Using Evidence Based Practice to Develop Speech and Language Skills

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PaTTAN’s Mission

The mission of the Pennsylvania Training and Technical Assistance Network (PaTTAN) is to support the efforts and initiatives of the Bureau of Special Education, and to build the capacity of local educational agencies to serve students who receive special education services.
PDE’s Commitment to Least Restrictive Environment (LRE)

Our goal for each child is to ensure Individualized Education Program (IEP) teams begin with the general education setting with the use of Supplementary Aids and Services before considering a more restrictive environment.

The presenters would like to thank the following people for contributions to this presentation:

Dr. Vincent Carbone, Ed. D., BCBA-D
Dr. Amiris DiPuglia, MD, BCBA
Dr. Barbara Esch, MA, CCC-SLP, BCBA-D
Dr. Mark Sundberg, BCBA-D
Mr. Mike Miklos, MS, BCBA
Evidence-Based Practice (EBP)

• No Child Left Behind Act of 2001 calls for "scientifically-based research" as a foundation for instructional practices in schools.

• ASHA (2007) scope of practice in speech-language pathology notes, "…an important characteristic of the practice of speech-language pathology is that, to the extent possible, clinical decisions are based on best available evidence.”

Evidence based practices include strategies, processes, and curricula that have…
• Gone through rigorous and systematic analysis
• Been reviewed by a panel of independent experts that apply strict standards to the work
• Outcomes that have been replicated
• Data that supports all aspects of the research

Evidence based practice is not what we think is best practice, nor is it based on our own personal philosophy, nor is it based on intuition.
EBP and ABA

**Applied Behavior Analysis** (ABA) is currently the most evidence-based framework for autism intervention.

- "Interventions based on principles of ABA have a track record of effectiveness when incorporated in well-designed programs for individuals with ASD" (NAC Standards Report, 2015).

- "Thirty years of research demonstrated the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social behavior" (U.S. Surgeon General, 1999).

Mark Sundberg (2011) notes that “Speech and language pathologists and behavior analysts share the same clinical focus of teaching communication skills to individuals with language delays and disorders.”

- Speech and language interventionists traditionally use treatment **procedures** (prompting, shaping, etc.) with a foundation in the behavioral literature.

- However, these behavioral procedures reside within a framework of **principles** that are non-behavioral.
Overview of Today’s Presentation

- Traditional accounts of language development
- Behavioral account of language development
- Assessment of basic skills: Merging form and function
  - Verbal Operants
  - VB-MAPP
- Sequenced programming
  - Level 1
  - Level 2
  - Level 3

Traditional Accounts of Language Development
Traditional Accounts of Language Development

Traditional theorists (Chomsky, Piaget, Pinker, Brown, etc.) view language development as an innate, biological process controlled by cognitive mechanisms which accept, classify, code, encode, and store information.

Language is explained in terms of innate, mental structures and activities.

• Words are symbols that represent ideas. Words and their meanings are "stored" in the mind and accessed prior to speech.

• Language occurs when special cognitive mechanisms manipulate symbols (words) according to "rules" of grammar and syntax.
• Traditional accounts report that these cognitive mechanisms are innate and universal to all people.

• Early exposure of an individual to his/her native language triggers these cognitive mechanisms, which enables the individual to apply innate "rules" and develop his/her native language.

Traditional Analysis of Language

• Traditional accounts typically organize language according to properties of **structure/form only**

• This structure-focused system, which arose from the field of **linguistics**, implies that the most important unit of analysis is how specific words/utterances look.

<table>
<thead>
<tr>
<th>Linguistic Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phonology</strong>: inventory of sounds, sound order, and sound relationships</td>
</tr>
<tr>
<td><strong>Morphology</strong>: smallest units of meaning in a language (includes bound grammatical markers like –ed and –ing)</td>
</tr>
<tr>
<td><strong>Syntax</strong>: word order</td>
</tr>
<tr>
<td><strong>Semantics</strong>: word meaning, including word classifications (nouns, verbs, etc.) and word relationships (synonyms, antonyms, associations, etc.)</td>
</tr>
<tr>
<td><strong>Pragmatics</strong>: the role of social context in the meaning and use of words (descriptive)</td>
</tr>
</tbody>
</table>
A cognitive/linguistic account of language development currently dominates the field of language assessment, and it forms the foundation for our intervention programs.

Our goal is to fix some sort of communication problem—not simply to describe it.


2. If we are inevitably treating language as behavior in order to fix it, why aren’t we analyzing language as behavior in order to assess it?
“Conceptually Inconsistent”

- “What should we teach first – nouns, opposites, plurals, or colors? Should we work to resolve word-finding problems before number repetition or relational vocabulary?” (Esch et al., 2010).

- What should we do when our procedures aren’t working? Is our only option to put compensatory measures in place (such as extra "processing time")?

Behavioral Account of Language Development
Behavioral Account of Language Development

- In his 1957 book, *Verbal Behavior*, Skinner argued that language is not some innate, cognitive process. Rather, language is behavior—verbal behavior.

- As behavior, language is best explained by the same environmental variables that explain other behavior.

(Very) Brief Tutorial in Behavior Analysis

The important environmental variables that explain behavior are:

- Consequences: environmental stimuli that occur after behavior
  - Reinforcement: a consequence that increases the future probability of behavior

- Antecedents: environmental stimuli that occur before behavior
  - Motivation (MO): an antecedent that determines the value of a reinforcer and the probability of behavior
  - Discriminative Stimulus (S\textsuperscript{o}): an antecedent that signals the availability of reinforcement
The relationship between antecedents, behaviors, and consequences forms what is known as the "three-term contingency."

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>MO</td>
<td>observable movement</td>
<td>reinforcement</td>
</tr>
<tr>
<td>S^D</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A behavior (B) that is followed by reinforcement as a consequence (C) is more likely to occur again in the future, under similar antecedent (A) conditions.

- This contingency represents a functional analysis of behavior—the environmental when (A) and why (C) a behavior (B) occurs.

Example:

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>body is dehydrated (MO)</td>
<td>walk to water fountain and push button</td>
<td>get water and body rehydrates (reinforcement)</td>
</tr>
<tr>
<td>see a water fountain (S^D)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Because your behavior was reinforced with water, you will be more likely to walk to a water fountain and push the button in the future, but only under the conditions that you are thirsty (dehydrated) and you see a water fountain.
Other Examples:

<table>
<thead>
<tr>
<th>Antecedent</th>
<th>Behavior</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Something interesting happens</td>
<td>Look in that direction</td>
<td>Seeing the Event</td>
</tr>
<tr>
<td>Need to go out and see a door knob</td>
<td>Turning the knob</td>
<td>The door opens</td>
</tr>
<tr>
<td>Driving and the traffic light turns red</td>
<td>Depress brake pedal</td>
<td>Car stops</td>
</tr>
</tbody>
</table>

Functional Analysis of Language

Language is also controlled by antecedents and consequences. However, communication (verbal behavior) is behavior that is reinforced through the mediation of other people.

Example:

Antecedent A: body is dehydrated (MO)
Behavior B: ask for water
Consequence C: someone gives you water and body rehydrates

Communication is something we do (B), under specific antecedent (A) conditions, that is socially reinforced (C).
Example Analysis—Choral response.

When I drop my hand, EVERYBODY…

What is this?

Traditional Cognitive/Linguistic Analysis:

**Stimulus**
What is this + See Pen
(Not Relevant)

- Retrieved “Pen” from Semantic System
- Coded the sounds for “Pen” from Phonological System
- Motor planned speech movements from Motor Speech System
- Said, “PEN”
Functional (Behavioral) Analysis:

Language never occurs outside of the environmental contexts that control it.

Advantages of a Behavioral Account

1. Behavioral assessment leads directly to treatment programs. It is conceptually systematic.

This is because assessment describes both the behavior structure and the environmental conditions under which it occurs.
2. Behavioral accounts lead to sequenced intervention targets.

- Researchers like Mark Sundberg have sequenced developmental milestones according to verbal functional categories.

- This prevents us from skipping skills, or working on more-complex skills before less complex skills.

3. Behavioral account allows us to better troubleshoot during intervention.

**What should we do when our procedures aren’t working?**

Analyze the breakdown along the 3-term contingency and make the necessary changes to environmental stimuli. Examples include:

- **Antecedent:** change kinds of prompts used; be sure you are adequately fading prompts; increase number of teaching/practice trials; change the target behavior by breaking it down into simpler steps; change the target behavior by focusing on a specific dimension of the behavior (e.g., fluency); work on rapport and instructional control.

- **Consequence:** Be sure you are reinforcing *only* the target response (including all dimensions of the response you want); reinforce the target response frequently; be sure that reinforcers you are using are valuable to the student at that time.
Assessment of Basic Skills: Merging Form and Function

Verbal Behavior

Communication is verbal behavior (B) that occurs under specific antecedent (A) conditions and is socially reinforced (C).

Instead of structural categories, Skinner organized language according to functional categories—why we say what we say. These functional categories are known as verbal operants.
Verbal Operants

**Video: Verbal Operants**

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**Mand** (request): Asking for reinforcers that you want.
Ex: saying “candy” because you want candy

- **Birth to 12 months:** non-vocal mands in the form of crying/pointing
- **12 months:** first word
- **24 months:** 2-word mands (noun & verb)
- **36 months:** mands for information

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**Antecedent**
Motivation

**Behavior**
Verbal Behavior

**Consequence**
Specific to the MO

**Antecedent**
Motivation for candy

**Behavior**
Learner says “Candy”

**Consequence**
Delivery of candy
**Tact** (label): Naming objects, actions, events, properties, etc.
Ex: saying “candy” because you see candy

12 months: 1-word tacts
24 months: 2-word tacts (noun & verb)
36 months: at least 500 tacts

**Intraverbal** (conversation): Answering questions, fill-ins, etc. in which one’s words are controlled by another person’s words.
Ex: saying “candy” because someone else asks, “What do you eat?”

30 months: 1-word intraverbals; complexity and length of utterance increase over time
48 months: full sentence intraverbals
**Echoic** (vocal imitation): Repeating what is heard. Ex: saying "candy" because someone else says "candy"

**Birth-6 months**: universal sounds (not under echoic control)
**6 months-12 months**: babbles sounds heard in daily activities (not under echoic control)
**12 months**: echoes some phonemes, phoneme combinations, and word approximations
**36-48 months**: generalized echoic skills (articulation may not be perfect)

### Antecedent
- **Vocal Verbal**
  - Stimulus

### Behavior
- **Verbal**
  - Behavior that Matches Antecedent

### Consequence
- **Non-Specific, Socially-Mediated Reinforcement**

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**Antecedent**
- Teacher says “Candy”

**Behavior**
- Learner says “Candy”

**Consequence**
- Teacher says “Good job” and delivers a toy

---

**Non-Verbal Operants**

**Listener Responding** (receptive): Following someone’s verbal directions. Ex: handing some candy after someone else says, “Give me some candy”

### Antecedent
- **Verbal Stimulus**

### Behavior
- **Non-Verbal**
  - Behavior (motor response to antecedent)

### Consequence
- **Non-Specific, Socially-Mediated Reinforcement**

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**Antecedent**
- Teacher says “Give me candy?”

**Behavior**
- Learner gives teacher candy

**Consequence**
- Teacher says “Good job” and delivers a toy

---
**Imitation** (non-vocal imitation): Copying someone's motor movements. Ex: putting your index finger on your cheek because someone else puts his/her index finger on cheek

**Activity: Identify the Operant**

<table>
<thead>
<tr>
<th>As a result of:</th>
<th>One has a tendency to:</th>
<th>This is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing banana</td>
<td>Say “banana”</td>
<td></td>
</tr>
<tr>
<td>Wanting a banana</td>
<td>Say “banana”</td>
<td></td>
</tr>
<tr>
<td>Hearing someone say “banana”</td>
<td>Say “banana”</td>
<td></td>
</tr>
<tr>
<td>Hearing someone say “a yellow fruit”</td>
<td>Say “banana”</td>
<td></td>
</tr>
<tr>
<td>Being told to get banana</td>
<td>Grab a banana</td>
<td></td>
</tr>
</tbody>
</table>
### As a result of:

<table>
<thead>
<tr>
<th></th>
<th>One has a tendency to:</th>
<th>This is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing a grape</td>
<td>Say “grape”</td>
<td></td>
</tr>
<tr>
<td>Hearing a horn</td>
<td>Say “truck”</td>
<td></td>
</tr>
<tr>
<td>Wanting a push on the swing</td>
<td>Say “push”</td>
<td></td>
</tr>
<tr>
<td>Being told to “stand up”</td>
<td>Standing up</td>
<td></td>
</tr>
<tr>
<td>Someone says “door”</td>
<td>Say “door”</td>
<td></td>
</tr>
<tr>
<td>Someone says “door”</td>
<td>Say “keyhole”</td>
<td></td>
</tr>
<tr>
<td>Smelling smoke</td>
<td>Say “barbeque”</td>
<td></td>
</tr>
<tr>
<td>Seeing a cloud</td>
<td>Say “white”</td>
<td></td>
</tr>
</tbody>
</table>

### As a result of:

<table>
<thead>
<tr>
<th></th>
<th>One has a tendency to:</th>
<th>This is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanting to buy a book</td>
<td>Ask “where’s my wallet?”</td>
<td></td>
</tr>
<tr>
<td>Seeing banana</td>
<td>Say “yellow”</td>
<td></td>
</tr>
<tr>
<td>Hearing “banana”</td>
<td>Say “yellow”</td>
<td></td>
</tr>
<tr>
<td>Hearing “cowboy”</td>
<td>Say “boy”</td>
<td></td>
</tr>
<tr>
<td>Being presented with a task</td>
<td>Say “later”</td>
<td></td>
</tr>
<tr>
<td>Seeing teacher</td>
<td>Say “go away”</td>
<td></td>
</tr>
<tr>
<td>Seeing teacher while getting ready for an activity</td>
<td>Say “can I have a marker?”</td>
<td></td>
</tr>
<tr>
<td>Seeing teacher</td>
<td>Say “teacher”</td>
<td></td>
</tr>
<tr>
<td>Hearing “teacher”</td>
<td>Say “teacher”</td>
<td></td>
</tr>
</tbody>
</table>
Why the VB-MAPP?

- Few assessment instruments exist that assess acquisition of verbal operants.
- Efficiency of assessment: the VB-MAPP is designed to be easy and time efficient to administer.
- Allows more detailed analysis of skill sets at the operant level (task analysis) when needed.
- Links to typical development.
- Includes components that can assist in trouble shooting instruction and aiding in transition to less restrictive environments.
VB-MAPP Milestones Assessment

- 3 levels
- 16 milestone areas
- 170 measurable milestones

- Level 1 = 0-18 months
- Level 2 = 18-30 months
- Level 3 = 30-48 months

Developmental levels determined by tryout sample with typical children and calibrated with normative samples from other established language instruments. Age ranges are approximate.
<table>
<thead>
<tr>
<th>Skill Area</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mand</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Tact</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Listener Resp.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>VP/MTS</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Play</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Social</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Imitation</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Echoic</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Vocal</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>LRFFC</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>IV</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Linguistics</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Writing</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Math</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

**TOTAL:**
- Level 1: 9
- Level 2: 12
- Level 3: 13

**VB-MAPP Assessment Grid**

- Provides a graphic presentation of assessment results and progress between re-assessments
- Allows simultaneous display of 4 assessments at different points in time.
Administration and Scoring
VB-MAPP Milestones

• 5 items per level in each domain; each scored 1, ½, or 0

• Items assessed by: direct testing (D), observation (O), either (E) D or O, or through a timed observation (TO)

• Prepare materials, label and keep them together if at all possible (some commercial products may be helpful: prepared VB-MAPP kit, V-BATT)
<table>
<thead>
<tr>
<th>Mand</th>
<th>Tact</th>
<th>Listener Responding</th>
<th>Visual Perceptual Skills/Matching to Symbol</th>
<th>Independent Play</th>
<th>Social Behavior Social Play</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Emits 3 mands w/ echic or imitative prompts/physical prompts</td>
<td>Does the child test people, objects, body parts, or pictures? Does the child attend to and respond to the words spoken by others?</td>
<td>Does the child attend to and respond to visual stimuli and match objects or pictures?</td>
<td>Does the child engage in independent play behavior that is automatically reinforcing?</td>
<td>Does the child attend to others and attempt to socially engage others?</td>
</tr>
<tr>
<td>2.</td>
<td>Emits 4 mands w/o prompts except item and/or “What do you want?”</td>
<td>Tacts any 4 items (may be part mand) (not echic prompts)</td>
<td>Responds to hearing his own name 5 times</td>
<td>Shows variation in play by independently interacting with 5 different items</td>
<td>Indicates that he wants to be held or physically played with 2 times</td>
</tr>
<tr>
<td>3.</td>
<td>Generalizes 6 mands across 2 people, settings, and examples</td>
<td>Tacts 6 non-reinforcing items w/o echic prompts</td>
<td>Looks at, touches, or points to the correct family member, pet, or other reinforcer when presented in an array of 2, for 5 different reinforcers (e.g., Wheres [Ems] Wheres [Mummy]?)</td>
<td>Demonstrates generalization by engaging in exploratory movement and playing with the toys in a novel environment for 2 minutes</td>
<td>Spontaneously locks (glances) at other children 5 times</td>
</tr>
<tr>
<td>4.</td>
<td>Emits 5 mands in 1 hour (item can be present)</td>
<td>Spontaneously selects 2 items during an observation (no time limit)</td>
<td>Performed 4 different motor actions or commands without a visual prompt (e.g., Can you jump? Show me clapping)</td>
<td>Independently engages in movement play for 2 minutes</td>
<td>Spontaneously engages in parallel play near other children for a total of 2 minutes</td>
</tr>
<tr>
<td>5.</td>
<td>Emits 10 mands w/o prompts except item and/or “What do you want?”</td>
<td>Tacts 10 items (common objects, body parts, pictures, or people)</td>
<td>Selects the correct item from an array of 4, for 20 different objects or pictures (e.g., Show me a cat. Touch shoe)</td>
<td>Independently engages in cause-and-effect play for 2 minutes</td>
<td>Spontaneously follows peers or initiates their motor behavior 2 times</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor Imitation</th>
<th>Echic</th>
<th>Vocal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Does the child imitate the actions of other people?</td>
<td>Does the child immediately repeat (echic) vowel and consonant phonemes, singly and in combinations?</td>
</tr>
<tr>
<td>2.</td>
<td>Imitates 2 gross motor movements when prompted with “Do this” (e.g., clapping, raising arms, etc)</td>
<td>Scores at least 2 on the EESAT subtest.</td>
</tr>
<tr>
<td>3.</td>
<td>Imitates 4 gross motor movements when prompted with “Do this”</td>
<td>Scores at least 5 on the EESAT subtest.</td>
</tr>
<tr>
<td>4.</td>
<td>Imitates 8 gross motor movements 2 of which involve objects (e.g., shaking a maraca, tapping sticks together)</td>
<td>Scores at least 10 on the EESAT subtest.</td>
</tr>
<tr>
<td>5.</td>
<td>Spontaneously imitates the motor behaviors of others on 5 occasions.</td>
<td>Scores at least 15 on the EESAT subtest.</td>
</tr>
<tr>
<td>6.</td>
<td>Imitates 20 motor movements of any type (e.g., fine motor, gross motor, imitation with objects)</td>
<td>Scores at least 25 on the EESAT subtest (at least 20 from group 8)</td>
</tr>
<tr>
<td>Mand</td>
<td>Tact</td>
<td>Listener Responding</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Does the child demonstrate frequent and spontaneous manding primarily controlled by reinforcers (MIs)?</td>
<td>Does the child tact nouns and verbs?</td>
<td>Is the child acquiring more advanced listener skills?</td>
</tr>
<tr>
<td>1. Mands for 20 different missing items with prompts.</td>
<td>Tacts 25 items when asked what's that?</td>
<td>Selects the correct item from a messay array of 8 for 40 different objects or pictures (e.g., Find cat. Touch ball.)</td>
</tr>
<tr>
<td>2. Mands for 5 actions.</td>
<td>Tacts across 3-examples of 50 items.</td>
<td>Generalizes listener discrimination (L2a) in a messay array of 8 for three different examples of 50 items (e.g., The child can find three examples of a train</td>
</tr>
<tr>
<td>3. Emits 5 different 2 word mand (not including “I want”).</td>
<td>Tacts across 3-examples of 50 items.</td>
<td>Performs 10 specific motor actions on command (e.g., Show me clapping. Can you hop?)</td>
</tr>
<tr>
<td>4. Spontaneously emits 15 different mand in 20 minutes (at least 2 Md's involved).</td>
<td>Tacts 50 two-component word or noun and verb combinations</td>
<td>Performs 10 specific motor actions on command (e.g., Show Me clapping. Can you hop?)</td>
</tr>
<tr>
<td>5. Emits 10 new mands without specific training (can be for items trained as tacts or MIs but not as mands).</td>
<td>Tacts a total of 200 nouns and/or verbs.</td>
<td>Selects the correct item in a book, picture scene, or natural environment when named, for 250 items (Texts from or from an accumulated list of known words)</td>
</tr>
</tbody>
</table>

### Social Behavior

<table>
<thead>
<tr>
<th>Social Behavior</th>
<th>Motor Imitation</th>
<th>Listener Responding by Function, Feature, and Class</th>
<th>Intra verbal</th>
<th>Classroom Routines and Group Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Play</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the child spontaneously participate in activities with other children and spontaneously verbally interact with them?</td>
<td>Does the child imitate the actions of other people?</td>
<td>Does the child understand as a listener words that describe or modify nouns and verbs by their functions, features, or classes?</td>
<td>Does the child verbally respond to the content of the words of others?</td>
<td>Does the child follow the daily routines in a classroom and appropriately participate in group activities, and respond in a group teaching format?</td>
</tr>
<tr>
<td>6. Initiates a physical interaction with a peer 2 times (e.g., push in a wagon, hand holding, Ping Around the Room).</td>
<td>Imitates 10 actions that require selecting a specific object from an array (e.g., selects a drum-stick from an array also containing a horn and a bell, and imitates an adult's drumming)</td>
<td>Selects an animal or object from an array of 3, for 5 different sounds made by the corresponding items (e.g., Mouse says a, Tod, toot, goes the . . .)</td>
<td>Completes 10 different fill-in-blank phrases of any type (e.g., song fill-ins, social games and fun fill-ins, animal or object sounds</td>
<td>Sits at a snack or lunch table with negative behavior for 3 minutes.</td>
</tr>
<tr>
<td>7. Spontaneously mands to peers 5 times (e.g., My turn. Push me, Look!).</td>
<td>Imitates 20 different line motor actions when prompted. Do this (e.g., wagging fingers, pinching, making a fist, making a butterfly)</td>
<td>Selects 5 different foods or drinks when each is presented in an array of 5 (along with 4 non-food or non-drink items) and asks the verbal fill-ins: You eat... You drink...</td>
<td>Provides first name when asked. What is your name?</td>
<td>Puts away personal items, lines up, or comes to a table with only 1 verbal prompt.</td>
</tr>
<tr>
<td>8. Engages in sustained social play with peers for 3 minutes without adult prompts or reinforcement (e.g., cooperatively setting up a play set, water play</td>
<td>Imitates 10 different three-component sequences of actions when prompted. Do this (e.g., clapping, jumping, touching toes, pick up a doll, place her in a crib, and rock the crib.</td>
<td>Selects the correct item from an array of 8, for 25 different LLRPF fill-in statements of any type (e.g., You eat... You drink...)</td>
<td>Completes 25 different fill-in-blank phrases (not including song fill-ins) (e.g., You eat... You drink... You sleep in a...Shoes and....)</td>
<td>Transitions between classroom activities with not more than 1 gestural or verbal prompt.</td>
</tr>
<tr>
<td>9. Spontaneously responds to the mands to peers 5 times (e.g., , Pull me in the wagon, I want the train)</td>
<td>Spontaneously imitates 5 functional skills in the natural environment (e.g., eating with a spoon, putting on a coat, removing shoes)</td>
<td>Selects the correct item from an array of 10 (or from a book), for 25 different verb-noun LLRPF what, who, or who questions (e.g., What do you ride? Which one bike? Who can help?)</td>
<td>Answers 25 different what questions (e.g., What do you like to eat?)</td>
<td>Sits in a small group for 5 minutes without disruptive behavior or attempting to leave the group.</td>
</tr>
<tr>
<td>Mand</td>
<td>Tact</td>
<td>Listener Responding</td>
<td>Visual Perceptual Skills/Matching to Sample</td>
<td>Independent Play</td>
</tr>
<tr>
<td>------</td>
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<td>--------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Does the child mand for information, mand with different parts of speech, and give directions to others?</td>
<td>Does the child emit a wide variety of tacts, and do they contain several different parts of speech?</td>
<td>Does the child understand complex words and sentences involving the different parts of speech?</td>
<td>Does the child complete complex designs, patterns, and sequences?</td>
<td>Does the child spontaneously engage in independent play that is automatically reinforcing?</td>
</tr>
<tr>
<td>11. Spontaneously mands for different verbal information with &quot;What?&quot; question 9 times in 60 minutes</td>
<td>Tact color, shape, and function of 5 items.</td>
<td>Selects items by color and shape from an array of 6 similar stimuli for 4 colors and 4 shapes. (i.e. Find the red car. Find the square cracker.)</td>
<td>Spontaneously matches any part of an art and crafts activity to another person's sample 2 times.</td>
<td>Spontaneously engages in pretend or imaginary play on 5 occasions.</td>
</tr>
<tr>
<td>12. Polley mands for removal of every/them in an activity for 5 different circumstances.</td>
<td>Tact 4 prepositions and 4 pronouns.</td>
<td>Follows 2 instructions involving 5 different prepositions (e.g. Stand behind the chair: 4 different prepositions (e.g. Touch my ear).</td>
<td>Demonstrates generalized non-identical matching in a messy array of 10 with 3 similar stimuli, for 25 items.</td>
<td>Repeats a gross motor behavior to obtain a better effect for 2 activities.</td>
</tr>
<tr>
<td>13. Mands with 10 different adjectives, prepositions, or adverbs in 60 minutes.</td>
<td>Tact 4 different adjectives excluding colors and shapes and 4 adverbs.</td>
<td>Selects items from an array of similar stimuli based on 4 pairs of relative adjectives (e.g. big/1000, long/short) and demonstrates actions based on 4 pairs of relative adjectives (e.g. quiet-loud, fast-slow).</td>
<td>Completes 20 different black designs, pan-pampery shape puzzles, or similar tasks with at least 8 different pieces.</td>
<td>Independently engages in arts and crafts type activities for 5 minutes.</td>
</tr>
<tr>
<td>14. Gives directions, instructions, or explanations as to how to do something or participate in an activity 5 times.</td>
<td>Tacts using 4 or more words 20 times.</td>
<td>Follows 3-step directions for 10 different directions (e.g. Get our coat, hang it up, and sit down).</td>
<td>Sorts 5 items from 5 different categories without a model.</td>
<td>Independently engages in sustained play activities for 10 minutes without adult prompts or reinforcement.</td>
</tr>
<tr>
<td>15. Mands for others to attend to his own verbal behavior at least 5 times.</td>
<td>Tacts at least 1000 non-verbal stimuli (hours, verbs, adjectives, etc.) 3 times from a list of known tacts.</td>
<td>Has a total listener repertoire of 1200 words (hours, verbs, adjectives, etc.), tested or from an accumulated list of known words.</td>
<td>Continues 20 three-step patterns, sequences, or serial tasks (i.e. star, triangle, heart, star, triangle).</td>
<td>Independently draws or writes in pre-academic activity books for 5 minutes (e.g. dot-to-dot, matching games, mazes, tracing letters and numbers)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Social Behavior Play</th>
<th>Social Play</th>
<th>Reading</th>
<th>Writing</th>
<th>Listener Responding by Function, Feature, and Class</th>
<th>Intraverbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the child spontaneously engage in play and reciprocal verbal interactions with peers?</td>
<td>Does the child show interest in words and books, tact and LD letters, and read and comprehend a few words?</td>
<td>Does the child draw, copy letters and numbers, and independently write his name?</td>
<td>Does the child understand as a listener multiple words that describe or modify nouns and verbs by their function, features, or classes?</td>
<td>Does the child verbally respond to the content of the words of others?</td>
<td></td>
</tr>
<tr>
<td>11. Spontaneously cooperates with a peer to accomplish a specific outcome 5 times.</td>
<td>Attends to a book when a story is being read to him for 75% of the time.</td>
<td>Initiates 5 different writing actions modeled by an adult using a writing instrument and writing surface.</td>
<td>Selects the correct item from an array of 10 that contains 3 similar stimuli (e.g. similar colors, shapes, or class, but they are the wrong choices), for 25 different WH questions (LPPC) tasks.</td>
<td>Spontaneously emits 20 intraverbal comments (one per part mand) (e.g. Dad says, &quot;I'm going to the car, and the child spontaneously says I want to go for a ride&quot;)</td>
<td></td>
</tr>
<tr>
<td>12. Spontaneously mands to peers with WH questions 5 times.</td>
<td>Selects LDU's the correct uppercase letter from an array of 5 letters, for 10 different letters.</td>
<td>Independently traces within 1/2 inch of the lines to 5 different geometrical shapes (e.g. circle, square, triangle, rectangle, star).</td>
<td>Selects items from a book based on 1 verbal component, either a feature (e.g., color), function (e.g. draw with), or class (e.g. clothing) for 25 WH questions (LPPC) tasks. (e.g. Do you see a known animal? Can you find some clothing with buttons?).</td>
<td>Demonstrates 30% different intraverbal responses, tested or obtained from an accumulated list of intraverbal intraverbals.</td>
<td></td>
</tr>
<tr>
<td>13. Intraverbally responds to 5 different questions or statements from peers.</td>
<td>Tacts 10 uppercase letters on command.</td>
<td>Copies 10 letters or numbers legibly.</td>
<td>Selects items from a picture in a book or in the natural environment based on 3 verbal components (e.g., verb, adjective, preposition, preposition, for 25 WH question-LPPC tasks (e.g., Which fruit grows on trees?).</td>
<td>Answers 2 questions after being read short passages (15 words) from books, for 25 passages (e.g. Who blew the house down?)</td>
<td></td>
</tr>
<tr>
<td>14. Engages in pretend social play activities with peers for 5 minutes without adult prompts.</td>
<td>Reads his own name.</td>
<td>Legitibly spells and writes his own name without copying.</td>
<td>Selects the correct item from a book in the natural environment given 4 different existing LPPC questions about a single topic (where does the cow live? What does the cow eat? Who makes the cow for 25 different topics)</td>
<td>Describes 25 different events, videos, states, etc. with 6 words (e.g. Tell me what happened...The monster scared everybody and they all ran into the house.)</td>
<td></td>
</tr>
<tr>
<td>15. Engages in 4 verbal exchanges on 1 topic with peers 5 topics. (e.g. the children go back and forth talking about making a cake in a sandwich).</td>
<td>Matches 3 words to the corresponding pictures or items in an array of 5 and vice verse(e.g. matches the written word (bird) to a picture of a bird).</td>
<td>Copies all 26 upper and lowercase letters legibly.</td>
<td>Demonstrates 100% different LPPC responses, tested or obtained from an accumulated list of intraverbal responses</td>
<td>Answers 4 different relating with questions about a single topic for 10 topics (e.g. Why do you go to school? Where do you go to school? What do you take to school?)</td>
<td></td>
</tr>
</tbody>
</table>
Sequenced Programming

Video: Programming

General Programming Considerations

• Be sure targets 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

• VB-MAPP is a curriculum guide. It is not a curriculum.
  – You do not always program for the first missing developmental milestone.
  – The number of exemplars listed for the milestone is not meant to guide the number of exemplars programmed. (You often need to program for many more exemplars.)
Level 1 Learners

Level 1 Program Considerations

• First consideration: instructional control!!!!
  – Are adults established as conditioned reinforcers for the student?
  – pairing process: “free” delivery (in absence of problem behavior)
  – Identification and conditioning of adequate pool of reinforcers

• First programs:
  1. Approach behaviors/pairing; conditioning reinforcers
  2. Assess and select a form of communication
  3. ***MAND***
  4. Other early programs
     • Imitation (with and without objects)
     • Match to sample
     • LR in context
     • Echoics
Selection of Verbal Response Form

<table>
<thead>
<tr>
<th>Form</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocal</td>
<td>Verbal (Saying Water)</td>
</tr>
<tr>
<td>Non-Vocal</td>
<td>Verbal (Signing Water, handing over a picture of water, writing)</td>
</tr>
<tr>
<td>Vocal</td>
<td>Non-Verbal (non-social vocal noises such as coughing)</td>
</tr>
<tr>
<td>Non-Vocal</td>
<td>Non-Verbal (crossing legs)</td>
</tr>
</tbody>
</table>

1. Rule of thumb: consider vocal (speech) first.

   If a child has echoic skills and can echo an intelligible approximation of the model, he/she can be trained to be vocal-verbal.

2. If the child has no echoic skills or poor echoic skills, you will need to consider AAC.
Not All AACs are Created Equal:

- **Topography-based:**
  Each “meaningful” communication unit involves a different response on the part of the speaker.
  
  Examples: speech, sign language, writing

- **Selection-based:**
  All communication responses are similar. Communication is achieved by the speaker selecting (discriminating) the desired picture from an array of options.
  
  Examples: PECS, voice output systems, picture communication boards

Advantages of topography-based response form:

1. Only topography-based systems can be used to emit **tacts** and **intraverbals**.

2. Well-developed tact and intraverbal skills are **critical** for any more complex listener skills, recall, and “problem solving.”
If the child has no echoic skills or poor echoic skills, consider a *sign language* response form first.

- Imitation will be a critical program for signed responders.
- Signs will often be programmed as imitation responses first.
- Plan for gaining/improving echoic skills

**Mand Programming**

Why do we begin with mands?
- Mands benefit the speaker. They allow the child to control the environment.
- Mands are functional!
- Mand training is inherently “interesting” to the child. It maintains engagement.
- Mands are key to communication initiation.
- Mand skills typically result in fewer problem behaviors.
- Mand skills develop early in child development and should naturally be a part of early language training.
Video: Types of Mands

Level 1: Balancing Programs

Early instructional programs should be heavy in manding, with some discrete trial instruction for key early skills.
Dylan

6 Years old

1st year receiving ABA consultation through the PA Autism Initiative

Barriers for Dylan included:
- instructional control issues
- response requirement weakening motivation,
- impaired mand repertoire

Dylan Programming

Initial Programming:
- Intensive mand training
- Establishing instructional control (including pairing)

2nd Phase Programming:
- Imitation
- Match to sample
- Tacting common items
- Vocal Shaping
- Conditioning peers as reinforcers
Seth
Age: 12 years

Seth Programming:
Response Form: Sign Language
- Mand: Manding for items sign or vocal
- Listener Responding: pictures of common items, performing actions, touching body part
- Tact: common items
- Intraverbal: fill-in song/animal noise/common phrase
- Visual Performance/Match to Sample: shapes/colors, non-identical pictures-field of 10
- Motor Imitation: Fine motor, motor w/objects
- Echoic: CV, some early Kauffman breakdowns
Level 2 Learners

Level 2 Program 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!
  - Maintain careful analysis of the appropriate sources of control.
  - Build a solid foundation of prerequisite skills on which to base advanced skills.
• Heavy focus on **mands**
  – Expanding mands for basic items, activities, and actions in sight. (Do NOT stop at 10)
  – Increase rate of manding
  – Manding for missing items (no item present)
  – 2-component mands *
  – Peer-peer manding

• Heavy focus on **tacts**
  – Expanding tacts of common items (Do NOT stop at 50)
  – Tacts of ongoing actions (Do NOT stop at 10)
  – Tacts of parts of common items
  – Tacts of class set
  – Multiple component tacts (noun-verb, verb-noun)*
  – Tacts of adjectives/features of common items
  – Tacts of prepositions

• **Intraverbals**
  – Fun fill-ins (e.g., songs)
  – Personal information (name, age, address, birthday, etc.)
  – **Beginning FFCs (Be Careful!! Not too soon!)**

• Begin teaching simple independent work activities

• Vocal shaping through echoics to make articulation of mands, tacts, and intraverbals clearer

• Motor shaping through imitation to make signs of mands, tacts, and intraverbals clearer
Level 2: On Expanding Length of Utterance*

• A frequent concern of parents and teachers is that the student learns to talk but only uses one or a few words at a time.

• This concern often results in attempts to expand the number of words a child uses each time they speak.

• While it has been shown that the average length of words used per utterance provides a fairly good estimate of a child’s ability to use complex language, working to extend the complexity of language too soon may result in the child’s language sounding odd.

Length of Utterance and Autoclitics

• First consideration is often given to “carrier phrases.”
  – I see a …
  – I want ____ please.

• **Autoclitic**: verbal behavior about verbal behavior
  – Function: to describe the verbal behavior to the listener

• Appropriate use of autoclitic carrier phrases requires very specific (often private) controlling conditions. The words are typically accompanied by particular intonations and rhythms (which are themselves autoclitics).
  – We only add words when they are necessary! Adding words adds effort!

Most carrier phrases are controlled by **private events (inside the person)** that are very difficult for an outsider to predict, observe, and contrive—such as how badly a person wants an item.
Pivot Phrases vs. Carrier Phrases

- Pivot phrases expand upon **observable** qualities of the items/actions
  - Action-agent (e.g., "throw ball," "roll ball," "push train," "push truck")
  - Feature adjective phrases (e.g., "chocolate cookie," "red ball")
  - Quantity adjective phrases (e.g., "three blocks," "a little water")
  - Adverb phrases (e.g., "push fast," "sing quietly")

- When given options of several characteristics of an item/action, there might be some value for the speaker in emitting a mand for a **specific characteristic** of the item/action

- Outsiders (i.e., us!) can more easily predict, observe, and contrive motivation for characteristics of items!

- Be careful about training the right sources of control! We don’t add more words unless something in the environment necessitates it. Don’t expect more descriptive phrases unless you make competing options available.

Last Word on Expanding Utterances

“It may be that as students develop a broad repertoire of manding behavior (in other words they can ask for a large number of items and actions), the mand begins to come under control of motivative operations only (pure mands), and a strong tact and intraverbal repertoire is established, children will likely begin to use autoclitic control with very little direct training.”
Level 2: Balancing Programs

Intermediate programs are typically equally heavy in manding and discrete trial instruction.

Natural Environment Teaching  Discrete Trial Instruction

Tommy

10 years old

5th year receiving ABA consultation through the PA Autism Initiative

Started as a non-vocal learner with limited skills across all operants
Brandon

Age: 9 years

Primary Response Form:
Sign Language

Brandon Programming:

- **Mand**: Multiple word mands and gaining a broader overall mand repertoire
- **Tact**: common pictures, actions, body parts
- **Imitation**: Fine motor, imitation of speed, imitation with objects in discrimination
- **IV**: fill in songs, fill in everyday activities, sign given word, personal information-name
- **Echoic**: reinforcing words/items
- **Reading**: receptive ID and tact of letters, matching word to picture, receptive ID of name
- **Math**: receptive & tact numbers 10-20, count sets of items vocally up to 15
- **Writing**: trace letters A-H capital and lowercase, copy name, trace lowercase t,a,i, r,n,m,c,e.
- **LR**: follow directions-simple motor movements, common pictures, body parts on others, identify items from scenes in a book, go to specific person and get an item, take items and give to specific person.
- **Visual Performance**: interlocking puzzles, matching non identical action pictures, match picture of body part to self, replicate sequence
Tommy Programming:

- Mands: missing items
- Tacts: for items, actions, parts/features of items
- LR: Following instructions to perform actions, receptive discrimination of parts/features
- Intraverbal: FFC’s
- Small group instruction
- Conditioning peers through peer-peer pairing

Level 3 Learners
Level 3 Program Considerations

• Purpose is 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.

• 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.

• Continued heavy focus on mands
  – Mands for removal of adverse stimuli
  – Mands for information
  – Mands for attention
  – Expand peer-peer mands to also include mands for information

• Tacts
  – Expanding tacts of prepositions and adjectives
  – Tacts of adverbs and pronouns
  – Yes/No tacts (yes/no starts here!)
  – Responding to rotating questions about items when item is present
• Larger focus on intraverbals
  – Increased range of intraverbal responses (300+); 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; intraverbal webbing

• Both independent and peer-peer play and leisure skills

• Independent work skills

• Group responding and group skills

Level 3: Balancing Programs

Advanced programs focus heavily on natural environment teaching—including generalization of skills learned in discrete trial instruction, independence skills, and social skills. Group instruction also begins to be a focus. Some discrete trial instruction is typically still necessary.
Beyond Level 3?

VB-MAPP assesses functional language and academic skills up to a pre-kindergarten level.

• If student has completed skills in the VB-MAPP, but is not at grade level, use sequenced and evidence-based curricula to teach language and academic skills (Reading Mastery, Corrective Reading, Distar Math, Connecting Math Concepts, Language for Learning, Sensible Pencil).

• Make sure students have necessary prerequisite skills to begin these programs—Placement test does not necessarily give you this information!

Ashley

Age: 9 years
Ashley Programming:

- **Manding**: information using who and where questions; peer to peer manding
- **Visual Performance**: continuing a pattern, sequencing, replicating block designs
- **Tact**: common items/pictures, multiple component noun/noun, adjectives, 2 component noun/verb and verb/noun combinations
- **LR**: perform 2 consecutive actions, adjectives, common items/pictures, ID items that don't belong, 2 step actions
- **Echoic**: echo phrases, number sequences
- **IV**: Feature, function, class
- **Reading**: grade level site words, reading groups of known words and phrases, Headsprout
- **Language for Learning and Reading Mastery Spelling**: grade level site words
- **Math**: count given items

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Damon

**Age**: 9 years
Damon Programming:

Mand: increase mand frequency; mand for information; peer to peer manding

Social skills training

Intraverbal (imbedded in social skills training)

Reading  Mastery Level 2

Saxon Math 1 Program

Conclusions

1. We have a duty to provide speech-language interventions that are based on best available evidence. Interventions based in applied behavior analysis (including the analysis of verbal behavior) have a strong base in research.

2. Behavioral assessment of communications skills offers several advantages to cognitive/linguistic assessments, including directly guiding sequenced treatment programs.

3. Careful programming based on behavioral assessments is key to developing broad verbal repertoires. It is important not to move too fast through skill sets, and to merge considerations of both form and function in instructional decisions.
References


Sundberg, M. (May, 2011). Form and function: Uniting speech and language pathologists and applied behavior analysts. Presented at The Applied Behavior Analysis International Annual Convention, Denver, CO.


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