# Heterogeneity of morphosyntactic abilities in individuals with Autism Spectrum Disorder (also in comparison with Specific Language Impairment)

Language and communication difficulties can arise in Autism Spectrum Disorder (ASD; Tager-Flusberg et al., 2005) and the co-occurrence of a language impairment is observed in at least some individuals affected by this condition (Bennett et al., 2008). Within morphosyntactic development, recent investigations point to a delay in the mastery of relative clauses in French and English speakers with ASD (Durrleman et al., 2015, 2016; Riches et al., 2010), thus supporting the usefulness of testing relative clauses to identify even a subtle language impairment. To date, virtually no study concentrates on morphosyntactic development in German-speaking individuals with ASD and the potential similarities with other conditions are not explored. German subject (SRC) and object (ORC) relative clauses are temporally ambiguous but can be disambiguated via case and number marking on different constituents (cf. Table 1). These different disambiguation points influence adults' accuracy rates, with number marked sentences to be harder than case marked ones (Friederici et al., 1998).

Seventy-eight individuals participated. They were divided into one group of individuals with ASD (mean age 12;6 years, range 7;5-15;3; all with a non-verbal IQ in the normal range), one group of children with Specific language Impairment (SLI, mean age 7;3; range 5;3-9;3) and two groups of TD individuals, age-matched with the ASD group (TD1) and the SLI group (TD2), respectively. Pretests included standardized measures of cognitive and linguistic abilities. In the experiment, the participants watched short videos displaying three animals: for instance, a fox (the agent) washing an hedgehog who is in turn washing another fox (the patient, cf. Fig. 1). They were instructed to choose the correct referent via button press. Table 1 illustrates the experimental design.

Proportions of accurate responses were significantly higher for SRC compared to ORC. This pattern held for both individuals with ASD (p=.002, Fig. 1a) and with SLI (p<.001, Fig. 1b) and their respective controls. The clinical groups were always less accurate than their age-matched controls (ASD/TD1: p=.004; SLI/TD2: p<.001). Only in the ASD/TD1 comparison, the number marked condition was less accurate than the one disambiguated via case on the embedded noun (p=0.04). In order to assess the co-occurrence of language impairment in ASD, this group was divided into language-impaired (ALI) and language-normal (ALN) individuals, based on the language pre-test's scores. Inspection of the plots in Figure 1 reveals that, in the ALI group, ORC accuracy was poorer than in the ALN group (Fig. 1c) and also poorer than the younger children with SLI (Fig. 1b/c). In contrast, the performance of the ALN group patterns with the one of the TD1 controls (Fig. 1a/c).

These results reveal a typical pattern of responses in the ASD as well as the SLI groups with lower accuracy in ORC (in ASD, SLI and TD1&2) and in the number marked condition (in ASD and TD1). This sensitivity to different disambiguation features is reminiscent of the adult's response pattern and points towards the existence of a substantial linguistic maturity in ASD, which is particularly evident in the ALN subgroup. Despite this strength, the ASD group as a whole (as well as the SLI) was impaired in the comprehension of ORCs. These difficulties are particularly pronounced in the ALI subgroup and they cannot hinge on low intelligence, which was in the normal range. Rather, it appears that the co-occurrence of language impairment (as measured by standardized assessment) and the ASD condition is detrimental for the processing of complex sentences to a larger extent than language impairment alone. These findings capitalize on the relevance of fine-grained psycholinguistic research to identify language strengths and weaknesses in the ASD population and highlight similarities as well as differences with respect to typical development and SLI.

**Table 1:** Samples of subject relative clauses (SRC) and object relative clauses (ORC) with different disambiguation points (in bold)

| Sentence type | Disambiguation point | Stimulus |
|---|---|---|
| SRC | Case on relative pronoun | (1) Wo ist der Fuchs, **der** gerade den Igel wäscht? *Where is the fox that is washing the hedgehog?* |
| | Case on embedded NP | (2) Wo ist die Biene, die gerade **den** Dino wäscht? *Where is the bee that is washing the dinosaur?* |
| | Number on final verb | (3) Wo ist das Zebra, das gerade die Wölfe **wäscht**? *Where is the zebra that is washing the wolves?* |
| ORC | Case on relative pronoun | (4) Wo ist der Fuchs, **den** gerade der Igel wäscht? *Where is the fox that the hedgehog is washing?* |
| | Case on embedded NP | (5) Wo ist die Biene, die gerade **der** Dino wäscht? *Where is the bee that the dinosaur is washing?* |
| | Number on final verb | (6) Wo ist das Zebra, das gerade die Wölfe **waschen**? *Where is the zebra that the wolves are washing?* |



**Figure 1:** Sample of the visual scene for (1) and (4)



(a)               (b)               (c)
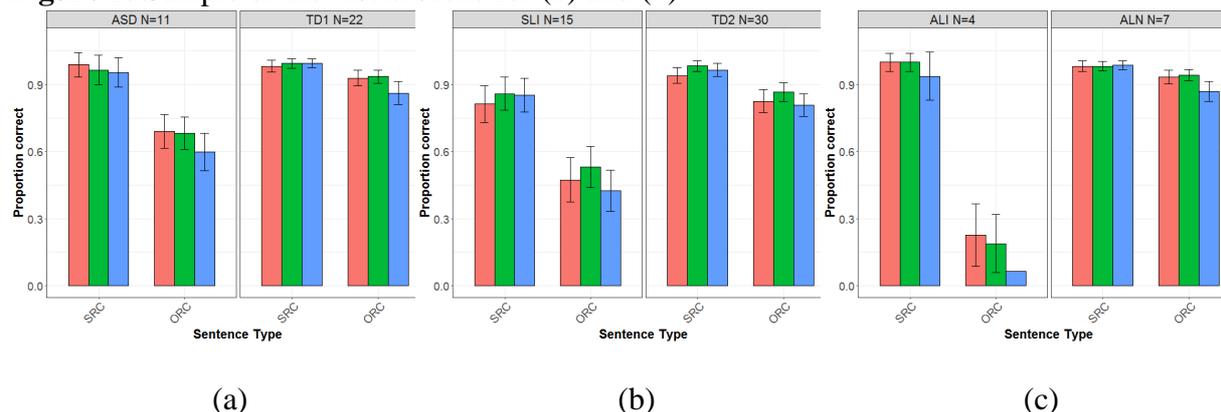
**Figure 2:** Response accuracy in the groups (a) ASD/TD1, (b) SLI/TD2 and (c) ALI/ALN in each condition: red=case on relative pronoun; green= case on embedded NP; blue= number on final verb.

**References**

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