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ABSTRACT BOOK

Background: Metaphors incorporate language abilities that include symbolic understanding created through processes of structural mapping used to form relations such as categories, analogies, and other knowledge-based structures that encompass properties that are related in complex manners. Structure mapping is a core cognitive process that enables creation of analogies and metaphors, during which different structures of knowledge are aligned, and compared, relevant relations are identified and transferred to form new coherent language structures. Metaphors can be interpreted as attributes based on perceptual characteristics, or using relations based on relational structures that encompass the components of the metaphor. The ability to use and understand metaphors increases, with reciprocal interactions between age language and cognition. Analogies and metaphors contribute to the acquisition of abstract concepts by paralleling between relational structures. Research investigating metaphors among individuals with ASD demonstrate mixed results in development, use, and interpretation of metaphors. For example, in one study comparing children with and without ASD, structural mapping and the development of understanding metaphors were significantly different.

Objectives: The purpose of this study was to investigate interpretation of three types of metaphors among adolescents with and without ASD, and siblings of adolescents with ASD: (1) Metaphors as attributes, whereas the base and the target mostly share perceptual qualities and attributes (e.g., "Jelly beans are like balloons"); (2) Relational metaphors that are mostly relational in nature (e.g., "A hat is like a roof"); and (3) double metaphors, in which the base and the target share many attributes and relational qualities (e.g., "a kite is like a bird").

Methods: Fifty adolescences ages 14-18 participated in the study: 20 adolescences with ASD, 10 adolescences that have siblings with ASD, and 20 adolescences with TD. All participants completed a structural mapping assignment aimed to identify perceptual and conceptual targets in uncertainty and certainty conditions; and a task in which they were asked to interpret a set of 24 metaphors (8 of each type) that were presented both in a visual and auditory manner with a request to provide an interpretation of the metaphor and to rank the adequacy of the statement as a metaphor.

Results: All participants completed the assignments. Each of the interpretations and the rankings were coded and evaluated. Preliminary results reveal no significant differences between the three groups in interpretations and ranking of metaphors. Preliminary analyses of specific interpretations and ranking provided by the participants demonstrate unique styles in interpretations and in ranking and in the explanations provided among the group of adolescents with ASD. In the structural mapping task, participants in the three groups selected perceptual targets in uncertainty condition but differed in the certainty condition.

Conclusions: Similarly to previous studies, groups differed in the certainty but not in the uncertainty condition in the structural mapping task. There were some similarities in the interpretations among adolescents across the three groups which could be related to the levels of knowledge in the understanding of metaphors. Examples of differences and unique interpretations will be discussed, and examples will be provided.

508.021 *(Virtual Poster)* Patterns of Finger-Tracking in Italian Early Readers with Autism Spectrum Disorder

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Background: Of late, the synergistic interaction of eye and hand movements in the exploration of a visual scene displayed on a computer touchscreen was shown to provide a congruent signature of the "attention maps" of subjects with autism spectrum disorders (ASD). A familiar context where this visual and tactile interaction is exploited is when children use the finger of their dominant hand to point the letters of written words as they are reading, particularly at early stages of their literacy development. In the present work, a dedicated app running on a common tablet is used to capture and analyse the finger-tracking behaviour of children with ASD while they are reading few episodes of a connected text on the tablet touchscreen. The reader's voice is also recorded through the tablet built-in microphone. The sliding movements of the finger across the tablet touchscreen are discretized into a series of densely distributed "touch events", which are then mapped onto the text lines in much the same way eye fixations are projected onto a sequence of words using an eye-tracker. Reading texts are linguistically annotated, to control for levels of reading difficulty, and finger-tracking times are associated with linguistic glosses.

Objectives: Investigate patterns of finger-tracking as a potential non biological marker for identification of children with ASD

Methods: A preliminary analysis is offered of evidence of the finger-tracking behaviour of 20 Italian children with high functioning ASD, aged 7-11 years, while they are engaged in reading. A grade-matched control group of children with typical development was included. Patterns of finger-tracking are assessed in connection with three complementary aspects of reading behaviour: (1) word recognition, (2) pace of reading of multi-word intonation units, and (3) text comprehension, controlled by asking children a few multiple-choice questions on text content after each reading session.

Results: Considerable variation in levels of reading ability was observed in the ASD sample, with a few children showing clear evidence of impaired reading comprehension. However, fluent readers with ASD exhibit the same correlation between accurate decoding (assessed by measuring per-word reading speed) and high levels of reading comprehension found in controls. Likewise, decoding rates were found to significantly increase with increasing grade levels, following the typical developmental pattern observed in controls. On a less local level of linguistic analysis, the reading pace of ASD readers fails to be modulated according to major syntactic structures, punctuation marks and direct speech turns, an effect concomitant with a flat prosodic intonation of oral reading.

Conclusions: Preliminary findings confirm the heterogeneous nature of reading skills in children with ASD, showing that the use of a tablet screen as a tactile interface for visual perception analysis can offer a robust experimental protocol for large-scale, multimodal collection of naturalistic data for extensive assessment of readers with ASD.

508.022 *(Virtual Poster)* Scalar and Non-Scalar Implicatures in Preschool Mandarin-Speaking Children with Autism Spectrum Disorder

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Background: Conversational implicatures include two kinds of implicatures: (1) scalar implicatures (SIs) based on lexical scales (e.g., the quantifier 'some' implies 'not all', and the number 'three' implies 'not four') and (2) non-scalar implicatures (non-SIs) based on the specific contexts (e.g., saying 'The cat got an apple' implies 'not an apple and a pear') (Horn, 1972). The consistent success in SIs was hardly seen in preschool typically developing (TD) children and those with ASD, whereas non-SIs were only observed in TD children (Mazzaggio et al., 2021; Zhao et al., 2021). However, no study has systematically investigated these two types of implicatures in preschool Mandarin-speaking TD children and children with ASD.

Objectives: We tested the interpretation of SIs (including quantifiers and numbers) and non-SIs by Mandarin-speaking preschool TD children and children with ASD, to examine their pragmatic abilities of computing implicatures as well as the link with Theory of Mind (ToM), receptive vocabulary and non-verbal IQ.

Methods: We recruited 20 TD children and 13 high-functioning children with ASD, matched on age, but not on scores of ToM, the Chinese Peabody Picture Vocabulary Test (C-PPVT), and the Chinese Raven's Matrices Progressive Test (CRT) (Table 1). Using the computer-based truth value judgment task (Su & Su, 2015), the experimenter presented the stories to children through Microsoft PowerPoint, and then asked children to judge the truth values of prerecorded test sentences describing the outcome of the stories.

Results: A Bayesian linear mixed effects model suggested that ASD group did worse than TD group in computing implicatures. TD group's total accuracy of both SIs, $V = 8.5$, $p < 0.001$, and non-SIs was significantly higher than that of the ASD group, $V = 0$, $p < 0.001$. For SI subtests, both groups got significantly higher accuracy in number than quantifier, TD group: $V = 2$, $p < 0.05$; ASD group: $V = 6.5$, $p < 0.01$. TD group also performed better than ASD group in both number, $V = 80$, $p < 0.01$, and quantifier, $V = 13.5$, $p < 0.001$. However, although TD group got significantly higher accuracy in non-SIs than SIs, $V = 26$, $p < 0.05$, ASD group showed a reverse pattern, $V = 5$, $p < 0.01$ (Figure 1). The other two models of ASD revealed a significant effect of TOM in the accuracy of two implicature tasks, $SE = 0.09$, $p < 0.05$, and two SI sub-tests, $SE = 0.15$, $p < 0.001$, a significant interaction of task and ToM, $SE = 0.11$, $p < 0.001$, and a significant interaction of SI sub-test and ToM, $SE = 0.19$, $p < 0.05$. By contrast, TD group did not reveal any significant effect or interaction with ToM. No significant effect or interaction with C-PPVT or C-Raven scores was found.

Conclusions: Preschool Mandarin-speaking TD children showed pragmatic awareness of both SIs and non-SIs, but the ASD children exhibited difficulty, especially with the non-SIs and the SIs of quantifiers. The pragmatic impairment in ASD may be related to their ToM deficits.

508.023 *(Virtual Poster)* Sex Differences in Pronoun and Maze Usage in the Language of Children with Autism Spectrum Disorder

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Background: Research on sex differences in the language of children with Autism Spectrum Disorder (ASD) has been limited. Song et al. (2020) found that "we" pronoun (1st person plural pronouns; e.g., "we", "ours") and "they" pronoun (3rd person plural pronouns; e.g., "they", "their") usage differs amongst ASD and TD girls and boys. In addition, studies have shown that maze (i.e. intervals of disfluent speech) usage rates distinguish ASD and TD children. However, whether these differences are influenced by sex has not been investigated.

Objectives: To compare usage rates of (1) "we" and "they" pronouns, and (2) mazes in ASD and TD girls and boys.

Methods: A total of 140 children, 98 ASD (17 girls) and 42 TD (22 girls), aged 7 to 15 years old, were included. All had full-scale IQ $\geq$ 70. Analyses were performed on transcribed Autism Diagnostic Observation Schedule (ADOS), Module 3 sessions. Transcription was completed according to modified Systematic Analysis of Language Transcripts (SALT) guidelines by trained transcribers who were blind to the participants' diagnostic status and intellectual abilities. Four ADOS conversation tasks were analyzed: Emotions; Social Difficulties and Annoyance; Friends, Relationships, and Marriage; Loneliness.

We calculated the total number of times each participant said a "we" pronoun, "they" pronoun, and maze. We fit three logistic regression models (Poisson distribution) with total "we", "they", or maze as the response variables and the total number of overall tokens as the offset. Each model included age, full-scale IQ, diagnosis, sex, and a diagnosis and sex interaction term. Pairwise Estimated Marginal Means (EMM) were compared post-hoc.

Results: Diagnosis and sex significantly predicted "we" frequency (ASD < TD, $p < .001$; male < female, $p < .001$). There was no significant effect of the diagnosis and sex interaction (see Figure 1). Post-hoc comparisons revealed that ASD girls significantly differed in "we" frequency from TD girls and ASD boys but not from TD boys (TD girls > ASD girls = TD boys > ASD boys, $p < .0001$).

Diagnosis and sex also significantly predicted "they" frequency (ASD < TD, $p < .05$; male < female, $p < .001$). The diagnosis and sex interaction did not have a significant effect (see Figure 1). Post-hoc analyses revealed that ASD boys differed in "they" frequency from ASD girls and TD girls (ASD girls > ASD boys, $p = .001$; TD girls > ASD boys, $p < .0001$).

Lastly, diagnosis and sex significantly predicted maze frequency (ASD > TD, $p < .001$; male < female, $p < .001$). There was a significant effect of the diagnosis and sex interaction ($p < .001$; see Figure 2). Post-hoc analyses revealed that maze frequency significantly differed amongst all subgroups except for TD girls and boys (ASD girls > ASD boys > TD boys = TD girls, $p < .0001$).