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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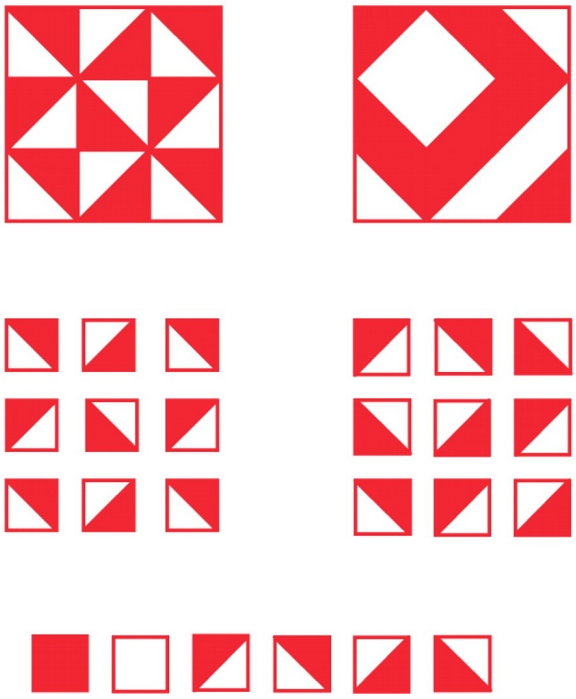
Treatment and manipulation of visuospatial information are well-known strengths in individuals with Autism Spectrum Disorder (ASD). These strengths are often measured by the Block Design subtest of the Wechsler Intelligence Scales. The Block Design subtest requires an individual to manipulate red and 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-



siveness of the designs varied across trials. Higher perceptual cohesiveness is said to occur when the different blocks in the design form a coherent whole and are hard to segment from one another. As expected, both ASD and controls participants with a visuospatial peak performed better than participants without a strength in visuospatial abilities. It was also found that ASD participants (with and without a peak) were less influenced by the increase in perceptual cohesiveness compared to controls. These results indicated that individuals with ASD are better at segmenting a design (i.e., to treat information at a local level) despite the high level of perceptual cohesiveness of the designs. Other researchers have previously hypothesized that this advantage in treating local visual information (i.e., detailed or segmented information) in ASD was due to their inability to treat information globally. Consequently, it was believed that individuals with ASD were not influenced by the increase of perceptual cohesiveness. The results of the next two tasks from Caron and colleagues invalidated that hypothesis.

In the **second task**, participants had to pair whole designs to their respective segmented forms. Once again, the perceptual cohesiveness of the designs varied across items. All participants performed better when the designs to be paired had a high perceptual cohesiveness since they were easier to treat globally. However, ASD and control participants with a visuospatial peak were faster to complete the task, regardless of the level of perceptual cohesiveness of the designs.

In the **third task**, participants had to determine if a design had previously been presented. Again, designs forming a coherent global whole were better recalled by all participants but those with a visuospatial peak (ASD and controls) remembered more details of the designs than those without this visuospatial strength. In addition to confirming that the mechanisms underlying global treatment of visual information are intact in ASD, these tasks demonstrated that those with a visuospatial peak perform significantly better on perceptual tasks compared to individuals without this peak.

In the **fourth task**, participants had to find a predetermined block among distractors. All of the participants had a similar rate of accuracy; however those with a visuospatial peak were faster at responding than the participants without a peak.

In the **fifth and final task**, participants had to choose which of two block designs matched the initial design that had been presented to them a few seconds earlier. Presentation time of the initial designs varied across trials. The results showed that participants with a visuospatial peak needed less time to memorize the initial designs compared to other participants.

In summary, Caron and colleagues found that individuals with ASD, with or without a visuospatial peak, prefer to treat visual information locally and are better than controls in doing so. In addition to this local bias, the ability to treat information globally remains intact in ASD. They also found that individuals with a visuospatial peak had superior perceptual processing abilities compared to those without a peak. Therefore, understanding the visuospatial peak in individuals with ASD is twofold. First, they have a preference in treating visual information locally (which aids in segmenting block designs and are less influenced by the global whole of the image). Second, individuals with ASD have superior perceptual processing abilities which help them complete tasks faster and to treat information more efficiently.

Original study: Caron, M.-J., Mottron, L., Berthiaume, C., & Dawson, M. (2006). Cognitive mechanism, specificity and neural underpinnings of visuospatial peaks in autism. *Brain*, *129*(7), 1789-1802. doi : 10.1093/brain/aw1072

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