivate the child to respond and respond correctly
- the inter-trial interval (ITI) - a brief pause between consecutive trials

These parts of the discrete trial are often represented symbolically like the following:

**SD → SP → R → SR → ITI**

This illustrates the order of a discrete trial teaching. First comes the teacher's instruction (SD). If the teacher thinks the child may need some help to respond correctly, she will give him a little prompt, cue, or model to help him out (SP). Then, either with help or without, the child gives some response to the instruction (R). If the child responds incorrectly she might correct him, and then give him another chance. If he responds correctly, or close to correctly, the teacher will give him some reward or praise to encourage him (SR). After that is completed, the teacher might want to pause for a bit before continuing, to let the child know that they have completed one set and have moved on to the next (ITI).

This procedure is effective in teaching a variety of simple and complex skills. Children with autism often face many deficits and difficulties in learning. Discrete-trial training can help them to compensate for these difficulties and gain the skills needed to overcome their disorder.<sup>11</sup>

For example:

- Attention - Many children with autism begin a program with rather short attention spans. In DTT, tasks are broken down into short, simple trials. At the start of a program, interactions may only be a few seconds in length. As the child's attention span increases, the length of the interactions increases accordingly.
- Motivation - Children with autism may not be as motivated to work as other children might be. DTT attempts to build this motivation by rewarding performance of desired behaviors and completion of tasks with tangible or external reinforcement (food, toys, time to play, etc.). That external reinforcement is paired with social praise with the hope that eventually praise will become as reinforcing as the treats, etc.
- Stimulus control - Discriminating between stimuli which we would like to think of as important -- teacher/parent requests, invitations from peers, important environmental cues (school bells, alarms, weather, etc.) - and all the other "background" stimuli is often difficult for children with autism. In DTT the presented stimuli (typically instructions from a teacher or parent) are clear and relatively consistent. The child is given rewards only for behaviors in response to those stimuli so that eventually he comes to understand that certain stimuli are probably more deserving of his attention than others.
- Generalization or transferring - Generalization, the application of a behavior or skill across a number of environments or to a number of related behaviors, is typically quite difficult for children with autism. Consequently, the instructions in DTT programs are designed to change over time, in content (the verbiage of the instruction) and context (who is giving the instruction, where and when it is being given) gradually and carefully.
- Cause-effect learning and observational learning - Children with autism typically have a great deal of difficulty in "picking things up" from their environments. To compensate then, DTT teaches skills and behaviors explicitly, without relying on these areas of difficulty.
- Communication - Often in children with autism, both expressive and receptive language are deficient. Teaching that relies on a great deal of verbiage from the teacher, then, is often too difficult for these children. The instructions given in discrete trials are simple, concrete, and clearly provide only the most salient information, especially at first. As the child progresses, and his receptive language becomes stronger, these instructions can become more complex.
- Perspective taking and understanding of social and behavioral expectations - While there is little built into

the DTT structure to directly address deficits in social cognition and perspective taking, they are designed to avoid reliance on these deficient skills. Discrete trials can be designed to teach those deficient skills explicitly as well.

Initially, ABA programs for children with Autism utilized only DTT, however, ABA programs continue to evolve, placing greater emphasis on the generalization and spontaneity of skills learned. As children progress and develop more complex skills, the strict DTT approach is often combined with other teaching strategies based on the ABA principles, such as Natural Environment Training (NET) to address more complex skills training needs. NET specifically emphasizes that all skills are taught in a more natural environment in a more "playful manner." Moreover, the reinforcers used to increase appropriate responding are always directly related to the task, not the subcomponent of the task. Some other ABA based interventions, such as RBI, VBI, CBT, and other educational programs, such as TEACCH, SIT, and RDI, are all proven to be beneficial to children with autism.<sup>12</sup>

#### EFFECTIVENESS OF ABA INTERVENTION

The use of ABA principles and techniques to help persons with autism live happy and productive lives has come into widespread use in 1990s. Thousands of published studies have shown that ABA techniques can help individuals with autism to learn specific skills, such as how to communicate, develop relationships, play, care for themselves, succeed in school and at work, and participate fully and productively in family and community activities. Documentation of the efficacy of ABA-based interventions for people with autism emerged in the 1960s, with comprehensive evaluations beginning in the early 1970s.

Hingtgen & Bryson in 1972 reviewed over 400 research articles pertinent to the field of autism that were published between 1964 and 1970. They concluded that behaviorally based interventions demonstrated the most consistent results.<sup>13</sup>

In a follow-up study, DeMeyer, Hingtgen & Jackson reviewed over 1,100 additional studies that appeared in the 1970s. They examined studies that included behaviorally based interventions as well as interventions based upon a wide range of theoretical foundations. Following a comprehensive review of these studies, DeMeyer, Hingtgen & Jackson (1982) concluded ". . .the overwhelming evidence strongly suggest that the treatment of choice for maximal expansion of the autistic child's behavioral repertoire is a systematic behavioral education program, involving as many child contact hours as possible, and using therapists (including parents) who have been trained in the behavioral techniques".<sup>14</sup>

In 1987, Lovaas published his report of research<sup>15</sup> conducted with 38 autistic children using methods of applied behavior

analysis 40 hours per week. Treatment occurred in the home and school setting. After the first two years, some of the children in the treatment group were able to enter kindergarten with assistance of only 10 hours of discrete trial training per week, and required only minimal assistance while completing first grade. Others, those who did not progress to independent school functioning early in treatment, continued in 40 hours per week of treatment for up to 6 years.

All of the children in the study were re-evaluated between the ages of six and seven by independent evaluators who were blind as to whether the child had been in the treatment or control groups. There were several significant findings:<sup>16</sup>

In the treatment group, 47% passed "normal" first grade and scored average or above on IQ tests. Of the control groups, only one child had a normal first grade placement and average IQ.

- Eight of the remaining children in the treatment group were successful in a language-disordered classroom and scored a mean IQ of 70 (range = 56-95). Of the control groups, 18 students were in a language-disordered class (mean IQ = 70).
- Two students in the treatment group were in a class for autistic or retarded children and scored in the profound MR range. By comparison, 21 of the control students were in autistic/MR classes, with a mean IQ of 40.
- In contrast to the treatment group, which showed significant gains in tested IQ, the control groups' mean IQ, did not improve. The mean post-treatment IQ was 83.3 for the treatment group, while only 53.3 for the control groups.

Subsequent to the work of Lovaas and his associates, a number of investigators have addressed outcomes from intensive intervention programs for children with autism. For example, the May Institute reported outcomes on 14 children with autism who received 15 - 20 hours of discrete trial training.<sup>17</sup> While results were not as striking as those reported by Lovaas, significant gains were reported which exceeded those obtained in more traditional treatment paradigms.

A 2005 California study found that early intensive behavior analytic treatment, a form of ABA, was substantially more effective for preschool children with autism than the mixture of methods provided in many programs.<sup>18</sup>

A 2007 clinical report of the American Academy of Pediatrics concluded that the benefit of ABA-based interventions in autism spectrum disorders (ASDs) "has been well documented" and that "children who receive early intensive behavioral treatment have been shown to make substantial, sustained gains in IQ, language, academic performance, and adaptive behavior as well as some improvement of social behavior."<sup>19</sup>

Researchers from the MIND Institute (Medical Investigation of Neurodevelopmental Disorders in UC, Davis) published an evidence-based review of comprehensive treatment approaches in 2008. On the basis of "the strength of the findings from the four best-designed, controlled studies," they were of the opinion that one ABA-based approach (the Lovaas technique created by Ole Ivar Lovaas) is "well-established" for improving intellectual performance of young children with ASD.<sup>20</sup>

A 2009 review of psycho-educational interventions for children with autism whose mean age was six years or less at intake found that five high-quality ("Level 1" or "Level 2") studies assessed ABA-based treatments. On the basis of these and other studies, the author concluded that ABA is "well-established" and is "demonstrated effective in enhancing global functioning in pre-school children with autism when treatment is intensive and carried out by trained therapists."<sup>21</sup> This list can go on and on, however, the report of the MADSEC (Maine Administrators of Services for Children with Disabilities) Autism Task Force provided a succinct description, put together by an independent body of experts:

*Over the past 40 years, several thousand published research studies have documented the effectiveness of ABA across a wide range of: populations (children and adults with mental illness, developmental disabilities and learning disorders), interventionists (parents, teachers and staff), settings (schools, homes, institutions, group homes, hospitals and business offices), and, behaviors (language; social, academic, leisure and functional life skills; aggression, self-injury, oppositional and stereotyped behaviors).<sup>22</sup>*

ABA is now considered to be at the forefront of therapeutic and educational interventions for children with autism. The large amount of scientific evidence supporting ABA treatments for children with autism have led a number of other independent bodies to endorse the effectiveness of ABA, including the U.S. Surgeon General,<sup>23</sup> the New York State Department of Health,<sup>24</sup> the National Academy of Sciences,<sup>25</sup> and the American Academy of Pediatrics.<sup>26</sup>

However, despite the vast empirical support, ABA behavioral intervention has faced many challenges and criticism. A 2009 systematic review and meta-analysis by Spreckley and Boyd of four 2000–2007 studies (involving a total of 76 children) came to different conclusions than the aforementioned reviews. Spreckley and Boyd reported that applied behavior intervention, did not significantly improve outcomes compared with standard care of preschool children with autism in the areas of cognitive outcome, expressive language, receptive language, and adaptive behavior. They stated that large multi-site randomized trials are needed to improve the understanding of ABA's efficacy in autism.<sup>27</sup> Others questioned whether Lovaas used a representative sample of children with autism and overstated the effectiveness of ABA intervention. It is also suggested that Applied Behavior Analysis and discrete trial techniques are

less effective for improving language than naturalized teaching.<sup>28</sup>

## CONCLUSION

There is a wealth of validated and peer-reviewed studies supporting the efficacy of ABA interventions to improve and sustain socially significant behaviors in every domain, in individuals with autism. Importantly, results reported include "meaningful" outcomes such as increased social skills, communication skills, academic performance, and overall cognitive functioning. These reflect clinically significant quality of life improvements. While studies vary as to the magnitude of gains, all have demonstrated long-term retention of gains made.

Additionally, according to a cost/benefit analysis conducted by Jacobson, Mulick & Green<sup>29</sup> competently-delivered, early, intensive behavioral intervention can offer the hope of significant gains for both children and taxpayers: estimated savings per child to age 22 are about \$200,000; to age 55, \$1,000,000.

However, ABA behavioral intervention is not without controversy. While that debate continues, researchers should continue to vigorously investigate behavioral intervention as a promising area of research and treatment benefiting individuals with autism. Practitioners should leverage ABA techniques with the proven efficacy of other effective interventions such as RBI, VBI, CBI, TEACCH, SIT, RDI, etc., and "broaden their collaboration with psychiatric specialists for optimal outcome and long-term benefit for children with autism", as suggested by Dr. Granpeesheh and his colleagues.<sup>30</sup>

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## REFERENCES

1. Autism and Developmental Disabilities Monitoring Network. Prevalence of Autism Spectrum Disorders. United States, 2006. MMWR Surveill Summ. 2009;58(10):1-20.
2. Rogers SJ, Vismara LA. Evidence-based comprehensive treatments for early autism. J Clin Child Adolesc Psychol. 2008;37(1): 8-38.
3. Mental Health: A Report of the Surgeon General: Other Mental Disorders in Children and Adolescents P.6-8. www.surgeongeneral.gov. 7/30/2011.
4. Baer DM, Wolf, MM, Risley TR. Some current dimensions of applied behavior analysis. J Appl Behav Anal. 1968;1(1):91-97.
5. Baer, DM, Wolf MM. Some still-current dimensions of applied behavior analysis. J Appl Behav Anal. 1987;20(4):313-327.
6. Ayllon T, Michael J. The psychiatric nurse as a behavioral engineer. J Exp Anal Behav. 1959;3:324-334.
7. Lovaas OI. Behavioral treatment and normal educational and intellectual functioning in young autistic children. J Consult Clin Psychol. 1987;55(1):3-9.
8. Baer DM, Wolf, MM, Risley TR. Some current dimensions of applied behavior analysis. J Appl Behav Anal. 1968;1(1):91-97.
9. Umbreit J, Ferro JB, Liaupsin CJ, Lane KL. Functional Behavioral Assessment and Function-Based Intervention. Prentice Hall Mar. 31st, 2006, ISBN-10: 013114989X
12. Myers SM, Johnson CP, Council on Children with Disabilities. Management of children with autism spectrum disorders. Pediatrics. 2007;120 (5):1162-1182.

13. Hingtgen JN, Bryson CQ. Recent developments in the study of early childhood psychoses: Infantile autism, childhood schizophrenia, and related disorders. *Schizophrenia Bulletin*. 1972;5:8-54.
14. DeMyer MK, Hingtgen JN, Jackson RK. Infantile autism reviewed: A decade of research. *Schizophrenia Bulletin*. 1981;7:388-451.
16. Lovaas OI. Behavioral treatment and normal educational and intellectual functioning in young autistic children. *J Consult Clin Psychol*. 1987;55(1):3-9.
17. Anderson SR, Avery DL, Dipietro EK., Edwards GL, Christian WP.. Intensive home-based early intervention with autistic children. *Education and Treatment of Children*. 1987;10:352-366.
18. Howard JS, Sparkman CR, Cohen HG, Green G, Stanislaw H. A comparison of intensive behavior analytic and eclectic treatments for young children with autism. *Res Dev Disabil*. 2005;26(4):359-383.
19. Myers SM, Johnson CP, Council on Children with Disabilities. Management of children with autism spectrum disorders. *Pediatrics* 2007;120 (5): 1162-1182.
20. Rogers SJ, Vismara LA. Evidence-based comprehensive treatments for early autism. *J Clin Child Adolesc Psychol*. 2008;37(1):8-38.
21. Eikeseth S.. Outcome of comprehensive psycho-educational interventions for young children with autism. *Res Dev Disabil*. 2009;30(1):158-178.
22. Maine Administrators of Services for Children with Disabilities (MADSEC). Report of the MADSEC Autism Task Force. 2000.
23. Mental Health: A Report of the Surgeon General: Other Mental Disorders in Children and Adolescents P6-8. [www.surgeongeneral.gov/7/30/2011](http://www.surgeongeneral.gov/7/30/2011).
24. New York State Department of Health, Early Intervention Program. Clinical practice guideline: Autism/ pervasive developmental disorders, assessment and intervention for young children (Age 0-3 Years). Albany, NY: 1999.
25. Lord C, McGee JP, editors. *Educating Children with Autism*. Washington, DC: National Academies. 2001. 217-221.
26. American Academy of Pediatrics Committee on Children with Disabilities. The pediatrician's role in the diagnosis and management of autistic spectrum disorder in children. *Pediatrics*. 2001;107(5):1221-1226.
27. Spreckley M, Boyd R. Efficacy of applied behavioral intervention in preschool children with autism for improving cognitive, language, and adaptive behavior: a systematic review and meta-analysis. *J Pediatr*. 2009;154(3):338-344.
28. McPheeters ML, Warren Z, Sathe N, Bruzek JL, Krishnaswami S, Jerome RN, Veenstra-Vanderweele J. A systematic review of medical treatments for children with autism spectrum disorders. *Pediatrics*. 2011;127(5): e1312-1321.
29. Jacobson, JW, Mulick JA, Green G. Cost-benefit estimates for early intensive behavioral intervention with young children with autism-general model and single state case. *Behav Intervent*. 1998;13:201-226.
30. Granpeesheh D, Tarbox J, Dixon DR. Applied behavior analytic interventions for children with autism : a description and review of treatment research. *Ann Clin Psychiatry*. 2009;21(3):162-173.