sequences, lateral glance was accompanied by a head tilt. Furthermore, lateral glance was often associated with the presence of an element in movement in the environment. Although lateral glances were also found in some typical children, they took a unique form in autistic children. Autistic children use them to inspect moving objects, or place objects at the edge of their visual field, while typical children use lateral glance to follow a coveted object.

(a)

(b)

CLINICALLY

No link was found between frequency of lateral glance and verbal mental age or chronological age. This challenges the notion that repetitive behaviors, such as lateral glances, are linked to developmental delay. Furthermore, the absence of correlation between communication skills and lateral glances confirms that these two areas of symptoms are independent of one another. This result had also been confirmed by other researchers.

NEUROCOGNITIVE IMPLICATIONS

The association between lateral glances and moving objects suggests that AVEBIOs have a purpose. It has been shown that it is more difficult for autistic children to perform perceptual tasks that include movement. A possible explanation is that lateral glance is used to filter visual information. The resolution on the periphery of the visual field is lower and it is therefore possible that looking at an object laterally allows autistics to obtain visual information in a simpler form, making it easier to process and analyse.

In conclusion, these results suggest that some repetitive behaviors have an adaptive function, they could be helpful for autistic individuals and allow them to better adapt to their environment. Therefore, this brings into question the relevance of interventions aiming to eliminate these behaviors. Moreover, it seems that the AVEBIOs identified in this study are specific to autism and appear hastily in development. These results could qualify AVEBIOs as precursors, to and hence having an impact on the diagnosis of autism spectrum disorders.

Original study: Mottron, L., Mineau, S., Martel, G., St-Charles Bernier, C., Berthiaume, C., Dawson, M., Lemay, M., Palardy, S., Charman, T., & Faubert, J. (2007). Lateral glances toward moving stimuli among young children with autism: Early regulation of locally oriented perception? Development and Psychopathology, 19(01), 23-36. doi: 10.1017/S0954579407070022

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INTELLIGENCE IN AUTISM: THE ROLE OF PERCEPTION AS A UNIQUE " P" FACTOR?

By Dominique Girard, Ph.D. student in psychology at UQAM
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Young autistic children present particular behaviours associated with the sensory aspects of their environment (e.g. react strongly to certain textures, sensitive to noise, interested in objects in repetitive movement, etc.). In the most recent version of the DSM, the diagnostic criteria of the Autistic Spectrum Disorder (ASD) have been modified such that perceptual behaviours now hold a greater im-

portance in the diagnosis of this condition. Given frequent clinical observations of sensory related behaviours in autistic children, our research group has focused on understanding how the autistic brain processes perceptual information.

VISUAL AND AUDITORY INFORMATION PROCESSING IN THE AUTISTIC BRAIN….

Studies have found that autistics' perceptual abilities differ from those of typically developing individuals. More precisely, autistics show more accurate processing of both auditory and visual information. In fact, autistic brains are more sensitive to changes in the elementary dimensions of visual and auditory information (e.g. luminance-contrast, spatial frequency, and pitch), in comparison to typically developing individuals with similar levels of intelligence (measured with IQ). These elementary dimensions are extracted from a stimulus during the early stages of perception through low-level information processing mechanisms located mainly in the primary perceptual regions of the brain.

As a result of these highly efficient low-level processes, autistics perform better in discrimination tasks (e.g. whether the pitch of 2 sounds is identical or different) compared to age- and intelligence-matched typically developing individuals. This generally enhanced processing of early perceptual information may be related to some common behaviours observed in young children with autism, such as hypersensitivity to noise and prolonged visual examination of objects.

Also, a strength has been documented in autistics for perceptual skills that involve mid-level information processing. Mid-level perceptual mechanisms involve later stages of perception that include activation of more complex brain networks (e.g. co-activation of frontal lobe). They are required to integrate low-level information (or signals) and group it together to make sense. For example, mid-level processing allows us to distinguish an object hidden within other visual stimuli and to understand how parts come together to form a whole. Mid-level processing is also more susceptible than low-level processing to the influence of expectations and anterior knowledge.

Researchers suggest that autistics are less sensitive to the influence of expectations and prior knowledge, compared to non-autistic individuals. This would allow them to reach high levels of performance in mid-level auditory and visual tasks. In fact, brain imaging studies have shown that autistics use the perceptual parts of their brain more often to complete a variety of tasks without systematically activating other cognitive processes, as is frequently found in typically developing individuals. Therefore, more autonomous cognitive processes that are less sensitive to external influences could give autistics an advantage when solving not only a variety of perceptual tasks, but also more complex task such as measures of fluid intelligence (i.e. matrix reasoning).

WHAT IS INTELLIGENCE?

Among the general population we find a correlation between perceptual skills and general intelligence. This means that the more intelligent you are, the better you will be at processing perceptual information. This positive relationship is also documented for other thinking skills (e.g. between memory and intelligence). Statisticians have identified a common factor to explain this positive relationship that exists between the different types of thinking skills. They called it the "g" factor, since it reflects the "global level of cognitive abilities".

AUTISTIC INTELLIGENCE: HOW DOES PERCEPTION RELATE TO GENERAL INTELLIGENCE?

Considering the presence of enhanced perception and the unique autonomy of brain mechanisms underlying such abilities in autism, researchers from the Rivière-des-Prairies Hospital designed an innovative study to investigate the intriguing relationship between perception and intelligence in autistics. They aimed to determine whether perceptual abilities are associated with general intelligence in autistics, in the same way as typically developing individuals. Specifically, they have examined 1) whether perceptual abilities are associated with each other, and 2) whether these perceptual performances are associated with the "g" factor (as demonstrated among non-autistic individuals).

In order to address these questions, 46 participants with an Autism Spectrum Disorder (ASD) diagnosis and 46 typically developing individuals, aged between 14 and 36 years old, were recruited. These participants were exposed to 4 perceptual tasks that assessed low- and mid-level auditory and visual skills. Intelligence was measured with the Wechsler Intelligence Scales (the most widely used IQ

test) and the Progressive Raven Matrices (a test of fluid intelligence found to be one of the closest measures of the "g" factor).

SAME, BUT DIFFERENT…

As predicted by popular models of intelligence, this study finds an association between auditory and visual performances in both typically developing and autistic individuals. This means that when an individual performed well in a perceptual task, he/she generally performed just as well in other perceptual tasks.

Furthermore, results confirmed that perceptual skills are associated with general intelligence or the "g" factor among typically developing individuals. In this study, this meant that higher IQs were related to better performances in perceptual tasks. Interestingly, researchers found a different pattern of results in autistics: performance on perceptual tasks was not directly related to general intelligence. Surprised by this result, researchers conducted complex statistical analyses and identified a distinct factor that seems to underlie this specific association between visual and auditory perception in autism. This new factor was named the "p" factor, for perception.

WHAT DOES THE "P" FACTOR MEAN?

According to authors, the "p" factor is a fundamental component of intelligence in autism. It could reflect a unique neurocognitive profile, which emerged from a series of modifications acting on different brain systems. These modifications have likely been occurring in the autistic brain since early development. This unique developmental course could optimize perceptual information processing in autism, which in turn, could influence how autistics understand their environment, think, and learning. This study brings novel understanding on the nature of intelligence in autism, which leads us to reconsider current assessment and intervention methods and adapt these to meet the needs of this unique clinical population.

Original study: S.Meilleur, A-A. Berthiaume, C., Bertone, A., Mottron, L. (2014). Autism-Specific Covariation in Perceptual Performance «g» or «p» Factor? Plos One. 9:8. doi:e103781.

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UNDERSTANDING THE VISUOSPATIAL PEAKS IN AUTISM SPECTRUM DISORDERS

By Éliane Danis, Ph.D. student in neuropsychology at UQAM
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Treatment and manipulation of visuospatial information are well-known strengths in individuals with Autism Spectrum Disorder (ASD). These strengths are often measured by the Block Design subtest of the Wechsler Intelligence Scales. The Block Design subtest requires an individual to manipulate red and white blocks to recreate a constructed model or picture. A portion of individuals with ASD perform significantly better on this subtest compared to the other subtests of the Wechsler Scales. This strength in performance is also referred to as a "peak".

In a study by Caron, Mottron, Berthiaume, and Dawson, 5 different tasks were administered to evaluate different visual, perceptive, and cognitive processes possibly implicated in this visuospatial peak in ASD. The tasks were administered to 16 adolescents and young adults with ASD and 18 controls. The participants were matched by age. Eight participants from each group had a visuospatial peak which resulted in a total of 4 different groups: ASD, controls, those with peak performance, and those with no-peak performance. Most of the participants had an average Intelligence Quotient (IQ), except the control participants with a visuospatial peak who had an above average IQ.

The **first task** was a modified version of the Block Design subtest. For this task, the perceptual cohe-