# 2021 Gatlinburg Conference Poster Submission

**Title**: Hyperlexia or Precocious Reading? Evidence from Brazilian Portuguese-speaking Preschool Children with ASD

**Authors**: Cláudia Cardoso-Martins[1], Daniela Teixeira Gonçalves[1], & Carolyn B. Mervis[2]

**Introduction:** Although most children begin to read after they have received formal instruction at school, a very small proportion starts to read very precociously and by 3 to 4 years of age can read as well as 7- to 8-year-old typical readers. Although this phenomenon has been described for typically developing (TD) children (e.g., Pennington et al., 1987; Thompson et al., 2015), it is more often documented in children with neurodevelopmental disorders, particularly autism spectrum disorders (ASD; Ostrolenk et al., 2017; Zhang & Joshi, 2019). In this context, precocious reading ability often is referred to as hyperlexia and considered to be associated with an atypical pattern of reading acquisition. For example, children with ASD and hyperlexia often are reported to start to read suddenly and spontaneously, without paying attention to the meaning of words (Ostrolenk et al., 2017). Additionally, although there is evidence that precocious readers with ASD process letter-sound relations (e.g., Cardoso-Martins & Da Silva (2010; Study 2), it has often been suggested that they capitalize on their relatively good visual-spatial skills to learn to read words (Ostrolenk et al., 2017). Most of what is known about early reading ability in precocious readers with ASD is based on single-subject studies (Ostrolenk et al., 2017). In the present project, we took a different approach, examining reading ability in a group of 12 precocious readers with ASD.

**Method:** Participants were 12 Brazilian Portuguese-speaking children with ASD (11 boys, 1 girl) aged 3.5 – 5.6 years (mean = 4.5 years, *SD* = .66) whose mothers reported had started to read at or before age 4.0 years (mean = 2.9 years, *SD* = .76; range: 2.0 – 4.0). To measure word reading accuracy, children completed a Brazilian Portuguese test of regular word, irregular word, and pseudoword reading that was normed for children in grades 1 – 6 (Salles et al., 2017). Nonverbal reasoning and visual-spatial abilities were measured by the SON-R 2½ - 7 (Laros et al., 2016), and receptive vocabulary was assessed using a Brazilian Portuguese adaptation of the Peabody Picture Vocabulary Test-4 (PPVT-4; Dunn & Dunn, 2007) Form A. Some participants also completed a word-reading comprehension task developed for this study from the PPPV-4 Form-B.

**Results:** All children performed in the average range on the SON-R nonverbal scale (mean SS = 102.25, *SD* = 6.36; range = 92 - 111) and in the average to superior range on the SON-R visual-spatial scale (mean SS = 121.25, *SD* = 18.87, range = 92 - 148). On the PPVT-4, seven participants scored within ± 1.00 *SD* of the mean for their CA, three scored between -1.01 and -2 SDs, and two scored > -2 SDs below the mean. Word reading ability varied considerably (regular: 5 – 20 words out of 20 possible, irregular: 1 – 17, pseudoword: 1 – 19). Regular word reading correlated strongly with irregular word reading (*rho* = .85, $p < .001$), and pseudoword reading correlated strongly with both regular word (*rho* = .91, $p < .001$) and irregular word (*rho* = .68, $p < .05$) accuracy. Receptive vocabulary correlated significantly with regular word reading ability (*rho* = .63, $p < .05$). The correlations between visual-spatial skills and regular (*rho* = .28) or irregular (*rho* = .13) word reading were small and not statistically significant. Although CA did not correlate significantly with individual differences in word reading ability, reading experience as measured by the number of months between the time participants had started to read and the time of the study (mean = 18.5 months, *SD* = 10.25; range: 4 – 37) correlated strongly and significantly with ability to read both regular (*rho* = .69) and irregular (*rho* = .65) words. In a final set of analyses, we compared the word-reading and comprehension abilities of the three 3- to 4-year old participants whose word-reading abilities were at the level expected for TD children at the 1st or 2nd grade to three TD precocious readers individually matched for word-reading ability. The two sets of children not only earned similar decoding scores on the word-reading comprehension task (ASD: 86% correct, TD: 89% correct), but they comprehended similar percentages of the words that were read correctly (ASD: 71%, TD: 71%). Furthermore, for both groups the number of written words comprehended on the PPVT-4 Form B corresponded closely to the number of spoken words comprehended on the PPVT-4 Form A.

**Discussion:** Precocious readers with ASD learn to read in fundamentally the same way as TD readers do, by processing and remembering letter-sound relations in words. Rather than starting to read suddenly, their reading ability increases gradually as a

function of the length of time since they began to read. We found no indication that precocious readers with ASD learn to read without paying attention to the meaning of words. Theoretical and practical implications of these findings will be addressed.

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[1] Universidade Federal de Minas Gerais, Brazil
[2] University of Louisville