Sur le spectre
Number 8
Fall 2019
The Montreal Cognitive Neuroscience Autism Research Group

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Sur le spectre

SUMMARY

Number 8– **FALL 2019**

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Autistic people in research: decreasing differences?

Fondation lespetitstrésors santé mentale et autisme
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RÉSEAU NATIONAL D'EXPERTISE EN TROUBLE DU SPECTRE DE L'AUTISME

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RECHERCHE CIUSSS NÎM

Université de Montréal
CHAIRE DE RECHERCHE MARCEL ET ROLANDE GOSSELIN EN NEUROSCIENCES COGNITIVES FONDAMENTALES ET APPLIQUÉES DU SPECTRE AUTISTIQUE

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Official magazine of the The Montreal Cognitive Neuroscience Autism Research Group

The Montreal Cognitive Neuroscience Autism Research Group focuses on brain function, auditory and visual perception, exceptional skills and interventions in autism.

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Sur le spectre :

Many thanks!

It is once again with great pride that we present to you a new issue of our scientific outreach magazine, Sur le Spectre, brought to you by the Montreal Cognitive Neuroscience and Autism Research Group.

Renewed engagement from many exceptional students and researchers has allowed us to pursue the magazine's mission to increase the accessibility of autism research. After four years of hard work, I want to specifically thank some of them.

First, Dr Laurent Mottron, who thoroughly revises many of the articles in each issue, in addition to writing some himself. Thanks to his constructive feedback, the quality of *Sur le Spectre's* content is constantly improving.

Second, Julie Cumin, who reads ALL articles and translates them. This represents an immense amount of work and thanks to her devotion we are one of the only sources of bilingual scientific information about autism.

Last but not least, I want to express my special thanks to Janie Degré-Pelletier, who has helped me since the very beginning. Back when *Sur le spectre* was only an idea, when we had no name, no logo and no graphic designer to help us, Janie was one of the most valuable partners. Together we created the first two issues of the magazine, literally from scratch. Janie continues to be involved in every issue and is now helping me with two projects to increase *Sur le Spectre's* outreach, both of which would not be possible without her help.

In this issue, you will find an article summarizing a recent meta-analysis by an autistic author from our group. This article was covered media outlets around the world (but the results were not always presented accurately!). You will also find articles summarizing the state of knowledge on executive functioning, melatonin and the quality of life of autistic children. This issue also includes a summary of an article on multisensory integration, published by our group and another article on atypical language development, published by a research group in Belgium. As usual, we encourage you to consult the original articles referenced by our authors if you would like further information on these topics.

Finally, we are again extremely grateful for the support of our partners. Thanks to the Marcel and Rolande Gosselin Research Chair in Cognitive Neuroscience and Autism, to the Réseau National d'expertise en TSA (RNETSA), to the Fondation des Petits Trésors and to the CIUSSS NIM Research center for the visibility on their newly launched website: https://rechercheciusssnim.ca/ . Please do not hesitate to consult our website (www.autismresearchgroupmontreal.ca) and like our Facebook page to stay updated with the group's activities. Invite your colleagues and friends to sign up for our newsletter in order to receive every issue of *Sur le Spectre* as soon as it is published.

Thank you again to all our research participants, who are the first target audience for this magazine and its reason to exist.

Happy reading!

Julie Cumin

Janie Degré-Pelletier

After four years of hard work, I want to specifically thank some of them

People presenting with different symptoms, each more or less present and more or less severe, may all receive a diagnosis of autism.

Autistic people in research:

decreasing differences?

By AUDREY MURRAY and LAURENT MOTTRON

Original article: Rødgaard, E. M., Jensen, K., Vergnes, J. N., Soulières, I., & Mottron, L. (2019). Temporal Changes in Effect Sizes of Studies Comparing Individuals With and Without Autism : A Meta-analysis. *JAMA psychiatry*.

The most recent Diagnostic and Statistical Manual of Mental Disorders (DSM-5) places autism in the category of *Autism Spectrum Disorders*. The DSM is a clinical tool, which lists the traits and behaviors associated with different conditions, thereby allowing health professionals to assess a person's mental condition. In the DSM, the term "spectrum" now encompasses several groups of signs, which used to each belong to distinct categories: autism, Asperger's syndrome, and Pervasive Developmental Disorder- Not Otherwise Specified (PDD-NOS).

This notion of a spectrum was not always used to describe autism. The way we define autism has evolved over time. It was first "categorical" under DSM-IV, meaning that the umbrella condition, as well as all its sub-types, were identified as distinct categories. The definition then became more "dimensional" under DSM-5, with autism being defined as a "spectrum", under which similar conditions are grouped on a continuum, which varies depending on the presence and severity of symptoms. By very definition in the DSM-5, autism is heterogeneous. People presenting with different symptoms, each more or less present and more or less severe, may all receive a diagnosis of autism. Although these symptoms have stayed relatively constant throughout different versions of the DSM, this shift in how we describe autism has gradually transformed the way in which we diagnose it, as well as the severity threshold required for a diagnosis.

Along with this evolution in definition, we have also observed over the past few years that the **reported prevalence** of autism has dramatically increased. Since the 1960s, the proportion of autistic people has increased over fiftyfold, from 0.04% to 2.3%. This considerable increase is not found in other neurodevelopmental conditions. If we were to compare this increase to schizophrenia, another heterogeneous condition, we would find that the number of people affected has remained stable over time. So far, the rise in autism diagnoses has been attributed to a better ability to detect it, a widening of diagnostic criteria, or even to a real increase in the actual number of autistic people.

These shifts in definition and prevalence, as well as their consequences, are the main topics addressed by a study published in the prestigious *JAMA Psychiatry* journal in August. The article, a **meta-meta-analysis**, covers data on 27,723 autistic and non-autistic people around the world, who were studied between 1966 and 2019. The study focused on the evolution of our capacity to detect brain and cognitive differences between autistic and non-autistic people.

Autistic people in research: decreasing differences?

Autism research is often focused on differences between autistic and neurotypical people, in order to better understand the mechanisms that underlie this condition. For example, we can compare cognitive abilities or brain size. To detect these possible differences, researchers recruit participants with and without an autism diagnosis. Having measured a particular variable across all participants, the **effect size**, which indicates the magnitude of difference between the groups, will be measured and reported in a scientific article.

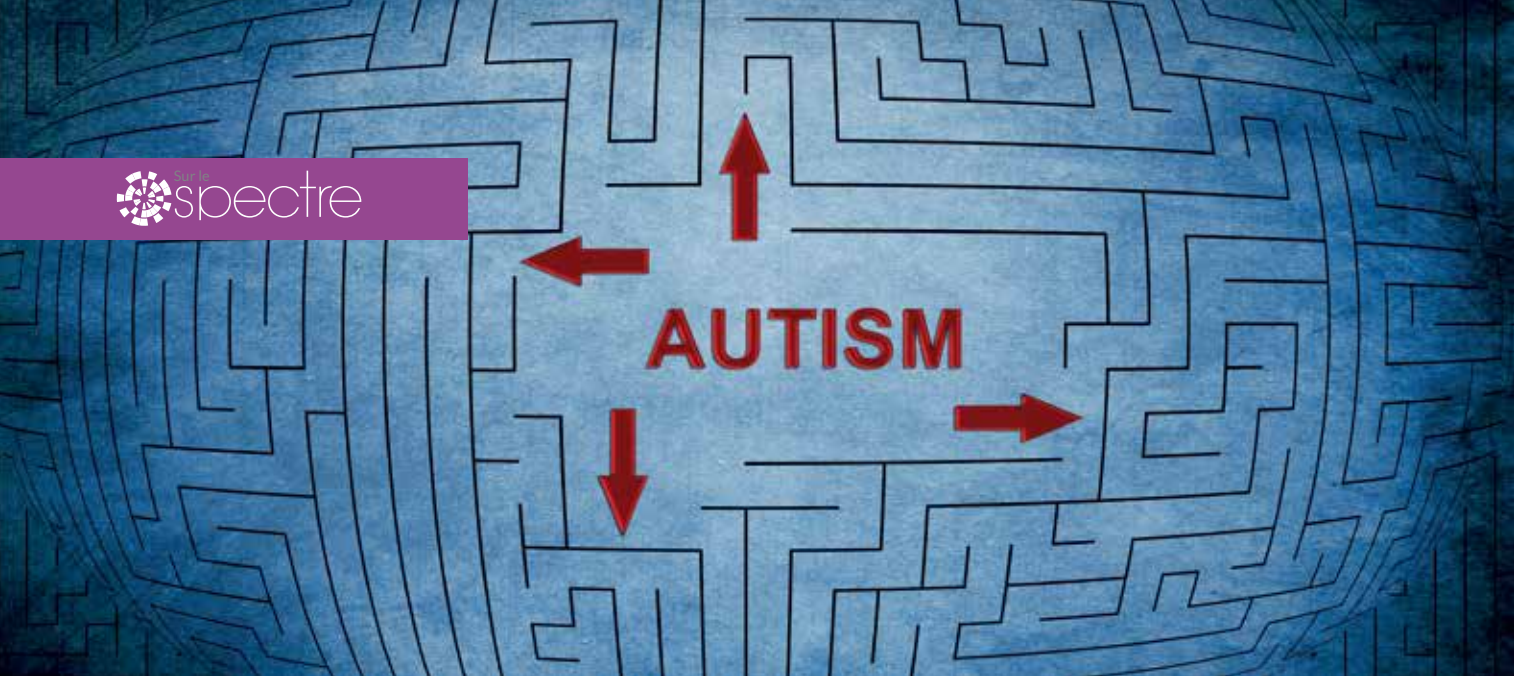
Since autism is increasingly heterogeneous, and the groups being compared are including a growing number of people with very different presentations of autism, the team hypothesized that differences between autistic people and the general population would have gradually

Prévalence

Prevalence refers to the proportion of people affected by a certain illness or condition at a given moment. Prevalence should not be confused with incidence, another important public health measure, which tells us the number of new cases of a particular illness or condition over a given time frame.

Effect size

Effect size is a statistical measure. It allows us to quantify the difference observed between two groups. The higher an effect size, the larger the difference between the groups. For example, for the specific measure of effect size used by the study's authors (which is called Cohen's d), we generally consider that the difference between two groups is large from 0.80. Conversely, the more the effect size approaches 0, the smaller the difference between the groups.



This study does not indicate that people with minor signs of autism have less of a need for services, or worse, that they should not receive any.

decreased over time. Based on a set of criteria, eleven meta-analyses were selected, assessing seven psychological and neurological domains in which a certain consensus exists that stable differences can be found in autistic people: emotion recognition, theory of mind (understanding the thoughts and feelings of others and oneself), planning, cognitive flexibility (transitioning between tasks), inhibition, P3b amplitude (neuronal activity indicator) and brain size. The researchers then compared how effect sizes between autistic and non-autistic groups have evolved over 50 years.

The difference between autistic and non-autistic people has significantly decreased (by 45 to 80%) on 5 of the 7 measures of interest. Decreased differences between autistic and neurotypical people were not significant on cognitive flexibility and inhibition, both of which are often altered in attention deficit and hyperactivity disorder (a diagnosis that can now be given in addition to an autism diagnosis). This trend was not observed in studies on people with schizophrenia.

Amongst a few possible explanations for this decreasing ability to detect differences in autism research, changes in diagnostic practices appear to be a probable cause. When current criteria are applied as a checklist, they will capture many people with other diagnoses, or with very minor signs of the condition. Knowing this, how do we set the limit whereby we judge that someone has too few friends, which is a criterion for social deficit in autism? How do we determine whether having few friends is a personal choice, the result of another pathology, or attributable to another cause? Our diagnostic tools cannot answer these types of questions, and it is via these very mechanisms that a person with very few autistic symptoms can end up with a diagnosis.

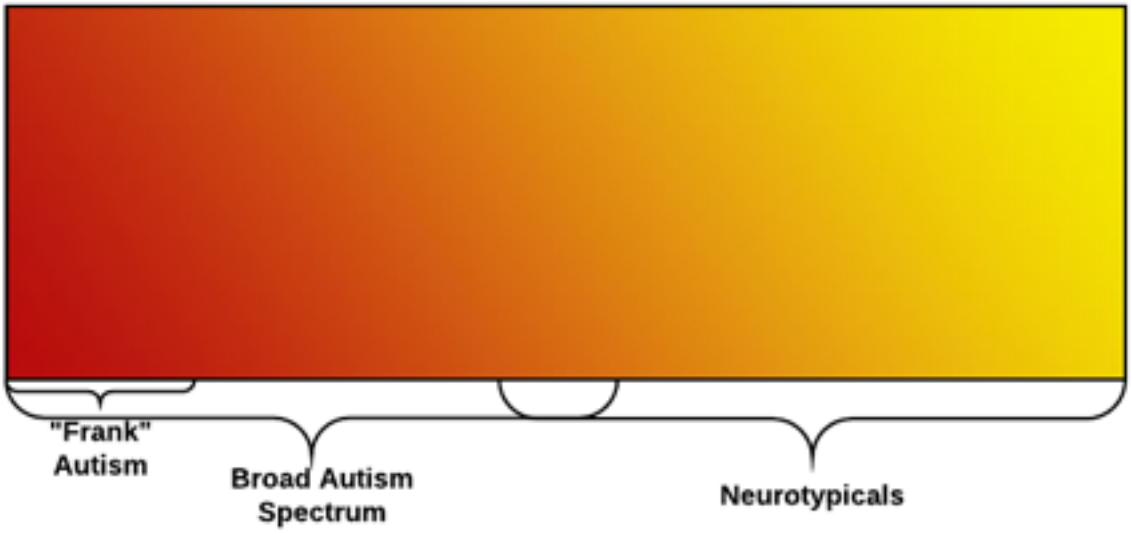


Diagram representing the "loss of signal" in autism. When comparing the red ("frank" autism, that is autistics for whom the diagnostic is really clear) to the yellow (neurotypicals) we find clear differences between the groups. However, when we include a lot of people belonging to the orange category (broad autism spectrum) we find fewer differences with the yellow (neurotypical).

What this study indicates, and what it does not.

This important study, first-authored by an autistic researcher, demonstrates an apparently irreversible tendency to define autism in a way which prevents us from understanding how it works, and thus what causes it. Despite extensive international media coverage, the significance of this study has often been misunderstood. It can explain that no great discoveries have been made in autism over the past fifteen years : how can we discover the cause of a difference between two groups of people if these groups have become… almost identical!?

However, this study does *not* indicate that people with minor signs of autism have less of a need for services, or worse, that they should not receive any. On the contrary, it advocates for care and services on the basis of need, not diagnosis. Otherwise, a vicious circle appears in which diagnoses are given more and more liberally and in a way that is less and less relevant to the needs of the person.

The study's authors do not question that certain people present with signs with are less present, identifiable or severe that those at the furthest extremity of the autism spectrum. The most important conclusions from this study are for research, where it may be unwise to include as many autistic participants as possible, if it lowers the homogeneity and representativity of the group by including persons less and less typically autistic. It would probably be better to focus on smaller populations with more typical presentations, or on large samples if clear and valid information on the autistic subgroups present is available. By including ever increasing numbers of people in research, all with very different presentations of autism, we "lose the signal". It thus becomes harder to find differences between autistic and non-autistic individuals.

Another point is important to clarify, because it has been largely misunderstood. There is *no* argument being made that autistic people of high intelligence or with Asperger's syndrome should be excluded from research. One can indeed be "very autistic" and "very intelligent". There is also no argument being made to exclude people who are relatively well adapted within mainstream society: one can be "very autistic" and in certain cases very well adapted. The point is rather that research must be undertaken on people with diagnoses that are clear and unmistakable, and that do not overlap with other conditions that could be mistaken for autism.

By including ever increasing numbers of people in research, all with very different presentations of autism, we "lose the signal". It thus becomes harder to find differences between autistic and non-autistic individuals.

Participants wanted

Differential diagnosis in autistic women

We want to hear from you!

Do you diagnose autism in adults,
or know someone who does?
This study is led by **Dr. Laurent Mottron**, Université de Montréal, and **Rivière-des-Prairies Hospital**, and will involve a phone interview on your experiences diagnosing autism in adult women with no intellectual disability.

Please contact

Julie Cumin

julie.cumin@umontreal.ca

This project has been approved by the Research Ethics Board of the CIUSSS du Nord de l'Ile de Montréal.

In addition to sleeping and waking, melatonin also influences intestinal movement regulation, immune and reproductive systems.

The potential effects of melatonin

on symptoms and co-morbidities associated with autism.

By KATIA GAGNON and RACKEB TESFAYE

Melatonin is routinely used to improve sleep in autistic children, but there is increasing evidence that melatonin could also have a therapeutic effect on other health problems. This article will summarize a recent literature review that reports on the potential effects of melatonin on the various symptoms associated with autism.

What is melatonin?

Melatonin is an hormone secreted at night by a gland located in the center of the brain. It is known to regulate the internal biological clock, including the sleep/wake cycle. The internal biological clock is influenced by two environmental factors: 1) the light / dark cycle (e.g., sunlight) and 2) social rhythms (social interactions, exercise, meal times).

The brain is not the only structure to secrete melatonin. In fact, the digestive system, lungs, kidneys and retina also secrete this neurohormone. Therefore, in addition to sleeping and waking, melatonin also influences intestinal movement regulation, immune and reproductive systems.

Sleep problems

Autistic individuals frequently have sleep issues. Some estimates report up to 80% of autistic youth will experience sleep disturbance. The most common problems include short sleep duration and symptoms related to insomnia, like resisting bedtime, frequent awakenings during the night and taking longer to fall asleep. The causes of sleep problems in autism are multifactorial, and include biological, psychological, and social factors. Although melatonin is safely used to improve sleep in autistic people, the specific mechanisms by which melatonin improves sleep problems remain unclear.

Anxiety

Anxiety is a common co-morbidity in autism, and it is known to contribute to sleep disturbances in both autistic and neurotypical individuals. A large study including autistic children and typically developing adolescents showed that anxiety symptoms are associated with several types of sleep problems, such as bedtime resistance, sleep-onset delay, sleep-related anxiety, and night awakenings.

There is a growing interest in using melatonin to decrease anxiety symptoms. Animal studies on chronic stress have shown that melatonin can significantly reduce anxiety-like behaviours in rodents. Human clinical trials have investigated the efficacy of melatonin compared to commonly used sedatives to reduce anxiety pre-and post- medical operations. They found that melatonin could be as effective as a sedative in reducing anxiety of children and adults. Despite these promising results, research has yet to investigate the effect of melatonin on anxiety in autism.

Sensory modulation

Sensory processing disorder is very common in autistic individuals. Sensory symptoms can have a major impact on daily functioning, including sleep. Although there have been no examinations on the effect of melatonin on sensory processing disorder, studies suggest that it may influence sensory modulation (organizing sensory information). Interestingly, rodent research on pain sensation has shown that melatonin has pain-relieving and anti-inflammatory properties.

In humans, studies on melatonin and pain show mixed results. Some researchers have found a decrease in pain sensation when using melatonin, while others observed no effect. This range of results could in part be explained by the different research methods used, for example, different populations, medical interventions, and measures of pain.

Melatonin seems to be a good candidate to improve sensory processing disorders, especially when it comes to hypersensitivity. However, more studies are needed to validate this hypothesis.

Gastrointestinal dysfunction

Up to 97% of autistic people have gastrointestinal dysfunction. Types of gastrointestinal problems vary from one autistic individual to the other, but the most common are constipation, diarrhea, and abdominal pain. The presence of gastrointestinal problems in autistic individuals is a risk factor for poor sleep.

Causes of gastrointestinal dysfunction in autism remain understudied. Some authors have suggested that inflammatory processes may be involved in the problem, while others believe that a significant proportion of autistic people have irritable bowel syndrome. More recently, researchers have studied the gut microbiota of autistic individuals. It was found that autistic people had abnormal concentrations of some bacteria in their digestive tract that could be related to gastrointestinal problems.

High concentrations of melatonin are found in the digestive tract. Melatonin could influence intestinal movement, modulate inflammatory responses, and pain. A randomized study has shown that the use of melatonin can improve quality of life and reduce the pain associated with irritable bowel syndrome. Further studies are needed to investigate the effect of melatonin on gastrointestinal dysfunction in autism.

Conclusion

Melatonin is often used to improve sleep problems in autism. However, this neurohormone also seems to provide promising improvements for other health problems that are associated with autism, such as anxiety, pain, sensory processing, and gastrointestinal dysfunction. Despite encouraging preliminary evidence, greater studies with autistic individuals are needed to investigate its potential therapeutic applications. Therefore, we hope this article will stimulate research on the subject and give a solid overview of the field. Consult your health care professional if considering use of melatonin.

In humans, studies on melatonin and pain show mixed results.

Original paper:
Gagnon, K., & Godbout, R. (2018). Melatonin and comorbidities in children with autism spectrum disorder. *Current developmental disorders reports*, *5*(3), 197-206.

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Integrating sound and image!

By ALEXIA OSTROLENK

Have you ever noticed how much easier it is to understand what someone is saying when you are able to see their lips move as they speak? The reason for this phenomenon is that our brain can add up two simultaneous sources of information (stimuli) coming from two different senses, in order to improve overall perception. In our example, the voice is perceived by your hearing and the movement of the lips by your vision, with the two together facilitating your perception of speech. This is called multisensory integration, or MSI. MSI allows information from several sensory inputs to be integrated into a coherent whole, resulting in more rapid and efficient processing of this information.

If the stimuli are not perfectly synchronized, for example in the case of a lag between sound and image in a video, integration does not happen and our perception is confused. It is this same phenomenon that allows us to recognize the food that we eat: by adding up information from smell, texture, and taste, we can distinguish between hundreds of different foods. MSI is therefore crucial for many things, since we are constantly receiving multiple stimuli from our environment: sounds, images, sensations… If this integration does not happen perfectly, the perception of our environment can become confusing and disruptive.

Autism in all senses

Some autistic people avoid loud noises, certain textures or certain smells. On the contrary, others seek out specific stimulation or sensory experiences. Research has shown that 69 to 95% of autistic people have sensory or perceptive specificities, and this criterion now appears in autism diagnostic tools.

Research suggests that autistic people do not integrate multisensory information in the same way that neurotypical people do. An overload of information could be partially responsible for particular sensory behaviours and social challenges experiences by some autistics. However, studies on this topic have generally used rather complex stimuli, for instance involving language or emotions, but no study to date had used a very simple non-social task to evaluate multisensory integration in autistic adolescents and adults. Hence, previous results did not tell us if differences really came from altered MSI, or if the tasks used were simply challenging for autistic people.

Testing MSI simply

This is why a recent study decided to use the simplest existing task to compare MSI between a group of 20 autistic and 20 neurotypical adolescents and adults. Participants were seated at a computer screen with headphones on. For each trial, they were presented with either an auditory stimulus (a *bip* in the headphones), a visual stimulus (a *flash* of light on the screen), an audio-visual stimulus (both simultaneously, *bip* and *flash*), or no stimulus at all. Every time a stimulus appeared, they had to press a button as fast as possible, and their reaction time was measured. There were a total of 256 trials!

When multisensory integration happens normally, participants press the button faster for the combined *bip* and *flash* condition than if they only see the *flash*, or only hear the *bip*. We can then compare participant reaction times between these three conditions to find out if they successfully integrate multisensory information, which allows them to react faster.

What did we discover?

The authors found that the autistic group did not press the button faster when presented with the two stimuli at the same time, whereas this condition helped neurotypical participants. In other words, autistic people do not benefit as much from the facilitation brought by the presence of two stimuli instead of one, even when a very simple and non-social task is used. These results suggest that the integration of audiovisual information is altered in autistic adolescents and adults.

If multiple stimuli are perceived as distinct pieces of information instead of an integrated whole, one can imagine how a busy environment can quickly become overwhelming. These findings could partially explain some of the signs present in autistic people related to communication and social interaction. The understanding of mechanisms that underly observable signs of autism could lead to better adaptations of autistic people's environment to their sensory characteristics and better targets for intervention strategies.

Research suggests that autistic people do not integrate multisensory information in the same way that neurotypical people do.

Original paper:
Ostrolenk, A., Bao, V. A., Mottron, L., Collignon, O., & Bertone, A. (2019). Reduced multisensory facilitation in adolescents and adults on the Autism Spectrum. *Scientific reports*, 9(1), 1-9.

Available open access:
https://www.nature.com/articles/s41598-019-48413-9

Very little work has been done measuring the impact of early intervention on the quality of fie of autistic children.

Quality of life in young autistic children: where do we stand?

By JÉRÔME LICHLTÉ

What is quality of life, and how can we assess it?

Quality of life is a very broad concept, influenced by physical and mental health, level of independence, social relations and relationships to important elements in one's environment. Quality of life is therefore multidimensional and includes objective indicators, namely the person's environment, as well as subjective aspects, or what the person perceives. We use quality of life measurement tools to characterize well-being, with the goal of then improving it. Using these tools, researchers and public officials can collaborate in order to positively influence quality of life.

How does quality of life fit in to health research?

Ultimately, quality of life is the most important measure when assessing whether a health intervention is effective. In autism, quality of life is increasingly emphasized in the assessment of pharmacological and psychosocial interventions.

Why is it important to consider an intervention's impact on quality of life in young autistic children?

Most early interventions offered to families are assessed by their impact on signs of autism. However, more and more researchers now think that an effective intervention should improve the quality of life of the children receiving these interventions, and not simply be based on its capacity to modify a behavior.

Why?

1. This is what parents and autistic people want
2. We have good reason to believe that autistic children have lower quality of life than their typically developing peers
3. Current interventions have not proved that they can significantly modify signs of autism
4. The number of different early interventions has increased considerable over the past 10 years. We know very little about their possible side effects. However, these early years are crucial for determining current and future well-being in many children.
5. Pediatric research highlights the importance of taking childrens' opinions and experiences into account. Quality of life measures include a subjective component, which integrates their perspective.

Evaluating quality of life in young autistic children: research priorities

Very little work has been done measuring the impact of early intervention on the quality of fie of autistic children. The few studies which do look into this use measurement tools validated in typically developing children. Due to functional differences in autistic people, these tools cannot reliably assess quality of life in these children. Researchers suggest designing specific quality of life measurement tools, using participatory methods which involve autistic people at every step of the process. This will not be without its own challenges, as language and communication difficulties in young autistic children make it difficult to solicit their opinion.

Main references:

Bieleninik, L., Posserud, M. P., Geretsegger, M., Thompson, G., Elefant, C. et Gold, C. (2017). Tracing the temporal stability of autism spectrum diagnosis and severity as measured by the Autism Diagnostic Observation Schedule : A systematic review and meta-analysis. *PLoS ONE, 12(9).*

Fletcher-Watson, S., Adams, J., Brook, K., Charman, T., Crane, L., Cusack, J., ...Pellicano, E. (2019). Making the future together : Shaping autism research through meaningful participation. *Autism, 23(4)*, 943–953.

McConachie H., Parr JR, Glod M, Hanratty J, Livingstone N, Oono IP, et al. (2015). Systematic review of tools to measure outcomes for young children with autism spectrum disorder. *Health Technology Assessment, 19(41)*, 1-538.

Executive functions in autism: updates and future directions

By VICKY CARON and ANNE-MARIE NADER

Executive functions refer to different cognitive abilities that allow us to plan and monitor our behaviors in order to reach a goal. They include functions such as working memory, inhibition control (interrupting an automatic response, managing distractions), planning and organization skills, mental flexibility, generativity (ability to produce new behaviors and ideas) and self-control. In practice, these abilities allow us to organize our thoughts and regulate our behavior in order to efficiently attain an objective. For example, not letting oneself get distracted by ambient noise in class, following the teacher's instructions, inhibiting inappropriate responses, refraining from impulsive actions, solving a math problem etc.

According to the scientific literature, difficulties with executive functions are common in autistic people. It has also been suggested that these difficulties could contribute to many differences observed in autism, such as repetitive and restricted behaviors, and difficulties with social skills. Until recently, it was thought that cognitive flexibility and planning and organization skills were the most impacted executive functions in autism.

However, two recent **meta-analyses** (Demetriou et al., 2018; Lai et al., 2017) suggest that there may not be just one or certain executive functions which are significantly more affected than others. What we effectively notice is a huge variability in strength and weakness profiles across executive functions in autistic people. When looking at results from an autistic group, we see that their overall performance appears slightly lower than that of a neurotypical group. However, not all autistic people have executive function difficulties, and profiles vary tremendously from one person to another. Some have severe difficulties across executive functions, whilst others have none or very few. Furthermore, weakened executive functions may look different from one person to another (e.g. one autistic child may present with difficulties in inhibition but not in cognitive flexibility, whilst another child may present in the opposite way). This variability across individuals suggests that personalized approaches are necessary when assessing cognitive functions and selecting interventions.

Many other autism-specific factors should be considered when measuring executive functions. Firstly, the results from the meta-analysis conducted by Lai et al.(2017) show that choice of measurement tool plays a crucial role. Indeed, we see performance gaps in tools meant to measure the same function, with autistic people performing best when tasks do not rely

Autistic people performing best when tasks do not rely on language.

Meta-analysis: a study which combines results from all research undertaken on a specific topic in order to analyze results more closely and draw general conclusions.

Original paper:
Demetriou, E. A., Lampit, A., Quintana, D. S., Naismith, S. L., Song, Y. J. C., Pye, J. E., ... Guastella, A. J. (2018). Autism spectrum disorders: a meta-analysis of executive function. *Molecular Psychiatry*, 23, 1198-1204. doi : 10.1038/mp.2017.75

Lai, C. L. E., Lau, Z., Lui, S. S. Y., Lok, E., Tam, V., Chan, Q., . . . Cheung, E. F. C. (2017). Meta-analysis of neuropsychological measures of executive functioning in children and adolescents with high-functioning autism spectrum disorder. *Autism Research*, 10(5), 911-939.

on language. Greater deficits are also reported when executive functions are assessed through daily behaviors linked to executive functions (e.g. BRIEF questionnaire filled by a parent or teacher), rather than through performance on formal executive function tasks. It is also of great importance to consider other factors involved in assessing cognitive functions, such as general intellectual functioning and language level. For example, reported differences between autistic and neurotypical groups on formal tasks tend to fade when the groups have similar intellectual levels, and even more so when IQ is high and participants older. As a matter of fact, age is an important aspect to consider since executive functions appear to develop differently in autism. Due to delayed maturity and/or compensation strategies, difficulties with executive functions usually improve in adulthood in autistic people. Lastly, executive function research rarely considers the impact of anxiety, which many autistic people experience, and can have a significant impact on performance.

Secondly, we must remember that around half of autistic people also present with Attention Deficit and Hyperactivity Disorder (ADHD), which affects executive functions and therefore makes it difficult to determine whether difficulties are linked to ADHD or autism. For example, the impulsivity found in ADHD could lead to difficulties with self-monitoring, and vice versa. Lai et al. (2017) also found that autistic groups without ADHD presented with less inhibition and planning deficits than those with associated ADHD, whilst weaknesses in working memory, flexibility and generativity were similar across autistic people with and without comorbid ADHD.

Interventions targeting executive functions could help to prevent and decrease psychological comorbidities, problem behaviours, emotional difficulties, promote social skills and, most significantly, improve quality of life for autistic people. Interventions targeting early development may be the best way to improve executive functions in autistic people. Interventional pilot studies in school and family settings have obtained encouraging results, and demonstrated that interventions targeting executive functions show potential in autistic people with and without ADHD. Further research is still needed to draw firm conclusions on the efficacy of such interventions.

Sylvie Lauzon
Executive director

Fondation les petits trésors

Research in healing

Though research may at times seem abstract to us, it has consistently managed to answer questions which seemed impossible just moments before. Research ultimately leads to better care, and sometimes cure. This knowledge allows the scientific and medical community to develop new treatments, new therapies and new tools. For example, thanks to research, the vast majority of children with leukemia recover, whereas just over 50 years ago, more than half of them would die.

The Petits Trésors Foundation is very proud to support the publication of Sur le Spectre magazine. The magazine discusses current projects and trends in autism research, but above all it makes this accessible. Valérie Courchesne and her team turn their research into fascinating stories!

Over the years, the Montreal Cognitive Neuroscience of Autism Research Group, which Valérie is a part of, has developed an approach that focuses on developing the strengths of autistic children and adolescents. This difference in perspective and new understanding of how the brain works is very positive because it allows us, parents of young people with autism, to see beyond the barriers inherent in autism. We contemplate possibilities rather than walls.

Of course, walls we have encountered and walls there will be more of. But to better understand the minds of our autistic children, focussing not only what is difficult, but what can be developed, makes all the difference.

This difference feels like a breath of fresh air during difficult moments.

Wishing you all the best with this new issue!

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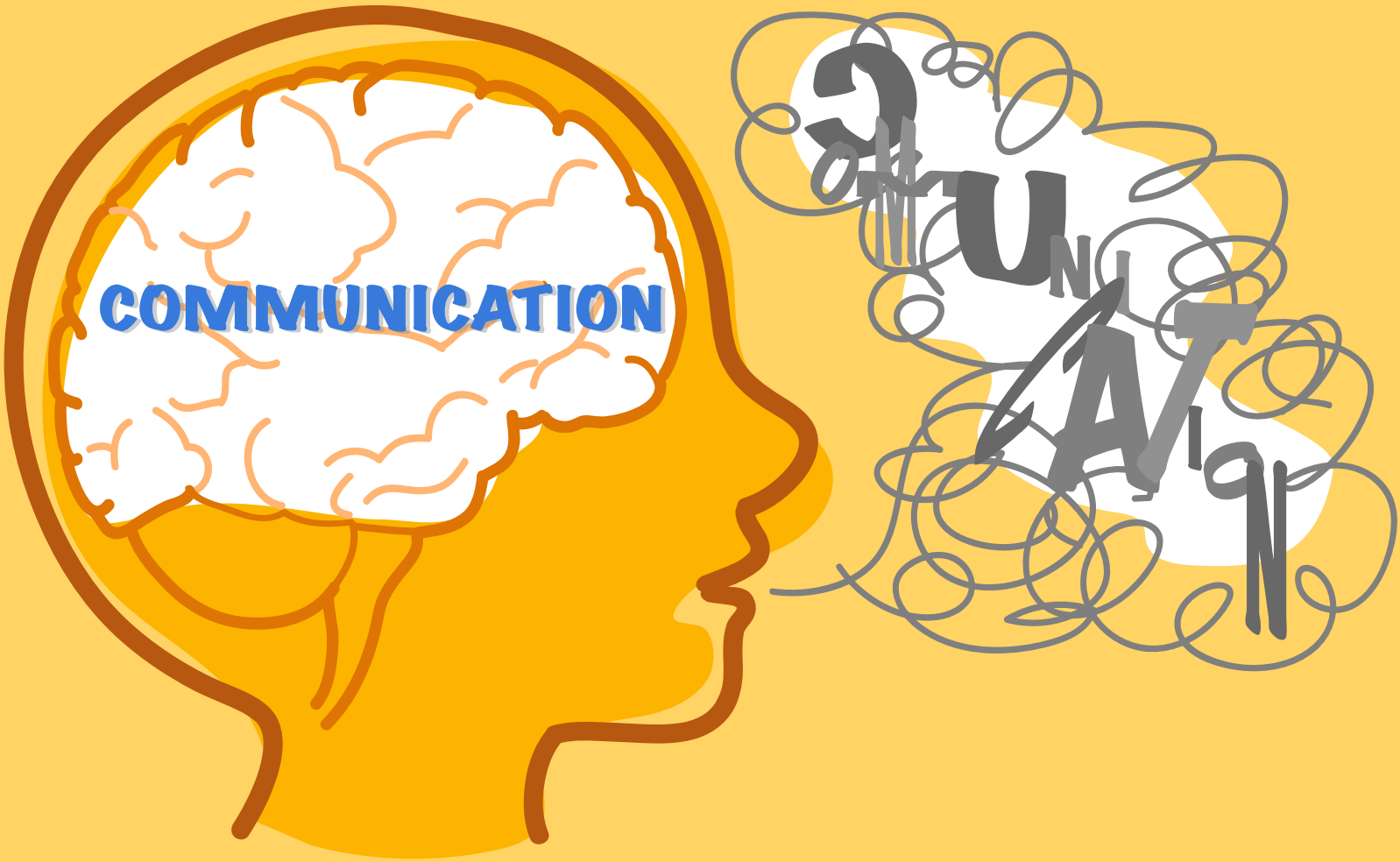

A distinctive language

acquisition process

By DAVID GAGNON,

Speech acquisition is an incredibly complex ability, one that most children will master before the age of 4, without any real consensus on exactly how this happens.

With this in mind, it appears self-evident that language acquisition must involve some type of exposure- English is not "coded" in our genes! In typical language development however, it does not seem as though all forms of exposure are created equal. Indeed, a source which does not involve any social interaction (e.g. television, radio) will not have the same impact as language heard in interactive contexts (e.g. parent speaking to their child, child playing with another person). For example, research has shown that infants aged 6 to 12 months were able to learn sounds specific to a foreign language when in an interactive situation with another person, but that simple exposure to a video with these same sounds was insufficient. These findings become extremely significant when one considers that ability to recognize sounds in the mother tongue at 6 months is a good predictor of language ability at 2 years old. In line with this theory, case studies have demonstrated that television and radio exposure are not sufficient for language development in non-autistic children. In fact, screen time could lessen interactions with parents. This is consistent with findings that children with more screen time are at increased risk for language delays.

It should therefore not come as a surprise that many psychologists and language specialists consider social skills and interaction to be at the heart of language acquisition. Consequently, language delays in autistic

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children are often attributed to difficulties with interaction and social communication. However, a recent article from Belgian linguist Mikhail Kissine forces us to reconsider this language acquisition paradigm for certain autistic children, who appear to acquire language independently of social interaction.

This ability was in fact described in a sample of Tunisian children. In Tunisia, and in many other parts of the Arab world, Arabic exists in two different forms:

1) Spoken form: this type of Arabic is spoken by the entire population and therefore corresponds to the language spoken within the child's social environment.

2) Formal form: usually only written, or sometimes spoken in formal, academic, or religious settings. Formal Arabic is also spoken in certain cartoons, which would be the main (or even only) exposure to formal Arabic for a child in Tunisia.

Spoken and Formal Arabic are different in several ways. Formal Arabic contains many noun and verb variations, and a more diverse grammar. The etymological roots of the two forms are not the same, and there are variations in consonant pronunciation. Furthermore, sentence components are inverted, with Formal Arabic using a verb-subject structure, whilst Spoken Arabic uses a subject-verb structure. Ultimately, these are two distinct language systems.

Following extensive speech analyses of 10 to 20 minute informal conversations with 5 autistic Tunisian children aged 5 to 10, Dr. Kissine found that speech in these children was comprised of up to 56% Formal Arabic, which remains practically non-existent in non-autistic children of the same age. Several of their sentences seemed to use a "mixed" form of the language, meaning that the two forms of Arabic were used within the same sentence, blending both vocabulary and grammar.

This study thereby demonstrated that autistic children learned a language, Formal Arabic, which was not spoken in their social environment. These findings bolster the well-known observation that most autistic people end up developing speech, despite persistent difficulties in social interaction.

The authors hypothesize that this atypical ability could indicate different speech learning patterns in autistic versus non-autistic people. Indeed, they suggest that autistic children may focus more on language structure during speech development (sounds, order of words, repetition based on certain patterns etc....) rather than communicative aspects. This different approach to language could support the idea that autistic people are able to learn a language regardless of whether exposure stems from a video or social settings. Language spoken by a real person would not be of higher value for these children. Kissine's study therefore suggests that, for some autistic people, the use of video material for language development could substitute direct intervention, as has also been found for other skills.

In sum, this article demonstrates that some autistic people, contrary to non-autistic people, do not depend on social settings for speech acquisition.

Original paper:
Kissine M, Luffin X, Aiad F, Bourourou R, Deliens G, Gaddour N. Noncolloquial Arabic in Tunisian Children With Autism Spectrum Disorder: A Possible Instance of Language Acquisition in a Noninteractive Context: Noncolloquial Arabic in Tunisian Children With Autism.