Reference tracking across the autism spectrum
(abstract for consideration for special session 2)

Background and Aims:
Referential expressions are an area of weakness in Autism Spectrum Conditions (ASC) across development both in language comprehension (e.g. Modyanova, 2009) and production (e.g. Durrleman & Zuffrey, 2009; Baixauli et al., 2016) and as such may play a role in the communicative deficits widely attested in this population. However, the literature to date has yet to explore referential tracking in a systematic way or across the autism spectrum, including those with intellectual disability. The present studies aim to ease these gaps by assessing the comprehension of a progression of referential expressions, spanning from indefinite reference to pronominal reference (Study 1), with a focus on tracking definiteness (Study 2) among children and adolescence with ASC, with and without intellectual disability.

Participants:
45 children with ASC participated in the study, grouped by absence of intellectual disability (ASC-HF, n=34) and presence of intellectual disability (ASC-LF, n= 11). The ASC-HF was matched on verbal mental age (VMA) to typically developing children (TD, n =34) and the ASC-LF group was matched on VMA to children and adolescents with intellectual disability without an autism diagnosis (1D, n=5).

Method:
Two studies were designed to assess the comprehension of referential expressions. In study 1 we do so through a reference tracking task, using a colorful picture book designed for purposes of the study. This task required the participant to listen to an utterance and point to the character or object indicated on the page. Sentence types included indefinite determiner phrases (DPs) (e.g. show me *a rabbit*), definite DPs that were not anaphoric (e.g. show me *the rabbit with the stripped shirt*), definite anaphoric DPs (e.g. where is *the rabbit* here?) and pronominal (e.g. where is (he) here?). As the utterances increase in referential complexity they become denuded of lexical content.

Study 2 consisted of an acting-out design. The participants are shown an object (e.g. a pink pencil) and asked to close their eyes. When their eyes are closed an object (either the same object or a different member of the kind pencil (e.g. a blue pencil) is placed into a box. The child was then able to feel the object through an opening and speculate if it was the pencil or not. When the object was removed, the child was asked, "*Is it the pencil?"* hence requiring the participant to distinguish between being an exemplar of the kind, the indefinite '*a pencil*' and the definite, anaphoric, *'the pencil'* – i.e. the one they saw just prior.

Results:
Study 1: No difference was identified between ASC-HF and TD groups on all sentence types ($p \geq .05$) though the pronominal category trended towards significance ($p = .071$). When comparing

the ASC-LF and ID groups, the pronominal category was significantly poorer in the ASC-LF group than the ID group, (p=.001) and marginally poorer in the definite-non anaphoric condition (p=.069). When comparing within the ASC groups (ASC-HF and ASC-LF), all DP types except for indefinites were significantly poorer, which was only marginally poorer (p=.099).

Study 2: The ASC-HF performed significantly poorer than TDs on the definite condition p = .001. Regarding the ASC groups, the ASC-LF group performed significantly lower than the ASC-HF group (p=.002). There was no significant difference between the ASC-LF and ID groups.

Discussion and conclusions:

Together both studies indicate a weakness in understanding referentially complex constructions such as pronouns and clitics which lack descriptive content to guide reference. While performance was high for all DP types in both the ASC-HF and TD groups in study 1, there was greater variability among the ASC-HF participants in comparison to the TD group in the pronominal condition, which approached significance. In contrast, when looking to individuals with ASC and intellectual disability (ASC-LF), difficulty with pronominals (*pro* and clitics) was more pronounced and was found to be significantly more impaired than the ASC-HF group as well as poorer than individuals with similar levels of intellectual disability without autism, suggesting that intellectual disability alone isn't accountable for this weakness. In study 2, we find a highly significant difference between ASC-HF and TDs in understanding definite anaphoric DPs. We expect that the trend level difference identified in study 1 manifests more robustly in study 2, where visual tracking strategies would be ineffective due to differences in study design. This suggests that certain weaknesses, which may be present across the autism spectrum, may be improved with compensation strategies or task supports. These findings also allow us to explore the nature of referential anomalies across the autism spectrum.

References:

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Durrleman, S., & Zufferey, S. (2009). The nature of syntactic impairment in autism. *Rivista di Grammatica Generativa, vol. 34 (2009), p. 57-86*.

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