

Background

- **Autism spectrum disorder (ASD)** is characterized by difficulties with social communication and interaction as well as repetitive behaviors and restricted interests (American Psychiatric Association, 2013)
- ASD entails deficits in understanding the **mental states** of others (Baron-Cohen, et al., 1985)
 - Children with ASD **produce fewer words referring to mental states** (Tager-Flusberg, 1993)
- Certain language impairments, such as difficulties with personal **pronouns**, are characteristic of ASD:
 - Individuals with ASD **produce fewer pronouns** in narratives (Colle et al., 2008)
- Speech errors or **disfluencies** increase under conditions of **stress** (Carroll, 1986)

Research Question

Do fluent children and adolescents with ASD differ from typical children and adolescents in their production of pronouns, mental state expressions, and disfluencies when telling stories under stressful conditions?

Participants

- 20 typically-developing (TD) children and adolescents (8 females) and 20 children and adolescents with mild ASD (3 females) and fluent language.
- Matched for chronological age, English ability on the Clinical Evaluation of Language Fundamentals (CELF), and nonverbal intelligence on the Kaufman Brief Intelligence Test (KBIT).

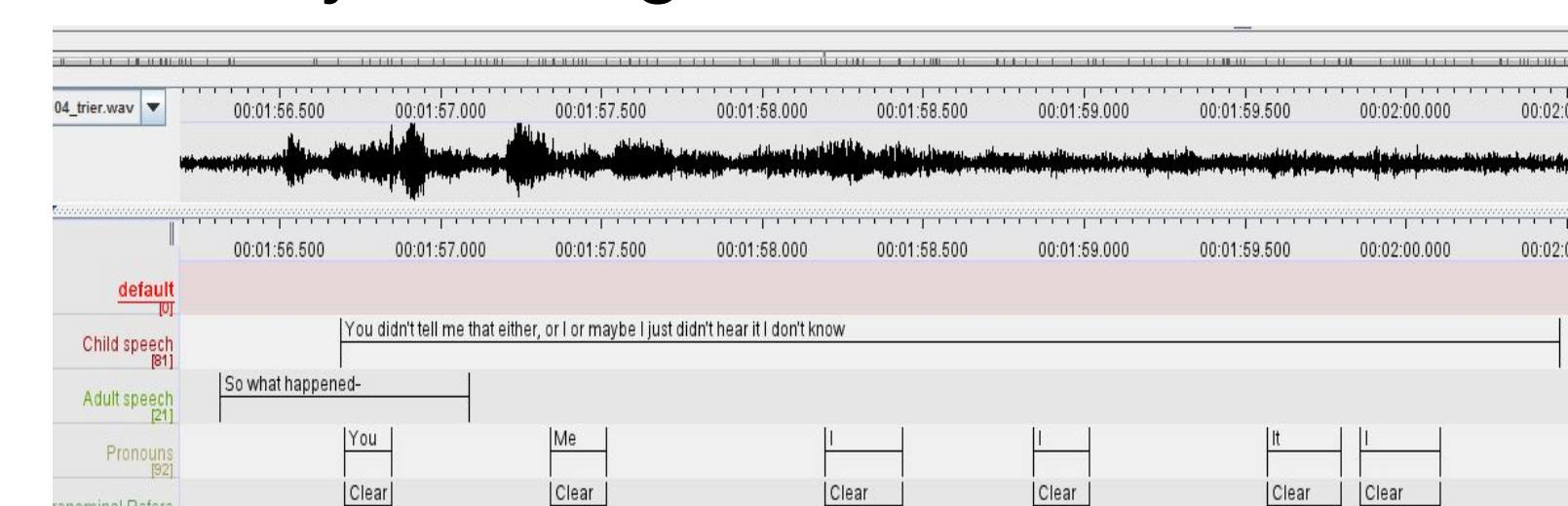
Participants (n=40)	Mean Age (Years)	Mean CELF	Mean KBIT
TD Participants (n=20)	13.8 (SD = 2.34)	109 (SD = 10.67)	110.0 (SD = 11.92)
Participants with ASD (n=20)	13.7 (SD = 2.21)	106 (SD = 19.99)	109.95 (SD = 20.84)

Method

- Data collected at Emerson College
- Used the **Trier Social Stress Test**, a laboratory procedure used to induce stress and measure its effects (Kirschbaum, Pirke, & Hellhammer, 1993)
- Adapted the original narrative prompt for children with ASD: children were asked to complete a story about going to visit an old man in a big spooky house
- In order to induce stress, children were asked to recite the ending of the story in front of a panel of judges viewed on a screen through a fake Skype call (**see picture below**)
- Participants had 3 minutes to tell their story.



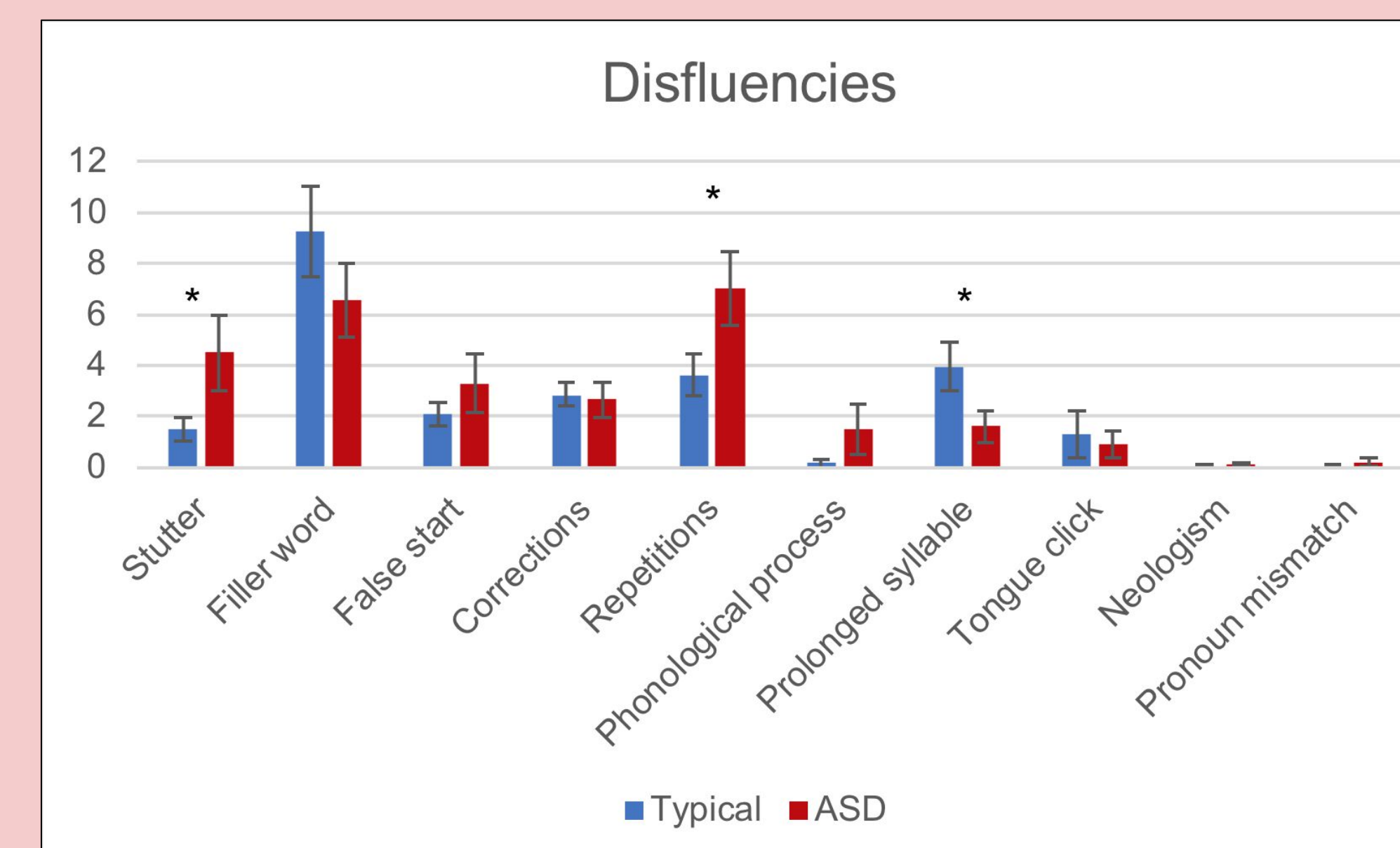
- Data coded at Miami University
- Audio files were recorded and imported into ELAN multimodal coding software.
- Stories were coded for speech, personal pronouns, mental state terms, and speech disfluencies.
 - Disfluencies included: stutters, filler words, false starts, corrections, repetitions, phonological processes, prolonged syllables, tongue clicks, neologisms, and pronoun number mismatches.
- Reliability was performed by each member of the team checking each other's work and discussion coding at weekly meetings.



Results

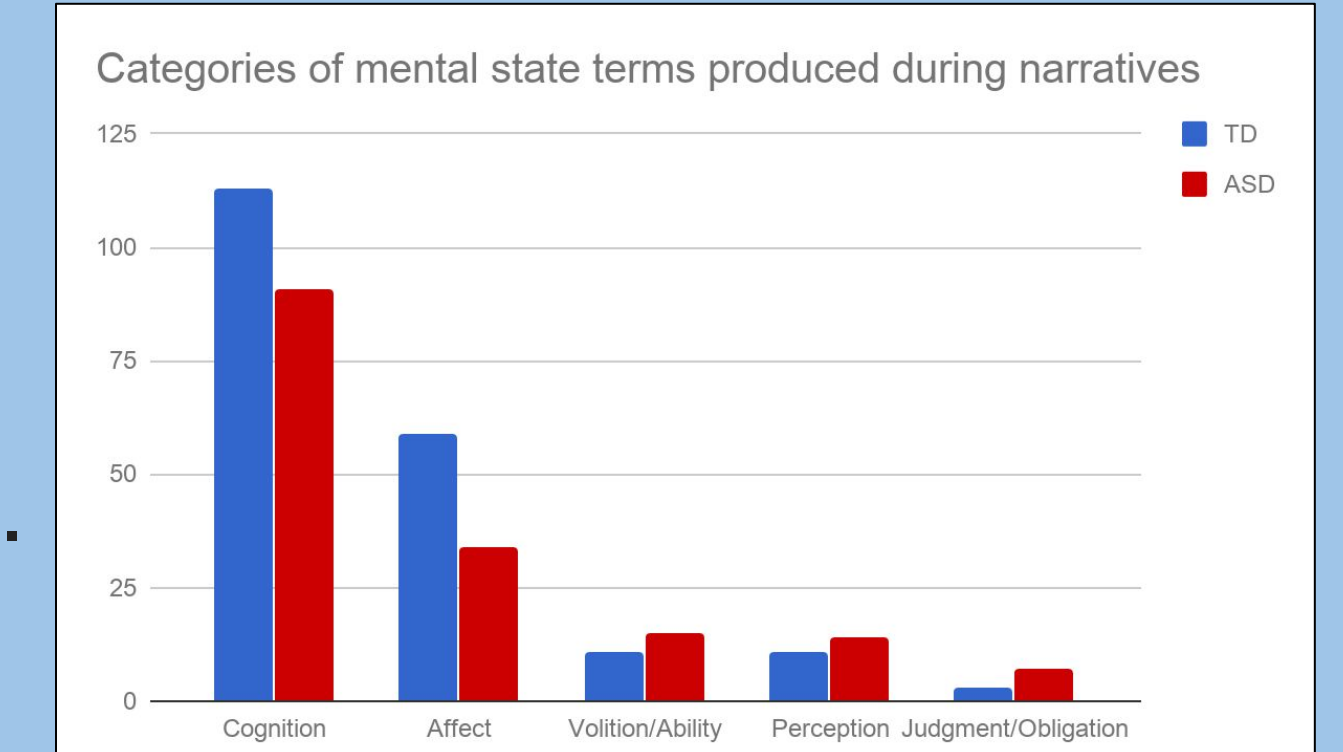
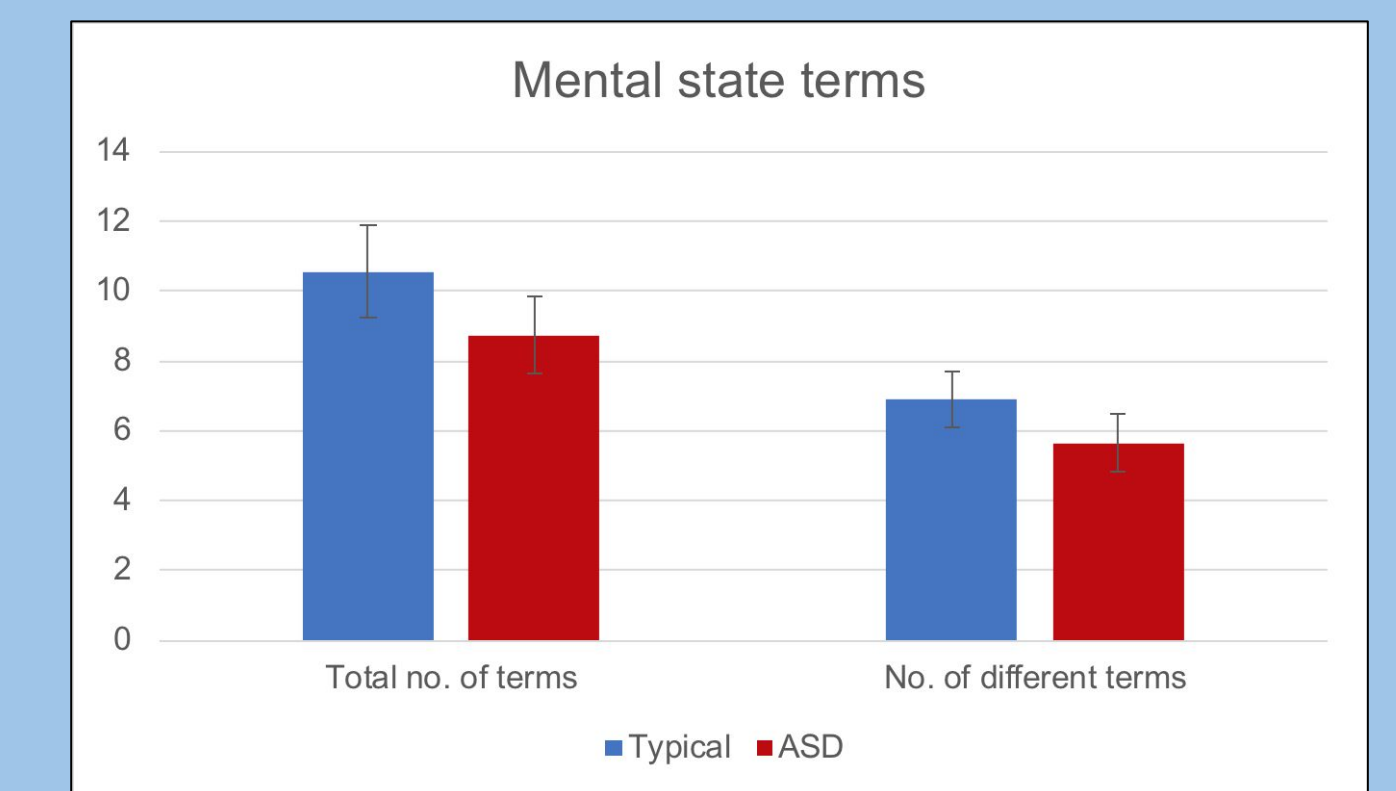
Disfluencies:

- Children with **ASD** produced more **stutters** ($M = 4.5$) and **repetitions** ($M = 6.46$) than TD children ($M=1.47, 3.63$), $p = 0.05$.
- **TD children** produced more **prolonged syllables** ($M = 3.95$) than children with ASD ($M=1.6$), $p = .05$.
- The groups did not differ on any other category.



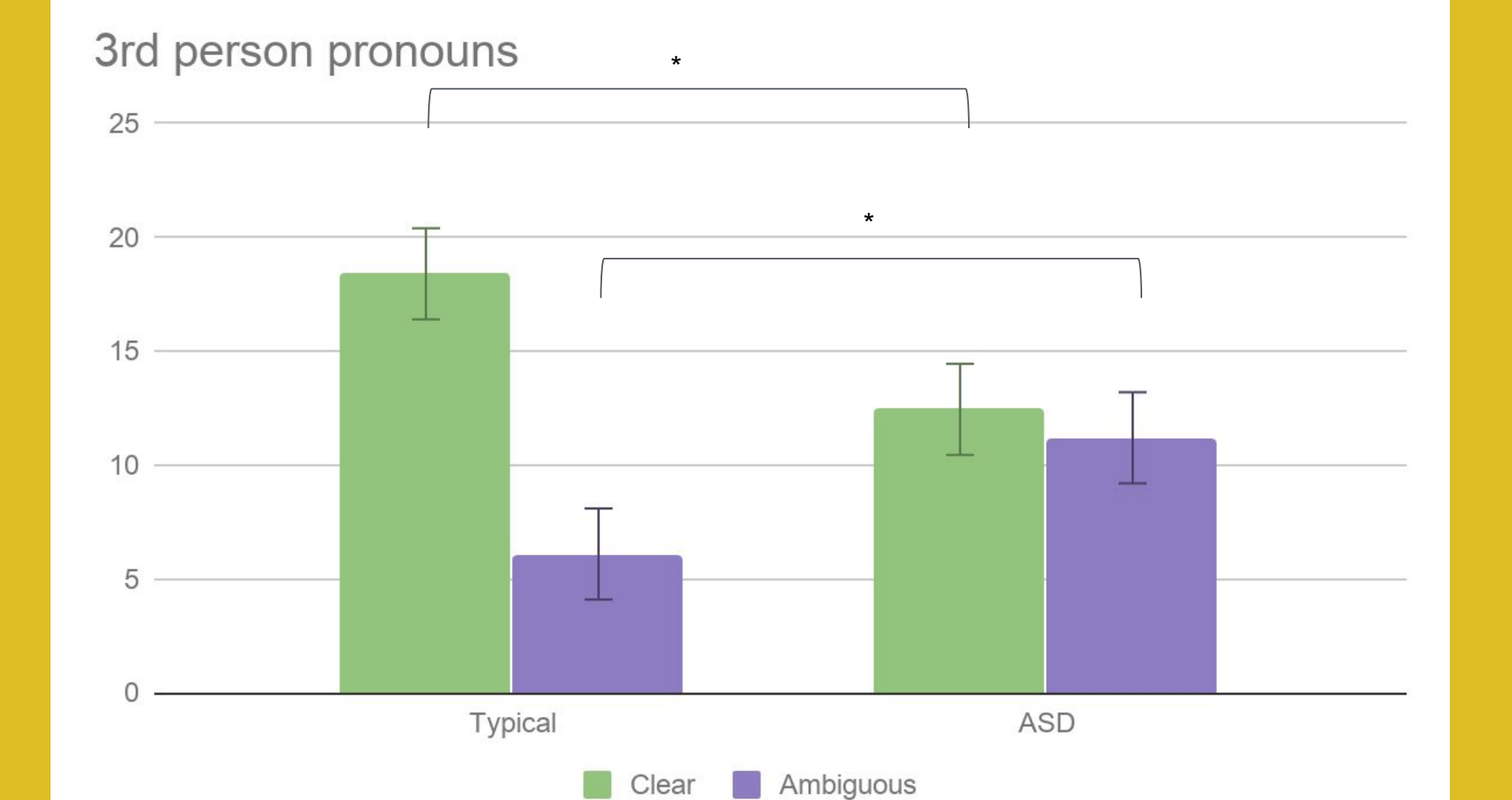
Mental state terms:

- TD children produced **nominally more mental state terms** ($M=10.55, SD=5.94$, range 4-23) than children with ASD ($M=8.75, SD=5.02$, range 0-20), $p = .15, ns$.
- TD children produced a **nominally higher number of different mental state terms** ($M=6.9, SD 3.68$, range 3-18) than children with ASD ($M=5.65, SD 3.69$, range 0-16), $p = .15, ns$.
- TD children produced more **cognition** and **affect** terms than children with ASD.



Pronouns:

- TD children produced **nominally more pronouns** ($M=62.9, SD=16.1$, range 35-94) than children with ASD ($M=52.85, SD=23.76$, range 13-95), however, this difference was not significant, $p = 0.13$.
- The two groups did not differ in the overall proportion of pronouns that had clear antecedents (TD: 56.3%; ASD: 58.8%) versus ambiguous antecedents (TD: 43.6%; ASD: 41.1%).
- TD children produced more **3rd person pronouns with clear referents** ($M=18.4, SD=11.34$) than children with ASD ($M=12.45, SD=8.94$), $p < .05$.
- Children with ASD produced more **3rd person pronouns with ambiguous referents** ($M=11.2, SD=10.68$) than TD children ($M=6.1, SD 6.82$), $p < .05$.



Discussion

- When language ability is controlled for, linguistic differences between adolescents with and without ASD are quite small. However, we found that:
 - Fluent children with ASD showed evidence of **increased stutters and repetitions** under stressful conditions.
 - TD children may pay more attention to **suprasegmental** aspects of speech, thus resulting in more **prolonged syllables** than children with ASD.
 - Children with ASD produced **fewer mental state terms** -- especially *cognitive* (e.g., think, know) and *affective* (e.g., scared, happy) terms -- than TD children.
 - Children with ASD produced **more ambiguous 3rd person pronouns** than TD children, which may reflect differences in theory of mind.
- **Limitations:** sample size, data quality, and lack of a control (low-stress) condition.
- **Future Directions:** analysis of prepositions, temporal terms, and spatial terms.

References

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