Explorations of Language in Autism

Helen Tager-Flusberg, Ph.D.
Boston University
SPARK Webinar
January 26, 2022
www.bu.edu/autism
Roadmap..

1. The complexity of language and communication
2. Overview of language in autism
3. Early signs and predictors
4. Minimally verbal autism
5. Why minimally verbal fail to acquire spoken language
6. Takeaways.....
Complexity of Language
Language and Communication in Autism
Language and communication in autism

• Core universal impairments in: *social communication*
• Co-occurring impairments in: *linguistic code*

Heterogeneity in outcome
• From nonverbal to superior
• (and everything in between...)
Language in autism

- Minimally/Non Verbal ~30%
- No Language Impairment ~25%
- Verbal but Language Impaired ~45%
Some reasons why language is so important!

1. Connect with people
2. Know people, other minds
3. ‘Tool’ for learning
4. Self regulation, self reflection
5. Single best predictor of future outcomes
Early Signs and Predictors
Studying infants

- Infants at higher risk – older sibling with autism (~1 in 5 later diagnosed ASD)
- Compare to lower risk (no family history)
- Follow from soon after birth to age 3: ‘diagnostic outcome’ – ASD or other
- Explore behavioral and brain development to predict outcomes at 3
Concerns at 12 months

- Language
- Social Com
- RepBeh

Graph showing concerns at 12 months with categories Language, Social Com, and RepBeh.

- ASD (red)
- HRA- (green)
- LRC (blue)

Talbott et al., 2015
Speech vocalizations at 12 months

Chenausky et al., 2017
EEG/ERP
6, 9, 12 months

Brain Response to Speech
♬ ♬ ♬ ♬
/da/ /ḍa/ /ta/

Brain Asymmetry
Atypical asymmetry at 12 months in ASD infants

Kayla Finch et al., 2017
Functional connectivity in ASD infants

Righi et al., 2014
Behavioral predictors of language in toddlers

Mullen Language Score

Motor Skills

Initiate Joint Attention

Respond Joint Attention

Play

Imitation

Cognition/IQ

Gesture

160 Toddlers with ASD
Minimally Verbal Autism

- Minimally/Non Verbal ~30%
- No Language Impairment ~25%
- Verbal but Language Impaired ~45%
The forgotten end of the spectrum

• Despite intervention, little spoken language – perhaps 20/30 words or brief phrases
• Language not used consistently
• Often most severely impaired with other co-occurring conditions
• **Difficult to evaluate...**
Types of language measures

1. Standardized test – administered by trained clinician/examiner
2. Parent report questionnaire/interview
3. Naturalistic assessment – natural language samples for expressive language
Receptive vs expressive language in minimally verbal children and adolescents

![Graphs showing receptive and expressive vocabulary frequencies](image-url)
Novel methods to assess receptive vocabulary

Standard Methods
1. Peabody Picture Vocabulary Test

Novel Methods
1. Eye-tracking
2. Touch screen
Novel methods are valid

<table>
<thead>
<tr>
<th></th>
<th>PPVT</th>
<th>Parent Report</th>
<th>Eye Tracking</th>
<th>Touch Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPVT</td>
<td></td>
<td>.68**</td>
<td>.71**</td>
<td>.80**</td>
</tr>
<tr>
<td>Parent Report</td>
<td>.50*</td>
<td>.60*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye Tracking</td>
<td></td>
<td></td>
<td>.64**</td>
<td></td>
</tr>
</tbody>
</table>

Muller, Brady, & Fleming, *Autism* 2022: Touch screen (iPad) better than PPVT
Welcome to ELSA!

Eliciting Language Samples for Analysis

*Eliciting Language Samples for Analysis* (ELSA) is a language elicitation protocol developed by Dr. Helen Tager-Flusberg and colleagues at Boston University’s Center for Autism Research Excellence. Developed in 2016, ELSA is an innovative method for assessing improvements in language and communication skills. Access all ELSA materials and manuals, and our adapted toddler version, ELSA-T, on this site.
ELSA-A Activities

- Leaf Falling
- Planting an Acorn
- Hide & Seek Animals
- Helping Animals
- Making a S'more
- Arts & Crafts
- Bean Bag Toss
- Movie Shorts

Barokova et al., 2020a
Who can administer ELSA-A?

Trained Examiners

Parents

Barokova et al., 2020
Examiner v. Parent language

Frequency of Utterances per min

Frequency of Words per min

Conversational Turns per min
Child’s language

Frequency of Utterances per min

Frequency of Words per min

Conversational Turns per min
Parent-child interactions in the home

- In 2021 we launched a new project – through SPARK Research Match
- 100 families with children 4-7 years old
- Focus on speech/language and motor functioning
- Exploring language during 15-minute parent-child interactions (using zoom)
Number of activities and child’s language level

Butler et al., 2022
Why don’t they speak?

Many potential explanations...:

- Impaired understanding of intentional communication/joint attention
- Symbolic deficits – play/representation
- Impaired imitation
- Intellectual disability (NV cognition)
- Speech motor impairments
- Auditory processing
Behavioral correlates of expressive language in MV ASD

- Respond Joint Attention
- Imitation
- Cognition/IQ
- Age
- Play
- Initiate Joint Attention
- Initiate Behavioral Regulation

Pecukonis et al. 2019
Behavioral correlates of expressive language in MV ASD

- Expressive Vocabulary
  - Play
  - Imitation
  - Cognition/IQ
  - Age
- Initiate Joint Attention
- Respond Joint Attention
- Initiate Behavioral Regulation
Behavioral correlates of expressive language in MV ASD

- Expressive Vocabulary
- Initiate Joint Attention
- Respond Joint Attention
- Play
- Imitation
- Cognition/IQ
- Age

Imitation – single best predictor
Speech motor impairments

Childhood apraxia of speech (CAS):
Rare neurological disorder – Impairments in speech movement precision and consistency

Chenausky et al. 2019
High rates of CAS among MV

- CAS in ~25%
- Over 75% some speech/motor disorder
Auditory processing

Receptive language LOWER in children/adolescents with MORE auditory behaviors

Schwartz et al., 2020
Brain marker for auditory processing problems in MLV autism

Amplitude of ERP response to deviant/rare tones SMALLER in adolescents with MORE auditory sensory behaviors
Takeaways - 1

• Acquiring language/communication is a/the critical goal for children with autism

• Many factors predict which young children will and won’t make progress – both behavioral and brain differences

• Interventions should target the behaviors that are key for each child
Takeaways - 2

• Despite every effort, some children don’t acquire spoken language
• Many explanations from behavior, to speech motor impairment, to how the brain processes sounds and speech
• Targeted interventions can make a difference beyond age 5, including AAC – we need to focus more research in this area!
Collaborators

**CARE Team**
Mia Barokova
Lindsay Butler
Karen Chenausky
Kayla Finch
Sommer Hassan
Chelsea LaValle
Collin Lee
Daniela Plesa Skwerer
Meredith Pecukonis
Sophie Schwartz
Annie Seery
Lue (Stella) Shen
Meagan Talbott
Ruthy Xu

**Other Collaborators**
Charles Nelson (Harvard)
Giulia Righi (Brown)
Rhiannon Luyster (Emerson)
Barbara Shinn-Cunningham (CMU)
Le Wang (BU)
Angela Morgan (MCRI Melbourne)
Amanda Brignell (MCRI Melbourne)

--

CARE 2021-2022
A very special thanks to all the families and children who have given their time and support!