



Helen Tager-Flusberg, Ph.D.  
Boston University  
SPARK Webinar  
January 26, 2022  
**[www.bu.edu/autism](http://www.bu.edu/autism)**



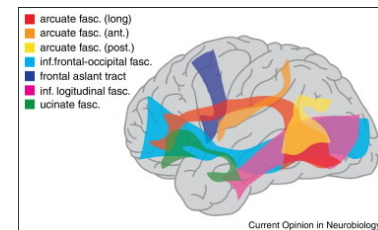
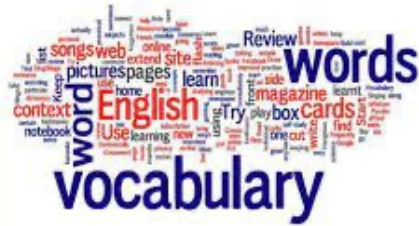
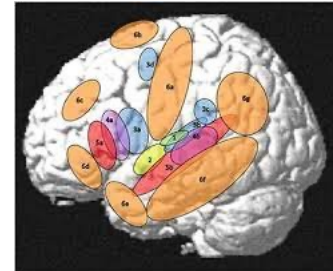
# Roadmap..



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



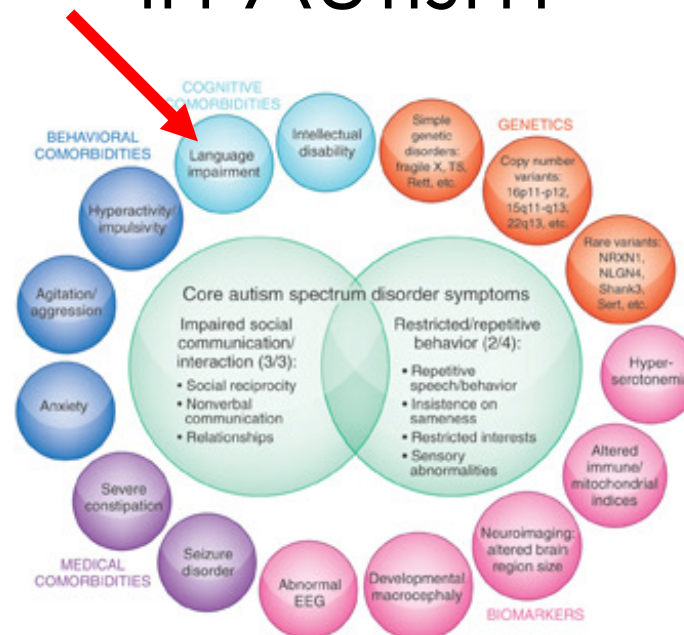
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# Language and Communication in Autism





# Language and communication in autism

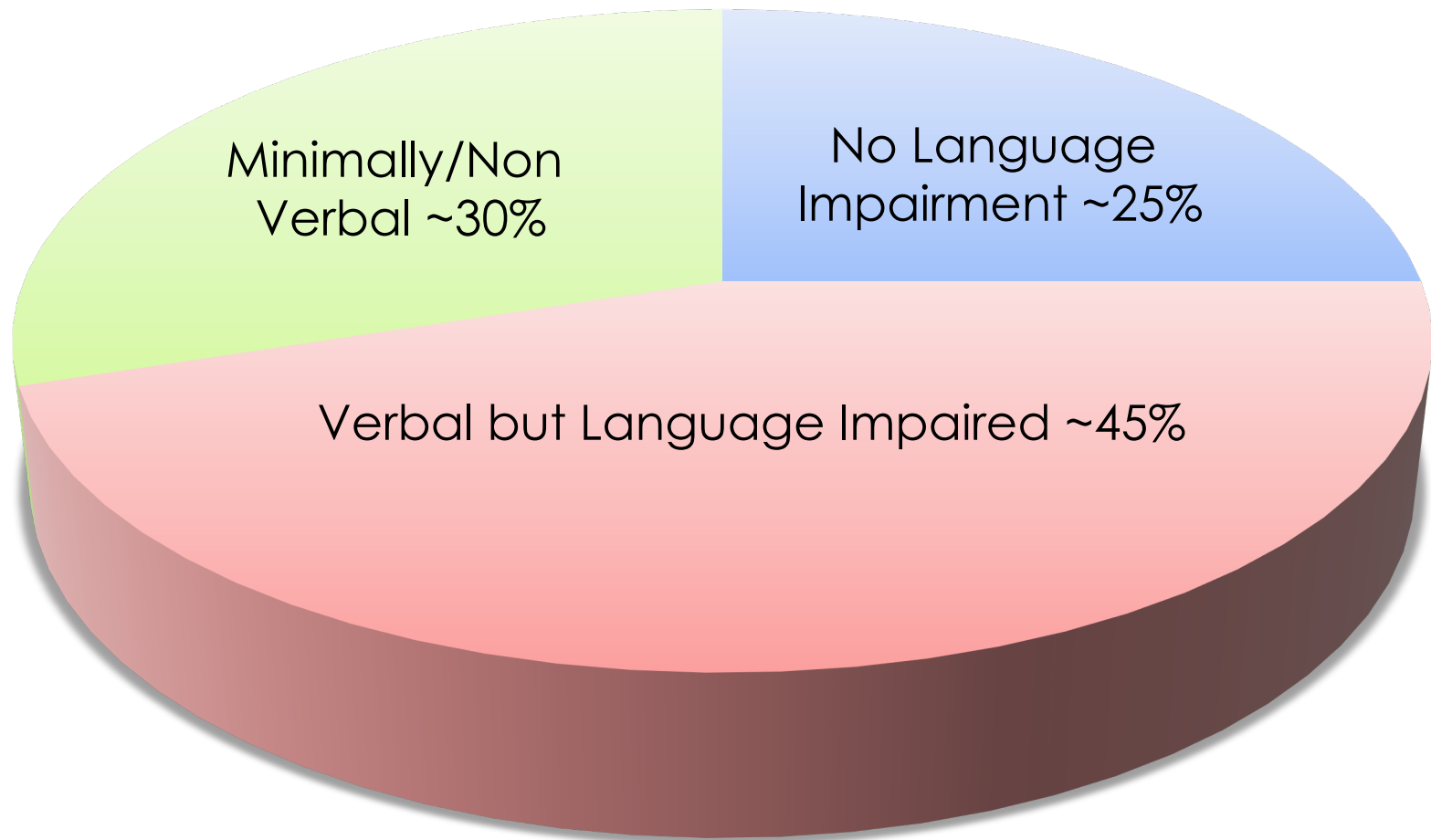
- Core universal impairments in:  
*social communication*
- Co-occurring impairments in:  
*linguistic code*

Heterogeneity in outcome

- From nonverbal to superior
- (and everything in between...)



# Language in autism



# 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*



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# Early Signs and Predictors



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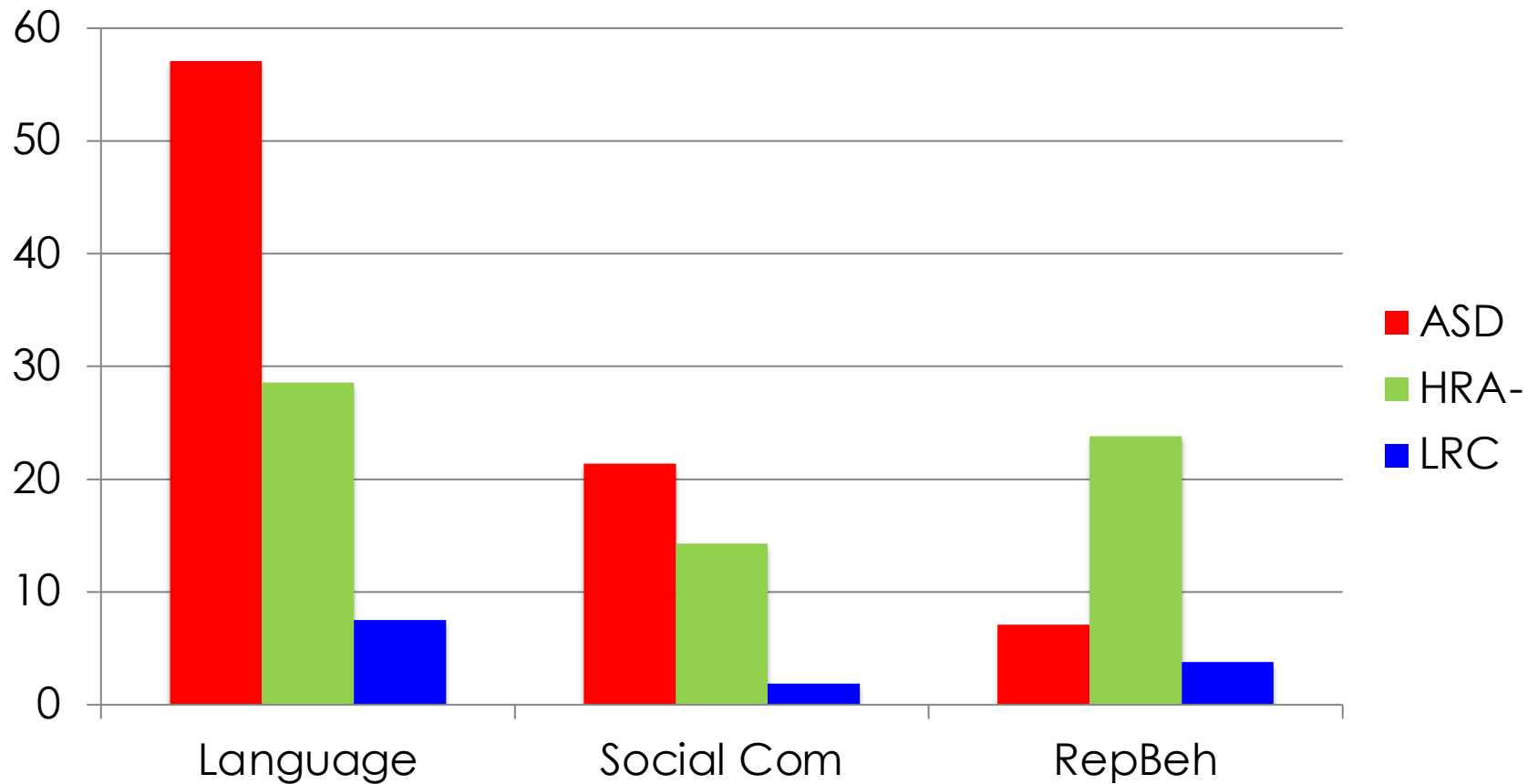
# Studying infants



- 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



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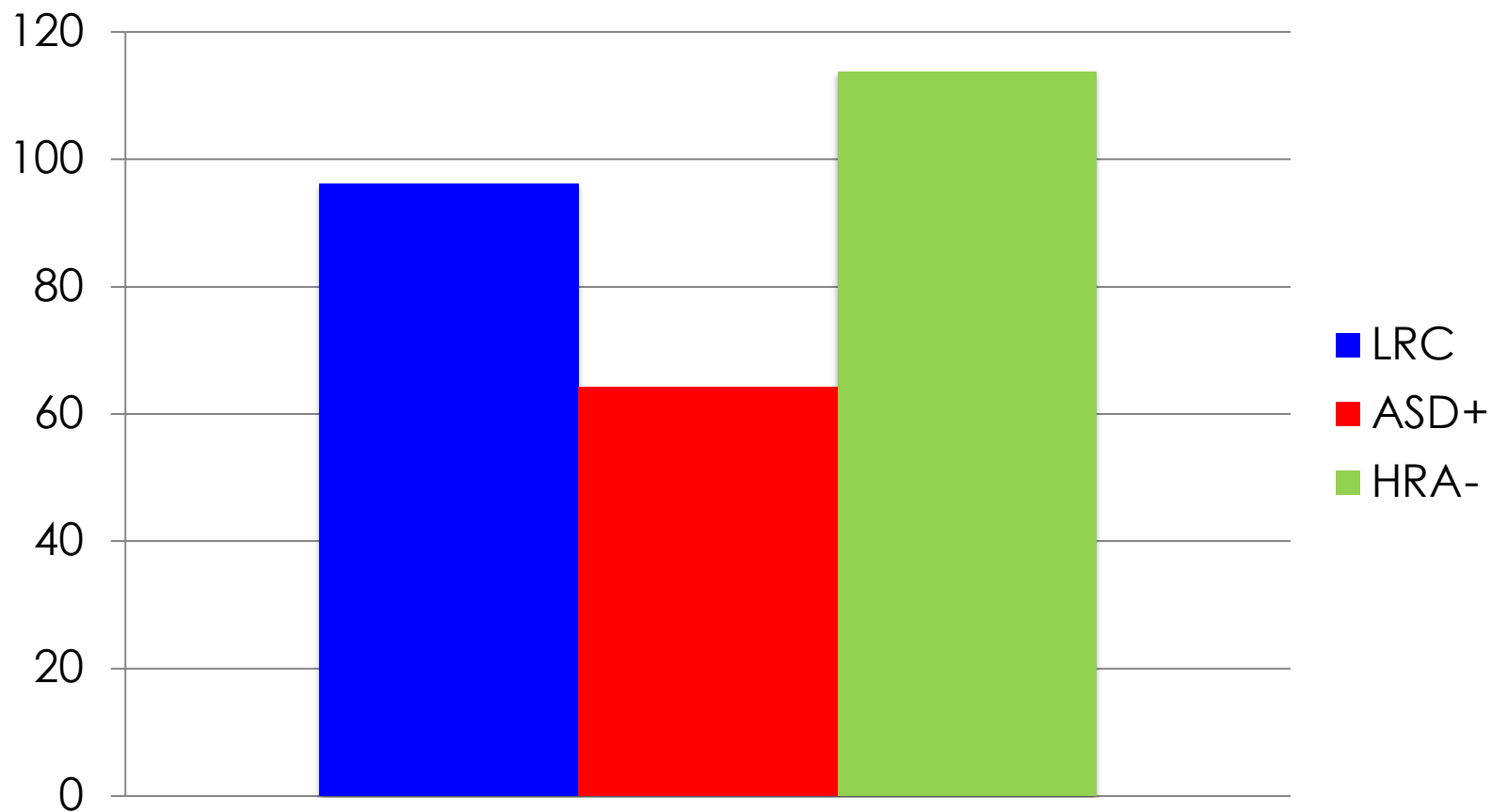


*Talbott et al., 2015*

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# Speech vocalizations at 12 months



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*Chenausky et al., 2017*

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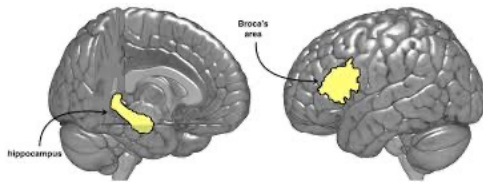


# Brain Response to Speech

♪   ♪   ♪  
**/da/** /da/ /ta/

**EEG/ERP**

6, 9, 12 months



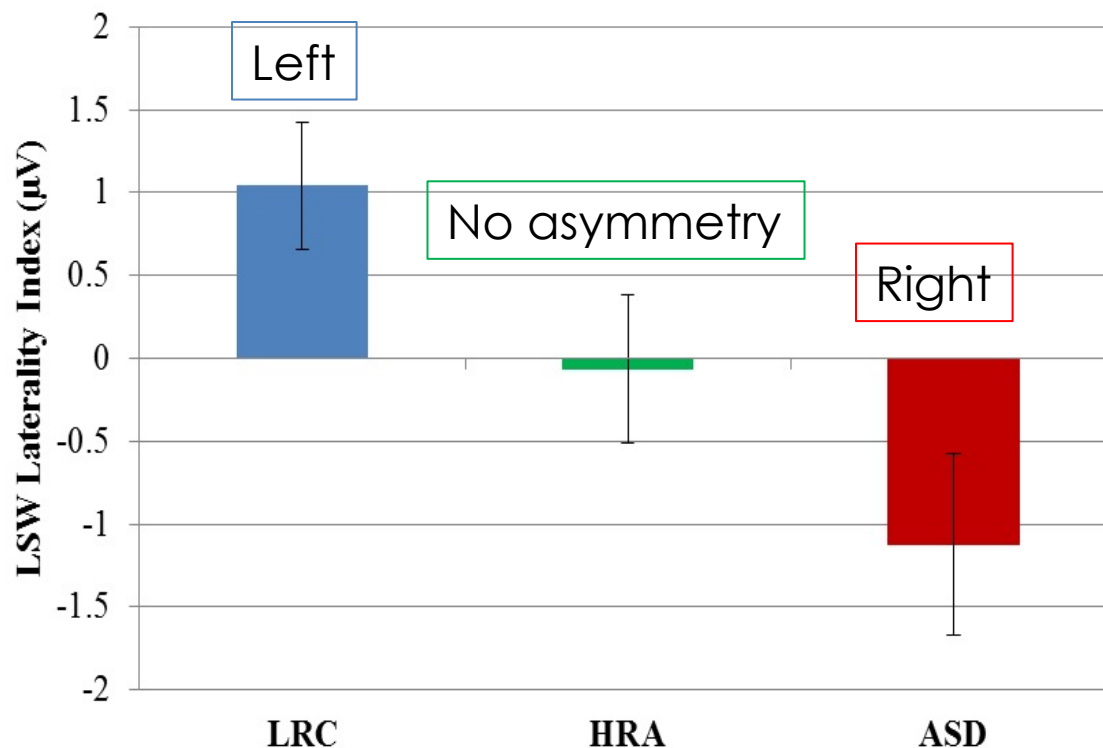
Brain Asymmetry



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# Atypical asymmetry at 12 months in ASD infants



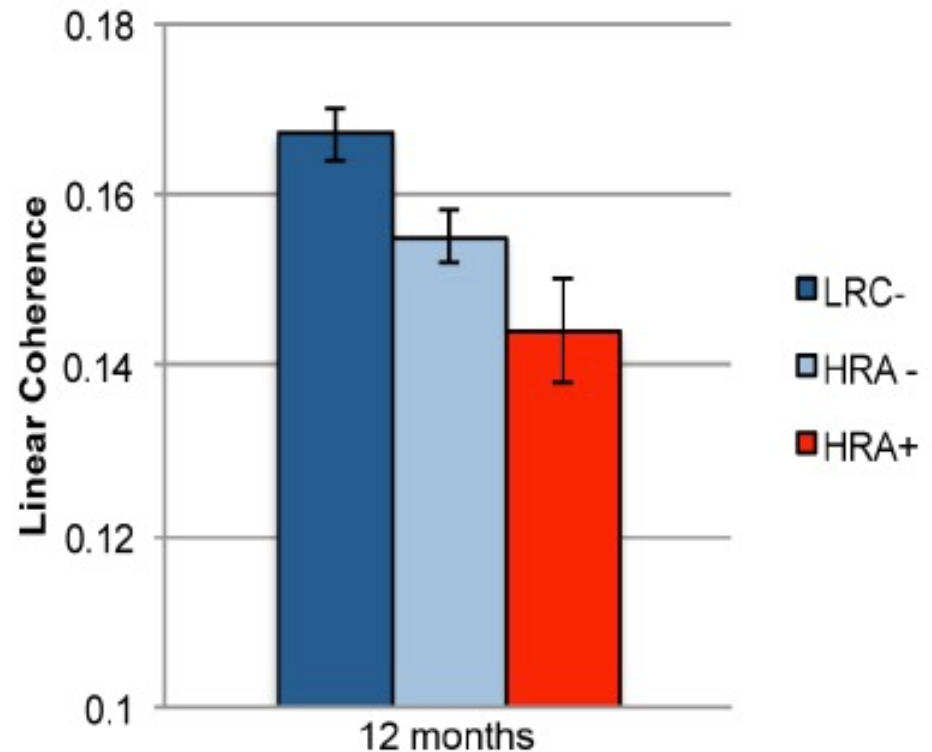
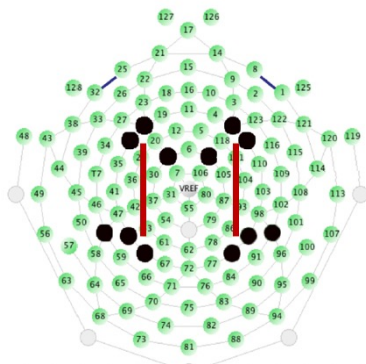
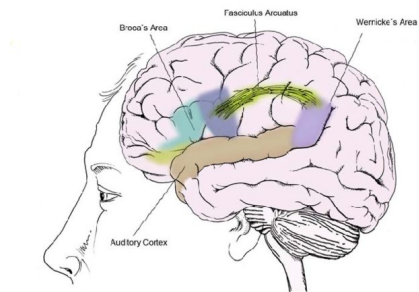
Annie Seery



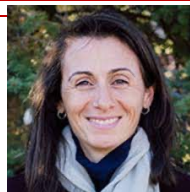
Kayla Finch



# Functional connectivity in ASD infants



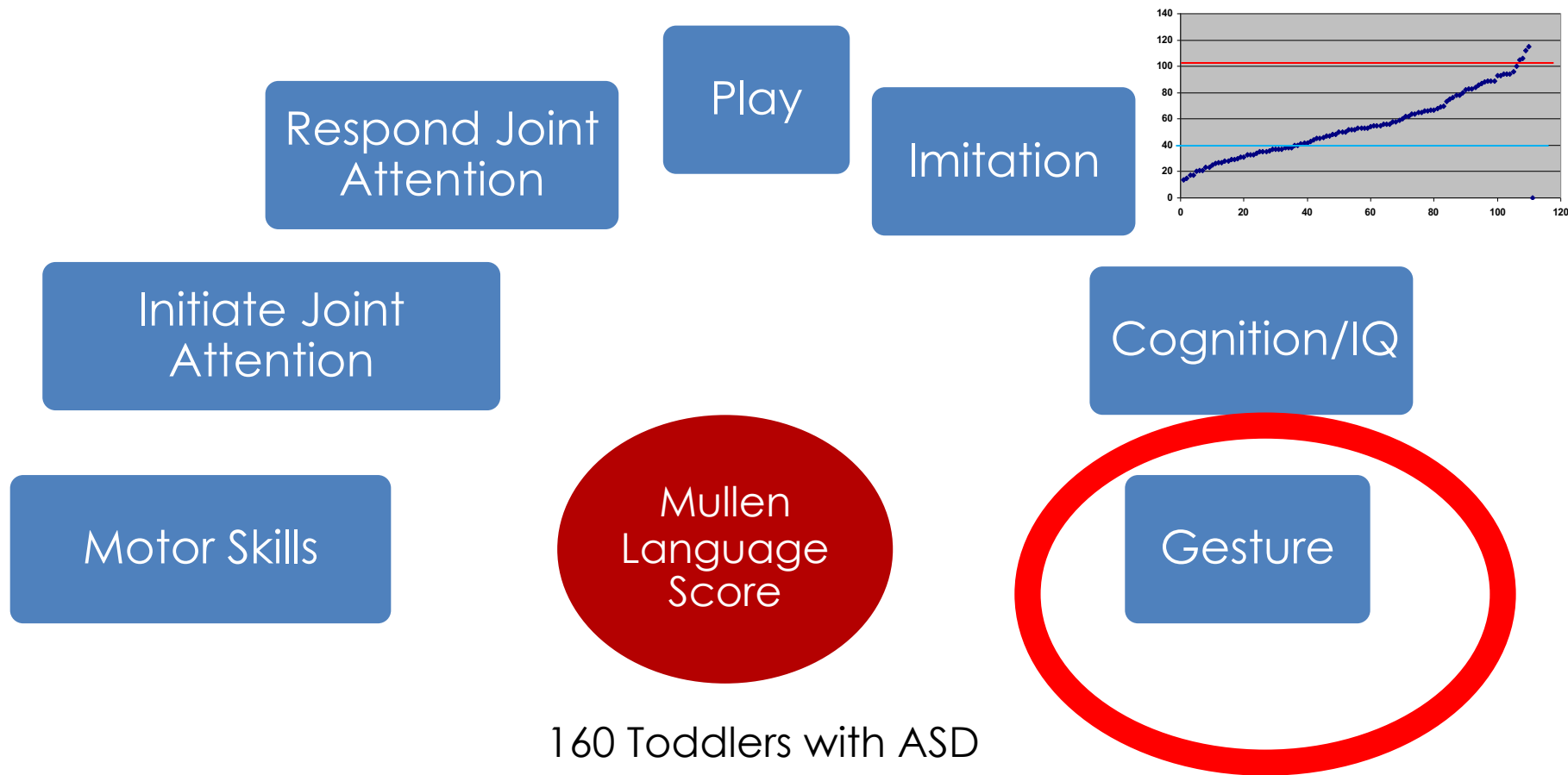
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Righi et al., 2014

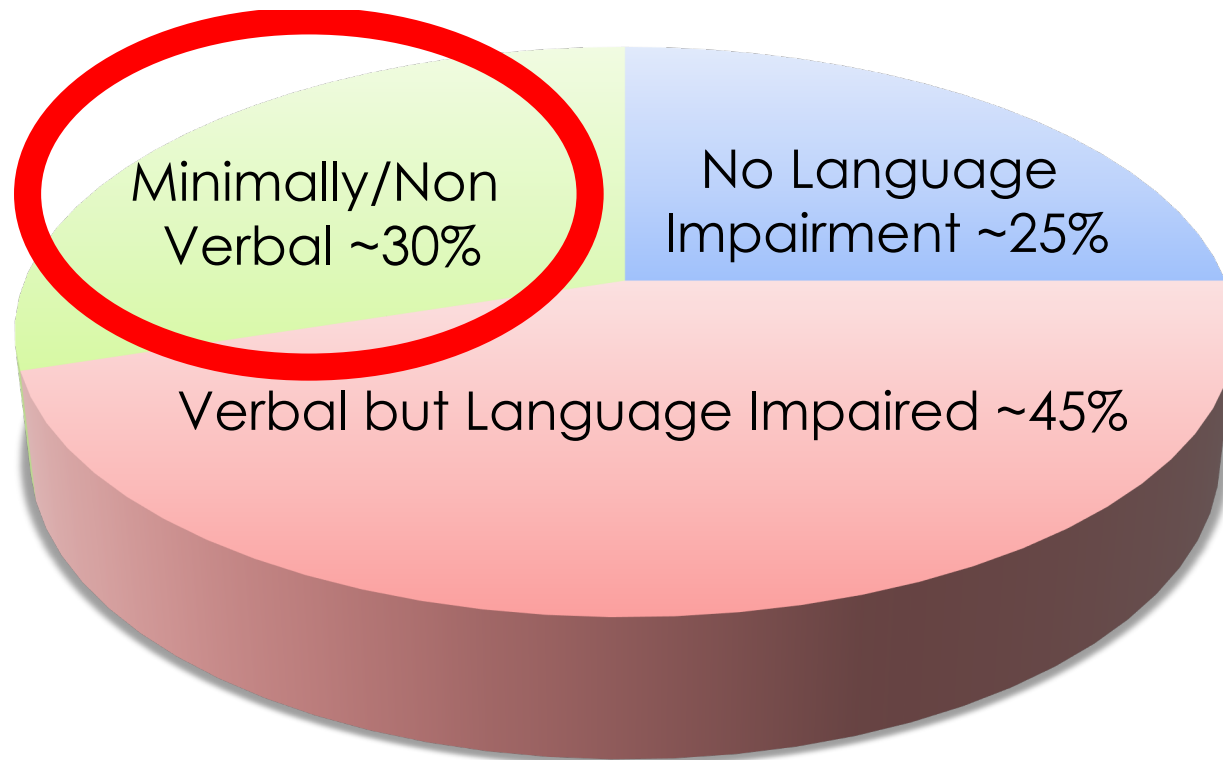
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# Behavioral predictors of language in toddlers





# Minimally Verbal Autism





# 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...***



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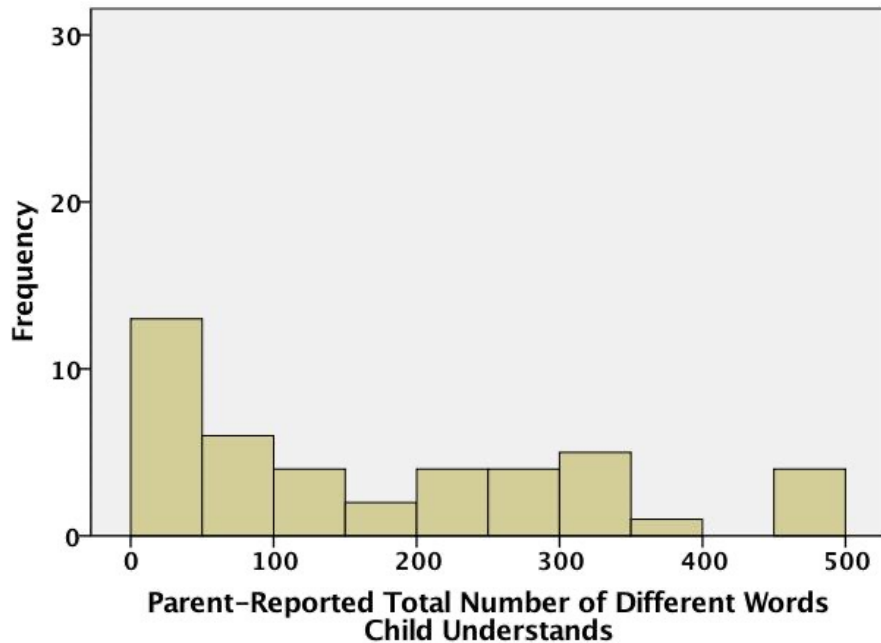
# Types of language measures

1. Standardized test – administered by trained clinician/examiner
2. Parent report questionnaire/interview
3. Naturalistic assessment – natural language samples for expressive language

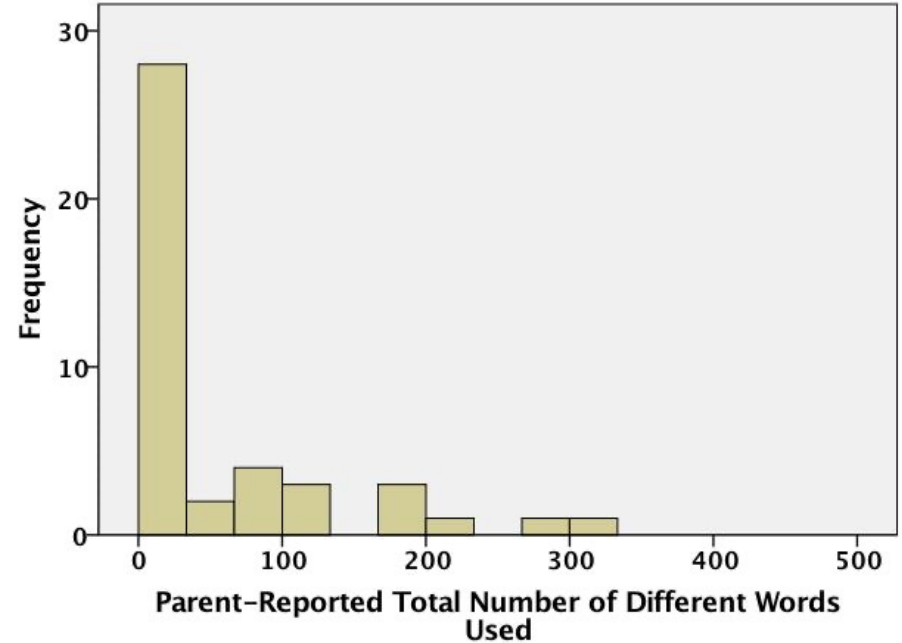


# Receptive vs expressive language in minimally verbal children and adolescents

Receptive Vocabulary



Expressive Vocabulary



# Novel methods to assess receptive vocabulary



## Standard Methods

1. Peabody Picture Vocabulary Test
2. Parent Report – *Word List*

150 Vocabulary Words	
List of words for the Peabody Picture Vocabulary Test (PPVT)	
1. ant	11. boy
2. antelope	12. boy's face
3. apple	13. boy's face (different expression)
4. apple (different color)	14. boy's face (different expression)
5. apple (different color)	15. boy's face (different expression)
6. apple (different color)	16. boy's face (different expression)
7. apple (different color)	17. boy's face (different expression)
8. apple (different color)	18. boy's face (different expression)
9. apple (different color)	19. boy's face (different expression)
10. apple (different color)	20. boy's face (different expression)
11. ant	21. boy
12. antelope	22. boy's face
13. apple	23. boy's face (different expression)
14. apple (different color)	24. boy's face (different expression)
15. apple (different color)	25. boy's face (different expression)
16. apple (different color)	26. boy's face (different expression)
17. apple (different color)	27. boy's face (different expression)
18. apple (different color)	28. boy's face (different expression)
19. apple (different color)	29. boy's face (different expression)
20. apple (different color)	30. boy's face (different expression)
21. ant	31. boy
22. antelope	32. boy's face
23. apple	33. boy's face (different expression)
24. apple (different color)	34. boy's face (different expression)
25. apple (different color)	35. boy's face (different expression)
26. apple (different color)	36. boy's face (different expression)
27. apple (different color)	37. boy's face (different expression)
28. apple (different color)	38. boy's face (different expression)
29. apple (different color)	39. boy's face (different expression)
30. apple (different color)	40. boy's face (different expression)
31. ant	41. boy
32. antelope	42. boy's face
33. apple	43. boy's face (different expression)
34. apple (different color)	44. boy's face (different expression)
35. apple (different color)	45. boy's face (different expression)
36. apple (different color)	46. boy's face (different expression)
37. apple (different color)	47. boy's face (different expression)
38. apple (different color)	48. boy's face (different expression)
39. apple (different color)	49. boy's face (different expression)
40. apple (different color)	50. boy's face (different expression)
41. ant	51. boy
42. antelope	52. boy's face
43. apple	53. boy's face (different expression)
44. apple (different color)	54. boy's face (different expression)
45. apple (different color)	55. boy's face (different expression)
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49. apple (different color)	59. boy's face (different expression)
50. apple (different color)	60. boy's face (different expression)
51. ant	61. boy
52. antelope	62. boy's face
53. apple	63. boy's face (different expression)
54. apple (different color)	64. boy's face (different expression)
55. apple (different color)	65. boy's face (different expression)
56. apple (different color)	66. boy's face (different expression)
57. apple (different color)	67. boy's face (different expression)
58. apple (different color)	68. boy's face (different expression)
59. apple (different color)	69. boy's face (different expression)
60. apple (different color)	70. boy's face (different expression)
61. ant	71. boy
62. antelope	72. boy's face
63. apple	73. boy's face (different expression)
64. apple (different color)	74. boy's face (different expression)
65. apple (different color)	75. boy's face (different expression)
66. apple (different color)	76. boy's face (different expression)
67. apple (different color)	77. boy's face (different expression)
68. apple (different color)	78. boy's face (different expression)
69. apple (different color)	79. boy's face (different expression)
70. apple (different color)	80. boy's face (different expression)
71. ant	81. boy
72. antelope	82. boy's face
73. apple	83. boy's face (different expression)
74. apple (different color)	84. boy's face (different expression)
75. apple (different color)	85. boy's face (different expression)
76. apple (different color)	86. boy's face (different expression)
77. apple (different color)	87. boy's face (different expression)
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79. apple (different color)	89. boy's face (different expression)
80. apple (different color)	90. boy's face (different expression)
81. ant	91. boy
82. antelope	92. boy's face
83. apple	93. boy's face (different expression)
84. apple (different color)	94. boy's face (different expression)
85. apple (different color)	95. boy's face (different expression)
86. apple (different color)	96. boy's face (different expression)
87. apple (different color)	97. boy's face (different expression)
88. apple (different color)	98. boy's face (different expression)
89. apple (different color)	99. boy's face (different expression)
90. apple (different color)	100. boy's face (different expression)
91. ant	101. boy
92. antelope	102. boy's face
93. apple	103. boy's face (different expression)
94. apple (different color)	104. boy's face (different expression)
95. apple (different color)	105. boy's face (different expression)
96. apple (different color)	106. boy's face (different expression)
97. apple (different color)	107. boy's face (different expression)
98. apple (different color)	108. boy's face (different expression)
99. apple (different color)	109. boy's face (different expression)
100. apple (different color)	110. boy's face (different expression)
101. ant	111. boy
102. antelope	112. boy's face
103. apple	113. boy's face (different expression)
104. apple (different color)	114. boy's face (different expression)
105. apple (different color)	115. boy's face (different expression)
106. apple (different color)	116. boy's face (different expression)
107. apple (different color)	117. boy's face (different expression)
108. apple (different color)	118. boy's face (different expression)
109. apple (different color)	119. boy's face (different expression)
110. apple (different color)	120. boy's face (different expression)
111. ant	121. boy
112. antelope	122. boy's face
113. apple	123. boy's face (different expression)
114. apple (different color)	124. boy's face (different expression)
115. apple (different color)	125. boy's face (different expression)
116. apple (different color)	126. boy's face (different expression)
117. apple (different color)	127. boy's face (different expression)
118. apple (different color)	128. boy's face (different expression)
119. apple (different color)	129. boy's face (different expression)
120. apple (different color)	130. boy's face (different expression)

## Novel Methods

1. Eye-tracking
2. Touch screen



# Novel methods are valid

	PPVT	Parent Report	Eye Tracking	Touch Screen
PPVT		.68**	.71**	.80**
Parent Report			.50*	.60*
Eye Tracking				.64**

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



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# 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.

[About](#)

[ELSA-A](#)

[ELSA-T](#)

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### ELSA Team





# ELSA-A Activities

Leaf Falling



Planting an Acorn



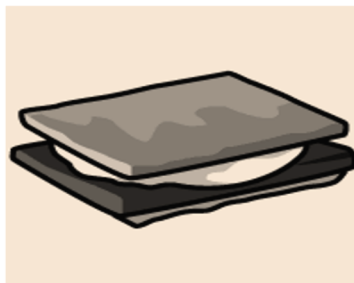
Hide & Seek Animals



Helping Animals



Making a S'more



Arts & Crafts



Bean Bag Toss



Movie Shorts



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Barokova et al., 2020a

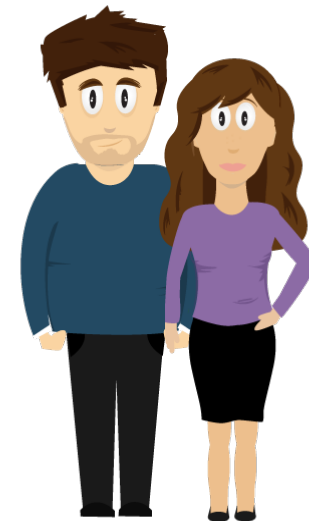
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# Who can administer ELSA-A?

Trained Examiners



Parents



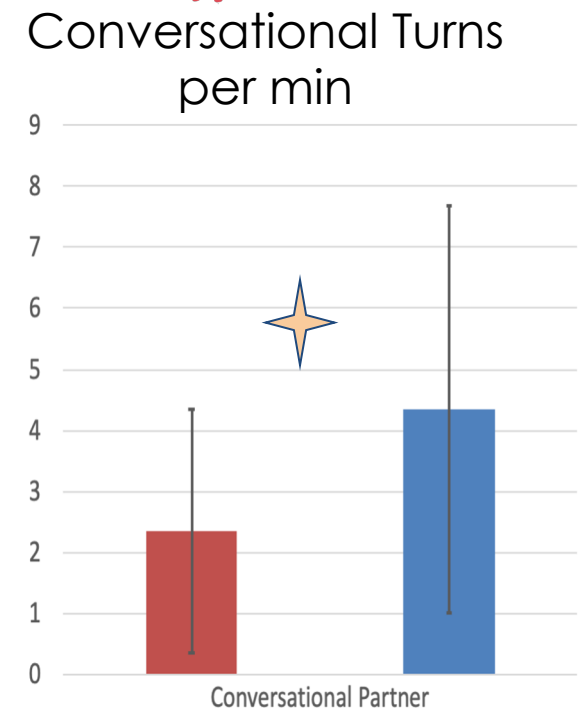
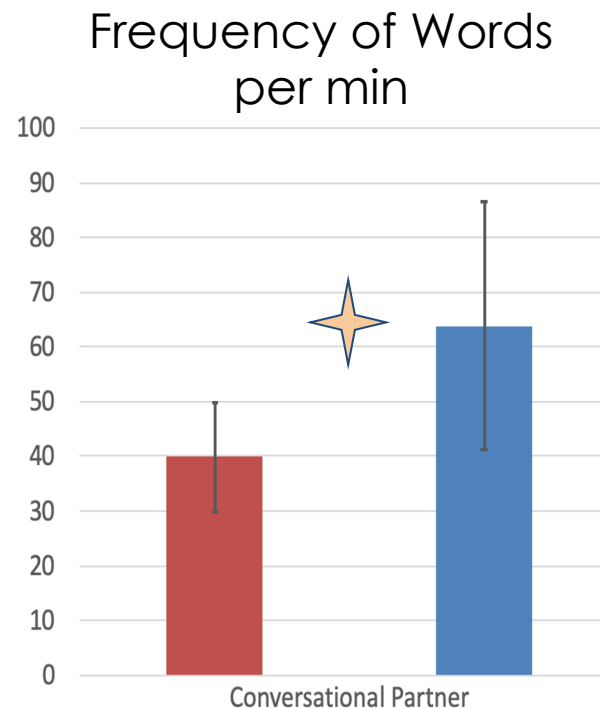
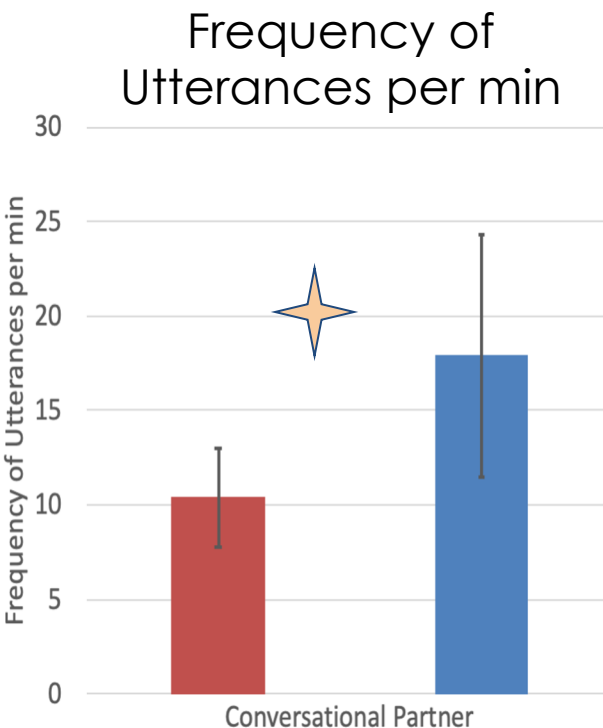
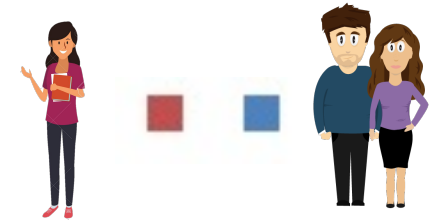
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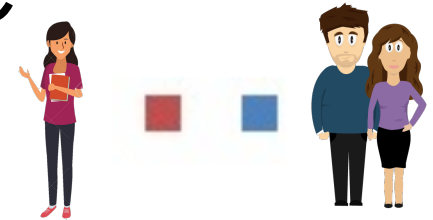
Barokova et al., 2020

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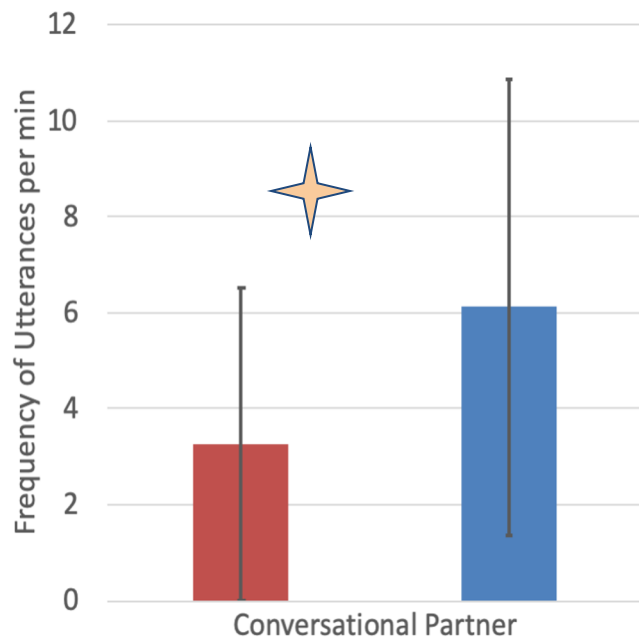
# Examiner v. Parent language



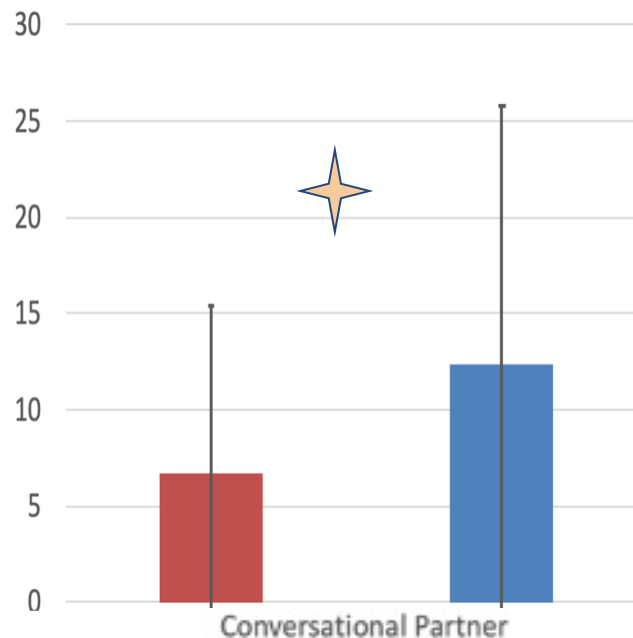
# Child's language



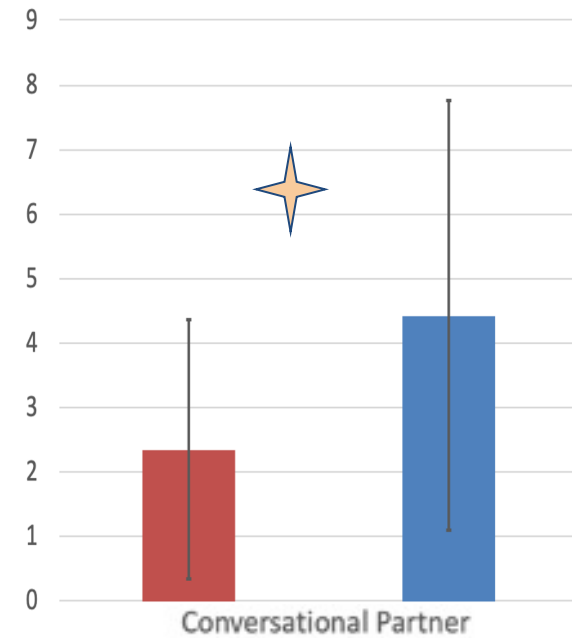
Frequency of Utterances per min



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)



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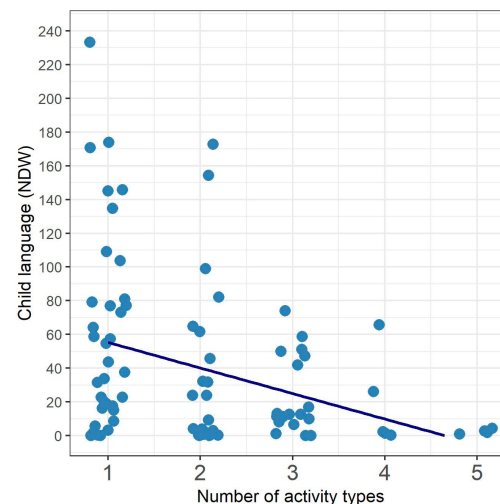
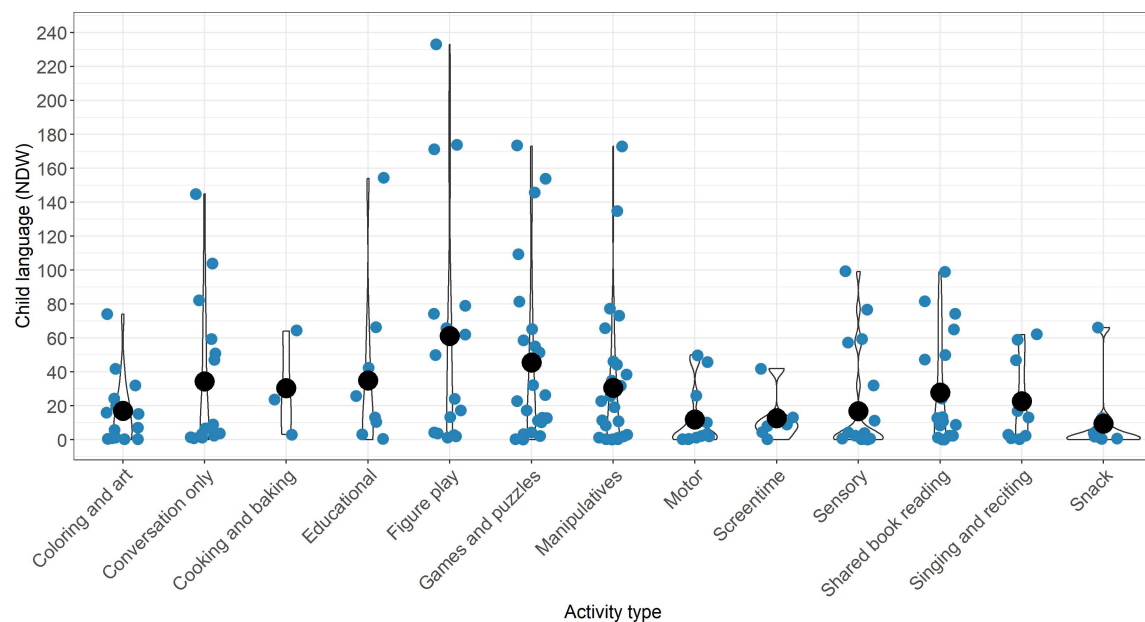


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# Number of activities and child's language level



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Butler et al., 2022

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# Why don't they speak?



Many *potential* explanations.... :

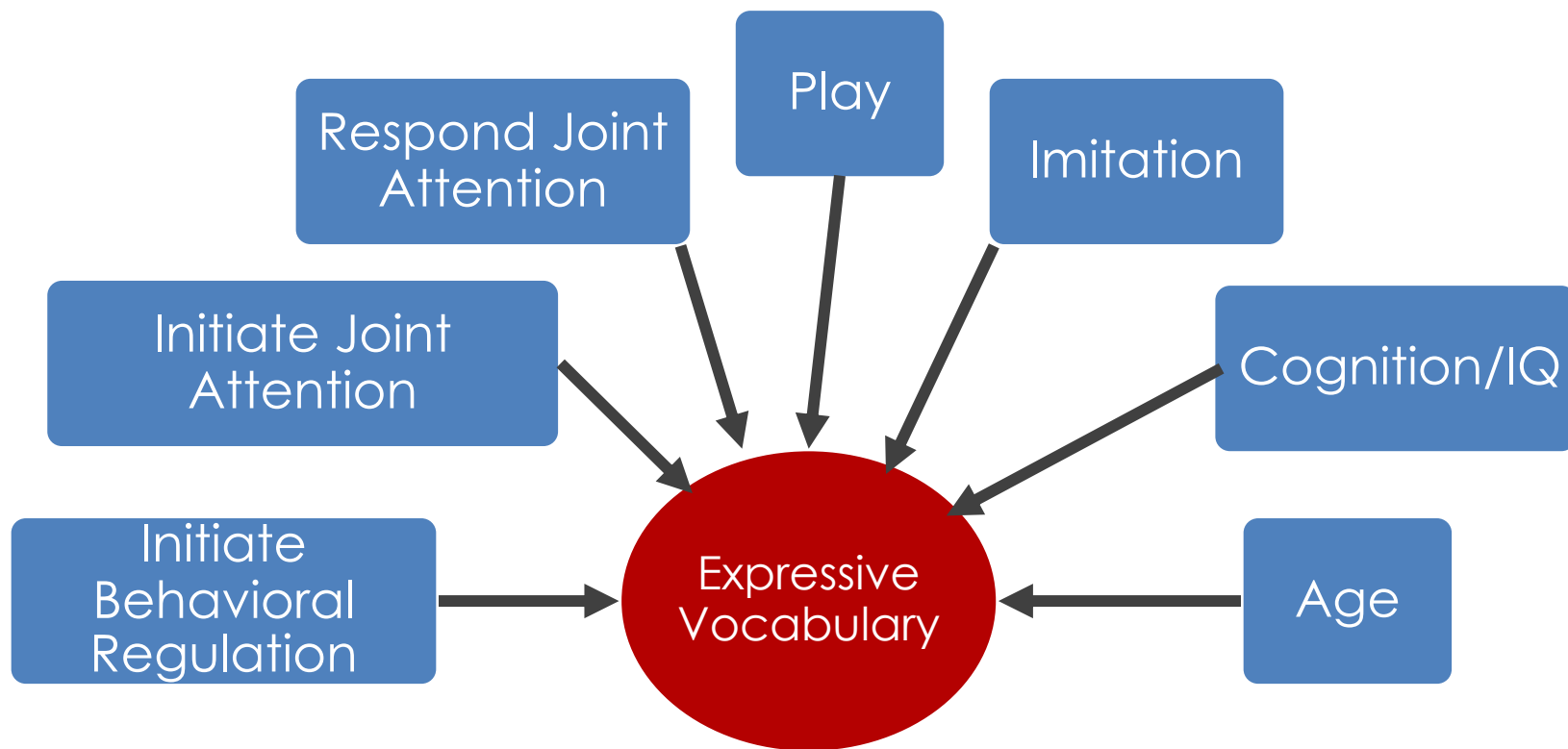
- Impaired understanding of intentional communication/joint attention
- Symbolic deficits – play/representation
- Impaired imitation
- Intellectual disability (NV cognition)
- Speech motor impairments
- Auditory processing



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# Behavioral correlates of expressive language in MV ASD



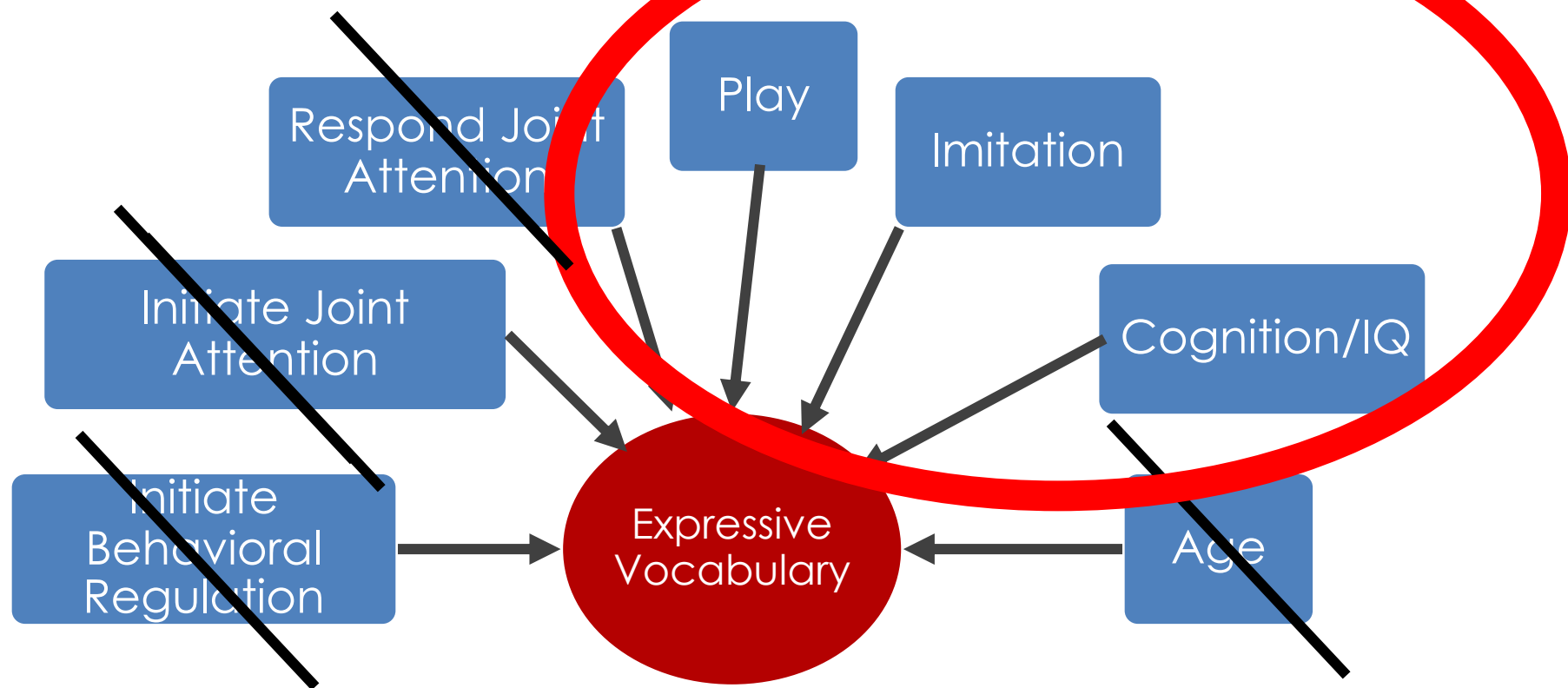
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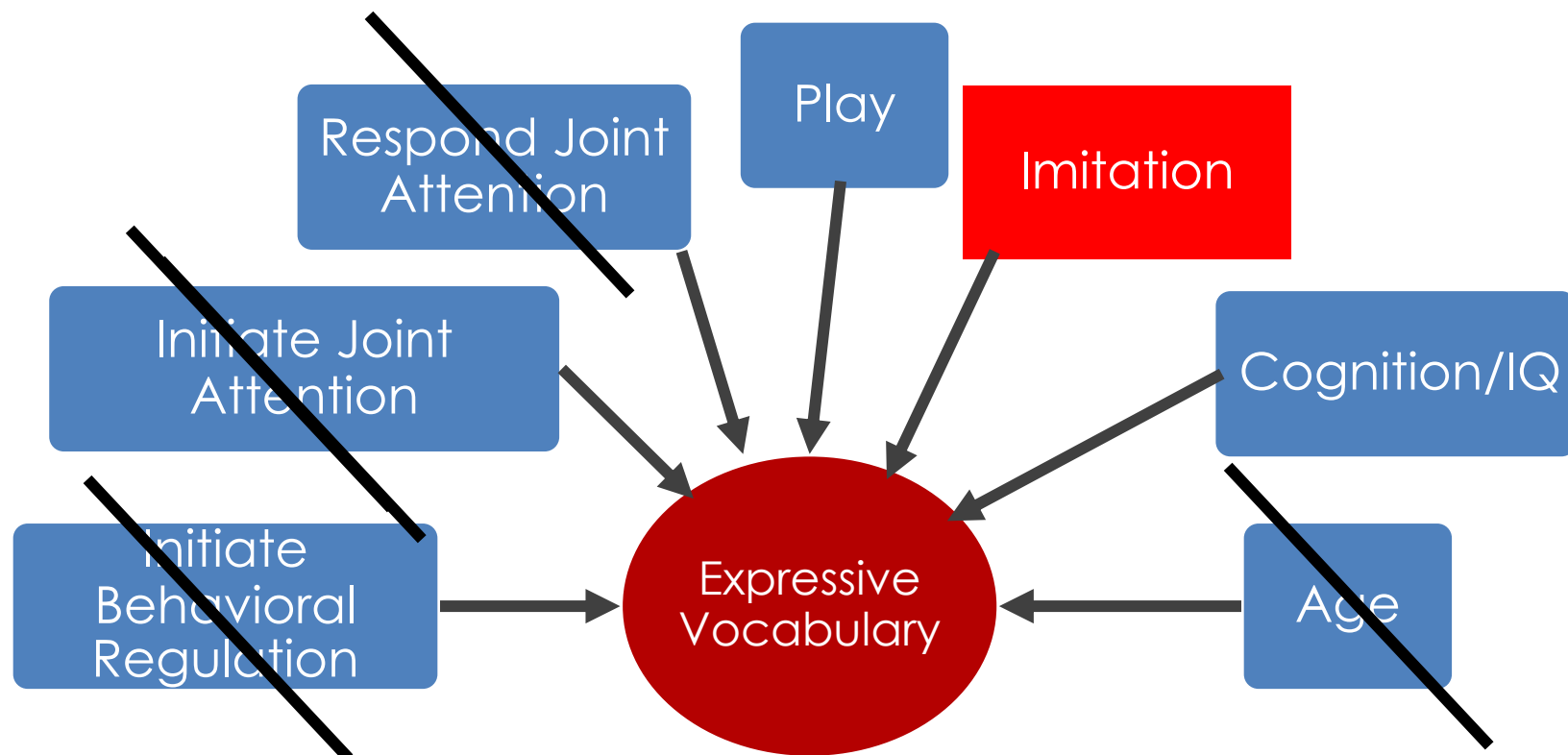
*Pecukonis et al. 2019*

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# Behavioral correlates of expressive language in MV ASD



# Behavioral correlates of expressive language in MV ASD



**Imitation – single best predictor**





# Speech motor impairments

## Childhood apraxia of speech(CAS):

Rare *neurological* disorder – Impairments in speech movement precision and consistency



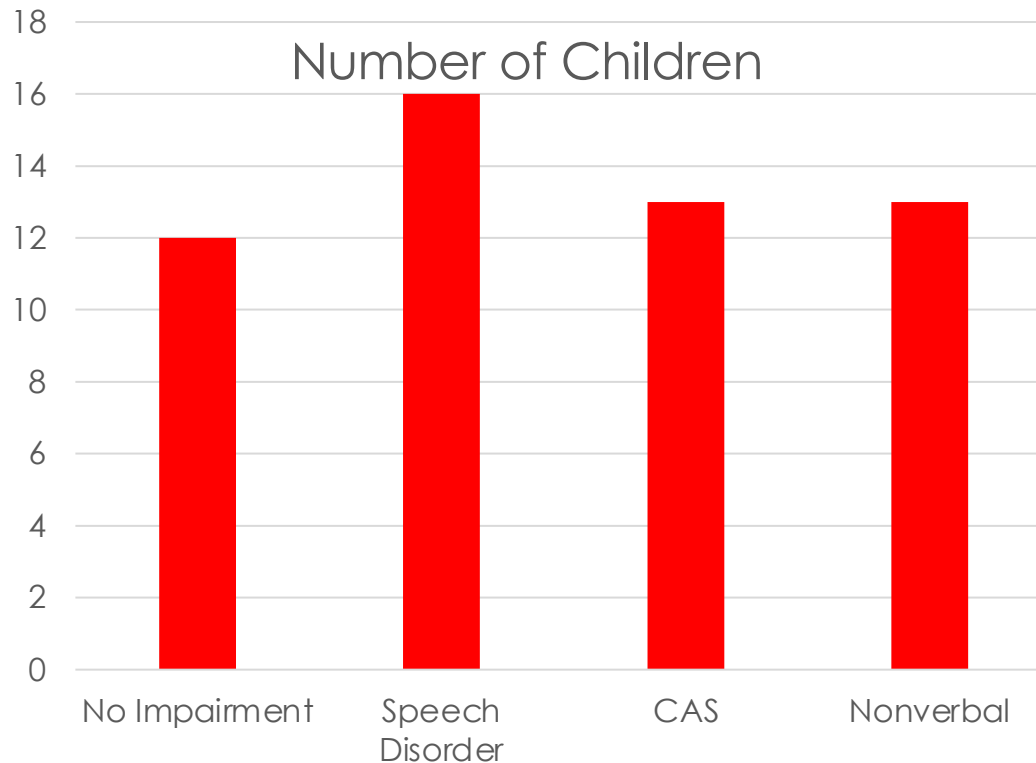
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Chenausky et al. 2019

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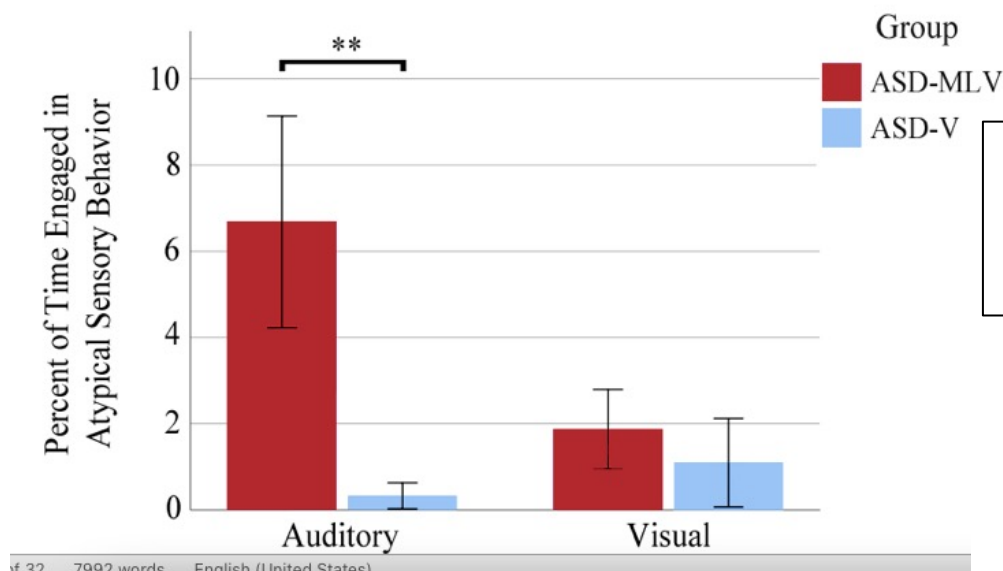
# High rates of CAS among MV



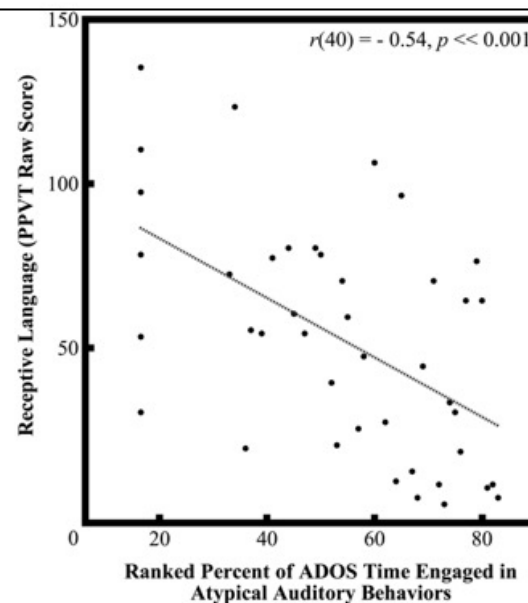
- CAS in ~25%
- Over 75% some speech/motor disorder



# Auditory processing



Receptive language LOWER in children/adolescents with MORE auditory behaviors



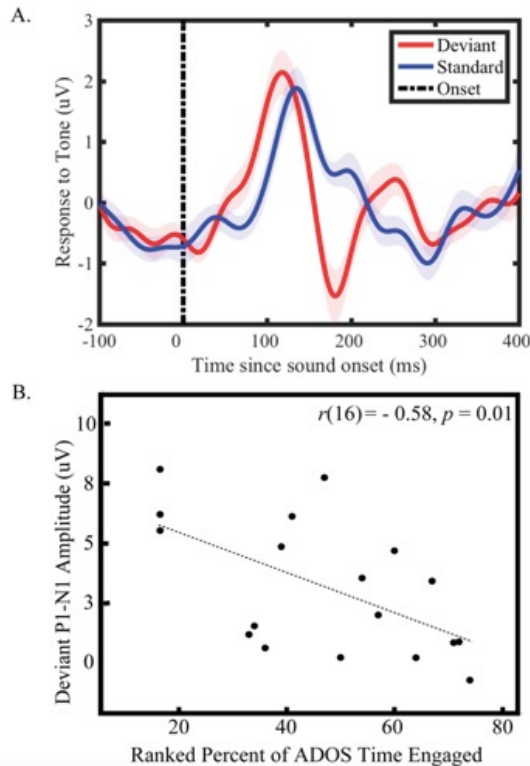
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Schwartz et al., 2020

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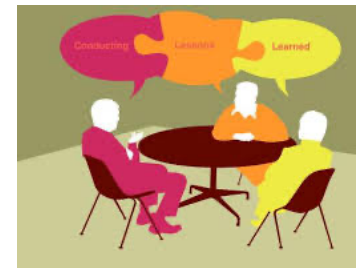
# Brain marker for auditory processing problems in MLV autism



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



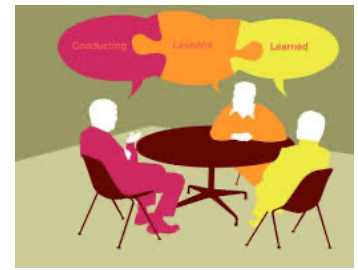
# Takeaways - 1



- 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  
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Chelsea LaValle  
Collin Lee  
Daniela Plesa Skwerer  
Meredith Pecukonis  
Sophie Schwartz  
Annie Seery  
Lue (Stella) Shen  
Meagan Talbott  
Ruthy Xu



CARE 2021-2022

## 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)



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# Thank You!



*A very special thanks to all the families  
and children  
who have given their time and support!*



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