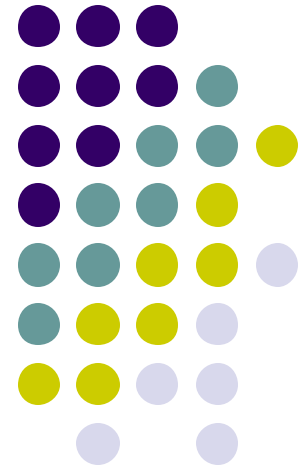


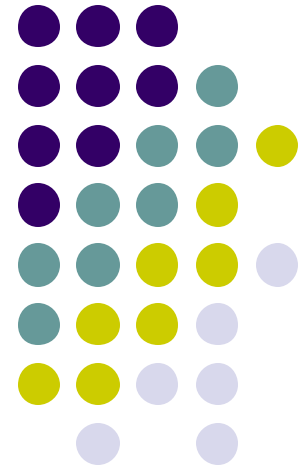
Applied Behavior Analysis in the Treatment of Autism

Autism Services and Support Conference
Camp Pendleton, CA
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Applied Behavior Analysis in the Treatment of Autism

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Objectives



- Overview of applied behavior analysis (ABA) in the treatment of autism spectrum disorders
 - What ABA is
 - State-of-the-art ABA programming for ASD
 - Research evidence
 - Identifying qualified behavior analysts
 - What ABA is not
- Summary and conclusions

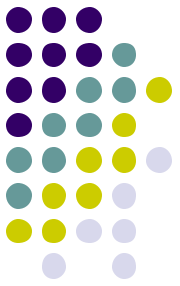
What ABA is



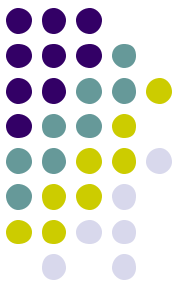
- Behavior (*not* “behavioral”) analysis: a natural science approach to understanding behavior
 - A scientific discipline with
 - Conceptual, experimental, and applied components
 - Unique research methodology
 - Professional journals and organizations
 - Professional credentialing program for practitioners
- Applied behavior analysis (ABA): Application of scientific principles of behavior (e.g., reinforcement) to improve socially significant behavior to a meaningful degree
 - *Many* applications in addition to autism
 - Based on the work of many researchers and practitioners

What ABA is

- Effective for building skills and reducing problematic behaviors in people of all ages, with and without disabilities
- Stresses positive reinforcement and scientific demonstrations of effectiveness
- Highly individualized, contextual, flexible
- Complex and intricate, comprising *many* techniques
- Continuously evolving



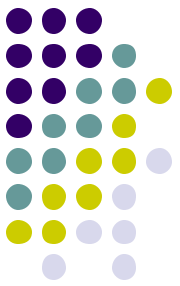
State-of-the-art comprehensive ABA for learners with ASD



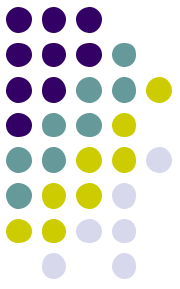
- Directed by professionals with advanced training in behavior analysis and specific experience in autism
 - Behavior analyst designs intervention program for each learner, trains and supervises those who provide intervention, reviews learner's progress and adjusts intervention procedures frequently
 - Teachers, college students, parents, and/or paraprofessionals deliver intervention to learner
- Guided by curriculum derived from research in behavior analysis, development, autism and related disorders
 - All skill domains addressed -- learning readiness, social, cognitive, communication, academic, play, motor, self-care, etc.
 - Skills broken into small components, defined in observable, measurable terms
 - Written programs for developing each component skill

State-of-the-Art ABA

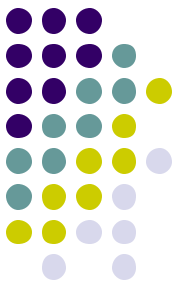
- Each learner's strengths and weaknesses assessed by direct observation and measurement
- Each component skill developed via many carefully planned learning opportunities
- Multiple, repeated learning opportunities arranged, in both structured and naturalistic situations
- Little unstructured time for practicing nonfunctional behaviors
- Various research-validated techniques used to arrange learning opportunities and enhance motivation: discrete trials, incidental teaching, activity-embedded instruction, task analysis and chaining, prompts and prompt-fading, child choice, etc.



State-of-the Art ABA

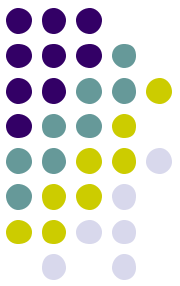


- All aspects of intervention tailored to individual needs and preferences
- Simple skills built systematically into more complex repertoires
- Emphasizes teaching the child how to learn, developing warm relationships, and making learning fun.
- Problematic behaviors are not reinforced; alternative adaptive behaviors are.
- Data reviewed by behavior analyst at least weekly to evaluate progress and "fine tune" intervention procedures
- Goal: develop skills that enable successful, independent functioning, both short and long term



ABA for ASD: Research

- Behavior analysis research methods: Direct observation and measurement of behavior, and single-case research designs
 - Specific, operationally defined behavior of an individual is observed and measured carefully over time during
 - Baseline (control) condition and
 - Treatment (experimental) condition; typically specific environmental events (e.g., antecedents, consequences) are manipulated
 - Baseline and treatment conditions are repeated (replication)
 - Data from baseline and treatment conditions are graphed and compared visually to make inferences about effects of treatment on specified behavior



ABA for ASD: Research

- Focus is on clinically important changes in individual behavior over time, not statistical comparisons of group average scores, but
 - Data from replications across behaviors and/or individuals can be aggregated
- Akin to methods used in other natural sciences, and by some medical researchers (e.g., geneticists, neuroscientists)
- Included in several protocols for developing evidence-based practice guidelines:
 - New York State Department of Health Early Intervention Program
 - National Autism Center's National Standards Project
 - California Department of Developmental Services ASD Guidelines Project

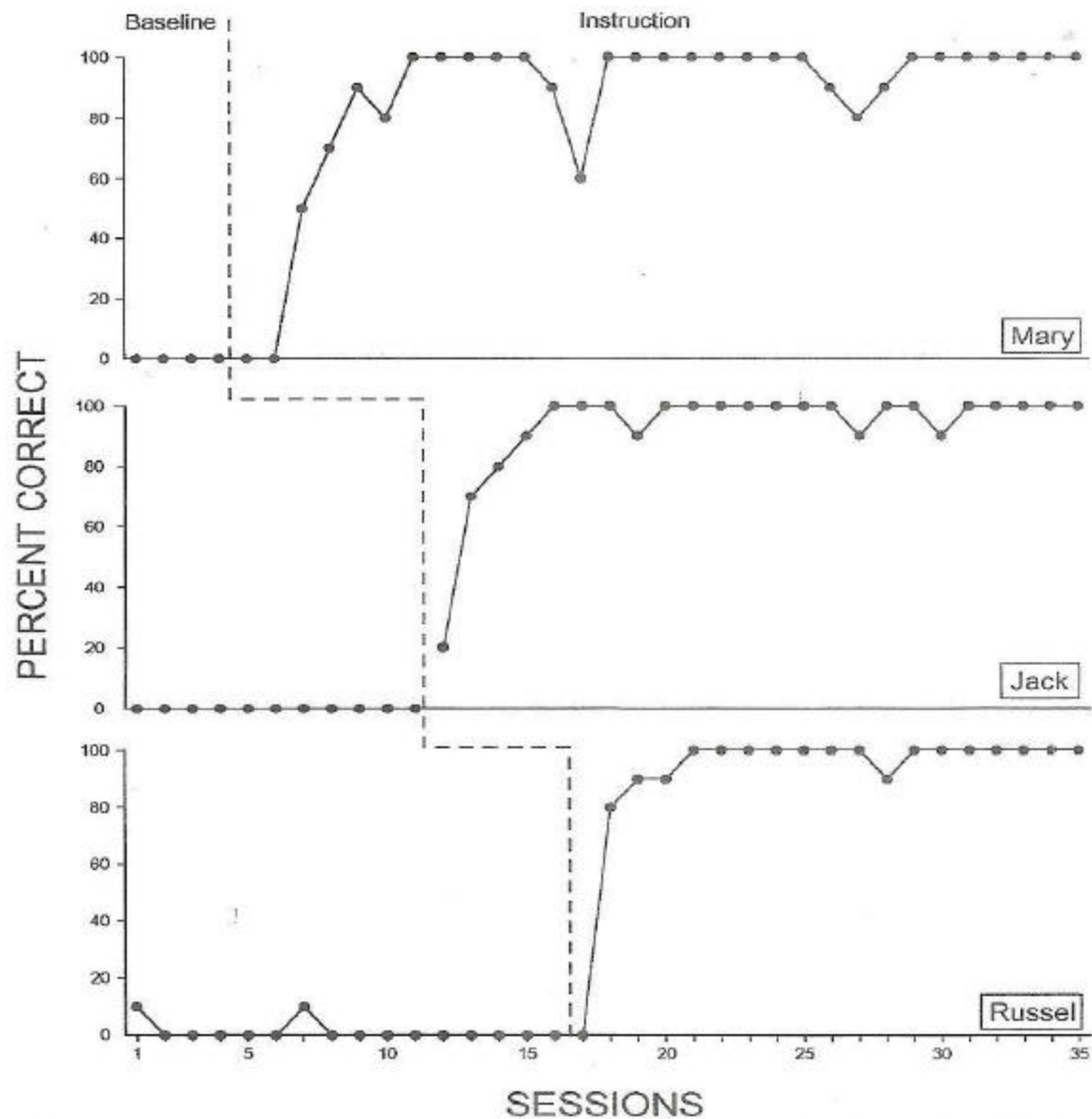
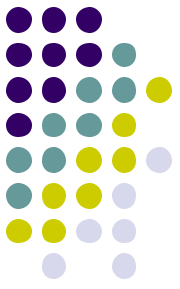


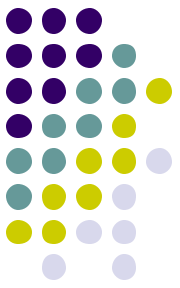
Figure 1. Percentage of correctly asking "What's that?" when pointing to a novel stimulus during baseline and instruction in Experiment 1.

ABA for ASD: Research



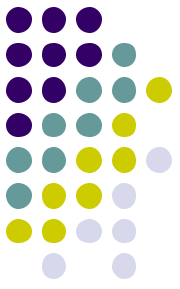
- Hundreds of published studies document effectiveness of many ABA techniques for developing many important skills in people with *ASD of all ages* (e.g., Matson et al., 1996; New York State Department of Health, 1999; *Journal of Applied Behavior Analysis*):
 - Learning to learn: looking, listening, imitating, following instructions, discriminating and matching stimuli, etc.
 - Communication: verbal and nonverbal; comprehension and production; from simple vocalizations to complex conversations
 - Social : simple reciprocal exchanges, playing with peers, sharing, expressing emotions, empathizing, dramatic play, etc.
 - Self-care: hygiene, personal safety, community living, etc.
 - Academics
 - Motor and leisure
 - Vocational

A Word about Research Designs



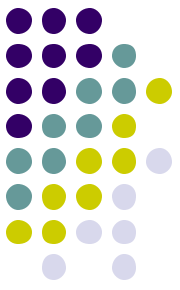
- Randomized clinical trials considered the “gold standard” for evaluating treatment effectiveness
- Constraints against using such designs to study many autism interventions:
 - Legal mandates that IEP/IFSP teams must choose interventions
 - Ethical requirements to provide effective intervention, and not to subject children to untested and ineffective interventions
 - Logistics and costs of studying comprehensive, intensive, long duration interventions
- Other types of controlled studies (e.g., matched groups, single-case)
 - Are better suited for field research and may have broader generality than RCTs
 - Can produce strong evidence about treatment effects if they include
 - Objective, valid, and reliable measurement
 - Independent diagnoses and evaluations
 - Adequate experimental designs

Research on Early Intensive ABA for ASD



- *Early*: generally, children under age 5 when treatment began
- *Intensive*: 25-40 hrs/wk, 1-to-1 initially, 1- 4 yrs
- *Comprehensive*: array of ABA techniques -- both adult-directed and child-initiated -- used to build skills in all domains
- Usually started in home, but can be done in centers
- Intervention provided in multiple environments
- 1-to-1 initially; gradually changed to small group instruction
- Gradual transition to regular classrooms where possible

Research on Early Intensive ABA for ASD



- Summaries that follow include
 - Studies with treatment group receiving ABA and one or more comparison groups, published in peer-reviewed journals
 - Intensive ABA: 25 - 40 hrs/wk
 - Low-intensity ABA: less than 20 hrs/wk
 - Treatment directed by qualified behavior analysts (mostly PhDs)
 - *Direct intervention provided mainly by teachers, tutors, college students, paraprofessionals, and parents trained by the behavior analysts*
 - Objective outcome measures administered by independent evaluators
 - Excluded: uncontrolled studies; indirect measures (e.g., surveys); retrospective studies using anecdotal reports (e.g., Sheinkopf & Siegel, 1998); studies with other populations (e.g., Rett's, severe MR)

Table 1. Comparison-group studies of early intensive ABA

Changes (standard scores)

Study, Group Assignment	Int ABA Gp					Measures	Int ABA	Comp Gp 1	Comp Gp 2
	n	CA	IQ	hrs/wk	Dur				
Lovaas (1987) Therapist availability; matched	19	35m	63	40	24+m	IQ # normal IQ	+20.0 9/19	10 hrs/wk ABA + Spec ed (n = 19) 0 0/19	Spec ed (n = 21) 0 1/21
Sallows & Graupner (2005) Randomized	13	35m	51	38	24+m	IQ Nonverbal Lang Š Rec Lang Š Exp Adaptive # normal IQ	+22.2 + 7.0 +17.0 + 5.5 + 9.5 5/13	Parent-managed Int ABA (n = 10) +27.5 + 6.7 +27.0 +10.8 + 5.8 6/10	
Cohen, Amerine-Dickens, & Smith (2006) IEP/FSP teams; matched	21	30m	62	35-40	36+m	IQ Nonverbal Lang Š Rec Lang Š Exp Adaptive # normal IQ	+25 +13 +20 +25 + 9 12/21	Spec ed (n = 21) +14 +13 + 9 +15 - 4 7/21	
Smith, Green, & Wynne (2000) Randomized	15	24m	51	25	33m	IQ Nonverbal Lang Š Rec Lang Š Exp Adaptive # normal IQ	+16.0 +42.7 +29.4 +29.4 - 02.3 4/15	Parent Managed ABA + spec ed (n = 13) - 01.0 +27.3 +19.3 +19.9 - 06.7 0/13	
Howard, Sparkman, Cohen, Green, & Stanislaw (2005) IEP/FSP teams; matched	29	31m	59	25-40	14m	IQ Nonverbal Lang Š Rec Lang Š Exp Adaptive # normal IQ	+29.7 +20.6 +20.2 +20.1 +10.5 13/29	Int eclectic (n = 16) +8.4 +6.1 +3.9 +3.8 - 0.6 2/16	Nonint eclectic (n = 16) +8.9 +2.3 - 4.8 - 4.5 - 2.8 3/16
Eikeseth, Smith, Jahr & Eldevik (2002) Therapist availability; matched	13	66m	62	28	12m	IQ Nonverbal Lang Š Rec Lang Š Exp Adaptive # normal IQ	+17.2 +17.5 +12.7 +22.6 +15.7 7/13	Int eclectic (n = 12) +4.3 +8.3 - 0.7 - 2.3 - 1.6 2/12	

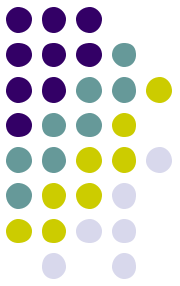
Notes: Int = intensive; nonint = nonintensive; comp = comparison; CA = chronological age; dur = duration; lang = language; rec = receptive; exp = expressive; adaptive = composite score from Vineland Adaptive Behavior Scales; # normal IQ = # of participants who moved from delayed to normal range on IQ tests over the course of the study.

Table 1b. Controlled studies of low-intensity ABA

Changes (standard scores)

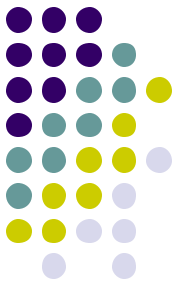
Study	Int ABA Gp					Measures	Int ABA	Comp Gp 1
	N	CA	IQ	hrs/wk	Dur			
Birnbrauer & Leach (1993)	9	39m	51	19	24m	IQ Nonverb Lang Adapt # normal IQ	+ 7 +29 + 6 - 5 2/9	Spec ed (n = 5) NT NT - 8 - 7 1/5
Eldevik, Eikeseth, Jahr, & Smith (2006)	13	53m	41	12.5	20m	IQ Nonverbal Lang – Rec Lang – Exp Adaptive # normal IQ	+ 8.2 + 8.6 + 6.8 +11.0 - 0.2 1/13	Eclectic, 1-to-1 (n = 15) - 2.9 -10.5 - 7.7 - 6.4 - 4.8 0/15

Summary of Evidence re: Early Intensive ABA



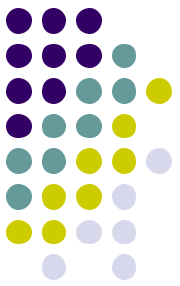
- Professionally directed early intensive ABA produced
 - Large gains in multiple skill domains, normal or near-normal functioning in many children
 - Modest or small gains in other children
 - Largest gains when treatment was most intensive
- Parent-managed ABA (with “consultants”) produced mixed results: large gains in some skill domains, small gains in others
- Low-intensity ABA produced smaller gains than intensive ABA, but larger than typical and eclectic services
- Other treatments (typical special ed/EI, nonintensive ABA + special ed, intensive “eclectic” treatment) produced negligible gains or losses in most studies

Evidence re: Early Intensive ABA



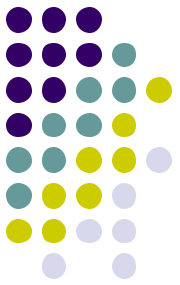
- Proportions of children who moved from delayed to normal range on IQ (most also in regular classrooms without specialized services):
 - Intensive ABA: $56/120 = 47\%$
 - Typical special ed/EI: $11/58 = 19\%$
 - Intensive eclectic: $4/28 = 14\%$
- Several uncontrolled studies corroborate these findings
- Estimated savings from investment in early intensive ABA: \$2 million+ per individual (Jacobson, Mulick, & Green, 1998)

Identifying Qualified Behavior Analysts



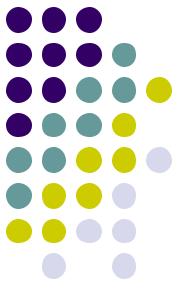
- International, voluntary certification program for practitioners of behavior analysis managed by Behavior Analyst Certification Board (www.BACB.com)
 - Applied behavior analysis is recognized by the American Psychological Association as a subspecialty of the doctoral training specialty in behavioral psychology, which is distinguished from other psychology specialties (clinical, developmental, educational, etc.). BACB certification is included in subspecialty description.
 - Behavior analysts are trained in variety of academic departments: behavior analysis, psychology, human development, special education, etc.
 - BACB credentials are recognized in California laws (DDS Title 17; Special Education Code)
- Currently two levels of certification: Board Certified Behavior Analyst and Board Certified Associate Behavior Analyst

BACB Certification



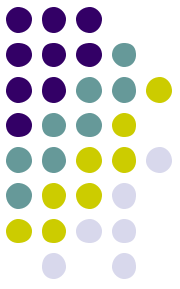
- **Board Certified Behavior Analyst (BCBA)**
 - Minimum of bachelor's and master's degrees from accredited institution
 - 225 classroom hours of graduate-level instruction in specified areas of behavior analysis
 - Experience in designing, implementing, and monitoring applied behavior analysis services, supervised and documented by BCBA or individual approved to take BCBA exam for a total of at least 75 hrs
 - Supervised independent fieldwork: minimum 1500 hrs with direct supervision at least once every 2 wks
 - Practicum in BACB-approved university program: minimum 1000 hrs with direct supervision at least once per week
 - Intensive practicum in BACB-approved university program: minimum 750 hrs with direct supervision at least twice per week
 - Passing score on BCBA exam
 - 36 CEUs every 3 yrs to maintain certification

BACB Certification

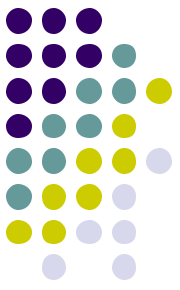


- **Board Certified Associate Behavior Analyst (BCABA)**
 - Minimum of bachelor's degree from accredited institution
 - 135 classroom hours of university instruction in behavior analysis
 - Experience in designing, implementing, and monitoring applied behavior analysis services, supervised and documented by BCBA or individual approved to take BCBA exam for a total of at least 50 hrs
 - Supervised independent fieldwork: minimum 1000 hrs with direct supervision at least once every 2 wks
 - Practicum in BACB-approved university program: minimum 670 hrs with direct supervision at least once per week
 - Intensive practicum in BACB-approved university program: minimum 500 hrs with direct supervision at least twice per week
 - Passing score on BCABA exam
 - 24 CEUs every 3 yrs to maintain certification

BACB Certification: Some Caveats

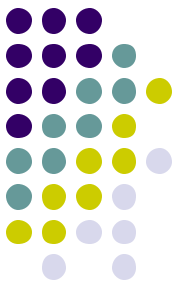


- **IMPORTANT:** The BACB states, “It is strongly recommended that the BCABA practice under the supervision of a BCBA, and that those governmental entities regulating BCABAs require this supervision.”
- As with any professional credential, BACB certification does not guarantee competent or ethical practice. Consumers should become familiar with BACB requirements, Guidelines for Responsible Conduct, and disciplinary standards (available at www.BACB.com).
- *Buyer beware:* There are many “posers,” and no central clearinghouse for identifying competent and ethical “consultants” in ABA for ASD.



More Caveats

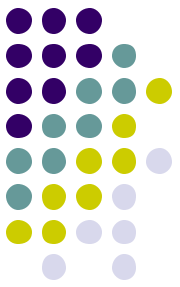
- BACB certification is a *general* one; no specialty certifications (e.g., in autism) at this time.
 - Not all BCBA's are qualified to direct ABA programming for learners with ASD, especially early intensive ABA
 - Autism Special Interest Group, Association for Behavior Analysis has developed guidelines for consumers (available at www.behavior.org/autism and www.abainternational.org)
- Consumers and funding agencies should check credentials of everyone claiming to be a behavior analyst, “Lovaas therapist,” or otherwise qualified to “do ABA” with individuals with autism.



What ABA is Not

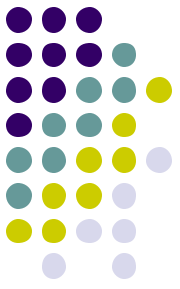
- Unproven, “experimental”
- A therapy for autism
- Discrete-trial training
- Just for building simple, rote skills or managing problem behavior
- A “one size fits all” intervention
- A canned, “cookbook” approach
- A curriculum
- A technique that can be learned from books, videos, or workshops
- Effective in the hands of people with inadequate training in the discipline

Summary and Conclusions

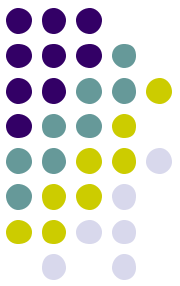


- Contemporary ABA treatment for ASD rests on more than 40 years of scientific research
 - At present, no other approach to autism intervention has a comparable empirical foundation (New York State Department of Health, 1999).
- Best available evidence supports *competently directed and delivered* early intensive ABA as effective treatment for ASD (New York State Department of Health, 1999; U.S. Surgeon General, 1999).
 - Lovaas model is most-studied to date, though some other behavior analysts have documented effectiveness of their early intervention models.
 - Other ABA models (e.g., “naturalistic” ABA, Applied Verbal Behavior) have not been evaluated in controlled studies

Summary and Conclusions



- Factors responsible for variable responsiveness to early intensive ABA are not yet known.
- Which of the many “ingredients” of early intensive ABA are necessary for maximal effectiveness is not yet known.
- *ABA is not just for toddlers and preschoolers:* techniques are also effective for producing improvements in many skill areas for older children and adults with autism.



For more information...

- Come to the CalABA Conference, February 8-10, San Francisco Airport Hyatt (visit www.calaba.org for details)
- www.behavior.org/autism
- www.autismspeaks.org/whattodo/what_is_aba.php
- www.BACB.com
- www.abainternational.org