

How Building Social Reinforcers are Key to Children's Social and Educational Prognosis

(Some contents subject to change)

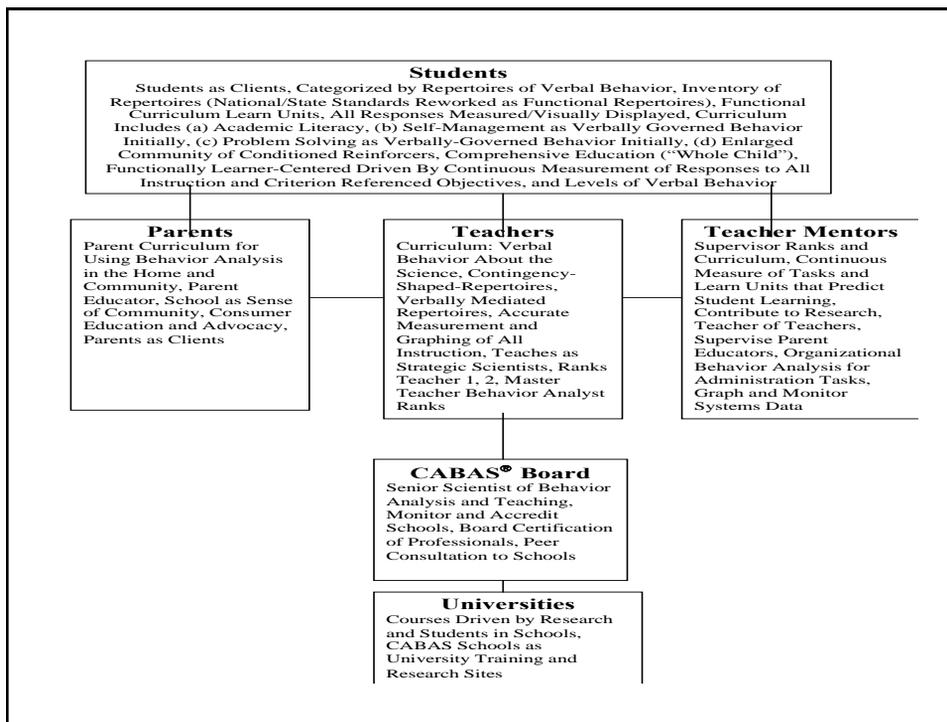
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Science of human learning and teaching

- Components of Applied Behavior Analysis
- Performance management by environmental contingencies
- Elementary principles of behavior:
Respondent and operant
- Principles/concepts of a science of learning

What we know (5 Aspects of ABA)

- (1) Performance behavior (increase, decrease), reinforcement source
- (2) Learn new operants and higher order operants
- (3) Organizational management (CABAS® Example Next Slide) (Systems, Field Theory)



(4) Functional Curriculum (form follows function, to affect others and be affected by others)

(5) Verbal Behavior Development (NEW)

Verbal Behavior Development Changes Everything

- SOCIAL DEVELOPMENT AS VERBAL BEHAVIOR DEVELOPMENT AND VICE VERSA

Verbal is social not vocal only (Smirk, Smile, Wave, Conversation, Roll of eyes) (Communicative Behavior)

Verbal behavior is social and social is verbal

Last two decades of research and application

Once Upon a Time

- Before Relational Responding and Verbal Behavior Development Theory (VBDT)
- After Relational Responding and VBDT (Skinner, 1957 to VBDT and Relational Responding)

Verbal Behavior Development

- Determines what we can teach
- How we can teach
- Who and What is in *the child's environment*
- OBJECTS OR PEOPLE
- WORDS OR BLURS

Reinforcement

- Selects what we care to see, hear, smell, taste, touch (duration and frequency)
- The right reinforcer for the operant being learned
- Our community of LEARNED (i.e., conditioned) reinforcers determine what we observe and keep us out of, or in, trouble!

Fixing Bad Behavior

- Is a function of the client's/student's reinforcement
- 2 ways to fix the problem
 - Work with the student's existing reinforcers (learning NOT NECESSARY, good band aid, good for limited access)
 - Build new reinforcers and behaviors follow (NEW REINFORCERS CHANGE ONE'S ENVIRONMENT)

Not Teaching New Operants

- Work with student's existing reinforcers where prosthetic reinforcers lead to the wrong operant!
- "Good talking" as reinforcer for a mand (request)
- Token or edible for a tact (declarative)
 - NO, NO, NO

SD, Behavior, Consequence/Outcome

- Fox = escape danger (MAND)
- Fox = cagey enemy (listener learns to watch out!, speaker socially reinforced for extended tact or "metaphor")
- Fox = animal (pure tact for audience reinforcement/affirmation)
- Fox = Beautiful Woman (extended tact audience reinforced)
- Fox = lox, box, fox (rhyme) (intraverbal audience reinforced)

Each use of FOX

- Is verbal because of the social reinforcement type
- Cannot be verbal unless there are two or more (exception speaker as own listener)
- “Meaning of fox” = linguistic and structural component of language
- Social and verbal FUNCTION determines MEANING (VERBAL BEHAVIOR AND VBDT)

How do we learn different fox operants

- Learn from *social environmental contact* (see, hear, smell, taste, touch) from the uterus to the grave (MUST BE ABLE TO CONTACT THOSE PARTS)
- Whether or not we contact that environment is a function of phylogeny (genes) and ontogeny (i.e., experience) and their interaction
- What we experience AND ACQUIRE FROM EXPERIENCE is in large part a function of unconditioned and LEARNED REINFORCERS

Different VB Functions =

- Different Types of SOCIAL AND SOMETIMES SOCIALLY Learned Reinforcers

Differences

- You can increase the emission of saying fox by any learned or primary reinforcer.
(TOPOGRAPY OR STRUCTURE)
- BUT YOU CANNOT LEARN/TEACH THE DIFFERENT VERBAL FUNCTIONS OF FOX WITH ANY REINFORCER!

Each Different function of FOX

- Tact of the animal (social reinforcement, affirmation)
- Extended tact (describes pretty lady to colleague for social reinforcement functions)
- Extended tact (cagey enemy, warn your friend social reinforcement as mand)
- Fox mand (HELP!, or yell to chase the fox away, social *contract* reinforcement)

How to teach the meaning fox?

- Meaning or function
- “Meaning” of the word is an intraverbal dictionary or lexicon. Word defined by words. Not social, except under pedagogical conditions.
- FUNCTION = usage, social

• So!

What determines the function of
FOX?

The type of LEARNED SOCIAL
REINFORCEMENT

When you have to use a prompt (stimulus or response prompt)
relevant reinforcers are missing.

If the child does not have the right
reinforcer for the verbal function
she emits the behavior under the
wrong reinforcer and the operant
is not verbal.

VBDT Research and Practice Focus

- What types of reinforcers are needed to be able to learn the different VERBAL functions of behavioral topographies?
- If they are missing how can we establish these new reinforcers?

The types of reinforcers in each child's *community of reinforcers* determine each student's or child's level of verbal behavior development.

Behavior Analysis of Development

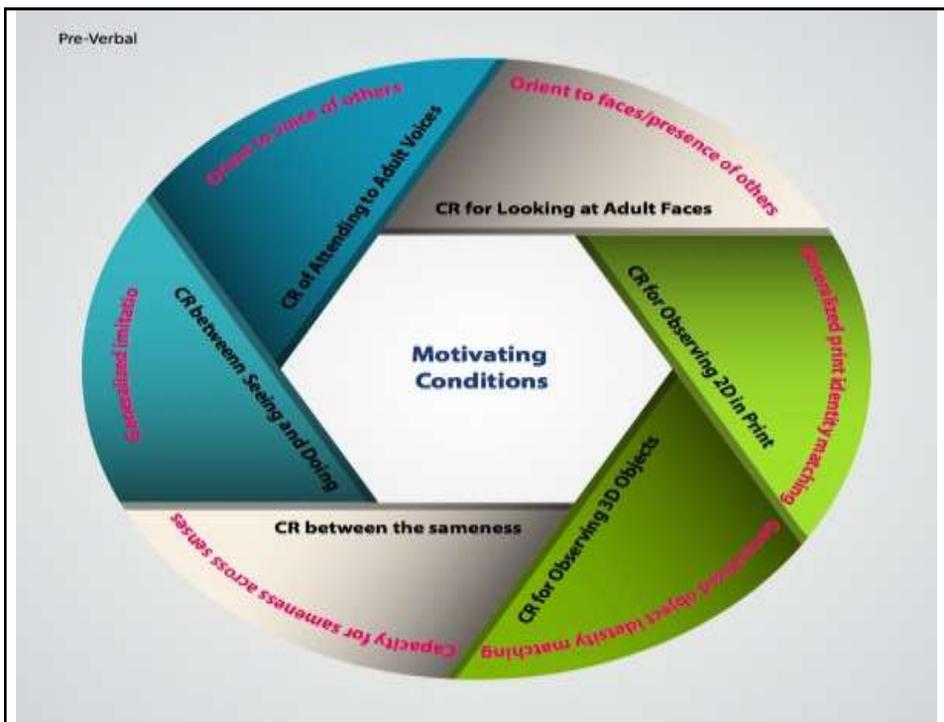
- Not stages but **cusps** of behavioral development
- Cusp = onset of being able to learn things *you could not before because you can come into contact with features of the environment you could not before you acquired the cusp.* (Orient to mom's voice, learn the names of things incidentally, acquire generalized visual match-to-sample with little or no direct instruction)

A Behavioral CUSP =
 First Instances of:
 The Onset of:
 First Time:
 Epiphany:



Or, Another view of the Pre-verbal cusps

Slide by Dr. Lin Du



Observing

- Most of the above are OBSERVING RESPONSES.
- LISTENING is an observing response
- SOURCE IS THE DIRECT OUTCOME OF SENSING OR LISTENING
- SINGLE CELL ORGANISM AND OBSERVING
- MULTI-CELL ORGANISMS OBSERVING AND PRODUCING

Examples: As a speaker/producer as opposed to a listener/observer

- First speech sounds (Parroting) NOT VERBAL
Babbling, for example
- Verbal- MAND (social *contract* reinforcement,
WHEN IT VERBAL AND WHEN IT IS NOT)

Examples: As a Listener

- Voices reinforce attention (NOT ESCAPE!)
- Phonemic sound control as listener (Hear and Say)
- Mediating function or social function!
Vicarious experiences, predict what to do,
extend the senses as verbal
function/REINFORCEMENT for listening

Listener



Examples: Joining of Listener and Speaker

- *Conversational units* with others (reinforced as listener and speaker), primary measure of social and hence VERBAL INTERACTION.
- VERBAL INTERACTIONS ARE SOCIAL. Measures of social operants are verbal interactions, hence measures of social must involve two or more individuals (interlocking operants). Verbal interactions are indicators of social reinforcement.

Joining of Listener and Speaker Responses



VB Developmental Protocols to Establish Cusps are NOT CURRICULA

- A) Pre-verbal foundational cusps and capabilities (other observing and producing responses)
- B) Listener cusps and capabilities
- C) Speaker cusps and capabilities
- D) Joining of speaker and listener within-the-skin
- E) The verbal behavior developmental theory

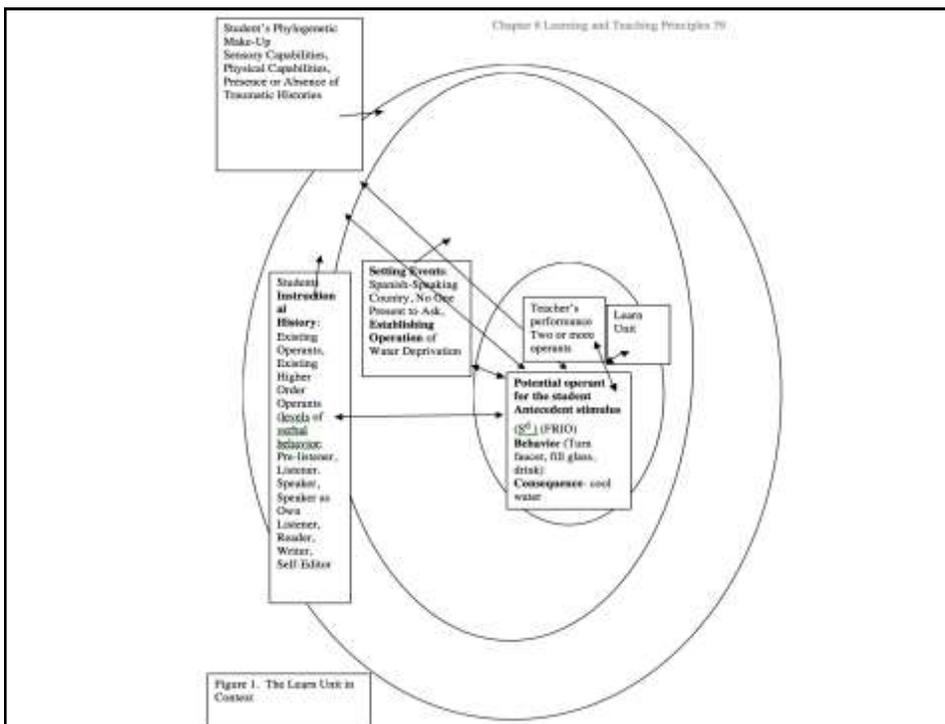
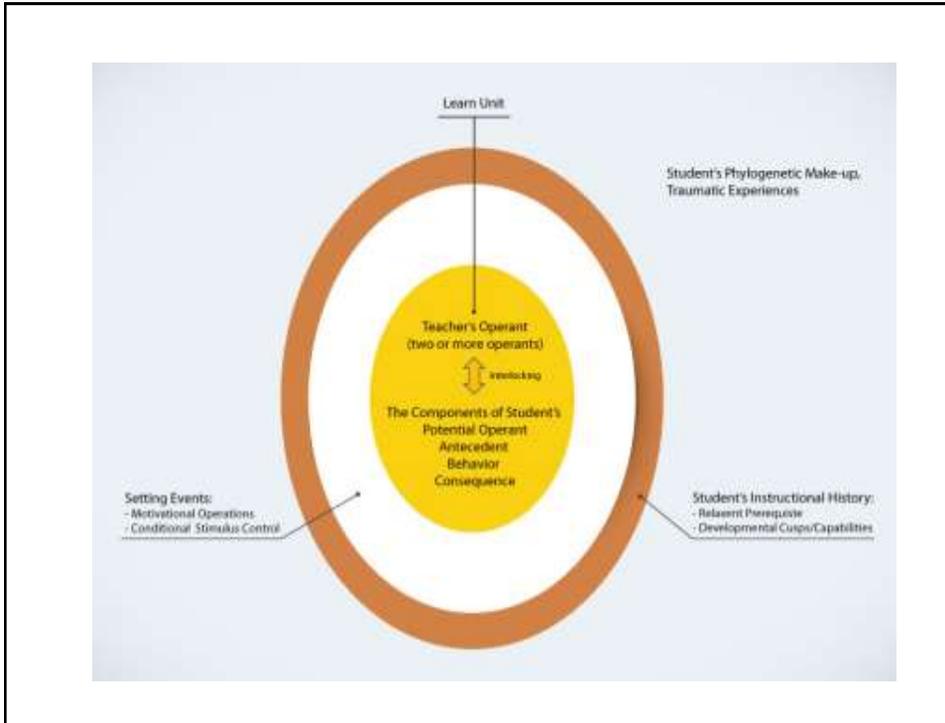
Source of Verbal Development

- There is growing evidence of a developmental trajectory for key verbal capabilities.
- The evidence comes from research guided by Skinner's (1957) theory of verbal behavior, thirty plus years of VB and VBDT research AND
- Already been translated to:
 - the accomplishment of schools based entirely on scientific practices
 - 35 years of CABAS Schools for children with and without disabilities
 - Over 300 Experiments

How you use VBDT in your
teaching or therapy.

Learn Unit and Learn Unit in Context

- Learn unit: interaction between clinician/teacher and student that is basic ABA for establishing new operants.
- Learn unit in context: If you eliminate learn units as the problem you can do a contingency analysis to see the source of the problem because you have eliminated a problem of instruction.



But Best practices Don't work

- Learn units present
- Correct sequence in curricula
- Require extensive use of prompt type tactics
- Always using prosthetic reinforcers

• What to do when?

Uninterested in social exchanges with others, unaware of others, ignores/avoids speech sounds, faces?

- | | |
|---|---|
| • What can we do? | • CUSP(S) is/are MISSING |
| Protocols from research to identify and establish missing cusps | Social Listener Reinforcement |
| | Conditioned reinforcement for voices |
| | Conditioned reinforcement for observing faces |

Don't know you are in the room

- What can we do?
Protocols to establish fundamental social/people observing responses?
- CUSP(S) is/are MISSING
- CONDITIONED REINFORCEMENT FOR OBSERVING FACES AND VOICES
after the cusp they observe presence of others in the environment
Learn from teachers at a faster rate because they attend to voices and faces

Lack Generalized Match to Sample?

- Hard or impossible to teach objectives involving match to sample, discriminations of shapes, objects, letters, anything on the page or on the desktop.
- Conditioned reinforcement for observing print stimuli
- Conditioned Reinforcement for 3D stimuli

Lack social interaction with peers.

- Children with tacts/social reinforcement from adults
- Protocol: Social Listener Game Board Protocol (establishes reinforcement for collaboration)
- Cusp– Social Listener Reinforcement (Peer Conversational Units)
- After cusp they engage in frequent initiation of conversational units and peers seek them out for interactions more often (initiate conversational units)

CUSPS necessary for success in general education (CABAS® AIL)

- Naming (new capability learn cusp)
- Audience Control (Social Listener reinforcement)
- Observational Learning
- Joint stimulus control across saying and writing
- Conditioned reinforcement by observation cusp
- In terms of skills they must be on or above grade level in reading or math (may be slightly behind in one)

Naming

- Incidental learning of names of things as listener and speaker (55,000 to 86,000)
- Necessary to make much of textual responding to phonemes lead to comprehension
- Allows children to learn from chalk and talk
- W/O naming the child can only learn from teacher consequences (regular education and learn units are like FLYING PIGS!)
- ESL, minority (two thirds fewer language interactions)

Audience Control as Cusp

- Embarrassment
- Listen and speak
- Respond differentially to different audiences (e.g., to cuss or to not cuss)
- (generalization myth)
- You can punish the behavior as a shadow
- You can differentially reinforce other behavior as a shadow
- OR
- Induce the cusp and eliminate the shadow!

Protocols To:

- Establish faces as conditioned reinforcers
 - Establish 2D and 3D stimuli as reinforcers
 - Establish transformation of MO across mand and tact reinforcement functions
 - Establish conditioned reinforcement for books
 - Establish naming (reinforcement source)
 - Establish abstraction of tenses (why kids say the darndest things)
 - Establish social listener reinforcement (yoked contingency game board)
- And many more

Part 2 Protocols

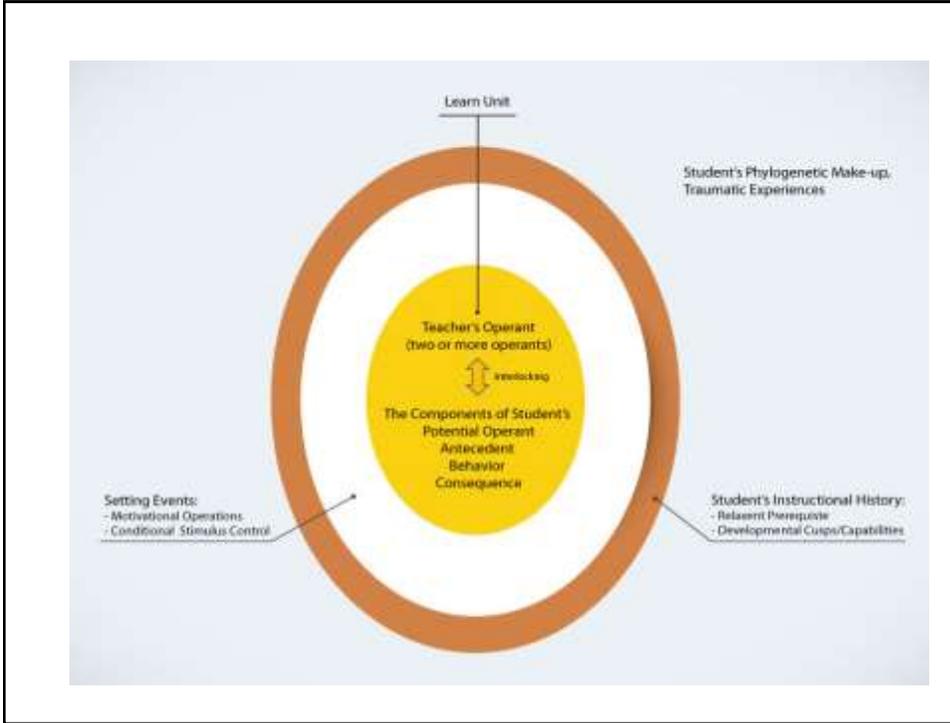
- The following slides are quick summaries of some of the studies
- The first two studies focus on pre-verbal foundational cusps
- Establishing (a) voices as conditioned reinforcers for listening to voices, (b) 2D stimuli as conditioned reinforcers for visual observing

Conditioning Voices

- Greer, R. D., Pistoljevic, N., Cahill, C., & Du, L. (2011). Effects of conditioning voices as reinforcers for listener responses on rate of learning, and preferences for listening to stories in preschoolers with autism. *The Analysis of Verbal Behavior*. 27, 103-124.

How is this a cusp?

- Once the voices are conditioned reinforcers for listening the children who lacked this cusp, their learning rate accelerates for listener discriminations and *general awareness*.
- This is for children who lack general awareness and for whom voices are simply not part of their environment.
- Source in the learn unit in context



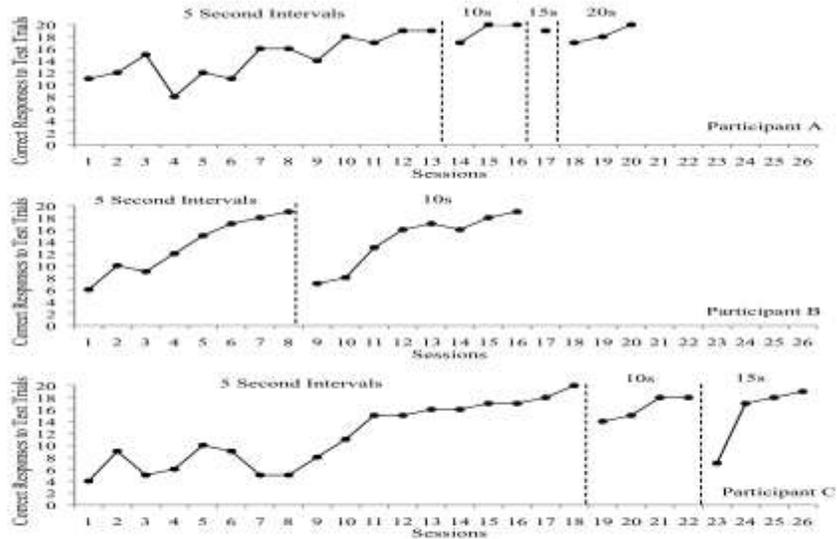


Figure 2. Figure 2 shows numbers of correct responses in the test component of pair-test trials in 20-trial training sessions for Participants A, B, and C during the implementation of the VCP stimulus-stimulus pairing procedure.

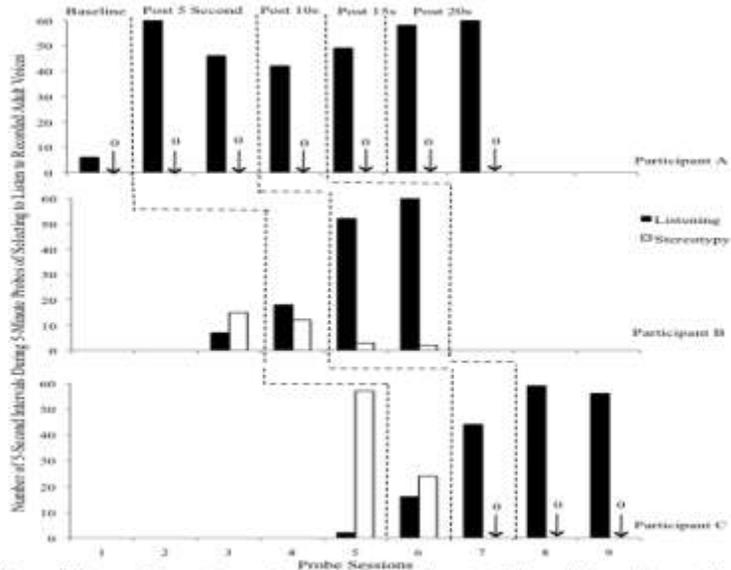
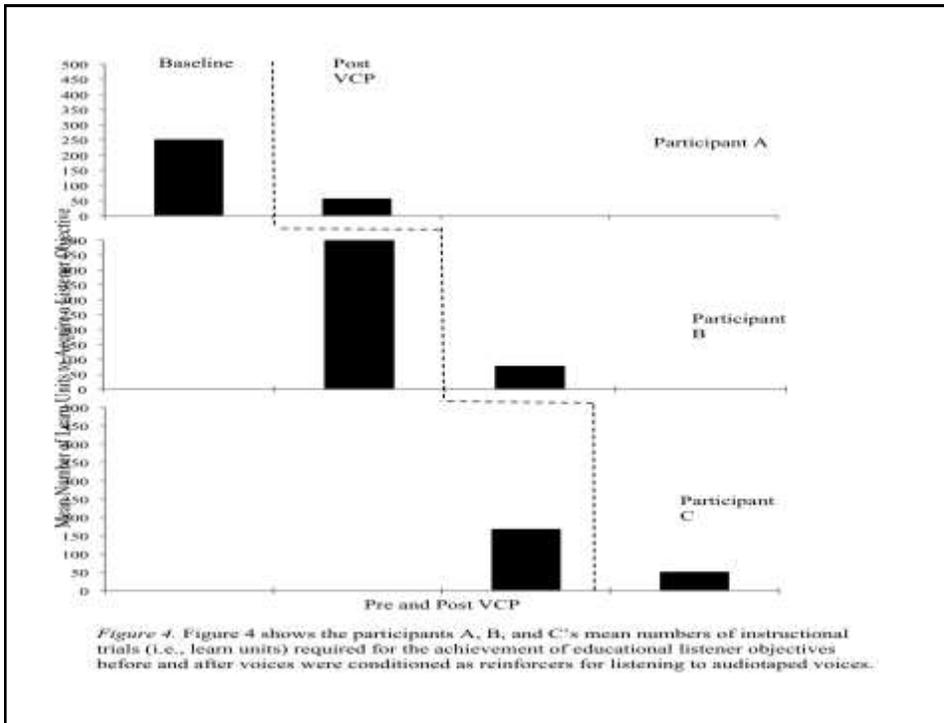


Figure 3. Figure 3 shows the numbers of 5-s intervals out of 60 in which participants A, B, and C selected to listen to recorded adult voices during preference probes before and after each phase of the pair-test training procedure leading to the conditioning criterion.



Missing generalized visual match-to-sample

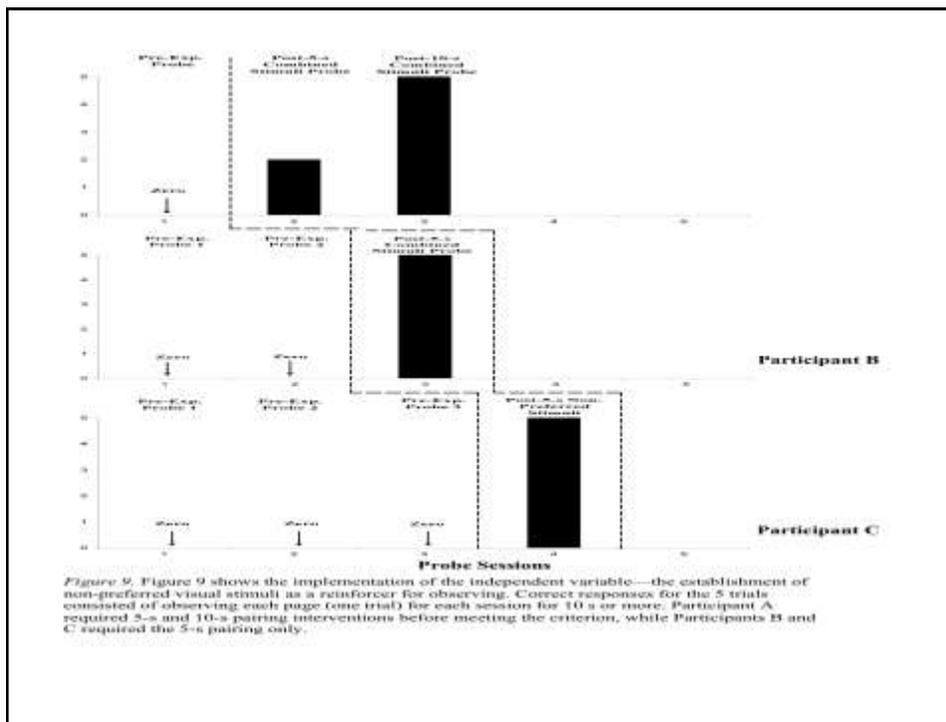
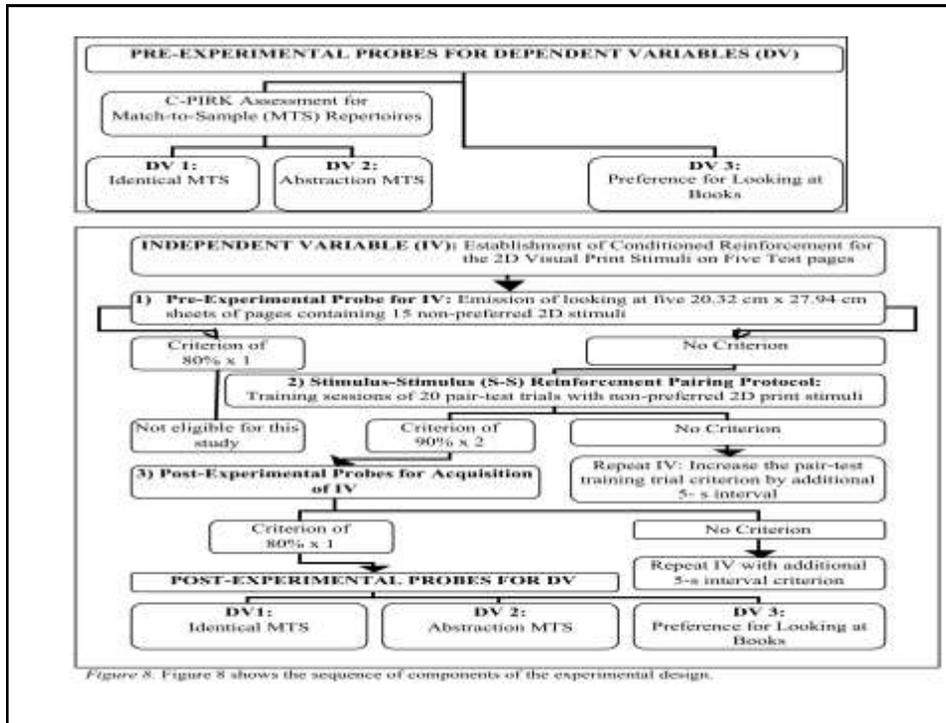
- Masters MTS for four letters, can't do novel letters
- Numbers
- Pictures
- Faces
- Animals
- Capacity for sameness and learning

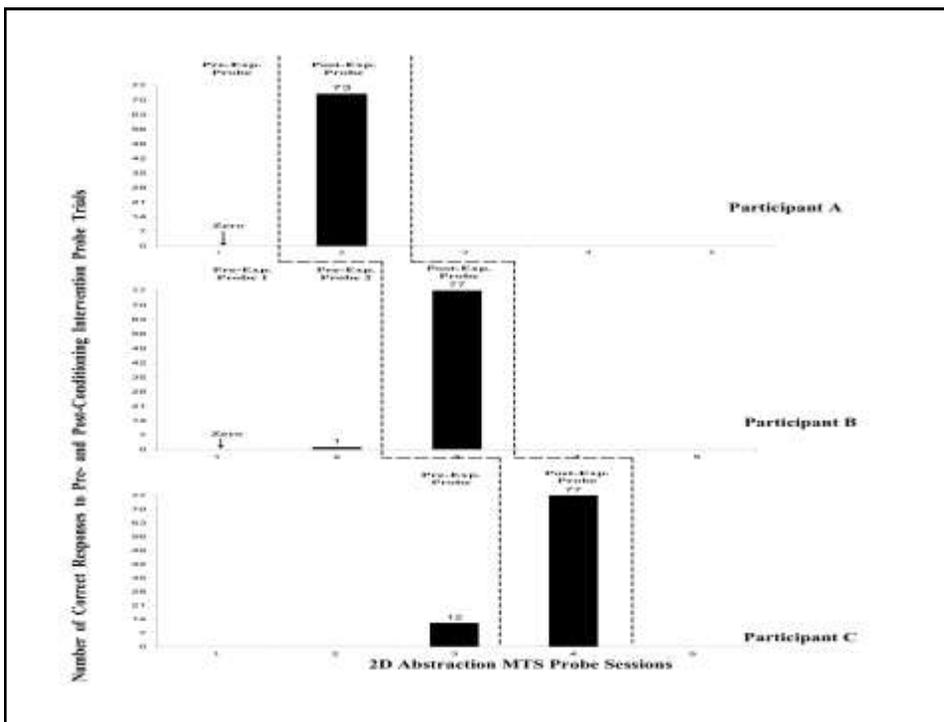
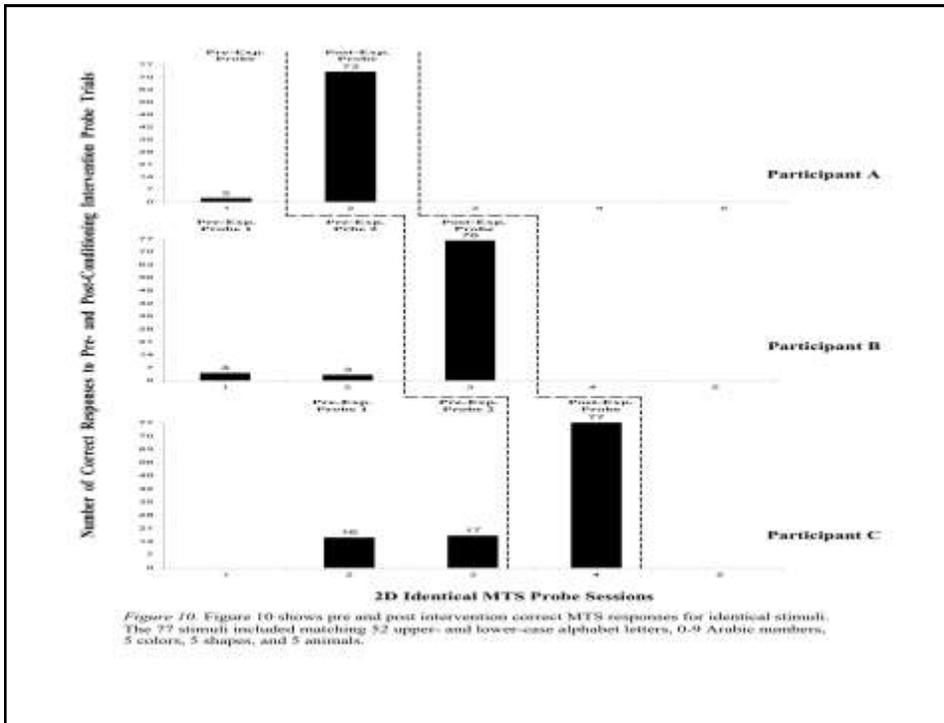
Conditioned Reinforcement for Observing Print Stimuli

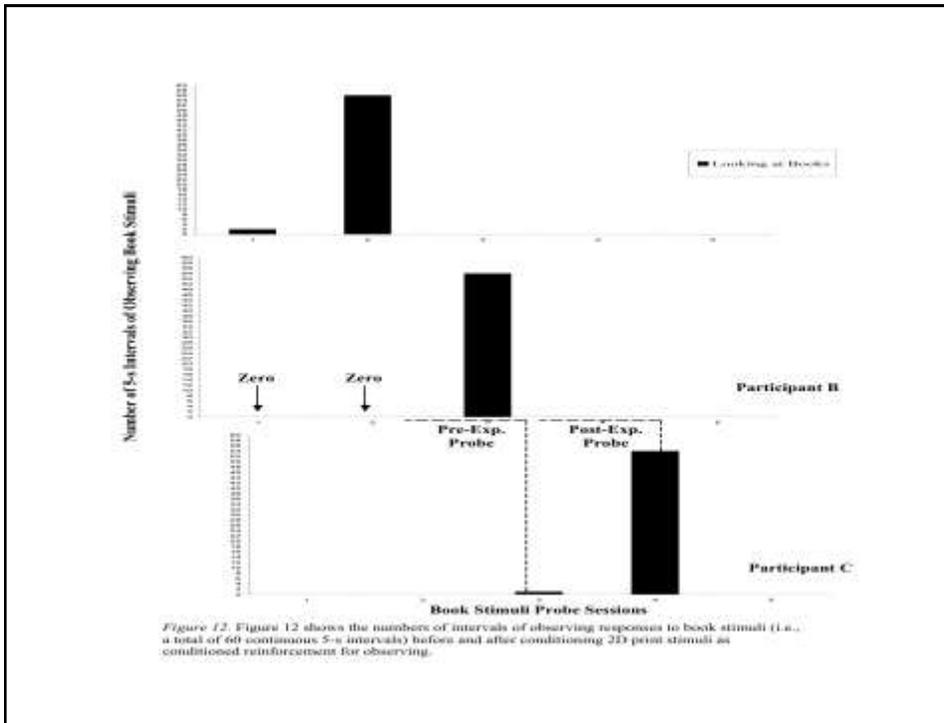
- Greer, R. D. & Han, H. A. H. (2015). Establishment of conditioned reinforcement for visual observing and the emergence of generalized visual identity matching and preference for books with three Kindergarteners with ASD. *Behavior Development Bulletin*.
<http://dx.doi.org/10.1037/h0101316>

Why?

- Children have to be taught each visual match-to-sample objective separately
- Missing generalized visual MTS cusp
- It is a preverbal foundational cusp
- Capacity for visual sameness is necessary if one is to learn to name things







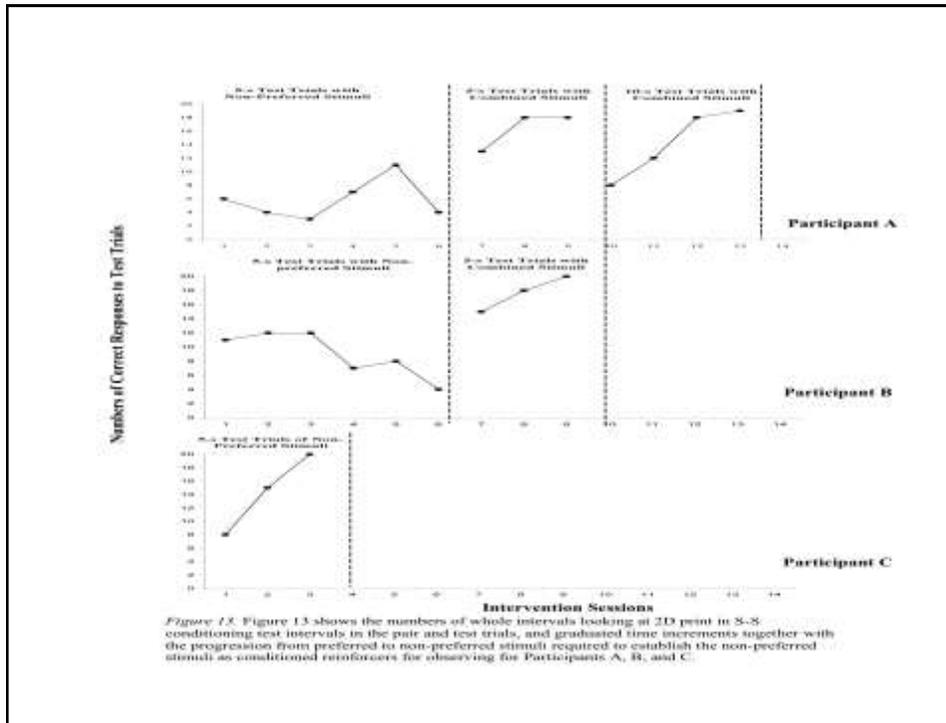
Materials

Materials used during this study included a black-ink pen, clipboard, and pre-constructed data forms (see Figure 3). During conditioning 2D print stimuli intervention and pre- and post-conditioning probe sessions that confirmed the implementation of the independent variable, several sets of 20.32 cm x 27.94 cm size sheets of pages containing 15 small pictures (i.e., 5 columns and 3 rows) were used with multiple exemplars across different colors, sizes, fonts, and shapes that were not preferred (i.e., they were not reinforcing for the participants to look at). All target stimuli used during this procedure were tested prior to the onset of the study to ensure that they were not preferred stimuli (see Figure 4 for set stimuli used during probe sessions). Figure 5 shows examples of the stimuli sets that were used during the first phase of the intervention sessions that contained only non-preferred stimuli. Figure 6 shows an example of the set stimuli used during the second phase of the intervention sessions that contained combined stimuli (i.e., non-preferred and preferred) to provide another pairing of preferred with non-preferred visual stimuli to enhance the effectiveness of the establishment of the 2D print stimuli as a reinforcement for the observing responses for Participants A and B. The preferred stimuli included pictures of participants' favorite cartoon characters, toys, food, and drinks.



Figure 3. Figure 3 shows the materials used during the intervention and pre- and post-conditioning intervention probe sessions (i.e., a digital timer, black pen, data forms, graphs, pages containing 2D visual print stimuli).

Figure 4. Figure 4 is an example of a page of non-preferred visual print stimuli used during the pre- and post-stimulus pairing conditioning intervention probes testing the implementation of print as a conditioned reinforcer for observing responses.



Generalized Imitation: Cusp and New Learning Capability

- Du, L. & Greer, R. D. (2014). Validation of adult generalized imitation topographies and the emergence of generalized imitation in young children with autism as a function of mirror training. *The Psychological Record*. DOI 10.107/s40732-0050-y

Advanced Valid GMI Responses

- 1
- Right hand cross to shoulder.
- Right hand cross to shoulder.
- Left hand same shoulder
- Right hand cross to shoulder.
- 2
- Right hand same shoulder
- Left hand same shoulder
- Left hand cross to wrist
- Left hand cross to shoulder
- 3
- Left hand cross to shoulder
- Both hands same shoulders
- Right hand cross to knee
- Both hands cross shoulders
- 4
- Left hand same shoulder
- Right hand cross to elbow
- Right hand cross to ankle
- Right hand cross to elbow
- ETC. for 24 probe trials

120 adults

- Adults don't consistently emit mirrored or non-mirrored responses
- Not necessary to teach non-mirrored

Training GMI

- Teaching multiple sets of imitation responses until a new set results in 100% mastery
- Pre and post training demonstrated that these 3 and 4 year old preschoolers could imitate novel responses
- Study showing that this allows use of models to teach
- Imitating becomes the reinforcer not the instructor's reinforcement

Post GMI Cusp

- Reduced or no prompts
- Demonstrate, then learn units for the child's inaccurate imitation attempts!
- Learn by new reinforcement –
Correspondence

Examples on the Speaker/Production Side of Development

- Greer, R. D. & Du, L. (2010). Generic instruction versus intensive tact instruction and the emission of spontaneous speech. *The Journal of Speech-Language Pathology and Applied Behavior Analysis*, 5(1), 1-19. ISN 1932-4731. <http://baojournal.com/SLP-ABA%20WEBSITE/SLP-ABA%20VOL-5/SLP-ABA-5-1.pdf>

Why

- Can tact (Social reinforcement), this is a cups
- Doesn't initiate
- Intensive tact procedure
- Purpose to build reinforcement value for social verbal interaction

How

- Verbal exchanges- 5minutes in three place daily with teachers (to and from class, during table game, lunch time)
- Count initiated tacts, intraverbals, conversational units
- Teachers only respond when child initiates
- When stable do intervention

Intervention (Intensive tact)

- 100 additional learn units for tacts over existing daily learn units
- 4 sets of 5 tact stimuli to mastery
- When one set is mastered, do learn units for daily 100 with remaining tacts
- After intervention count verbal exchanges.

First instances of Echoics

- Parroting (not verbal), repetition for correspondence is the reinforcement
- Echoic to mand is verbal because what is delivered by listener is the reinforcement **contact**
- Echoic to tact is verbal because social reinforcement is the **contact** reinforcement

Standard Procedures in the Literature

- Echoic to mand/tact
- Rapid motor imitation
- Stimulus-Stimulus pairings
- Auditory matching (mostly for children with poor elocution)

Reading: First Step

- Establish looking at books and print stimuli as conditioned reinforcer
- This reinforcement cusp results in children learning to textually respond significantly faster. A valid measurement of “reading readiness.”

Early Study

- Tsai, H. & Greer, R. D. (2006). Conditioned preference for books and faster acquisition of textual responses by preschool children. *Journal of Early and Intensive Behavioral Interventions*.3.1, 35-60. Retrieved May 1, 2006 from online at <http://www.behavior-analyst-online.org>

Cusps: Listener/Observer Cusps & Protocols

- Voices- voices as reinforcer for listening and general awareness
- Faces- faces as reinforcers for looking at faces and general awareness
- Visual match-to-sample- condition 2 and 3D stimuli as reinforcers for looking
- Phonemic stimulus control cusp: basic listener literacy protocol
- Auditory match to sample- establish listener sameness

Cusps: Listener/Observer Cusps & Protocols

- Conditioned reinforcement for looking at books- reading readiness cusp
- Blending cusp: auditory matching protocol or behavior momentum
- Reading controls responding: Reader immersion protocol
- Conditioned reinforcement for doing math: math engagement cusp
- Conditioned reinforcement for reading content- establishes reading as preferred activity

Cusps: Speaker, Writer, Production

- Preverbal ones: parroting- Stimulus-Stimulus pairing
- Foundational verbal: echoic to mand, echoic to tact, autoclitics, intraverbals: Echoic to mand/tact,
- Speaker immersion

Cusp: Joining of Speaker and Listener

- Fully verbal when the cusps for say and do correspondence, conversational units in self-talk fantasy play, and bidirectional naming are demonstrated!
- Naming protocols: MEI across speaker and listener, Intensive Tact, conditioned reinforcement for observed stimuli and spoken words
- Onset of consciousness?

Types of Bidirectional (BiN) Naming Cusps

- Simple
- Exclusion
- Word and actions
- Word and additional auditory stimuli
- BiN from reading
- BiN is language specific because child must have accurate phonemic echoic in either language

Bin Allows Complex Verbal or “Cognitive” Repertoires

- Learning language incidentally
- Critical cusp for inclusion
- Learning from chalk and talk becomes possible
- Leads to spelling, writing
- Leads to algorithmic control (learn form reading)
- Leads to writing algorithms (Write and affect readers behavior)

Videos for Training

- PIRK video for learn units also curriculum
- Faces
- Voices
- Auditory matching (app is
- Intensive tact
- Blending
- Basic listener literacy
- Basic BiN

Sources to Learn

- Training videos from cabasschools.org (FSK)
- Workshops
- Greer, R. D. (2002). *Designing teaching strategies: An applied behavior analysis systems approach*. New York: Academic Press. Gary Phye (Series Editor), Educational Psychology Series: *Critical Reviews of Research Knowledge, Theories, Principles, and Practices*. (Selected to be available online as well as in print by Elsevier Press).
- (Spanish translation 2013)
- Greer, R. D., & Ross, D. E., (2008). *Verbal behavior analysis: Developing and expanding verbal capabilities in children with language delays*. Boston: Pearson/Allyn & Bacon/Merrill. [ISBN-13: 0-205-45837-0 and ISBN-10: 0-205-45837-8]
- Korean translation October 2011
- Spanish translation March 2014
- Italian translation 2016
- See www.cabasschools.org for research references

**BUILD REINFORCERS AND THE
REAL OPERANTS WILL FOLLOW!**