Indeed, research groups that have conducted longitudinal studies have shown that autistic children present highly varied developmental trajectories

Projet de recherche longitudinal
UNE AUTRE INTELLIGENCE
Les prédicteurs et corrélats de l'intelligence autistique

Predictors of Intelligence in Autism:

The role of perceptual skills and behaviors and interests during the preschool period

By ÈVE PICARD

At the time of diagnosis of autism in preschool, parents of autistic children frequently wonder how their child will develop intellectually. They want to know what the future holds for their child. Yet, even today, it remains difficult to answer this question, as studies show great variability in the intellectual development of autistic children. Indeed, research groups that have conducted longitudinal studies have shown that

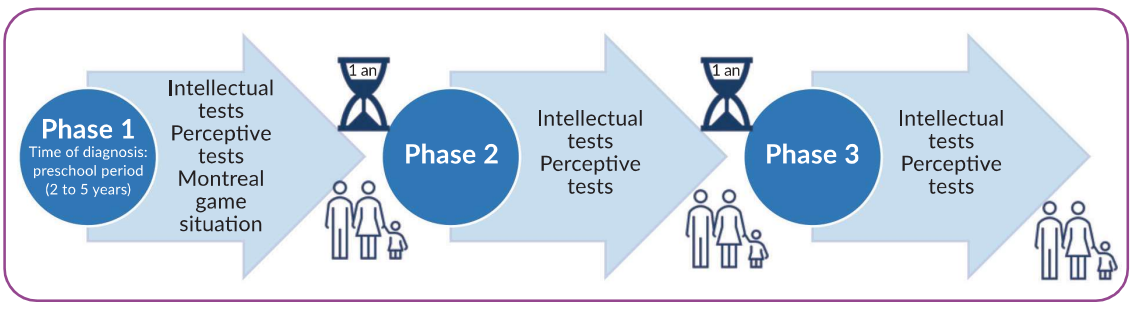
autistic children present highly varied developmental trajectories: while the intelligence test scores of some autistic children remain stable as they grow up, they seem to increase or decrease considerably for others. This "unpredictability" in assessing the intelligence of autistic children has often been associated with the difficulty of conducting a valid intellectual assessment at such a young age . Indeed, during the preschool period, assessments are accompanied by numerous challenges that can undermine the validity of their results. While some challenges are present with most young children (e.g., limited attention span, needing several pauses, loss of interest in the task, etc.), others are more specific to children with autism (e.g., language delays). As a result, at the time of diagnosis in preschool, it can be difficult to conduct a valid assessment, and thus reveal the true intellectual potential of autistic children. Predictors of intelligence in autism remain to be discovered.

In autism, perception seems to play a more important role than in neurotypical (without developmental particularities) individuals, both cognitively and behaviorally. Cognitively, compared with their neurotypical peers, children and adults with autism often perform better on perceptual tests, and their perceptual skills are more strongly associated with their general intellectual skills (stronger positive relationship). Behaviorally, the restricted and repetitive behaviors and interests that are central to the diagnosis of autism frequently have a strong perceptual component (e.g., lateral or close gazes, exploration of visual objects with perceptual features, interests in letters and numbers, etc.). These perceptual peculiarities suggest that the predictors of intelligence in autistic children may differ from those in neurotypical children, with a more important role for perception in autistic individuals.

To fill this gap in scientific knowledge, researchers at the Centre de Recherche, d''Évaluation et d'Intervention en Autisme (CREIA) conducted a longitudinal study at Hôpital Rivière-des-Prairies to determine whether measures other than conventional intelligence tests at preschool age could be used as predictors of intellectual level at school age. Specifically, the researchers tested: 1) whether perceptual skills and behaviours, and interests identified at preschool age could predict school-age intellectual level and the trajectory of intellectual development in children with autism; and 2) whether these perceptual predictors were specific to autism or shared with neurotypical children.

Methodology: Another Intelligence Project

In order to elucidate the question of predictors of intelligence in autism, the researchers set up a longitudinal study following a cohort of 41 autistic and 57 neurotypical children, all aged 2 to 5 years old, i.e. during the preschool period. The autistic children were recruited from Hôpital Rivière-des-Prairies as soon as they were diagnosed with autism, and the neurotypical children from nearby daycare centers. All children were assessed using intelligence tests (the Wechsler Intelligence Scale (WPPSI-IV) and the Raven Colored Progressive Matrices (RCPM)), and perceptual tests (a Visual Search Task (VS) and a Figure Entanglement Task (CEFT)) on three occasions during their development, with a one-year gap between each assessment. The children also took part in the Montreal play situation (SSM1) at the time of their 1st assessment at preschool age. The Montreal play situation consists of a filmed play period lasting around 30 minutes, during which an experimenter presents the child with some 40 toys specially chosen for their perceptual properties (e.g., toys with lights, toys that turn, etc.). This allows us to document the frequency of perceptual behaviors and interests, i.e., behaviors that are atypical either in nature (e.g. sideways glances) or intensity (e.g. alignment of objects), and have a perceptual component.



In autism, perception seems to play a more important role than in neurotypical (without developmental particularities) individuals, both cognitively and behaviorally.

Main references:

1- For more details on the assessment of preschool-aged children with autism, see the article: Early Childhood Assessment: The importance of a multi-method and multi-perspective approach

2- Fore more details on the play situation (SSM1), see the article: Are repetitive behaviours and object exploration in young autistic children compatible?

3- For an illustration of SSM1, please refer to the comic strip on page 11 of this magazine.

Unlike conventional intelligence tests, perceptual tests have the advantage of being easier to use with young children with autism, since they do not require the use of language and are based on the perceptual strengths frequently observed in autism.

Brief description of the intelligence and perceptual tests used in the Another Intelligence project

The **Wechsler Intelligence Scale (WPPSI-IV)** is a conventional intelligence test requiring a good level of language on the part of the child (verbal instructions and verbal responses). The **Raven Colored Progressive Matrices (RCPM)** also measures intelligence. Unlike the Wechsler intelligence scale, it does not require a high level of language to be completed. The **Visual Search Task (VS)** and the **Figure Entanglement Task (CEFT)** measure perceptual skills. The first involves finding a target letter (e.g., red X) among other letters as quickly as possible (see Figure 1), and the second involves finding a geometric shape (e.g., triangle) hidden in a global image as quickly as possible (see Figure 2). Compared with other intelligence tests, perceptual tasks are more concrete and rely less on language, and seem to better represent the cognitive style of autistic people (perceptual and visual).

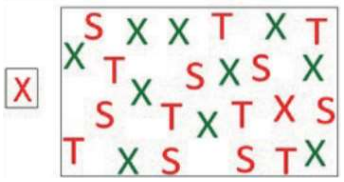


Figure 1. Visual search task (VS).

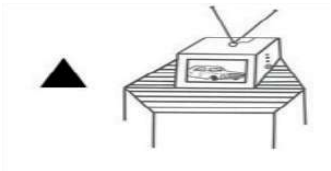


Figure 2. Entangled figures task (CEFT).

Main results

The results suggest that perceptual skills on the VS and CEFT at preschool age predict later intellectual level on the WPPSI-IV for both autistic and neurotypical children. In other words, autistic and neurotypical children who demonstrated better VS and CEFT skills at preschool age had higher WPPSI-IV performance at school age. Similarly, in autistic children, better perceptual skills on the VS and CEFT at preschool age predicted later intellectual level on the RCPM. However, in neurotypical children, only CEFT performance is related to RCPM. In summary, the results suggest that perceptual skills measured at preschool may be useful in estimating intellectual potential at school age, particularly in children with autism.

In preschool-aged children with autism, the frequency of perceptual behaviors and interests in the SSM1 is a good predictor of later intellectual level on the RCPM only, and not on the WPPSI-IV. Thus, children with autism who showed more perceptual behaviors and interests generally performed better on the MPRC at school age. However, in neurotypical children, the frequency of perceptual behaviors and interests is not related to later intellectual level (WPPSI-IV and RCPM). Thus, the predictive role of perceptual behaviors and interests at preschool age seems specific to autism!

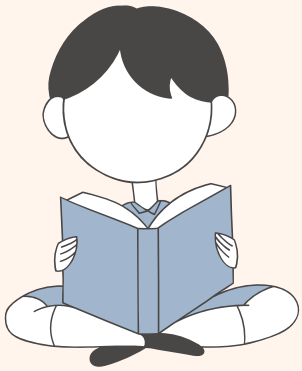
Conclusion and relevance of the study

In conclusion, this study suggests that perceptual skills and perceptual behaviors and interests at preschool age are good predictors of later intellectual level in autism. These findings are of great clinical importance, because as previously discussed, at the time of diagnosis at preschool age, it can be difficult to conduct a valid intellectual assessment. Unlike conventional intelligence tests, perceptual tests have the advantage of being easier to use with young children with autism, since they do not require the use of language and are based on the perceptual strengths frequently observed in autism. Although perceptual tests and the observation of the frequency of perceptual behaviours and interests do not replace a complete intellectual assessment, they are interesting and complementary avenues to explore in order to better estimate the intellectual potential of children with autism. Ultimately, the findings of this study have important clinical significance, as they may contribute to improving assessment methods with preschool-aged children with autism.

ÉLÈVES AUTISTES D'ÂGE SCOLAIRE RECHERCHÉS POUR UNE ÉTUDE!

Centre intégré universitaire de santé et de services sociaux du Nord-de-l'Île-de-Montréal
Québec
UQÀM

Cette étude vise à documenter les profils d'habiletés scolaires des élèves autistes.



Critères d'égibilité :
- Être âgé entre 6 et 12 ans
- Diagnostic d'autisme

Participation attendue :
- 2 séances de 1h30

Compensation :
- 30$ par séance (total 60$)

Lieu :
- Hôpital Rivière-des-Prairies **ou** Pavillon Adrien-Pinard, UQÀM

Pour participer, contactez Ève Picard au :

(514)-323-7260 #4572

projet.intelligence.cnmtl@ssss.gouv.qc.ca

Étude menée par :
Isabelle Soulières, UQÀM
Claudine Jacques, UQO
Valérie Courchesne, CAMH

Approuvé par le comité éthique du CIUSSS NIM, #2023-2639.

Comic strip

Comic strip by Stéphanie Milot, B.A. bd, story by Catherina Lacelle, undergraduate student in psychology produced with the support of a research initiation grant from the Fond de Recherche du Québec - Société et Culture (FRQSC).

Context setting: As part of the broader project "Une autre intelligence", preschool children (aged 3 to 6), both autistic and typically developing, are presented with the Montreal stimulating play situation. The children are videotaped to enable analysis of toys exploration and manifestation of repetitive behaviors over four play periods. In the first period, Free Play 1, the child can explore the toys of his choice. In the second period, Semi-Free Play, the child can play with the toys of his choice, and the experimenter activates the toys or copies the child's actions. In the third period, Semi-Structured Play, the experimenter introduces new toys in a predetermined order. Finally, in the last period, Free Play 2, the child can play with all the toys in the room. In this story, you'll follow Jordan, an autistic child, through the four phases of the play situation.

Lien vers l'article : Jacques, C., Courchesne, V., Meilleur, A. A. S., Mineau, S., Ferguson, S., Cousineau, D., Labbe, A., Dawson, M. & Mottron, L. (2018). What interests young autistic children ? An exploratory study of object exploration and repetitive behavior. *PloS one, 13*(12), e0209251.

Conseil de recherches en sciences humaines du Canada
Social Sciences and Humanities Research Council of Canada
Canada