Math Competence in Students with Autism

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Introduction

On the assumption that early detection helps to prevent subsequent difficulties, different studies have been carried out to assess basic mathematical competence. In particular, informal knowledge is considered to be a strong predictor of subsequent academic mathematical performance (see e.g., Kilday & Kinzie, 2009). According to Titeca et al. (2014), early numeracy skills of children diagnosed with high-functioning ADS are similar to those found in their typically developing peers. On the contrary, Chen et al. (2019) identified two different profiles within autistic students showing discrepancies in mathematical achievement.

Methodology

Participants

The present study was carried out with a sample of 17 students enrolled in the first four levels of primary school. The following selection criteria were also considered to be met by participants: (1) being between 6 and 12 years old; (2) being diagnosed with ASD and showing no evidence of another psychiatric comorbidity; and (3) an IQ score equal to or greater than 70, as measured by the Wechsler Intelligence Scale for Children (WISC-V; Wechsler et al., 2014). The mean age of the students within the subsample is 8,16 years old, with a standard deviation of 1,42 years. Only two of the selected students are girls (11.8%).

Information-gathering tool

In this poster, the *Test of Early Mathematical Ability* (3th edition; TEMA-3, Ginsburg et al, 2007) is used to assess the mathematical skills of the students. It is a valuable tool for children, aged from 3 to 8 years and 11 months old, with typical mathematical development, and for older students with special needs. Since the test assesses different aspects of mathematical competence including both informal and formal tasks, it allows the specialist to determine specific strengths or weakness in the student's proficiency.
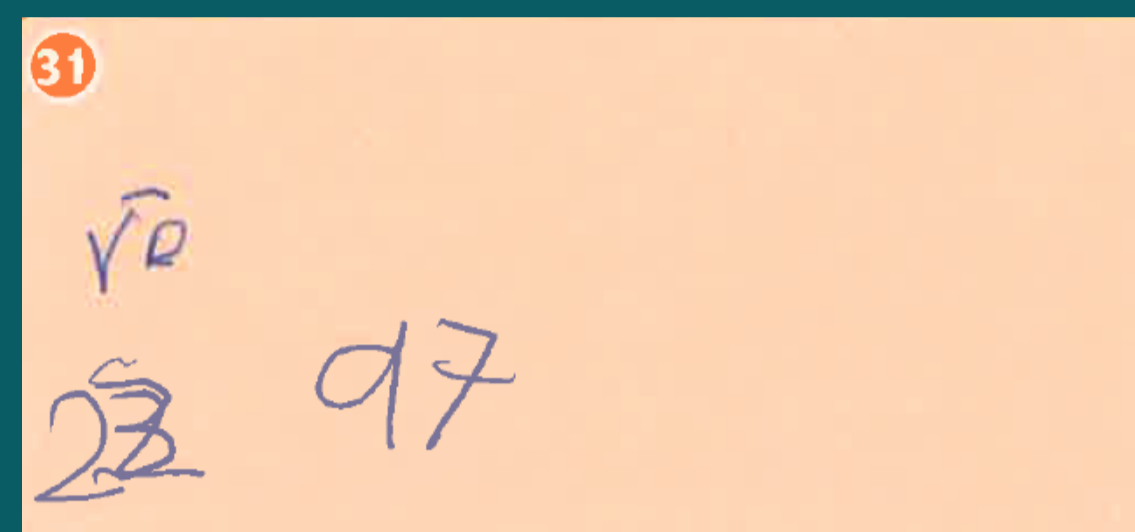
Example of a task of numeral literacy in which children are asked to write twenty-three and ninety-seven.

Example of a task of number comparison (informal knowledge): the student is asked to identify the set with larger number of elements.
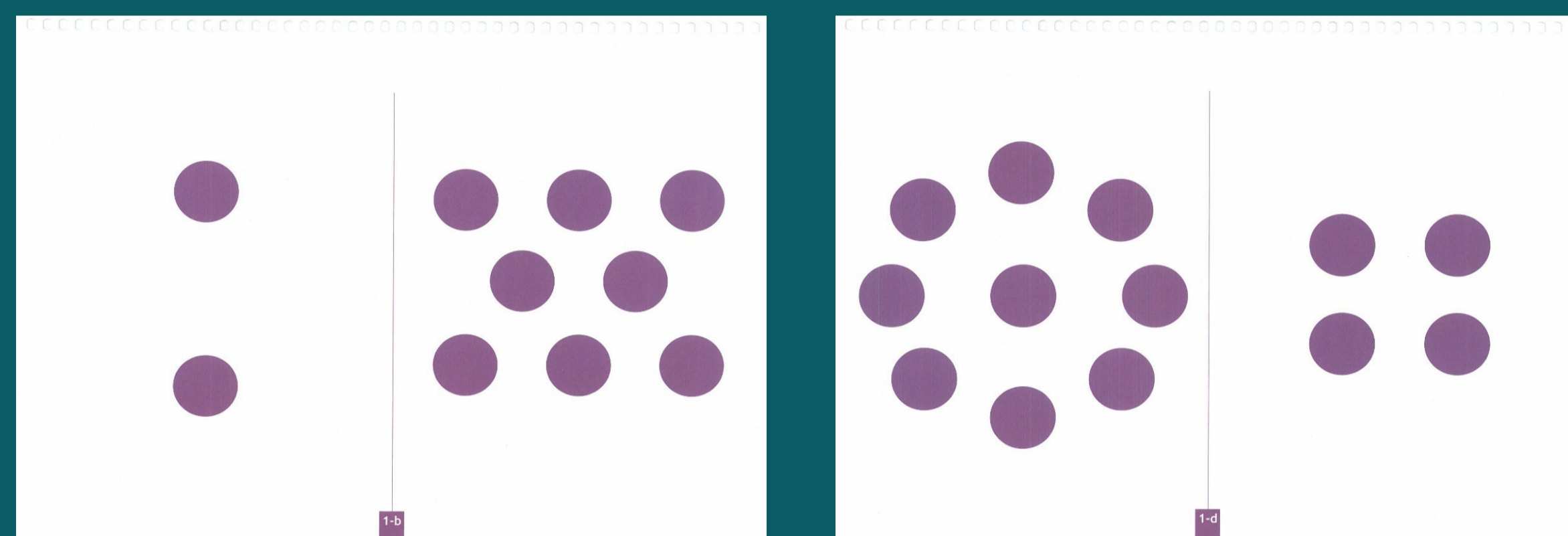
Results

Separate scores obtained for informal-knowledge (numbering, number facts, calculation and concepts) and formal-knowledge (numeral literacy, number comparisons, calculation and concepts) categories measured by the TEMA-3 are analysed.

We observe a group of students older than 8 years with mathematical difficulties. These students obtained low scores (low percentage of correct tasks with respect to those expected for the student's age) for both informal and formal knowledge.

Another group of four students under the age of 7 shows a level of mathematical competence greater than expected.

Correlation analysis

In general, a preliminary analysis of correlations between the categories measured by the TEMA-3 reveals no apparent dependence on each other, but there seem to be some exceptions:

- **Informal categories**: The category of numbering shows a dependence with respect to the other informal-knowledge categories, such as calculation ($\rho = 0.87$) and concepts ($\rho = 0.71$).

- **Formal categories**: formal-knowledge categories of number facts and calculation appear to be related to each other ($\rho = 0.82$).

- **In respect of the mathematical age**, it correlates with formal categories of number facts ($\rho = 0.71$) and calculation ($\rho = 0.80$).

- Regarding the **relation between informal and formal categories**, numerical literacy seems to be correlated with informal-knowledge categories: numbering ($\rho = 0.89$), number comparisons ($\rho = 0.42$), calculation ($\rho = 0.67$) and concepts ($\rho = 0.76$).
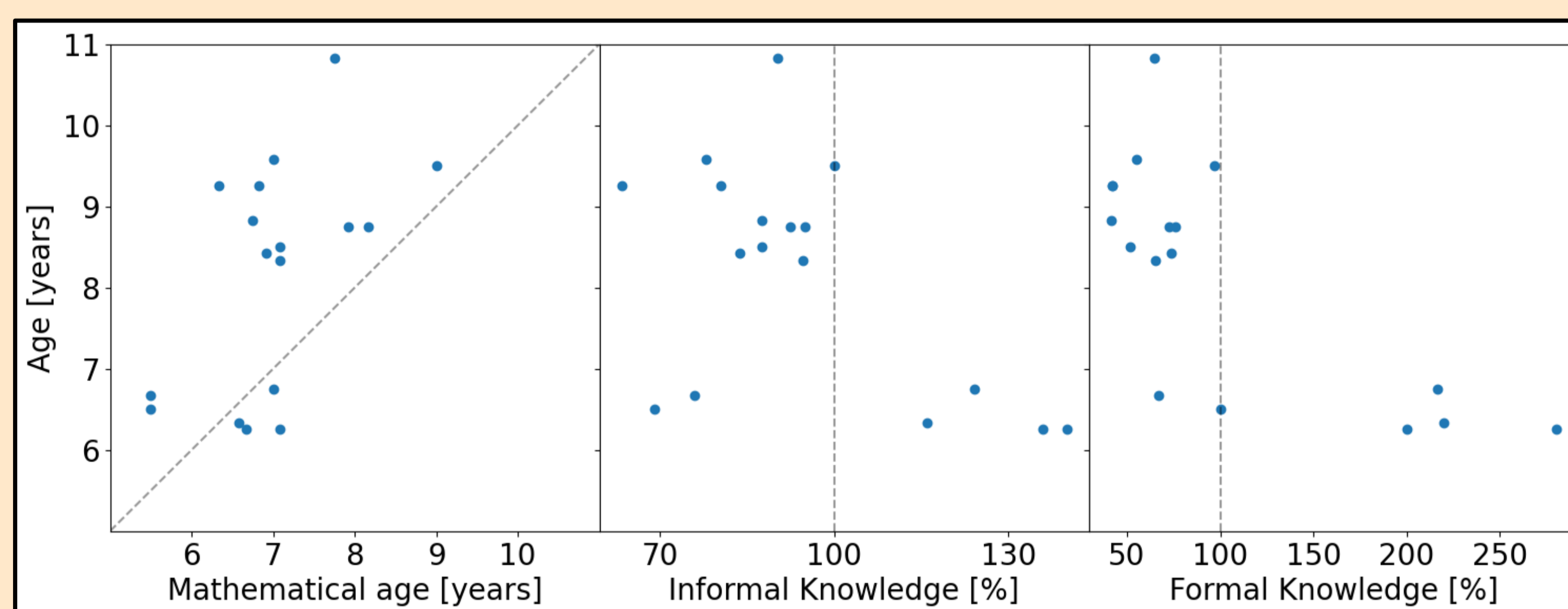
Conclusions

Most of the students (13 of 17) showed mathematical difficulties for both informal and formal domains, and four children showed a mathematical age greater than their chronological age. This could be consistent with the results obtained by Chen et al. (2019).

A low achievement in informal skills could be related to difficulties in numerical literacy.

This very preliminary analysis suggests that future instruction may be focused on improving calculation and numerical literacy skills in those students within our sample who scored lower on the TEMA-3.

Website of the project: https://matematicasyautismo.unican.es/

References

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