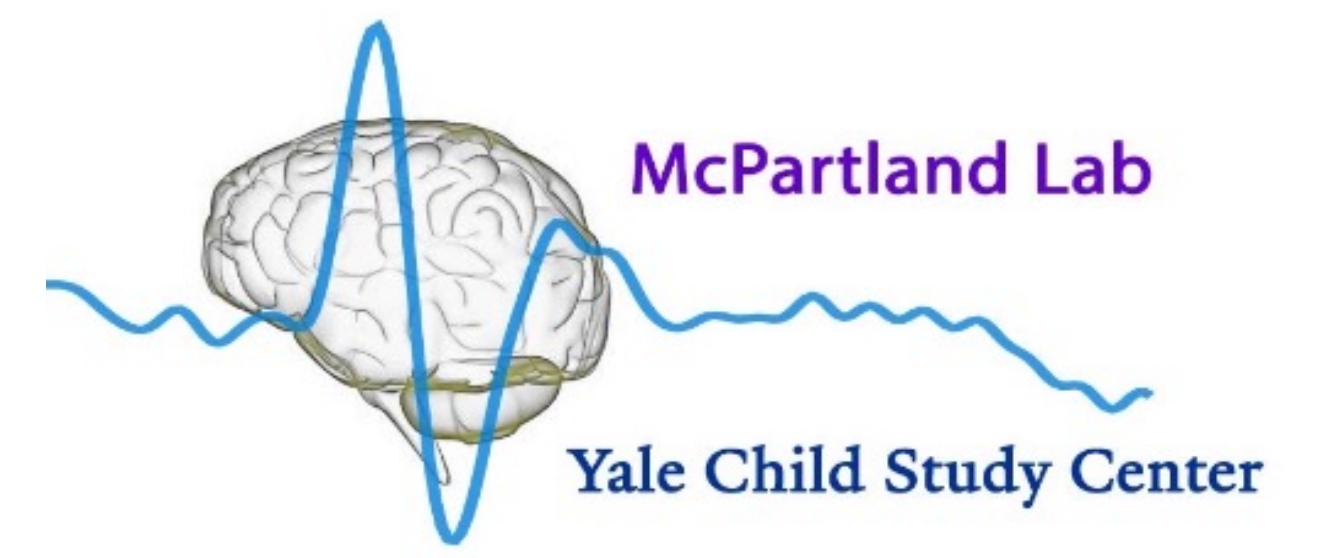
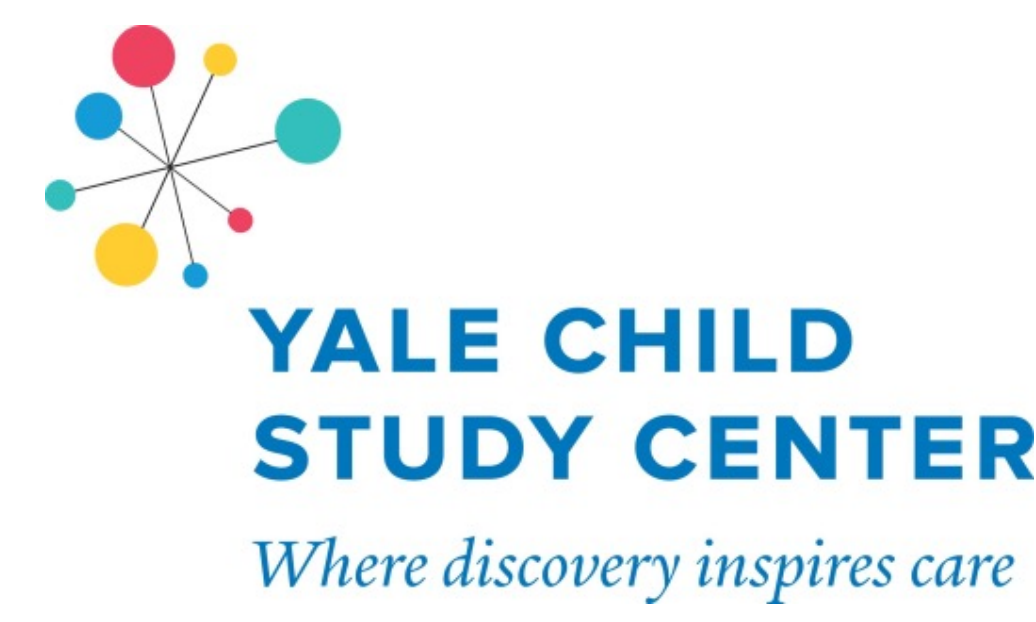


# Speech on the Spectrum: Analyzing the Unique Lexicons of Autistic Speakers

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## Background

- Many autistic speakers exhibit language behaviors considered unconventional by neurotypical social norms, collectively referred to as “unconventional language”<sup>1</sup>
- This includes idiosyncratic speech—words or phrases that are unusually bookish, elaborative, or overly formal for casual social encounters
- Determining whether language is unconventional is subjective; formality is often tied to cultural norms
- Psycholinguistic properties may be used to operationalize and measure idiosyncratic speech
- lexical diversity** – # unique words / # total words
- word frequency** – how often a word occurs in a text corpus (lower scores = less common words)
- contextual diversity** – how many text samples within a corpus the word appears (lower scores = higher specificity)

## Objective

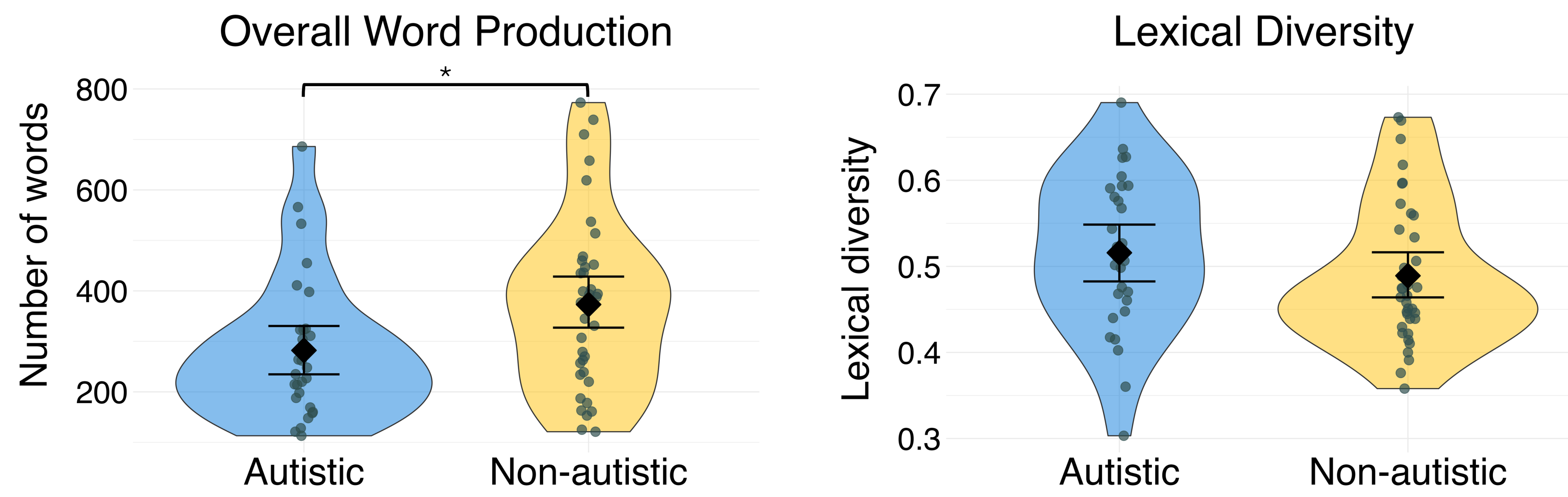
Compare psycholinguistic properties of transcribed speech between autistic and non-autistic speakers

- $H_1$ : Autistic speakers will produce words of lower frequency (i.e., more rare words) compared to non-autistic speakers
- $H_2$ : Autistic speakers will produce words of lower contextual diversity (i.e., more specific words) compared to non-autistic speakers

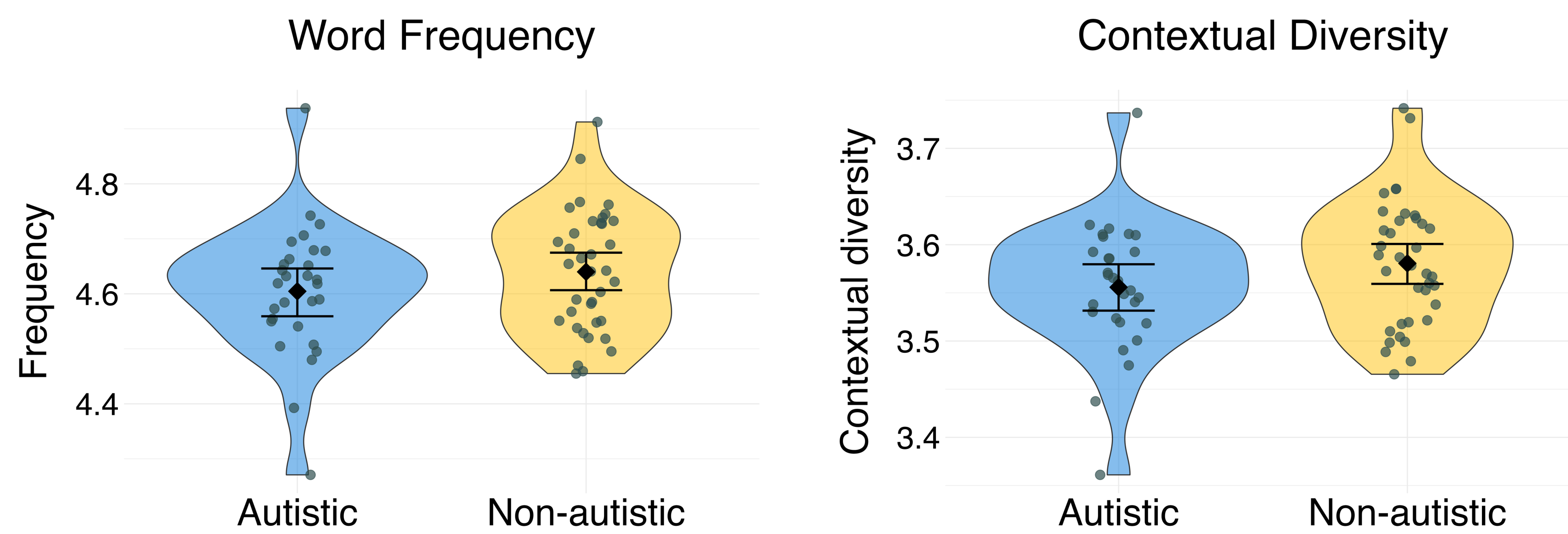
## Methods

- Participants: 29 autistic and 37 non-autistic adults
- Autism diagnosis verified by clinician-administered Autism Diagnostic Observation Schedule (ADOS), Mod 4<sup>3</sup>
- Verbal IQ measured using the Wechsler Abbreviated Scale of Intelligence Second Edition (WASI-II)<sup>2</sup>
- Audio recordings from the ADOS *Telling a Story from a Book* task were transcribed and diarized
- Transcriptions were appended with word-level scores for frequency and contextual diversity from the SUBTLEX-US corpus<sup>4-5</sup>
- Group means were compared using *t*-tests for overall number of words produced, lexical diversity, word frequency, and contextual diversity
- ADOS *Stereotyped/Idiosyncratic Use of Words or Phrases*
  - Item that captures idiosyncratic phrasing and use of unusual words
  - Scored 0=rarely; 1=occasionally; 2=often; 3=frequently
- Item score used in exploratory analyses to measure the relationship between idiosyncratic speech and contextual diversity
  - Group frequencies of item scores
  - Logistic regression to test whether item predicts group
  - Linear regression to test whether item predicts contextual diversity

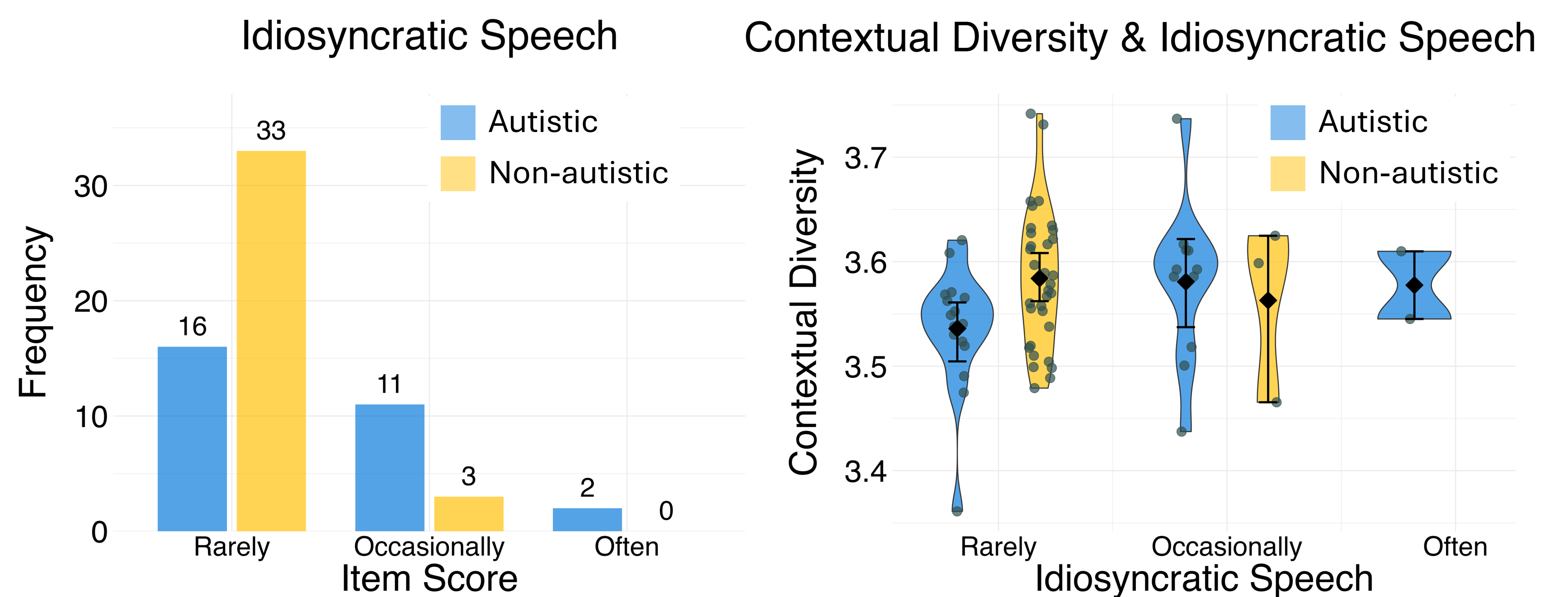
## Results



Autistic participants produced fewer words overall compared to non-autistic participants but did not differ in lexical diversity



Groups did not differ in standardized word frequency or contextual diversity scores



Autistic participants had more instances of idiosyncratic speech according to the idiosyncratic speech ADOS item, but item score did not predict rates of contextual diversity,  $\beta=0.007$ ,  $p=.67$

## Conclusions

- Non-autistic participants had higher verbal IQ and produced more words compared to autistic speakers but there were no group differences in psycholinguistic measures
- These results suggest that autistic and non-autistic speakers in this study had comparably diverse vocabularies and detailed speech
- Contextual diversity was not correlated with ADOS scores for idiosyncratic speech, but this may be due to the small sample size and small speech samples available in the current study
- Future studies with larger participant and speech samples may apply these methods as psycholinguistic measures have the potential to capture unconventional speech, an under-investigated feature of autism

	Autistic	Non-autistic	Comparisons
<i>n</i> (female)	29 (6)	37 (20)	$\chi^2=6.25$ , $p=.01$
Age ( <i>m</i> , <i>sd</i> )	18-39 (24.4, 4.6)	18-40 (24.0, 5.5)	$t(63.7)=0.33$ , $p=.74$
WASI VIQ	$m=92.1$ , $sd=17.4$	$m=117.7$ , $sd=16.0$	$\beta=0.09$ , $p<.001$
ADOS Comm	$m=4.03$ , $sd=1.30$	$m=1.25$ , $1.32$	$\beta=-1.29$ , $p<.001$
ADOS Item A4	$f(0)=16$ , $f(1)=11$ , $f(2)=3$	$f(0)=33$ , $f(1)=3$ , $f(2)=30$	$\beta=-2.08$ , $p=.003$
Word production	113-686 ( $m=282$ , $sd=140$ )	121-773 ( $m=373$ , $sd=173$ )	$t(63.9)=2.36$ , $p=.02$
Lexical diversity	$m=0.516$ , $sd=0.090$	$m=0.489$ , $sd=0.082$	$t(57.3)=1.24$ , $p=.22$
Word frequency	$m=4.604$ , $sd=0.120$	$m=4.640$ , $sd=0.110$	$t(57.8)=-1.23$ , $p=.22$
Contextual diversity	$m=3.574$ , $sd=0.598$	$m=3.580$ , $sd=0.600$	$t(59.5)=-1.50$ , $p=.14$

### Examples of low contextual diversity words produced by participants

Adorned	Myriad	Clothesline	Aghast	Mystified
Exasperated	Sentient	Illustration	Cautiously	Peaceably
Expanse	Topography	Levitating	Frantically	Perplexed
Forlornly	Undeterred	Newscaster	Giddily	Perturbed
Mimicking	Zenith	Similarly	Halted	Sauntering
Autistic		Both		Non-autistic

## References

<sup>1</sup>Luyster et al., (2022). *Autism and Dev. Lang. Impairments*. <sup>2</sup>Wechsler, D. (2011). *APA PsycTests*. <sup>3</sup>Lord et al. (2012). *Western Psychological Services*. <sup>4</sup>Gao & Desai (2022). *Behavior Research Methods*. <sup>5</sup>Brybaert & New (2009). *Behavior Research Methods*.

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