Increasing Vocal Production for Individuals with Autism

Christina Martin, M.S., CCC-SLP, BCBA
Jemma Goss, M.S., CCC-SLP

Handouts

Updated handouts are available on our website at:
www.therapyandbeyond.com/presentations
Disclosures

Christina Martin, M.S., CCC-SLP, BCBA

Relevant Financial Disclosures
• Receives salary for employment at Therapy and Beyond. This organization provides ABA and speech therapy to individuals with autism and other developmental disabilities.

Relevant Non-Financial Disclosures
• Is dually credentialed as a Speech Language Pathologist and a Board Certified Behavior Analyst.

Disclosures

Jemma Goss, M.S., CCC-SLP

Relevant Financial Disclosures
• Receives payment for employment at Therapy and Beyond. This organization provides ABA and speech therapy to individuals with autism and other developmental disabilities.

Relevant Non-Financial Disclosures
• No relevant non-financial disclosures.
Learning Objectives

- Identify the difference between non-behavior analytic procedures and behavior analytic procedures
- Describe behavior analytic procedures to increase vocal verbal production for individuals with autism
- Describe vocal profiles to select use of behavior analytic procedures

What is Vocal Behavior?

- “... The production of auditory stimuli resulting from the movements of the muscles of the vocal apparatus (e.g., the sounds one makes.)”
- Non-vocal individuals may use other forms of verbal behavior such as signing, writing, PECS, or use of speech generating devices.
- Not all vocal responses constitute verbal behavior.

Vocal vs. Verbal Response

<table>
<thead>
<tr>
<th>Form</th>
<th>Function</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocal</td>
<td>Verbal</td>
<td>Say, “Bubble”</td>
</tr>
<tr>
<td>Non-Vocal</td>
<td>Verbal</td>
<td>Sign bubble, touch symbol for bubble, exchange picture of bubble, write or type bubble</td>
</tr>
<tr>
<td>Vocal</td>
<td>Non-Verbal</td>
<td>Non-social vocal noises (ex: yawn, cough, clear throat)</td>
</tr>
<tr>
<td>Non-Vocal</td>
<td>Non-Verbal</td>
<td>Fold arms, cross legs, etc.</td>
</tr>
</tbody>
</table>

Value of Vocal Behavior

Approximately 33%-50% of individuals with autism present with little or no functional speech.

These individuals may be candidates for AAC to replace or supplement natural speech.

Key Terms

Communication
Act of giving or receiving information in any form

Language
System of conveying thought with shared rules

Speech
Communication by vocal production

Behavior Analytic Procedures

Since a large number of children with autism fail to develop vocal verbal behavior, the implementation of some behavior analytic procedures has shown promise in supporting the development of this repertoire.
Behavior Analytic Procedures

Applied Behavior Analysis

“The science in which procedures derived from the principles of behavior are systematically applied to improve socially significant behavior to a meaningful degree and to demonstrate experimentally that the procedures employed were responsible for the improvement in behavior.” (p. 14)


Non-Behavior Analytic Procedures

There are several methods that clinicians use to attempt to increase speech production for individuals with autism. Not all of these methods are behavior analytic procedures.
Non-Behavior Analytic Procedures

Non-Speech Oral Motor Exercises (NSOME)

NSOMEs are based upon the assumption that the limited speech production of some individuals with autism is the result of weak articulatory muscles, so oral motor exercises will overcome the problem.

Common aim of NSOMEs to increase speech production include:

- Increasing the range, accuracy, power and rate of articular movements
- Enhancing voluntary control of oral movements
- Heightening awareness of oral structures
- Constructing motor programs underlying phonemic features
- Warming up the speech musculature

Non-Behavior Analytic Procedures

Non-Speech Oral Motor Exercises (NSOME)

Examples of NSOMEs include:
- Sucking thickened drinks through straws
- Blowing cotton balls, horns, whistles, and pin wheels
- Chewing or mouthing plastic or rubber objects
- Licking peanut butter and other foods off items or from around the mouth
- Playing with oral motor tools and toys


Non-Behavior Analytic Procedures

Despite popularity of use, there are no adequately controlled studies that suggest NSOMEs effectively increase speech production for children with autism

Some individuals may rely on socially inappropriate, or maladaptive behaviors (i.e. hitting) to communicate their needs to others. In these cases, **AAC** can serve as an alternative method of communication through functional communication training (FCT).


Behavior Analytic Procedures

Functional Communication Training

A differential reinforcement procedure in which an individual is taught an alternative response that results in the same class of reinforcement identified as maintaining problem behavior.

For example, instead of screaming for an orange, an individual is taught to exchange a picture to gain access.


Behavior Analytic Procedures

Functional Communication Training

According to Mirenda (2003), if AAC (e.g., the manual sign or graphic symbol for cookie) is presented along with the spoken word (as is typically the case in AAC intervention), and these are followed by a reinforcer (e.g., a chocolate chip cookie), both the AAC mode and speech production should increase in frequency.

Behavior Analytic Procedures

Functional Communication Training

Identify Replace Reinforce

Behavior Analytic Procedures

FCT Manding Procedures

Identify the Response Form

- Assess the individual’s skills
- Consider AAC options
Behavior Analytic Procedures

FCT Mandaing Procedures

Select Target Requests

- Use preference assessments or parent surveys
- Are usually strongly motivating
- Can be delivered quickly
- Allow only for a brief period of contact
- Are consumable (“giver not a taker”)
- The sign or word for the item is not too hard to produce
- Are under the control of the instructor

Teaching Procedures

- Deliver wanted activities and items freely at first
- Model the target response (*say it as item/activity is delivered*)
- Pause and see if child asks (time delay)
- If necessary, prompt the response
- Fade Prompts
Behavior Analytic Procedures

FCT Manding Procedures

Teaching Procedures

• Limit access: Individuals cannot have free access to items used as reinforcers or they will lose their value (i.e. become satiated)
• Rotate and vary reinforcers

• Require social approach and initiation
• Capture naturally occurring motivation (i.e. states of deprivation such as hunger)
• Contrive motivation for items/activities by manipulating the environment to make certain outcomes more valuable (i.e. give juice box with no straw)
• Must have hundreds of opportunities every day
Behavior Analytic Procedures

FCT Manding Procedures

Important Considerations

- Begin with one word requests
- Requiring multiple-word responses may punish the behavior of requesting by making it too effortful
- If the response effort is too great, it will decrease the motivation to request

Attempting to increase length of utterance too early may cause several problems:

- Increase response effort and child stops talking
- Articulation/clarity is affected
- Rote responding
- Unusual grammatical structures
Behavior Analytic Procedures

**Automatic Reinforcement** in Speech Production

Describes circumstances in which reinforcement of behavior occurs when it is not directly socially mediated, but is, instead, the product of a response.

For example, parent’s sounds and words that have been paired with the reinforcing activities (food, caresses, smiles) may become conditioned reinforcers.


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Behavior Analytic Procedures

**Stimulus-Stimulus Pairing (SSP)**

Many researchers have extended the use of the concept of automatic reinforcement to develop vocal responding in children who fail to develop vocalizations typically.

Since then, results have been mixed with some participants showing greater effects than others.

Behavior Analytic Procedures

SSP Procedure: Step One

Identify an Appropriate Candidate
- Very few speech sounds in babbling repertoire
- No or very limited echoic repertoire
- Cooperative in teaching situations
- Does not engage in aggressive or self-injurious behavior to obtain reinforcers

SSP Procedure: Step Two

Select Target Sound
- Complete a babbling inventory
  - Use a sound currently in the child's repertoire
  - Heard most frequently
- Select targets based on the results and/or sounds heard during manding (requesting)
- Sound/word targets are not related to the reinforcer used
Teaching Procedures

- Reinforcers are not targeted as mands (requests)
- Present the target sound three times
- Deliver the reinforcer after any vocal approximation is made
- If there is no approximation, deliver the reinforcer after the third presentation
- Allow 1 second between presentations

Shaping Word Approximations

- Use shaping to break down speech and build it up
- Use phonological processes to simplify words
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Jemma Goss, CCC-SLP

Behavior Analytic Procedures

Shaping Word Approximations:
Word Shells

• Each target word can be simplified
• Natural phonological processes
• Teach toward the adult form of the word

Behavior Analytic Procedures

Shaping Word Approximations:
Word Shells

• Sound Simplification Changes

<table>
<thead>
<tr>
<th>Target Sound</th>
<th>Sound to substitute</th>
<th>Example word</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>r</td>
<td>core-flow</td>
</tr>
<tr>
<td>g</td>
<td>d</td>
<td>good-dog</td>
</tr>
<tr>
<td>r initial</td>
<td>w</td>
<td>rabbit-rabbit</td>
</tr>
<tr>
<td>r final</td>
<td>x or s</td>
<td>water-water</td>
</tr>
<tr>
<td>l initial</td>
<td>x or w</td>
<td>lady-lady or wasy</td>
</tr>
<tr>
<td>l final</td>
<td>th or x</td>
<td>apply-appen</td>
</tr>
<tr>
<td>ch</td>
<td>t or sh</td>
<td>cheese-ness-or-kase</td>
</tr>
<tr>
<td>j</td>
<td>d or z</td>
<td>jump-jump or jump</td>
</tr>
<tr>
<td>f</td>
<td>p or t</td>
<td>finger-finger</td>
</tr>
<tr>
<td>v</td>
<td>b</td>
<td>voice-box</td>
</tr>
<tr>
<td>th (voiceless)</td>
<td>f</td>
<td>thank-thank</td>
</tr>
<tr>
<td>th (voiced)</td>
<td>d</td>
<td>there-there</td>
</tr>
<tr>
<td>s</td>
<td>t</td>
<td>shoe-box</td>
</tr>
<tr>
<td>sh</td>
<td>t</td>
<td>shoe-box</td>
</tr>
</tbody>
</table>

Behavior Analytic Procedures

Shaping Word Approximations: Word Shells

Use transcription as a way to:
• Measure response
• Determine sequence of approximations toward adult form

Behavior Analytic Procedures

Shaping Word Approximations: Word Shells

Transcription requires:
• Accuracy of hearing what was said
• Standard way of recording what was said
Behavior Analytic Procedures

Structured Word Approximations: Word Shells

Methods of Transcription
- Formal - International Phonetic Alphabet
- Informal - Modified Phonetic Transcription

<table>
<thead>
<tr>
<th>English Diachthons</th>
<th>IPA Examples</th>
<th>English Consonants</th>
<th>IPA Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>jet</td>
<td>/eɪt/</td>
<td>gun, span, tip</td>
<td>/g/</td>
</tr>
<tr>
<td>cut</td>
<td>/k/</td>
<td>bat, web</td>
<td>/b/</td>
</tr>
<tr>
<td>bit</td>
<td>/b/</td>
<td>love, sing, bet</td>
<td>/t/</td>
</tr>
<tr>
<td>hit</td>
<td>/h/</td>
<td>do, odd</td>
<td>/d/</td>
</tr>
<tr>
<td>get</td>
<td>/g/</td>
<td>chair, nature, teach</td>
<td>/k/</td>
</tr>
<tr>
<td>eat, kill, queen, thick</td>
<td>/t/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>go, get, beg</td>
<td>/g/</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

English Vowels

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Behavior Analytic Procedures

Shaping Word Approximations: Word Shells

Modified Phonetic Transcription

<table>
<thead>
<tr>
<th>Vowels</th>
<th>Example</th>
<th>Transliteration</th>
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<tbody>
<tr>
<td>e</td>
<td>key</td>
<td>p</td>
</tr>
<tr>
<td>eh</td>
<td>red</td>
<td>b</td>
</tr>
<tr>
<td>i</td>
<td>pie</td>
<td>t</td>
</tr>
<tr>
<td>ih</td>
<td>pix</td>
<td>d</td>
</tr>
<tr>
<td>a</td>
<td>bat</td>
<td>k</td>
</tr>
<tr>
<td>ah</td>
<td>had</td>
<td>g</td>
</tr>
<tr>
<td>o</td>
<td>glory</td>
<td>m</td>
</tr>
<tr>
<td>oh</td>
<td>cool</td>
<td>n</td>
</tr>
<tr>
<td>oo</td>
<td>room</td>
<td>s</td>
</tr>
<tr>
<td>uh</td>
<td>wood</td>
<td>ng</td>
</tr>
<tr>
<td>uh</td>
<td>boot</td>
<td>f</td>
</tr>
</tbody>
</table>

Developed by V. Carbone and T. Kasper

Behavior Analytic Procedures

Shaping Word Approximations: Word Shells

Vocal Production Classification System per V. Carbone and T. Kasper.
• Speech Sound
• Word Approximation
• Intelligible Word
• Adult Form
Vocal Production Classification System per V. Carbone and T. Kasper.

- Speech Sound- Any vocal production that contains at least one phoneme or any combination of phonemes not found in the adult form of the word; independent of relevant controlling variables
- Example: Says, “m” for bubble

- Word Approximations- Any vocal production with at least 2 phonemes included in an adult form of the word; emitted more than once in session under the control of relevant variables
- Example: Says, “buh” for bubbles
Behavior Analytic Procedures

Shaping Word Approximations: Word Shells

Vocal Production Classification System per V. Carbone and T. Kasper.

• Intelligible Word- Any word that effectively controls the behavior of an unfamiliar listener without contextual cues, but does not contain all phonemes of the adult form; under control of relevant variables
  • Example: Says, “buh-boh” for bubble

• Adult Form- Any word that includes all phonemes of the adult form; under control of relevant variables
  • Example: Says, “buhbul” for bubble
Essential for Living

• The Essential for Living (EFL) is:
  A communication, behavior, and functional skills curriculum, assessment, and skill-tracking instrument for children and adults with moderate-to-severe disabilities.

Assesses and teaches functional skills as opposed to developmental skills

Developed by Patrick McGreevy, Ph.D., BCBA-D, Troy A. Fry, M.S., BCBA, and Colleen Cornwall, Ed.D., BCBA.


Methods of Speaking

• Chapter 6 in the big grey book (Practitioner’s Handbook)
• Co-authored by Janine Shapiro, M.S., CCC-SLP, BCBA
• Methods of Speaking is used similarly to AAC
• Defined as a way to communicate in a form other than “Saying Words”
Vocal Profiles

Vocal Profile 1
- Typical Spoken-Word Interactions and Controlled Spoken-Word Repetitions

Vocal Profile 2
- Uncontrolled or Controlled Spoken-Word Repetitions

Vocal Profile 3
- Occasional Words or Phrases

Vocal Profile 4
- Uncontrolled or Controlled Spoken-Word Repetitions that are Not Understandable

Vocal Profile 5
- Occasional Words that are Not Understandable

Vocal Profile 6
- Noises, a Few Sounds, and Syllables
### Vocal Profile Summary

<table>
<thead>
<tr>
<th>Vocal Profile</th>
<th>Frequency</th>
<th>Spoken Words</th>
<th>Spoken-Word Repetitions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Spontaneous</td>
<td>Understandable</td>
</tr>
<tr>
<td>1</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td>3</td>
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<td>4</td>
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<tr>
<td>5</td>
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</table>

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Vocal Profile Recommendations

Vocal Profile 6
Noises, a Few Sounds, and Syllables

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action Plan</th>
<th>Resource Allocation</th>
</tr>
</thead>
</table>
| Select, confirm, and maintain an alternative method of speaking | 1. Select an alternative method of speaking  
2. Teach requesting  
3. Confirm selection of this method  
4. Maintain this method of speaking | Commit nearly all available resources to establishing an alternative method of speaking  
Allocate a small portion of these resources to increase salient sounds, syllables, and spoken word approximations |

Resource Allocation
Commit nearly all available resources to establishing an alternative method of speaking  
Allocate a small portion of these resources to increase salient sounds, syllables, and spoken word approximations

Vocal Profile Summary

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<td>✓</td>
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<td>4</td>
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### Vocal Profile Recommendations

#### Vocal Profile 5

**Occasional Words that are Not Understandable**

<table>
<thead>
<tr>
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</table>
| Select, confirm, and maintain an alternative method of speaking | 1. Select an alternative method of speaking  
2. Teach requesting  
3. Confirm selection of this method  
4. Maintain this method of speaking | Commit nearly all available resources to establishing an alternative method of speaking  
Allocate a small portion of these resources to increase spoken word approximations |

**Exhibit word approximations more frequently (i.e. become aligned with Profile 4)**

### Vocal Profile Summary

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</table>
## Vocal Profile Recommendations

### Vocal Profile 4
Uncontrolled or Controlled Spoken-Word Repetitions that are Not Understandable

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action Plan</th>
<th>Resource Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve intelligibility of repetitions to become aligned with Profile 2.</td>
<td>1. Collaborate with SLP 2. Evaluate the level of intelligibility 3. Evaluate potential for improvement in intelligibility</td>
<td>Commit resources to adding speech therapy and continuing ABA therapy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If speech therapy indicates potential improvement, commit to improving spoken-word communication and analyze within 6 months If speech therapy indicates limited potential for improvement, select an alternative method of speaking</td>
</tr>
</tbody>
</table>

### Action Plan

1. Collaborate with SLP
2. Evaluate the level of intelligibility
3. Evaluate potential for improvement in intelligibility

### Resource Allocation

Commit resources to adding speech therapy and continuing ABA therapy

If speech therapy indicates potential improvement, commit to improving spoken-word communication and analyze within 6 months

If speech therapy indicates limited potential for improvement, select an alternative method of speaking

## Vocal Profile Summary

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</tbody>
</table>
Vocal Profile Recommendations

Vocal Profile 3
Occasional Words and Phrases

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action Plan</th>
<th>Resource Allocation</th>
</tr>
</thead>
</table>
| Exhibit words more frequently, along with repetitions of the same (i.e. become aligned with Profile 2) | 1. Reward any sounds or spoken words 2. Stimulus-stimulus pairing 3. Reward requests and provide opportunities for repetition | Commit to procedures listed in Action Plan for 2-3 months  
If procedures are successful, alignment with Profile 2  
If procedures are unsuccessful, select an alternative method of speaking |

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<td>6</td>
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</table>
Vocal Profile Recommendations

**Vocal Profile 2**

Uncontrolled or Controlled Spoken-Word Repetitions

<table>
<thead>
<tr>
<th>Goal</th>
<th>Action Plan</th>
<th>Resource Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquire a repertoire of requests, along with some names or descriptions, listener responses, and answers to questions while acquiring controlled repetitions (i.e. become aligned with Profile 1)</td>
<td>Convert uncontrolled repetitions into requests and controlled repetitions to acquire additional requests, names or descriptions, and answers to questions.</td>
<td>Commit all available resources toward achieving the goal and ensure everyone is familiar with teaching protocols and behavioral procedures</td>
</tr>
</tbody>
</table>

Vocal Profile Summary

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### Vocal Profile Recommendations

#### Vocal Profile 1

Typical Spoken-Word Interactions and Controlled Spoken-Word Repetitions

<table>
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<th>Goal</th>
<th>Action Plan</th>
<th>Resource Allocation</th>
</tr>
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<tbody>
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<td>Increase repertoire of requests, names and descriptions, and answer questions within functional contexts while teaching to participate in conversations.</td>
<td>Convert controlled repetitions into requests, names, and descriptions, and convert those names and descriptions into answers to questions.</td>
<td>Commit all available resources toward achieving the goal and ensure everyone is familiar with teaching protocols and behavioral procedures.</td>
</tr>
</tbody>
</table>

### Questions
Contact Information

For more information, please visit:
www.mytherapyandbeyond.com

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Jemma.Goss@therapyandbeyond.com