Interventions to Promote Language in Minimally Verbal Children with ASD

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Objectives

- Describe Minimally Verbal children with ASD
  - Review literature
- Introduce interventions for this population
  - Specific to spoken language acquisition
  - Introduction to alternative forms of communication
  - Video Examples

Minimally Verbal Children with ASD

(Tager-Flusberg & Kasari, 2013)

- 25–30% will be nonverbal, or only minimally verbal by the time they enter kindergarten (Anderson et al., 2007)
- 14% to 20% of their sample of children with autism were “nonverbal,” (Lord, Risi, & Pickles, 2004)

Minimally Verbal Defined

- Nonverbal (Lord, Risi, & Pickles, 2004)
  - Using fewer than five words on a daily basis
- Nonverbal toddlers (Romski et al., 2010)
  - Mullen expressive language scores below 12 months
  - Fewer than 10 intelligible spoken words
- Nonverbal or low verbal preschoolers (Yoder and Stone, 2006)
  - Fewer than 20 different words used over three separate language samples

Minimally Verbal Defined

(Tager-Flusberg & Kasari, 2013)

- There is little consistency in the definition of this group
  - 3 broad groups
    - Lack all spoken language
      - Vocalizations predominately atypical nonspeech sounds and some vowel approximations
    - Expressive language is extremely limited
      - A few words or fixed phrases (e.g. Want ____)
      - Used infrequently and only in limited situations
    - May emit some spoken language
      - Predominately echolalic
      - Stereotyped or scripted language that is noncommunicative
- Nonverbal (Koegel, Shirotova, & Koegel, 2009)
  - Preschoolers with no functional words
  - No object label correspondence
- Low Verbal (Kasari, Paparella, Freeman, & Jahromi, 2008)
  - 3–4 year old children with fewer than 5 spoken words
Consequences of remaining minimally verbal

- 25% begin to show increased social withdrawal as they age (Lord, 2010)
- Delays in functional language:
  - Severe problem behaviors, such as self-injurious behavior, aggression, and destructive behaviors (Carr & Durand, 1985)
  - Impede academic success and the development of meaningful relationships (Aram, Ekelman, & Nation, 1984; Hinshaw, 1992)

Goals

- Acquisition of some spoken language by the age of 5
  - Important benchmark
  - After age 5, concern that it is unlikely that a child would acquire significant linguistic skills (e.g., Tager-Flusberg, Paul, & Lord, 2005)
  - Acquisition of “useful speech” by age 5 predicts better social and adaptive functioning
  - Language acquisition by age 6 is associated with better outcomes in adulthood (Howlin, Goode, Hutton, & Rutter, 2004)
  - IACC set a longterm goal that 90% of children with autism would acquire useful speech by age 5

Acquisition of Spoken Language after Age 5

- Minimally verbal children can learn vocal language
  - (Pickett, Pullara, O'Grady, & Gordon, 2009)
  - Surveyed the literature from 1951–2006
  - 167 cases of children who started speaking after age 5
  - Most began talking between the ages of 5 and 7, some at older ages, up to age 13.
  - All had received intensive, often behaviorally based, intervention targeting the formation of sounds and words
    - Increased use of single word utterances
    - About one third acquired phrase speech

Autism Treatments

- Behavioral Interventions and autism
  - Most widely used interventions for individuals with ASD (Kasari & Lawton, 2010)
  - Comprehensive and targeted behavioral interventions improve communication, social skills, and problem behavior (Dawson & Burner, 2011)
  - Based on learning principles
    - Prompting, fading, shaping, chaining, differential reinforcement, stimulus control, discrete trial intervention, natural environment teaching, incidental teaching, etc
  - All are administered intensively (upwards of 20 hr/wk) and for an extended duration (2-4 years)

Profiles of Children

- 11 year 5 month old nonverbal male
  - Vocally imitate fewer than 5 sounds
  - No functional vocal communication
  - Several functional signs (requests, labels)

- 2 year 9 month old nonverbal male
  - Vocally imitate fewer than 5 sounds
  - No functional communication (no words)

- 2 year, 3 month old nonverbal male
  - No vocal imitation
  - No functional communication (no words)

Interventions to Improve Spoken Language

- Common Procedures
  - Shaping Vocal Imitation
  - Chaining Sounds to Words
  - Echoic to Functional Language Transfer

- Lesser Known/Novel Procedures
  - Stimulus-Stimulus Pairing
Shaping Vocal Imitation

- Differentially reinforcing closer approximations to the goal behavior; systematically extinguishing other attempts
  - Butz & Hasazi, 1973
  - Harris, 1975
  - Hung, 1976
  - Harris & Wolchik, 1982
  - Charlop & Haymes, 1994
  - Lovaas et al. 1991; Lovaas & Smith, 2003 etc…

Step 1
- Present vocal model
- Provide reinforcer for ANY vocal response
- Ignore non-responding

Step 2
- Present vocal model
- Provide reinforcer only for closer approximations of correct sound (contains correct consonant or vowel)
- Ignore non-responding and completely incorrect

Step 3
- Provide vocal model
- Provide reinforcer for closer approximations

Step 4
- Provide vocal model
- Provide reinforcer only for correct responses

Images: Videos

Chaining Vocal Imitation

- Purpose is to chain individual sounds together into more complex sounds or words
  - Backward chaining (Seiverling, Pantelides, Ruiz, & Sturmey, 2010)
  - Forward chaining (Tarbox, Madrid, Aguilar, Jacobo, & Schiff, 2009)

Step 1
- Identify vocally imitated sounds

Step 2
- Reinforce each step in the chain

Forward Chaining: Bar, Barbie, Barbie doll
Backward Chaining: doll, die doll, Barbie doll
Chaining Vocalizations

- 11 year 5 month old male
  - Shaping and chaining multiword requests

Transfer from Vocal Imitation to Functional Speech

- Strong vocal imitation is transferred from an imitation skill to functional language
  - Requests—Often happening from the beginning
    - Labeling
    - Answering questions
    - Reciprocal conversation
    - Greetings
    - Commenting
  - Videos

When Shaping and Chaining Aren’t Enough

- No responding to shape or chain
  - Not enough vocal behavior to reinforce
  - No variability in vocal responding to use differential reinforcement
  - Operant conditioning results in negative behaviors
Stimulus-Stimulus Pairing (SSP)

- Consists of
  - Pairing vocally presented sounds with access to preferred stimuli
  - No response requirements (remember optional step 1 in shaping??)
  - Numerous repeated trials

Typical Development
- 1000s of pairings of vocal sounds with social stimuli (reinforcers)

ASD experience
- 1000s of vocal sounds, paired with less effective reinforcers due to social impairment

SSP seeks to systematically and repeatedly pair vocal sounds with identified reinforcers

Jumpstarts vocal responding
- Once vocalizations are being produced, proceed to vocal shaping and chaining
- Usually targeted in a request context
- Trials conducted when strong motivation is present
- Videos

The Effects of a Stimulus–Stimulus Pairing Procedure on the Vocal Behavior of Children Diagnosed with Autism
Cal V. Miguel, James E. Carr, and Jack Michael
Western Michigan University

Many children seem to acquire aspects of their parents’ language without formal training. This is one form of conditioning referred to as the parent’s imitation by the child. In this study, we examined the effects of a stimulus–stimulus pairing procedure on the vocal behavior of children with autism. The procedure involved pairing vocal sounds with social reinforcers, such as toys or social interactions, in a systematic and repeated manner. We observed an increase in vocal responding, with the children producing more and varied vocal sounds after the pairing procedure. The results suggest that stimulus–stimulus pairing can be an effective intervention for promoting vocal responses in children with autism. The findings support the use of this procedure as a potential strategy for improving vocal communication and social interaction in this population.
Stimulus-Stimulus Pairing (SSP)

- 2 year 9 month old male
  - Sound stimulus-stimulus pairing

- 2 year 3 month old male
  - Sound stimulus-stimulus pairing
  - Whole word stimulus-stimulus pairing

Vocal Shaping and Chaining

- 2 year 9 month old male
  - Vocal approximations as requests
    - Bounce
    - Go
    - Bubbles

  - Vocal approximations as labels
    - Colors and objects
    - Early Labels, Multiword requests
    - Multiword labels/sentences
    - Peer directed requests

- 2 year 3 month old male
  - One word request
  - Shaping early 2 word request
  - Early label approximations
  - Shaping 2 word request, early label approximations
  - Answering questions
  - Multiword requests

Alternative Forms of Communication

- Picture Exchange Communication System (PECS)
- Sign Language
- Speech Generated Devices (SGD)

Picture Exchange Communication System (PECS)

- Several studies have demonstrated PECS to be a successful communication system for children with autism
  - Ryan et al., 1987
  - Bondy, 1987, 1988
  - Ryan, 1990

- PECS is an augmentative and alternative communication system
- PECS aims to systematically teach communication through the exchange of picture icons
- PECS begins with simple requests and progresses to other types of functional communication
Picture Exchange Communication System (PECS)

- Frost and Bondy (2002) outlined six phases:
  - Phase 1: How to communicate
  - Phase 2: Distance and persistence
  - Phase 3: Discrimination
  - Phase 4: Using phrases
  - Stage 5: Answering direct questions
  - Stage 6: Commenting

Considerations when teaching PECS:
- Picture book/iPad will need to be present (have battery life) in order for child to communicate
- Child needs to be able to or be taught to scan and discriminate pictures
- Gradually increase array of options

Various studies have demonstrated effectiveness of teaching children with autism to use sign language
- Carr et al., 1978
- Konstantareas et al., 1977
- Benaroya et al., 1977
- Sundberg, 1998
- Bartman and Freeman, 2003

Common teaching components:
- Prompting and fading
- Reinforcement of successive approximations
- Imitation training
**Sign Language**

- Requesting with sign language

**Considerations when teaching sign language**
- Child’s gross/fine motor skills
- Training of other caregivers/teachers
- Ease of use in natural environment
- We suggest teaching specific signs, not general “more” or “please”
  - Sundberg, 2008

**Speech Generating Devices (SGD)**

- Augmentative and alternative communication system which produces an auditory output
- Can be seen on iPods, iPads and android devices.
- May be viewed as more socially acceptable (Alzrayer, Banda & Koul, 2014).

**Typically begin by teaching a touch response on a single image on a screen that generates a complete and relevant output that is reinforced**
- Ex: A single icon producing “I want toy” (Sigafoos et al., 2013).
- Following the child independently requesting for initial target item:
  - Generalization of additional preferred items
  - Increasing array of options

**Several researchers have investigated the effectiveness of teaching children with developmental disabilities to use Speech Generated Devices**
- Sigafoos et al., 2013
- Kasari et al., 2014

**Pros and Cons**

**Vocal**
- Pro: Understood in all same language environments
- Pro: Same topography can be used for other types of functional communication

**Sign**
- Pro: Same topography can be used for other types of functional communication
- Con: Only understood in some environments/communities, each new sign has to be taught, and the child may not respond

**Picture Exchange Communication System**
- Pro: Understood by “adults” in all environments (or children that have been trained to respond)
- Con: Difficult to teach other types of functional communication using PECS and the child may not respond
Comparing Alternative Methods

- Van der Meer et al. (2012) compared all three of these systems in a study with four children with developmental disabilities.

Effects of Alternative Communication on Vocalizations

- There is disagreement regarding the effects of these procedures on vocal language.
- Schlosser and Wednt (2006) found these did not hinder speech production, and in most cases, increased speech production.
- Millar et al. (2006) found that 89% of participants demonstrated gains in speech.

Conclusions

- Interventions based in Applied Behavior Analysis (ABA)
  - Successful in developing functional vocal communication in nonverbal children with ASD
  - Common, well-researched, successful vocal shaping and chaining procedures
    - Requires significant therapist training
    - Requires a lot of oversight
  - Procedures to transfer vocalizations to functional language are well-developed and researched
    - Requires oversight
**Conclusions**

- Interventions based in Applied Behavior Analysis (ABA)
  - Emerging, innovative procedures to produce vocal skills
  - Preliminary research, but we need more
  - Specific to ASD population
  - Understanding with what population within ASD

**Things I didn’t cover**

- Nonverbal communication
  - Eye contact and eye gaze
  - Gestures and pointing
- Social Interaction and play skills
- Adaptive/daily living skills
- Visual supports and independence
- Behavior Problems
- Parent training—what to do at home!

**Thank you**

- All our wonderful families and children!!!
- Our AWESOME staff!!!

**Look for Sign Language Workshop Information**

- Figure out structure for slides
  - How to teach
  - Research
  - Visual/videos
  - Considerations