Relationships Between Alignment and Cooperative Task Performance in Autistic and Neurotypical Teenager-Caregiver Dyads

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BACKGROUND

- Linguistic alignment: unconscious modification of one's language to match interlocutor's language[1]
  - **Lexical alignment:** same words
  - **Syntactic alignment:** same sentence structure
  - **Semantic alignment:** same overall topic

Person A: We should steal from the blue aliens.
Person B: Hmm, I think we should wave to the blue ones.

Note. The turns above semantically align.

- Alignment can be described in terms of rate or level[1]
  - Alignment **rate**: proportion of turns in which alignment occurred at all
  - Alignment **level**: degree of alignment when alignment occurred
- Why align?
  - Making diverse contributions to discussion about a cooperative task (lower rate[5]), but building on interlocutor's statements when relevant (higher level[5,6]), **positively** correlates with task performance
- Who aligns?
  - Neurotypical (NT) and autistic children lexically align with experimenters at similar rates[2,3] & syntactically align with peers at similar levels[4]

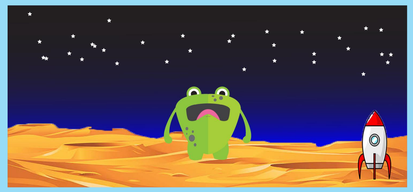
RESEARCH QUESTIONS

- Do autistic and NT **teens & young adults** lexically, syntactically, and semantically align to their **caregivers** at similar rates and levels?
- Does alignment correlate with overall performance on a cooperative task[7], and does this correlation depend on diagnostic group and alignment type?

PROCEDURE

- Caregiver-child dyads played the Aliens Game[7] (**Figure 1**)

Figure 1. *Sample Aliens Test Trial*



- Saw 40 aliens, discussed whether aliens:
  - Were **friendly** or **mean**
  - **Did** or **did not** have a gem
- Choices: **ask for gem, wave, run,** or **steal gem**
- Correct → +10 points | Incorrect → -2 points
  - Saw feedback after each trial

PARTICIPANTS

- 24 NT, 18 autistic teens & young adults from Longitudinal Study of Early Language[8] (**Table 1**)
- Matched on expressive language (EL)[9] at study onset, now differing in EL

ANALYSIS

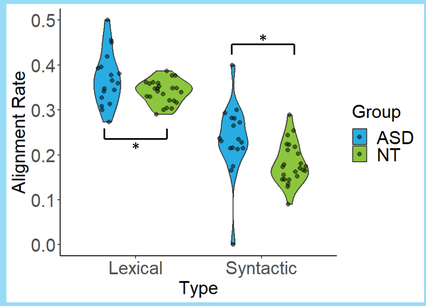
- Ran ALIGN[13] on dyads' transcripts to obtain:
  - Lexical & syntactic alignment **rate**
  - Lexical, syntactic, & semantic alignment **level**
- During analyses, controlled for:
  - **Mean length of utterance** → all analyses
  - **Lexical alignment (rate/level)** → analyses of syntactic/semantic alignment

Table 1. *Participant Demographics and Test Scores*

	Diagnostic Group		Comparisons		
	NT (*N* = 24) *M (SD)*	ASD (*N* = 18) *M (SD)*	*F*	*p*	η^2
Age (years)	15.84 (2.91)	17.37 (3.12)	2.67	.110	-
CELF-5[10] Expressive Language Index	**105.25 (12.75)**	**80.17 (20.14)**	**24.35**	**<.001**	**0.38**
CELF-5[10] raw score (sum, six subtests)	**206.50 (19.35)**	**145.61 (67.81)**	**17.58**	**<.001**	**0.31**
DAS-II[11] Special Nonverbal Composite	**106.54 (14.10)**	**81.72 (24.88)**	**16.79**	**<.001**	**0.30**
DAS-II[11] raw score (sum, four subtests)	**66.50 (13.62)**	**51.28 (15.40)**	**11.49**	**.002**	**0.22**
ADOS-2[12] (Social Communication + RRB)	**2.43 (2.74)**	**11.83 (6.07)**	**43.91**	**<.001**	**0.53**

Note. CELF-5 = Clinical Evaluation of Language Fundamentals-5th Edition[10]. Subtests: Word Classes, Following Directions, Formulated Sentences, Recalling Sentences, Sentence Assembly, Semantic Relationships. DAS-II = Differential Ability Scales-2nd Edition[11]. Subtests: Recall of Designs, Pattern Construction, Matrices, Sequential & Quantitative Reasoning. ADOS-2 = Autism Diagnostic Observation Schedule-2nd Edition[12].

Figure 2. *Autistic Rates > NT Rates*



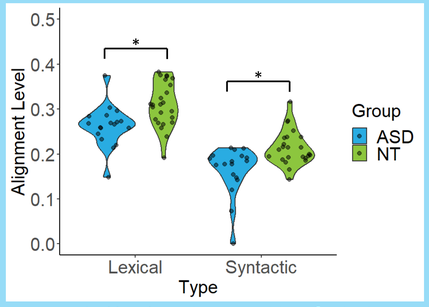
Note. Lexical rate: $F = 4.10$, $p = .050$, $\eta^2 = 0.10$. Syntactic rate: $F = 10.59$, $p = .002$, $\eta^2 = 0.22$.

RESULTS

Lexical & syntactic **rate**: **ASD>NT**
Lexical & syntactic **level**: **NT>ASD**
Semantic level: **NT=ASD**

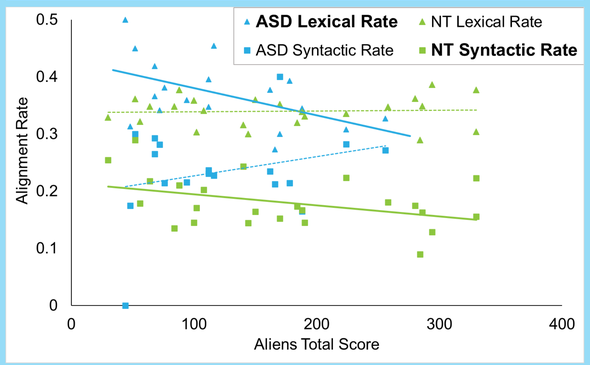
Performance in the game did not statistically differ ($p = .061$, NT *M(SD)* = 172.33(94.13), ASD *M(SD)* = 122.56(63.99))

Figure 3. *NT Levels > Autistic Levels*



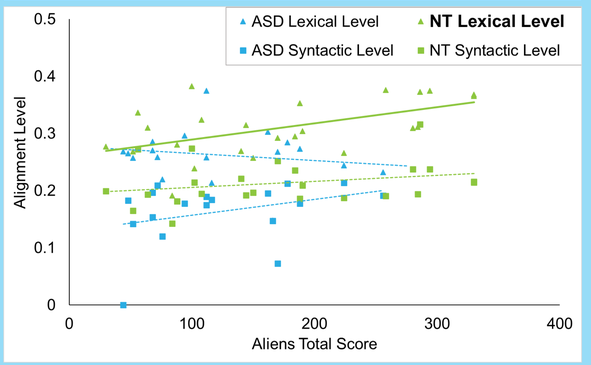
Note. Lexical level: $F = 9.11$, $p = .004$, $\eta^2 = 0.19$. Syntactic level: $F = 5.24$, $p = .028$, $\eta^2 = 0.12$.

Figure 4. *Rates Negatively Correlated with Score*



Note. For ASD: **lexical** rate negatively corr. with total score ($r = -0.50$, $p = .040$). For NT: **syntactic** rate negatively corr. with total score ($r = -0.53$, $p = .011$). No other significant relationships ($ps > .729$).

Figure 5. *Lexical Level Positively Correlated with Score*



Note. For NT only: lexical level positively corr. with total score ($r = 0.54$, $p = .008$). No other significant relationships ($ps > .135$), including with semantic level.

DISCUSSION

- Both groups aligned to caregivers, but in different ways: autistic participants were frequent aligners, but NT participants aligned to larger chunks of caregivers' utterances
- Previous work has indicated that low alignment rates[5], high (lexical/syntactic) alignment levels[5], and low semantic alignment levels[7] **positively predict** task performance
- Our NT participants adhered fairly closely to these patterns, but our autistic participants did not
  - How, then, did they achieve similar performance?
- Future work will more explicitly model the categorization process as it develops throughout dyadic conversation → will be able to better map the mechanisms at play
  - Groups may be focusing on different alien traits or picking up patterns at different points in the game
  - How do categorization processes unfold linguistically?

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This work is supported by NIHDCD R01 DC 016665.