

Programming and Instruction for Generalization and Generativity

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Some Common Dilemmas:

- Why am I teaching chair?
- How many items are sufficient to teach a student before I can start teaching higher order skills?
- How many imitation targets do they need to have mastered before I can discontinue the program?
- How does this lead to a functional and independent 21 year-old?
- Why can my student read at grade level, but is unable to respond to questions regarding what he read?

- Despite using effective procedures, teaching discrete skills without regard to how those skills will develop and eventually become part of more complex repertoires, is insufficient
- Non-systematic and non-sequential instruction of mands, tacts, echoics, intraverbals or other skills will unlikely result in establishing functional complex verbal repertoires

A Note On Something Commonly Misunderstood About Behavior Analysis

1. Complex behaviors emitted by competent humans are rarely shaped bit by bit
2. Most human behavior is not directly shaped at all
3. Complex behaviors, however, arise from other response classes that have been shaped bit by bit
4. Palmer calls the building blocks of complex behavior “atomic repertoires” (Palmer, 2012)

Atomic Repertoires

A set of fine-grained units of behavior, each under the control of a distinctive stimulus, that can be evoked in any permutation by the arrangement of corresponding stimuli.

David Palmer, 2012

Some Atomic repertoires

- Imitation (doing what someone else does)
- Echoic (repeating words said to you)
- Tacts (saying the name of things)
- Textual behavior (reading words)
- Transcriptive behavior (copying a text)

Atomic Repertoires and Autism

Common issues:

- Failure to use skills taught in novel ways or under novel circumstances
- Failure to transfer responses to novel exemplars (generalization)
- Responding to a very limited number of cues in their environment.

One Way to Address the Issue: Teach Atomic Repertoires

- Systematic programming that involves teaching some critical atomic repertoires may result in more generalized and generative responding
- Teaching basic repertoires will not suffice, but rather is a necessary step in the process of teaching complex skills
- Determining which repertoires/skills need taught will require assessment processes
- Assessments should be efficient and yield the necessary information to determine what skills need taught

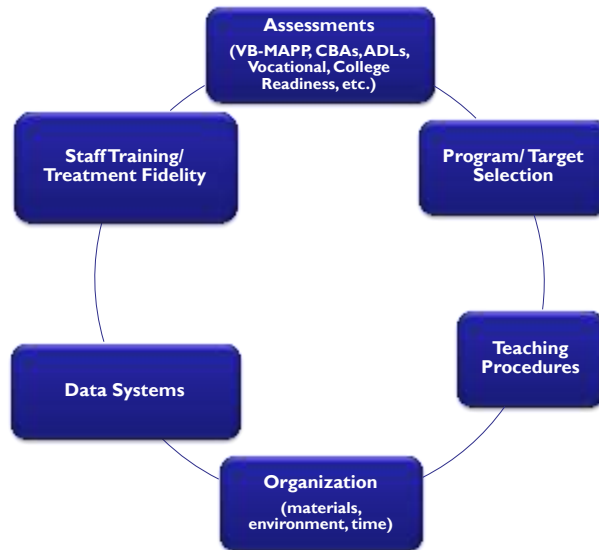
VB-MAPP as an Assessment Tool

- The VB-MAPP was developed as tool to guide programming (**not** a curriculum, but rather a **curricular guide**)
- The tool is based on a functional approach to language acquisition rather than a structural approach
 - Allows us to assess, not only what children say, but also under what conditions they say it
- The tool was meant to be guided by teams skilled in applied behavior analysis, the analysis of verbal behavior, and curricular sequences
- It is criterion referenced; not standardized

VB-MAPP as Criterion Level Assessment

- Assessment and instruction systems are probably most effective when they are integrated and form a feedback loop.
- The VB-MAPP provides a formative assessment that guides more fine grained analysis of student performance and instructional effectiveness

An Integrated System of Instruction



Clarification of Common Misunderstandings

- Primary curricula: PA Core Standards
- Verbal Behavior Milestones Assessment and Placement Program: Curricular guide to be used as one tool in PaTTAN ABA supported classes
- Other skill sequences may also serve as supplemental curricula to support the PA Core Standards (e.g. Direct Instruction sequences; Social Skills, ADLs, Vocational)

Teacher Effectiveness, PA Core Standards, and the VB-MAPP

- PATTAN Autism Initiative has linked content from VB-MAPP with the PA Core Standards
- The sequence of skills from basic repertoires through more complex combinative usages are set up to lead students to language skills that will allow higher order acquisition of concepts in content areas and social interactions
- The skills necessary to implement programming from the VB-MAPP are consistent with:
 - Establishing a culture of learning
 - Using assessment in instruction
 - Using prompts to facilitate participation
 - Setting instructional outcomes

VB-MAPP Milestones Assessment

- Three developmentally sequenced levels
 - Level 1= 0-18 months
 - Level 2= 18-30 months
 - Level 3= 30-48 months
- 16 milestone areas
- 170 measurable milestones
- Includes a task analysis which provides a more detailed description of skill sets at operant level for Milestones Assessment
- Allows further specification of instructional programs

Skill Area	Level 1	Level 2	Level 3
Mand	X	X	X
Tact	X	X	X
Listener Resp.	X	X	X
VP/MTS	X	X	X
Play	X	X	X
Social	X	X	X
Imitation	X	X	
Echoic	X	X	
Vocal	X		
LRFFC		X	X
IV		X	X
Group		X	X
Linguistics		X	X
Reading			X
Writing			X
Math			X
TOTAL:	9	12	13

Considerations for Teaching Atomic Repertoires to Build Complexity

Teach Concepts not Items

- What is a concept? An extended tact
 - Teach multiple exemplars (full range)
 - Teach critical features
 - Establish stimulus class formation
 - Generalized to novel examples
- Teach recombination and novel responding
 - How you arrange and populate skill tracking sheets is critical (see examples)
 - Natural environment teaching
- Directly teach complex skills
 - Use of joint control procedures
 - Matrix training (Axe, 2008)

Generalize across:

- People
- Places/settings
- Materials
- Instructions (Verbal S^ds)
- Time presented

Reminder of VB-MAPP as Assessment Tool vs. Adequate Criteria for Mastery

- VB-MAPP criteria for assessing generalization: mastering items across 3 exemplars (low bar)
 - Student should be able to tact almost any exemplar of the item
- Tact of critical features may facilitate concept acquisition
 - Why we teach tacts of parts and features

Teaching Verbal Conditional Discriminations

- Conditional discrimination:
 - A response that occurs (is reinforced) dependent on (conditional on) more than one component in the antecedent
- Verbal conditional discrimination:
 - At least one of the components in the antecedent is verbal
- Students with autism often fail to attend to all aspects of a statement or question
 - Example: “name some big dogs.”
 - Response: “Great Dane, Labrador, Retriever, Collie (Not Chihuahua Pekingese or a list of ALL big dogs)

Teaching Combinatorial Responding

- Establishing responses that can be combined to generate an indefinite number of novel arrangements and responses
- One example:
 - Teach tacts of items across almost any novel exemplar and to fluency
 - Tact and LR of ongoing actions: teach action across multiple exemplars of objects and multiple actions across each object taught
 - Without much effort, student can then learn to respond to an indefinite amount two component tacts involving verb-noun and noun-verb combinations

Skill Tracking Sheet

Student Name: _____ Skill: Tact of Verb-Noun Combinations

	Target	Date introduced	Date Mastered
1	Rolling Pencil		
2	Rolling Ball		
3	Rolling Marker		
4	Rolling Bottle		
5	Rolling Glue		
6	Tapping Pencil		
7	Tapping Ball		
8	Tapping Marker		
9	Tapping Bottle		
10	Tapping Glue		
11	Spinning Pencil		
12	Spinning Ball		
13	Spinning Marker		
14	Spinning Bottle		
15	Spinning Glue		
16	Coloring Ball		
17	Coloring Tree		
18	Coloring Flower		
19	Coloring Circle		
20	Coloring Car		

Joint Control

- Many of our responses require us to engage in more than one response (not always overt and observable by others) before we emit the end response
- When several operants control a response, it is called Joint Control
- End Response is mediated by other responses

Joint Control

- Often times joint control works by first echoing something that was said, then using the echoic/self-rehearsal while tacting/or emitting an intraverbal as part of a selection response
- As the selection is made an “aha” comment or prosody change is usually emitted
 - Example: following instructions to select multiple items (grocery list)

Lowenkron, 1998

Some applications of Joint Control...

Multiple LR Discrimination

- Not explicitly listed on VB-MAPP Milestones
- Is included at 8-d LR task analysis
- Is an important skill; usually taught at a level similar to tacts of actions and features
- Student has acquired wide range of single LR discriminations and responds easily to such tasks.
- Student must have strong echoic/imitation and tact repertoire for items to be discriminated

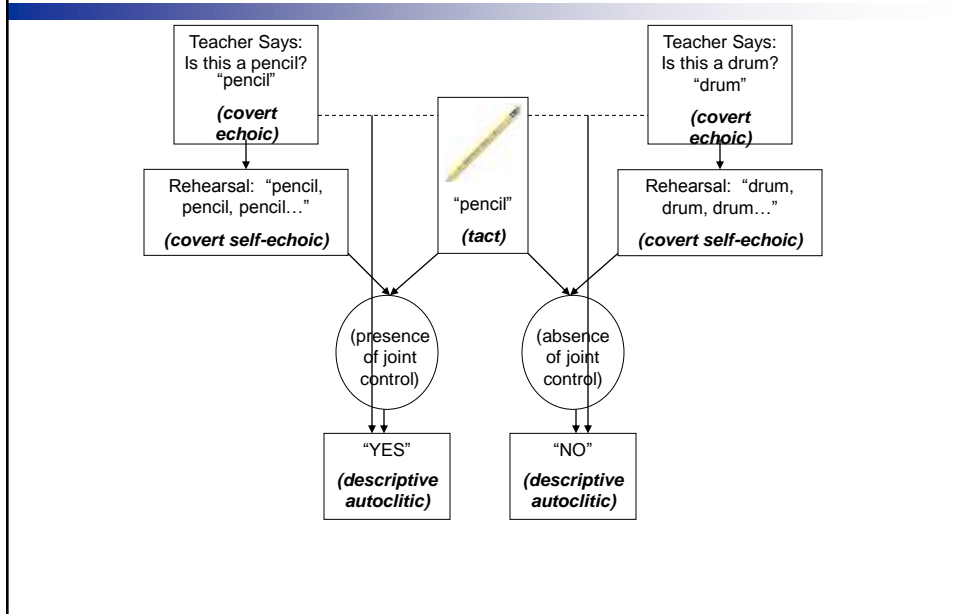
Demonstration of Teaching Procedure Multiple LR Discrimination with Joint Control

- Steps:
 - S^d presented (select 3 items in sequence)
 - Do not use imitative prompts
 - Rehearsal phase: have student echo or imitate the 3 item sequence and then self-echo or self-imitate
 - Have the student rehearse more than you think is necessary, but a minimum of 3 times
 - Re-present the S^D and have student respond

Teaching Yes/No Tacts

- Answering “yes” or “no” in response to questions about a non-verbal stimulus. For example:
 - When shown a pencil and asked “Is this a pencil?” the participant would say “yes.”
 - When shown a pencil and asked “Is this a drum?” the participant would say “no.”
- Yes and No responses are actually:
 - Yes or No, in this case, not actual tacts
 - Verbal behavior about verbal behavior (autoclitics)
 - The speakers tendency to say whether they would tact the item as spoken.
- Can be taught through process of joint control

CONCEPTUAL ANALYSIS YES/NO TACTS



Another example of establishing atomic repertoires relevant to autism:

Teaching Category/Class:

- Tacting item when provided with the class
 - In the presence of an array of items that includes a cat:
 - Sd: "Tell me the one that's an animal" R: student scans, tacts "cat" upon seeing the cat
 - Usually only introduced once the LR discrimination and the tact of item is strong
 - Response involves both responding as a listener and emitting the tact
- Tacting the Class of Items
 - The student tacts the category/class of objects. When presented with an object or picture of an object can the student name the class
 - Sd: in the presence of a cat "a cat is a kind of ____" R: "animal"
 - The stimuli that evoke the response are the relevant features that are necessary criteria for inclusion in a particular class of items

Teaching and Programming Considerations:

- Teach tact of class on items that are strongly acquired as tact
- During training, intersperse trials for tacting the whole item
- Tact and LR class are taught at the same time
- At any one time, teach two categories
- Teach each category until the student can tact novel items when provided with the named category as well as provide the category of items not previously targeted

Skills Tracking Sheet:

Student Name: _____ Skill: Tact of Class/Tact of Item by Class

Target	Date Introduced	Date Mastered
Tell me an animal:		
Cat		
Dog		
Horse		
Pig		
Cow		
Elephant		
Lion		
Zebra		
Sheep		
Monkey		
Tell me a food:		
Pizza		
Hamburger		
Hotdog		
Sandwich		
Spaghetti		
Soup		
Rice		
Chicken		
French Fries		
Eggs		

Target	Date Introduced	Date Mastered
A cat is a type of:	Animal	
A dog is a type of:	Animal	
A horse is a type of:	Animal	
A pig is a type of:	Animal	
A cow is a type of:	Animal	
A elephant is a type of:	Animal	
A lion is a type of:	Animal	
A zebra is a type of:	Animal	
A sheep is a type of:	Animal	
A monkey is a type of:	Animal	
A pizza is a type of:	Food	
A hamburger is a type of:	Food	
A hot dog is a type of:	Food	
A sandwich is a type of:	Food	
Spaghetti is a type of:	Food	
Soup is a type of:	Food	
Rice is a type of:	Food	
Chicken is a type of:	Food	
French fries are a type of:	Food	
Eggs are a type of:	Food	

Intraverbal Feature, Function, Class (FFC's) and Webbing

- The student will fill in phrases and answer questions regarding the feature, function, and class of items.
- **Example:** When presented with the question (item not present) “What do you write with?” the student will answer “pencil”.
- The stimuli that evoke the response is the other person’s verbal behavior (the fill in the blank phrase or question).

Prerequisite Skills and Considerations for IV-FFC Training:

- Many tacts items (tact for item involved must be known)
- For function: Tact and LR of item and ongoing action involved.
- For features: Tact and LR of the items, parts and features of the item involved.
- For class: Tact and LR of items in the class as well as tacting the class of items.
- Having a solid base of these skills will avoid establishing intraverbal rote responding. For example, some children may be able to respond “car” when asked to name something with wheels, but may not know what wheels are.
 - *When prompting the intraverbal, generally, use mastered tacts. For example, when teaching the fill in response for “You swim in the _____”, the prompt would be showing the student a picture of a pool.*

Intraverbal FFC's and Webbing

Stimulus and Response Classes

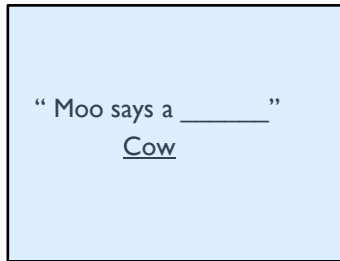
Car		Bed		Ball		Cat	
Stimulus Class (Convergent)	Response Class (Divergent)	Stimulus Class (Convergent)	Response Class (Divergent)	Stimulus Class (Convergent)	Response Class (Divergent)	Stimulus Class (Convergent)	Response Class (Divergent)
Something you drive is a	What do you do with a car?	Sleep in a	What do you do with a bed?	You throw a	What do you do with a ball?	You pet a	What do you do with a cat?
Something you ride is a	What do you do with a car?	Something with pillows is a	A bed has	You bounce a	What do you do with a ball?	What has a tail?	A cat has a
Something with wheels is	A car has	Something with blankets is a	A bed has	You kick a	What do you do with a ball?	Something with whiskers is a	A cat has
Something with wipers is a	A car has	Something with a mattress is a	A bed has a	You catch a	What do you do with a ball?	Something with fur is a	A cat has
Tell me a vehicle	A car is a	Tell me a furniture	A bed is a	Something round is a	A ball is	Tell me an animal	A cat is an
Something with a seatbelt	A car has a			Tell me a toy	A ball is a		

Intraverbal FFC's and Webbing

- Utilize a separate skills tracking sheet for feature, function, and class (see examples)
- Initial intraverbal responses for each item as well as those that apply only to one item will be taught using the usual prompt-transfer-distract-check procedure.
- Once these first FFC's for each item are mastered you will begin the first step of the webbing process.

Preparation of teaching materials:

- For single responses:



Intraverbal FFC: Teaching Trial Example

Trial	Teacher's Response	Learner's Response
Intraverbal Trial with Tact Prompt	“Moo says a ____” (with picture of cow present)	“Cow”
Intraverbal Transfer	“Moo says a ____” (no picture)	“Cow”
Intraverbal distracter	“Your first name is?”	“Marty”
Receptive distracter	“Give me the popcorn”	“Gives picture of popcorn”
Intraverbal transfer	“Tell me the one that bounces” (no picture)	“Cow”

Protocol: Intraverbal FFC's and Webbing Phase 2

- Pick the concepts to teach as web(from FFC's taught). From the examples in the above table these could be: things that have wheels, vehicles, furniture, things that are round, toys, animals, things with tails.
- The student should already have one mastered response to each FFC area.
- Continue to add new responses to each of these classes (one at a time).
- As the student masters each response, require naming all of the previously learned responses when asked for them one at a time. For example: "tell me a vehicle ...car". Yes, "tell me another vehicle"...."train".....

Preparation of teaching materials:

- For concepts with more than one response:

"A pizza has _____"	"Tell me something with a door"
<u>Cheese</u> <u>Sauce</u> <u>Crust</u> <u>Pepperoni</u>	House Bus Cabinet Elevator Microwave Car Van Oven Refrigerator Store

- Write the verbal S^d on a blue 3x5 card and list responses that will be targeted within that concept
- As student masters each item, it should be highlighted on the card

Preparation of teaching materials:

- If student emits a response for a novel item not currently targeted, mark with a plus (+) as shown below:

- Novel responses
 - Once student can emit multiple novel items, mark the right bottom corner with word "Novel" and add card to easies
- If you have two consecutive probes correct response for a novel item, it should be highlighted on card and considered mastered
- Responses emitted that are not on card can be added in at any time

"Tell me an animal"

Dog	Cat
Pig ⁺⁺	Horse
Cow	Elephant
Zebra ⁺	Giraffe
<i>Novel</i>	

Materials Organization for Webbing

- Develop marker cards with titles of concepts (only for those with multiple responses being taught)
- Organize in small card holder/bin in alphabetical order for quick access
- Each tab will include pictures of all mastered items



Teaching Procedures for additional members of a class:

Seven steps:

1. Present verbal S^d and wait for student to emit response for mastered item (repeat as necessary for all mastered members of the class)
 - Example: “Tell me a vehicle” (student responds with mastered item “car”)
2. Repeat verbal S^d followed by an immediate prompt
 - Example: “Tell me another vehicle” and show picture of bus for student to tact (may reinforce here if necessary depending on VR)
3. Distract (Run a few easy trials)
4. Repeat steps 1 and 2 (may need repeated more than once)
5. Distract
6. Check
 - Example: “Tell me a vehicle”: “car”, “tell me another vehicle”: “bus”
7. Differentially reinforce

Intraverbal FFC's and Webbing Phase 3

- As new responses are added to the class, also teach the relevant FFC's of the added response.
- Eventually the student will have mastered several responses for each class and, therefore, be able to emit relevant verbal responses to a randomly varied set of questions/verbal S^d s.

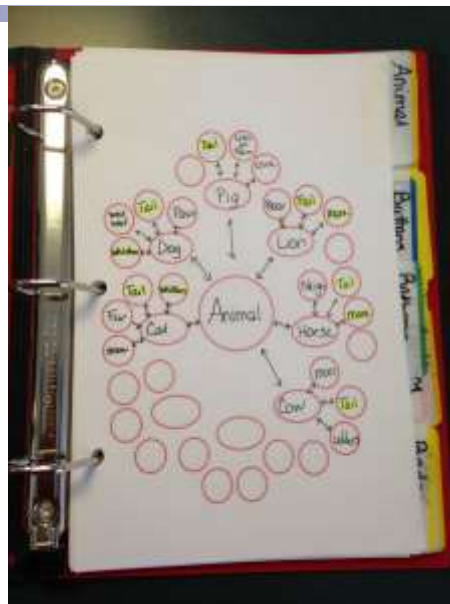
Webbing Maps

- It is helpful to create summaries of what the student already has mastered (as a prompt for the instructor)
 - This allows instructor to present questions in a flexible manner to whatever responses a student may emit.

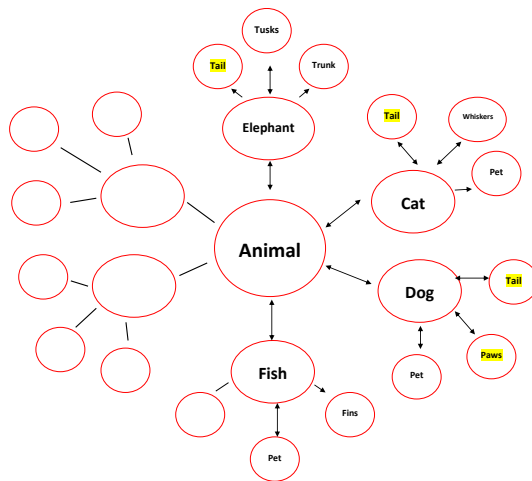
To accomplish this you can set up a binder or folder with clear tabs for each class so you can quickly reference them.

Sample Webbing Map Summary

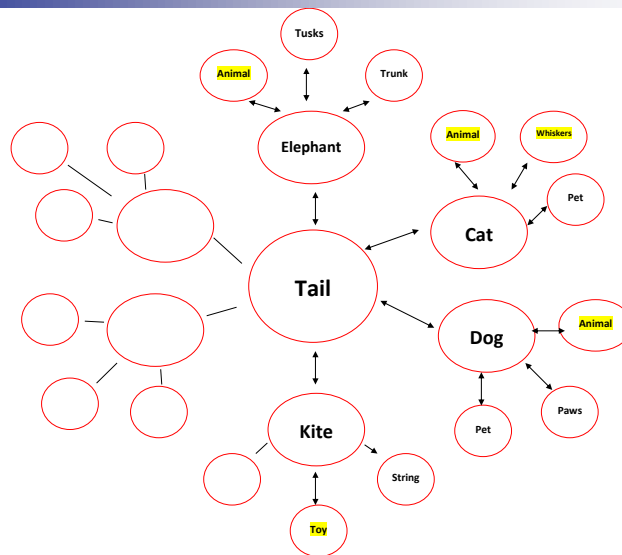
- ❖ 2 way arrows indicate student has also mastered the reversal
- ❖ Highlight means student has other members of that concept mastered



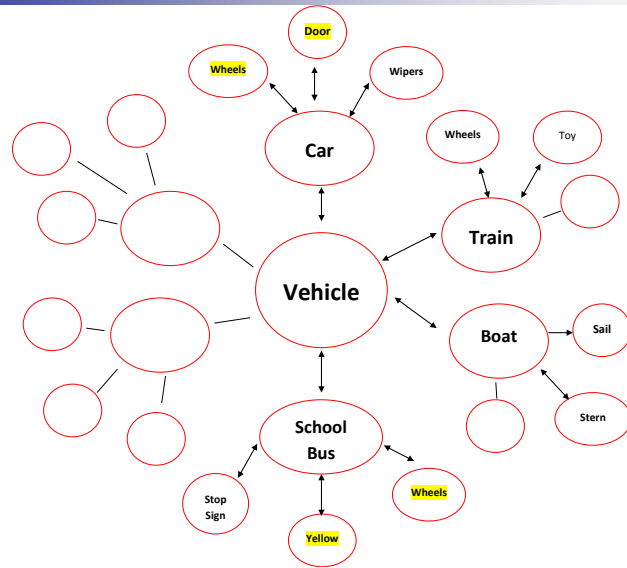
Animal



Tail



Vehicle



Intraverbal FFC's and Webbing Data Based Decision Making

- Ongoing analysis of student responding to determine when and how to fade prompts.
- Decisions to discontinue program should be based on student's ability to provide novel intraverbal responses within categories, web within and across concepts, across settings and instructors as well as student's ability to acquire novel targets without intensive teaching.

Skills Tracking Sheet for IV Class

	Target	Date introduced	Date Mastered
1	"A car is a type of _____" (Vehicle)		
2	"A bus is a type of _____" (Vehicle)		
3	"A Boat is a type of _____" (Vehicle)		
4	"A Train is a _____" (Vehicle)		
5	"A Airplane is a type of _____" (Vehicle)		
6	"A helicopter is a type of _____" (Vehicle)		
7	"A shirt is a kind of _____" (Clothing)		
8	"Pants are a kind of _____" (Clothing)		
9	"A jacket is a kind of _____" (Clothing)		
10	"A hat is a kind of _____" (Clothing)		
11	"Socks are a kind of _____" (Clothing)		
12	"A dress is a kind of _____" (Clothing)		
13	"A sweater is a kind of _____" (Clothing)		
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

	Target	Date introduced	Date Mastered
1	Tell me a vehicle: Car		
2	Bus		
3	Boat		
4	Train		
5	Airplane		
6	Helicopter		
7	Tell me a clothing: Shirt		
8	Pants		
9	Jacket		
10	Hat		
11	Socks		
12	Dress		
13	Sweater		
14			
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25			

General Programming Considerations

General Guidelines for Programming

1. **Complete** VB-MAPP assessment (completion of all domains not always necessary to begin programming)
2. **Identify** the general level of the child
3. **Analyzing** the scores in each of the relevant skill areas and note performance level obtained in each column (skill domain)
 - *Determine skill sets in relation to selecting known items, items that can serve as prompts and assist in selection of target items and response forms*
 - *Note the gaps (milestones for which student did not meet the criteria) in each column*
4. **Select Instructional Programs** that are balanced across operants and at appropriate instructional level

*Caveat: Remember the criteria are intended for assessment purposes and **do not** imply mastery of the skill sets*

General Guidelines for Programming

- Select targets for instruction that are relevant for student:
 - Usually valuable to student
 - Common in day-to day life
 - Tied to general education curriculum
 - Will promote and facilitate social initiations and interactions.
 - Will promote independence
- Be sure programming is consistent with student's response form (vocal vs. sign)
- Be sure instructional materials are available for specific items selected within programs

Guidelines for Selecting Response Forms

- Assessment
 - Echoic skills
 - Imitation skills
 - Spontaneous vocalizations
- Consideration should be given:
 - Ease of production
 - Developing a full range of verbal skills
 - Portability
 - Independent use
- History of response to intervention
 - How long have signs been tried?
 - Verify quality of implementation of training efforts

Establishing Initial Repertoires: Common Programming Procedures for Level I and Related Protocols

Earliest Learners in Level I

- May need to establish instructional control
 - Are adults established as conditioned reinforcers for the student: pairing process; “free” delivery (in absence of problem behavior)
- Saliency of attending response (attending to speakers voice, instructional materials)
- Identification and conditioning of adequate pool of reinforcers
- First programs:
 - Approach behavior
 - Mand
 - Imitation (objects and motor)
 - Tact
 - Match to sample
 - LR in context

Establishing Mand Repertoires: Level One

- Schedule adequate opportunities to mand
- Provide mand trials across a variety of motivational classes, across a variety of listeners, and across settings.
- **Always** check for motivation (or contrive motivation)
- Have a systematic plan to fade mand prompts
 - Two types of mand transfer trials: within trial and second trial transfer
- Consistently use correction procedures
- Avoid “generalized mands”
- Avoid chaining extraneous behaviors into mand responses (reach first, then sign)
- Select target responses that will be relatively easy for child to produce
- Sequence mand skills carefully: don’t move too early to multiple component mands or increased MLU for mands; to yes/no mands...Focus on building full range and independent responding!

Establishing Tact Repertoires: Level One

- Teach many tacts
- Teach **sufficient exemplars** for tact targets (will cover in more detail later)
- Be sure student can tact objects
- Provide sufficient tact training opportunities to establish new skills as well as assist with generalization and fluency
- Sequence tact instruction carefully: do not stop at tacting objects
- Initially, keep verbal S^D consistent
- Be sure controlling variables are right (that what you think is a tact is really a tact and not a mand, or in the case of prompt dependency, an echoic)

Establishing Imitation Repertoires: Level One

- Schedule adequate opportunities for imitation trials
- Sequence action to be imitated carefully (from easy to hard)
 - Easier movements to produce will include grounded movements, bidirectional, do not involve crossing midline, are in their view)
- Plan to fade prompts (appropriate use of transfer trials)
- Be sure imitative discrimination is taught
- For imitation with objects teach each movement across several objects and several movements across each object
- Initially, keep verbal S^D consistent and teach using identical items
- Consistently use correction procedures
- Provide sufficient training to teach new skills as well as establish generalized imitation repertoire and fluency of responses
- Require clean responding (but keep in mind shaping process)

Listener Responding (LR): Level One

- Schedule adequate opportunities for instruction
- Sequence skills from easy to hard
 - Begin with following instructions in context
 - Teach targets for actions already mastered in imitation
 - For selecting named items, begin with small field size and far out non-exemplars (items that are not similar to the target being taught)
- Keep in mind that the tact may facilitate the development of LR discrimination
- Plan to fade prompts (appropriate use of transfer trials)
- Teach discrimination from the start
- Consistently use correction procedures
- Provide sufficient training to establish generalization and fluency
- In some cases, may need to teach scanning and/or response skills in isolation from the discrimination

Teaching Scanning and other Response Skills

- Avoid “look here” or “Johnny, look here”
- Use sufficient 0 second prompts but fade prompts asap
- Fade in complexity of array
- May need to start with scanning between reinforcers
- Keep field dynamic (avoid shaping up location selection bias)
- Avoid mastering in field size of 2
- Teach skills such as touching item in various locations
- Teach response (e.g. “touch”, “give”)

Establishing Social and Play Skills: Level One

- The main focus for early learners is conditioning items, activities and peers as reinforcers
- Motivational variables: establishing the value of social interactions
- Be careful not to target eye contact too early (rather condition others as reinforcers as above)
- Spontaneity: hard to program for! (Comes from multiple exemplar training and fluent responding) *Social items 4-5*

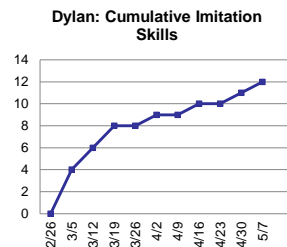
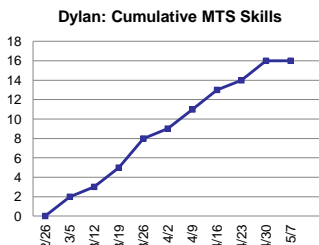
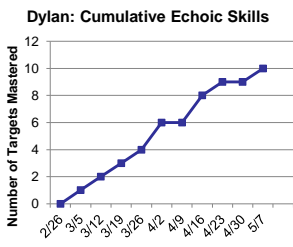
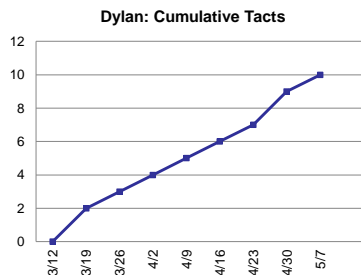
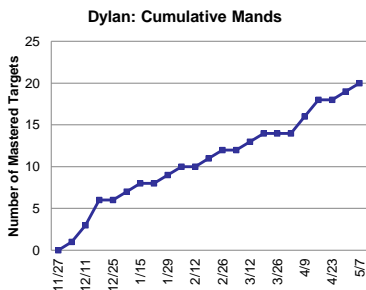
Dylan

- 6 Years old
- Attends Autism support classroom (elementary)
- 1st year in classroom
- Barriers for Dylan included instructional control issues, response requirement weakening MO, and impaired mand repertoire



Dylan Programming

- Initial Programming:
 - Intensive mand training
 - Establishing instructional control
- 2nd Phase Programming:
 - Imitation
 - Match to sample
 - Tacting common items
 - Vocal Shaping
 - Conditioning peers as reinforcers



Total Cumulative Skills in 20 weeks: 68 (20 Mand)

Seth

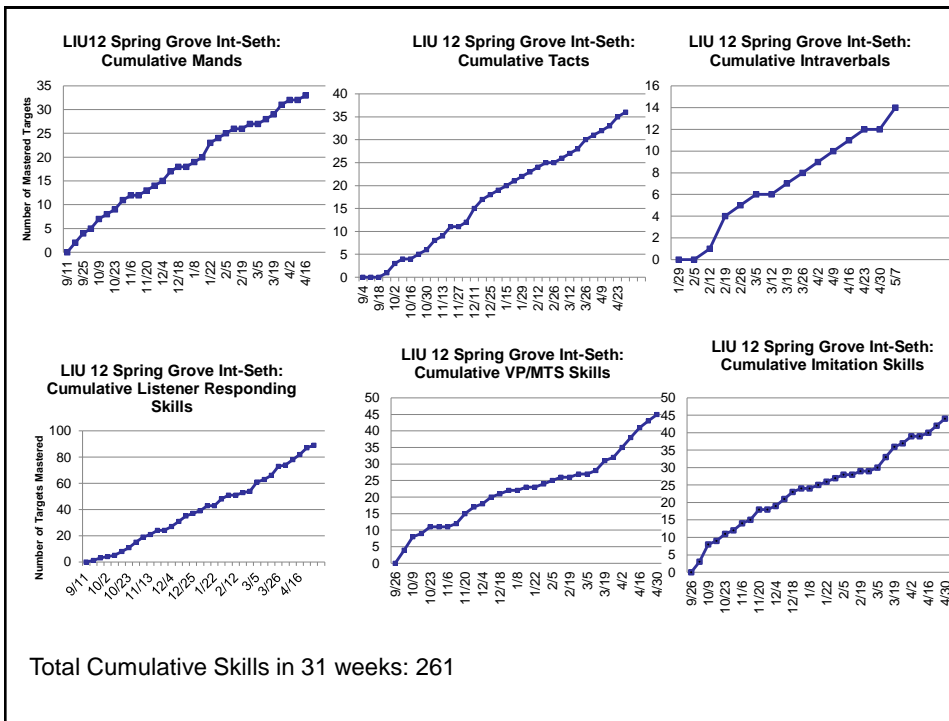
Age: 12 years
Special Education
eligibility: Autism



Seth Programming:

- Primary Response Form: Sign Language
- Mand: Manding for items sign or vocal
- Listener Responding: selecting named common items, performing actions, body part
- Tact: common items
- Intraverbal: fill-in fun phrases/common phrases
- Motor Imitation: with and without objects, future signs
- Visual Performance/Match to Sample: shapes/colors, non-identical pictures-field of 10
- Echoic: CV, some early Kauffman breakdowns





Broadening Repertoires: Common Programming Procedures for Level 2 and Related Protocols

Level 2 Programs: Purpose and Considerations

- Careful programming and sequencing of skills helps avoid producing unwanted barriers that will impede development of a broad language repertoire and which we must eventually address in the future.
- Considerations:
 - Don't be tempted to move too fast through these intervention programs.
 - Careful analysis of the appropriate sources of control.
 - Build a solid foundation of skills on which to base advanced skills...**build atomic repertoires!**

Mand Program Considerations

- Expand mands for items, activities, actions: be careful not to stop #5 from level 1 at the 10 criteria
- Increase rate of manding
- Mands for missing items
- Spontaneous mands and acquiring novel mands without specific training will often come with multiple exemplar training and density of opportunity to mand (may be necessary to teach spontaneous mands)
- Two-component mands (action-item, adjective item, action-adverb)
- Multiple component mands
- Y/N mands:
 - Child is not the one to initiate
 - Can become a generalized mand

Imitation Program Considerations

- Imitation of objects requiring discrimination
- Fine motor imitation
- Imitation fluency
- Multiple step motor imitation (beyond two steps generally require mediating responses)
- Imitation free of verbal S^D (fluency drills may help in teaching this step)

Tact Program Considerations

- Expand tacts for items
- Tacting ongoing actions
- Tact parts of items
- Tact class of items
- Two component tacts (noun-noun, noun verb)

Listener Responding Program Considerations

- Responding to varied verbal instructions (verbal SD)
- Discriminating items in larger fields, in messy arrays, and with similar stimuli
- Continue expanding performing motor actions on command
- Discriminating items in picture/book scenes and/or the natural environment
- Discriminate parts of items

Visual Performance/Match-to-Sample

- Match identical items in larger fields, messy arrays, and with similar stimuli
- Match non-identical items (same progression as identical, if necessary)
- Replicating 3-D block designs, block designs on pictures as well as from pictures
- Replicate sequence patterns

Social and Play Skills

- Peer-Peer pairing
- Peer-Peer manding
- Play/Leisure skills: can, and should, include independent engagement.

Intraverbal Program Considerations

- Fill in responses
 - Fun activities
 - songs
- Responding to questions regarding personal information
- Intraverbal by feature, function, and class
- Answering what, who, where questions

Classroom Routines and Group Instruction

Classroom Routines

- Completing classroom routines (e.g., packing, unpacking, lining up, etc.)
- Work independently for brief periods of time and stay on task

Group Instruction

- Respond in dyads and small groups to known instructions (unison/choral responding)
 - Choral/unison responding: Students' ability to respond along with others in a group setting (responding on signal).
 - Individual Responding: Student's ability to respond when called on in a group setting.
 - Waiting for others individual responses: Student's ability to remain quiet and attentive when it is another student's individual turn to respond.

Tommy

- 10 years old
- Attends an autism support classroom at an intermediate school
- Started as a non-vocal learner with limited skills across all operants

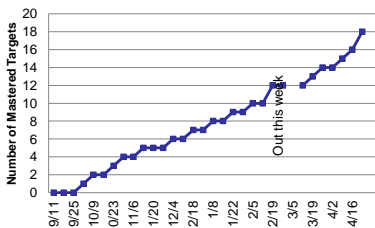


Tommy Programming:

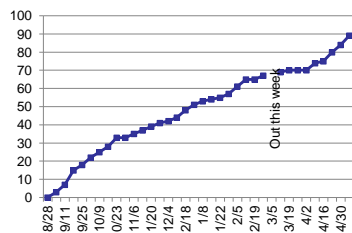
- Mand for missing items and continue to expand mands for items, actions, activities
- Tacts for items, actions, parts of items
- LR: Following instructions to perform actions, receptive discrimination of parts
- Intraverbal FFC's
- Small group instruction
- Conditioning peers



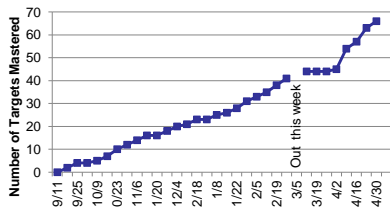
Tommy: Cumulative Mand for Missing Items



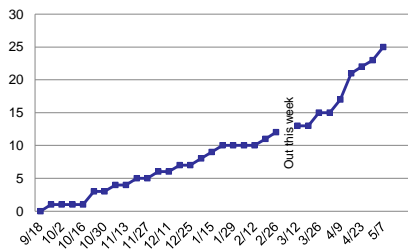
Tommy: Cumulative Tacts



Tommy: Cumulative Listener Responding Skills



Tommy: Cumulative Intraverbals



Total Cumulative Skills in 30 weeks: 198

Beyond the Basics: Common Programming Procedures for Level 3 and Related Protocols

Purpose of Level 3 Programs

- To continue building on basic learning skills that include more complex language skills.
- Building toward academic performance, group instruction and more complex verbal and social relations (will not cover in depth academic components)
- Procedures need to include:
 - Generalization
 - Spontaneity
 - Transfer between operants
 - Social and verbal interactions with peers
 - Use of new skills in a functional and meaningful way in the student's day to day natural environment.

Teaching Mands at Level 3:

- Mands for removal of aversive stimuli (remember why this is at level 3!)
- Mands for attention
- Mands for information

Expanding the Tact Repertoire

- Tact at least 4 specific aspects of items when presented with rotating verbal questions about the item.
- Tact adjectives (relative concepts: long, big, etc)
- Tact prepositions (may need advanced analysis; is a relative concept)
- Yes/No tacts (remember this is really an autoclitic and quite complex to teach: conditional discrimination or joint control protocols suggested)
- Tact exclusion from category
- Tact pronouns, adverbs
- Tact emotional states and social situations (with extreme caution of teaching under the right sources of control)

Listener Responding

- Follow instructions involving multiple components (selecting multiple named items, following multiple step directions)
- Following instructions involving adjectives
- Following instructions regarding prepositions
- Follow instructions regarding pronouns and adverbs
- Discriminate among common social situations and emotional states

Expanding Repertoire of Visual Performance/Match-to-Sample Skills

- Matching items in the natural environment
- Extend or continue patterns and sequences
- Sorting items into categories
- Matching models of art/craft type activities

Social and Play

- Responding to peer mands
- Play/Leisure skills...independent
- Play/Leisure...with peers
- Verbal exchanges with peers
- Other relevant social sequences

Intraverbal

- Increased range of intraverbal responses; can include expanding FFC's
- Respond to "WH" questions
- Answer intraverbal yes/no questions
- Describe events, movies, stories
- Answer questions about a story read
- Answer multiple questions regarding a specific topic

Classroom Routines and Group Instruction

Classroom Routines

- Work independently in a group and stay on task
- Retrieving and putting away materials for instruction

Group Instruction

- Respond in larger groups to known instructions (unison/choral responding)
- Learning new behaviors in a group format

Academic Skills in Conjunction or Beyond VB-MAPP

- If student not at grade level, use sequenced and evidence-based curricula to teach academic skills (Reading Mastery, Corrective Reading, Distar Math, Connecting Math Concepts, Language for Learning, Sensible Pencil).
- Make sure students have necessary skills to begin these programs...Placement test does not necessarily give you this information.
- Curriculum-based assessment and familiarity with PA Core Standards are a critical component of programming for academic skills

Damon

Age: 9 years

Category of
eligibility: Autism



Damon Programming:

- Mand for Information
- Peer to Peer Mand
- Social Skills Training
- Intraverbal skills (imbedded in social skills training)
- SRA Reading Mastery Level 2
- Adapted/sequenced math curriculum



A Helpful Planning Sheet:

Programming Checklist & Worksheet

Student: _____ Date: _____ Program: _____

Student Checklist	Completed	Notes
Confirmed that program is at proper level (from student's assessment(s))	Y N	
Checked for critical component skills before starting new program or increasing the difficulty level of current program (probe or data)	Y N	
Developed a clear definition of the expected student behavior and mastery criteria	Y N	Behavior: Mastery Criteria:
Scheduled practice opportunities to use skill (NET, contrived, captured)	Y N	How often: When: Where: With Whom: Material(s):

Teacher Checklist	Completed	Notes
Reviewed teaching procedures, including prompt and prompt fade procedures	Y N	
Determined a sequence of instruction	Y N	
Determined targets that are relevant to the student	Y N	
Determined/developed data collection system to monitor progress	Y N	
Determined and gathered materials for instruction	Y N	
Planned for generalization	Y N	People Setting Examples
Provided staff training and resources if necessary	Y N	Who What When

Prior to New Program Selection:

- Issue of response adduction
- Probe for skill acquisition without specific teaching

Some Final Thoughts:

- The challenges presented by many students with autism makes programming an insurmountable task.
- There is much work to be done and efficiency of teaching is not a luxury but a necessity
- The recommendations provided in this presentation are not intended to suggest this is the only way to do things or that there may not be a better way (now or in the future). They are simply considerations, systematic procedures and recommendations for arranging instruction in ways that will likely overcome the common pitfalls
- Teaching basic repertoires for children with autism that lead to combinatorial, novel responding must be a central component of instruction

Thank You for Your Participation!

References

- Adams, G. L., Tallon, R. J., & Rimmel, P. (1980). A comparison of lecture versus role-playing in the training of the use of positive reinforcement. *Journal of Organizational Behavior Management*, 2, 205-212.
- Alessi, G. (1987). Generative strategies and teaching for generalization. *The Analysis of Verbal Behavior*, 5, 15–27.
- Axe, J. (2008) Conditional discrimination in the intraverbal relation: a review and recommendations for future research. *The Analysis of Verbal Behavior*, V24(1); 159-174.
- *Azrin, N. H., Jamner, J. P., & Besalel, V. A. (1989). Student learning as the basis for reinforcement to the instructor. *Behavioral Residential Treatment*, 4, 159-170.
- Causin, K., Albert, K., Carbone, V. J., & Sweeney-Kerwin, E. (2012) The Role of Joint Control In Teaching Complex Listener Behavior to Children with Autism. Presentation at 33rd Annual Conference of the Berkshire Association for Behavior Analysis
- Carbone, V. (2003). Workshop Series: Teacher Repertoires Necessary to Teach Language and Basic Learner Skills to Children with Autism; Four Important Lines of Research in Teaching Children with Autism.
- Carbone, V. (2004). Invited Address: Clinical Applications of Verbal Behavior Research with Children with Autism. Presentation at the 30th Annual Convention of the Association of Behavior Analysts: Boston, MA
- Carbone, V.J., Morgenstern, B., Zacchin-Terri, G., & Kolberg, L. (2007). The role of the reflexive conditioned motivating operation (CMO-R) during discrete trial instruction of children with autism. *Journal of Early Intensive Behavioral Interventions*, 4, 658-679.
- Carbone, V. J. (2015) Selected Topics in Behavior Analysis and Teaching Children with Autism. Training Workshop: Harrisburg, PA.

References

- Codding, R. S., Feinberg, A.B., Dunn, E.K., & Pace, G. M. (2005). Effects of immediate performance feedback on implementation of behavior support plans. *Journal of Applied Behavior Analysis*, 38, 205-219.
- Cooper, Heron, and Heward. (2007). *Applied Behavior Analysis*, 2nd Edition, Prentice Hall: Upper Saddle River, NJ
- Dipuglia, A and Miklos, M. (2014). Instructing Functional Verbal Behavior in Public Schools: Recent Outcomes from the PATTAN Autism Initiative. Symposium presented at the 40th Annual Convention of the Association for Behavior Analysis, Chicago, IL
- Donahoe, J. W., & Palmer, D. C. (2004). *Learning and complex behavior*. Richmond, MA: LedgeTop Publishing (Originally published in 1994)
- Durcharme, J. M., & Feldman, M. A. (1992). Comparison of staff training strategies to promote generalized teaching skills. *Journal of Applied Behavior Analysis*, 25, 165-179.
- Engleman, S. & Carnine, D.W. (1982) *Theory of Instruction: Principles and Applications*. New York: Irvinston
- Fleming, R. K., Oliver, J. R., & Bolton, D. M. (1996). Training supervisors to train staff: A case study in a human service organization. *Journal of Organizational Behavior management*, 16, 3-25.
- Ford, J. E. (1984). A comparison of three feedback procedures for improving teaching skills. *Journal of Organizational Behavior Management*, 6, 65-77.
- Greenwood, C. R., Delquadri, J. C., & Hall, R. V. (1984). Opportunity to respond and student academic achievement. In W. L. Heward, T. E. Heron, D. S. Hill, & J. Trap-Porter (Eds.), *Focus on behavior analysis in education* (pp. 58-88). Columbus, OH: Merrill.

References

- Jones, F. H., & Eimers, R. C. (1975). Role playing to train elementary teachers to use a classroom management skill package." *Journal of Applied Behavior Analysis*, 8, 421-433.
- Keller, F. (1968). "Goodbye teacher..." *Journal of Applied Behavior Analysis*, 1, 79-89
- Krumhus, K. M., & Malott, R. W. (1980). The effects of modeling and immediate and delayed feedback in staff training. *Journal of Organizational Behavior Management*, 2, 279-293.
- Lovaas, O. Ivar; Koegel, Robert L.; Schreibman, Laura. (1979) Stimulus overselectivity in autism: A review of research. *Psychological Bulletin*, Vol 86(6), Nov., 1236-1254.
- Lowenkron, B. (1998.) Some logical functions of joint control. *Journal of the Experimental Analysis of Behavior*, 69, 327-354.
- Luiselli, J.K., Russo, D.C., Christian, W.P., Wilczynski, S.M. (2008). *Effective Practices for Children with Autism*. Oxford University Press, Inc., NY
- Layng, T.V. J. (2012) Analyzing and Teaching Concepts to Higher Functioning Children. Conference presentation: 2012 National Autism Conference, State College, PA
- Maine Department of Health and Human Services and Maine Department of Education. (2009). *Interventions for Autism Spectrum Disorders: State of the Evidence*. Report of the Children's Services Evidence-Based Practice Advisory Committee
- Michael, J. (1988). Establishing operations and the mand. *The Analysis of Verbal Behavior*, 6, 3-9.
- Michael, J., Palmer, D. C., & Sundberg, M. L. (2011). The multiple control of verbal behavior. *The Analysis of Verbal Behavior*, 27, 3-22.

References

- Miklos, M. & Dipuglia, A. (2009) Mand training within the Pennsylvania Verbal Behavior Project: a training manual. Pennsylvania Training and Technical Assistance Network: Harrisburg, PA.
- Miklos, M., Dipuglia, A., & Galbraith, W. A. (2010, May). *Changes in student performance: Case studies in verbal behavior within a large-scale public school project*. Symposium presented at the 36th Annual Convention of the Association for Behavior Analysis, San Antonio, TX.
- Missouri Autism Guidelines Initiative (2012.) *Autism Spectrum Disorders: A guide to evidence based interventions*. Missouri Foundation for Health: St. Louis and Springfield, MO.
- National Autism Center (2009). *National Standards Project, Findings, and Conclusions, Addressing the need for evidence-based practice guidelines for autism spectrum disorders*. National Autism Center: Randolph, MA
- National Research Council (2001). *Educating Children with Autism*. National Academy Press: Washington, DC
- Neef, N. A., Walters, J., & Egel, A. L. (1984). Establishing generative yes/no responses in developmentally disabled children. *Journal of Applied Behavior Analysis, 17*, 453-460.
- O'Hanlon, J. and Mortensen, L. 1980. "Making Teacher Evaluation work." *Journal of Higher Education, 51*, 664-72
- Palmer 2012 The role of atomic repertoires in complex behavior. *The Behavior Analyst, Spring; 35(1): 59-73*
- Partington, J.W. & Sundberg, M.L. (1998). *The assessment of basic language and learning skills*. Behavior Analysts, Inc., California
- Pennsylvania Department of Education (2012). Annual child count data: 1993-2013. Harrisburg, PA: DOE.

References

- Sautter, R. A. , & LeBlanc, L. A. (2006.) Empirical applications of Skinner's analysis of verbal behavior with humans. *The Analysis of Verbal Behavior: 22*, 35-48.
- Skinner, B.F. (1957). *Verbal Behavior*. New York: Appleton-Century.
- Sundberg, M. L. (2005). A behavioral analysis of motivation and its relation to mand training. In L. W. Williams (Ed.). *Development disabilities: Etiology, assessment and intervention*.
- Sundberg, M. L., & Michael, J. (2001). The Benefits of Skinner's analysis of verbal behavior for teaching children with autism. *Behavior Modification, 25*, 698-724.
- Sundberg M.L. (2008) *The verbal behavior milestones assessment and placement program: The VB-MAPP*. Concord, CA: AVB Press.
- Sundberg, M. L., & Sundberg, C. A. (2011). Intraverbal behavior and verbal conditional discriminations in typically developing children and children with autism. *The Analysis of Verbal Behavior: 27*, 23-43.
- Tu, J. C. (2006). The role of joint control in the manded selection responses of both vocal and non-vocal children with autism. *The Analysis of Verbal Behavior, 22*, 191-207.
- Wolery, M., Bailey, D. B., & Sugai, G. M. (1988). *Effective teaching: Principles of applied behavior analysis with exceptional students*. Boston: Allyn & Bacon
- Wong, C., Odom, S. L., Hume, K., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnik, J. B., Fluey, V. P., & Schultz, T. R. (2014). *Evidence based Practices for Children, Youth, and Young Adults with Autism Spectrum Disorders*. Chapel Hill: University of North Carolina Frank Porter Graham Child Development Center.

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