

# Paving a New Road: The Importance of Vision Therapy with Patients with Autism Spectrum Disorder

Dr. Mehrnaz D. Azimi Green

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# 1 IN 44

## 8 YEAR-OLD CHILDREN WERE IDENTIFIED WITH AUTISM IN 2018



**Learn the signs.  
Act early.**

Based on data collected in 2018 on 8-year-old children living in 11 communities across the United States.



<https://bit.ly/ss7011a1>

**MM**



Depression



Epilepsy



What is  
**AUTISM**  
spectrum  
-DISORDER-

Hyperactive



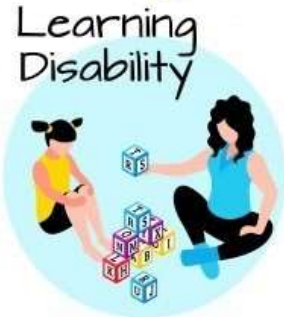
Not Responding



Prefer to Play Alone



Connection problems



Learning Disability



# Vision Therapy

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A progressive program of vision procedures that provide meaningful experiences

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Appropriate for the patient's developmental level

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Presented in a way that is interesting to that patient

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Tailored to meet the person's unique needs



# Neuroplasticity

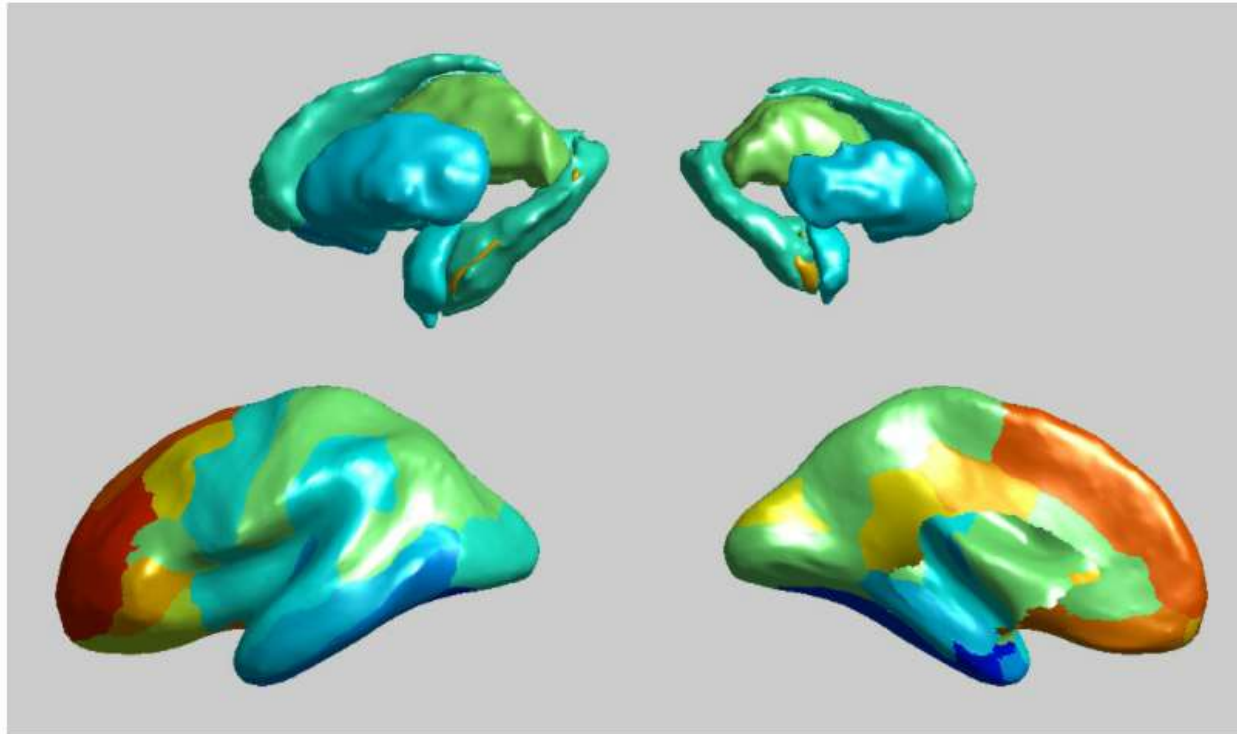
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# Autism brains show widespread alterations in structure

BY CATHERINE CLABBY / 4 JUNE 2018



*Sampling size: Some regions of the brain (yellow, red) tend to be larger in people with autism than in controls; others (blue) are typically smaller in autism brains.*

*Daan van Rooij, Donders Institute for Brain, Cognition and Behaviour*

## RESEARCH ARTICLE



## Intrinsic gray-matter connectivity of the brain in adults with autism spectrum disorder

Christine Ecker, Lisa Ronan, Yue Feng, Eileen Daly, Clodagh Murphy, Cedric E. Ginestet, Mich...

[+ See all authors and affiliations](#)

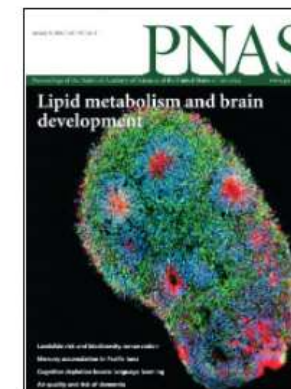
PNAS first published July 22, 2013; <https://doi.org/10.1073/pnas.1221880110>

Edited by Alex Martin, National Institute of Mental Health, National Institutes of Health, Bethesda, MD, and accepted by the Editorial Board May 15, 2013 (received for review January 3, 2013)

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### Abstract

Autism spectrum disorders (ASD) are a group of neurodevelopmental conditions that are

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Exp Neurol. 2015 Dec; 24(4): 273–284.

PMCID: PMC4688328

Published online 2015 Dec 16. doi: [10.5607/en.2015.24.4.273](https://doi.org/10.5607/en.2015.24.4.273)

PMID: [26713076](https://pubmed.ncbi.nlm.nih.gov/26713076/)

## Characteristics of Brains in Autism Spectrum Disorder: Structure, Function and Connectivity across the Lifespan

[Sungji Ha](#),<sup>1</sup> [In-Jung Sohn](#),<sup>1,2</sup> [Namwook Kim](#),<sup>1,2</sup> [Hyeon Jeong Sim](#),<sup>1</sup> and [Keun-Ah Cheon](#)<sup>✉1,2</sup>

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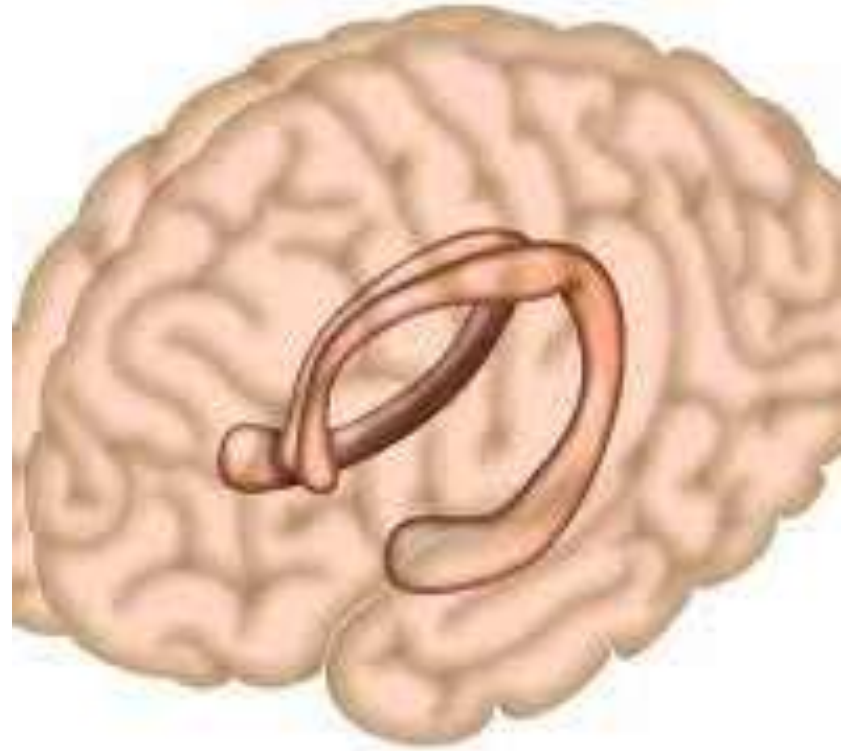
# Brain Structure Changes in ASD

- <https://www.spectrumnews.org/news/brain-structure-changes-in-autism-explained/>
  - -in-autism-explained/



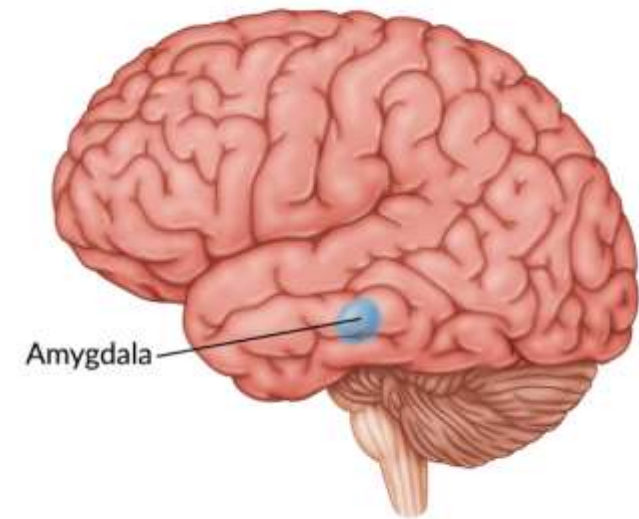
# Hippocampus

- “Children and adolescents with autism often have an **enlarged hippocampus**, the area of the brain responsible for forming and storing memories, several studies suggest, but it is unclear if that difference persists into adolescence and adulthood”



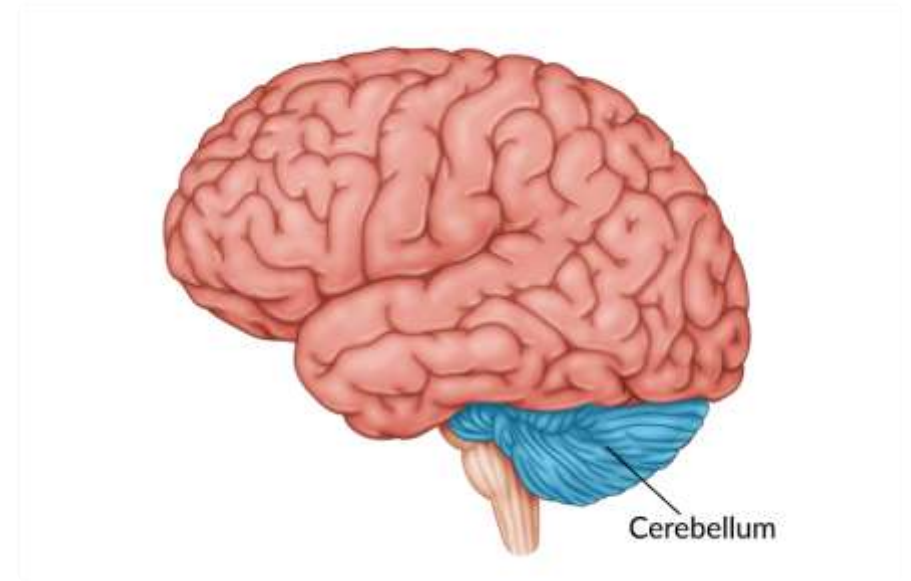
# Amygdala

- “The size of the amygdala also seems to differ ...although researchers from different labs have turned up *conflicting results*. Some find that people with autism have **smaller amygdalae** ... or that their amygdalae are only smaller if they also have **anxiety**. Others have found that autistic children have **enlarged amygdalae** early in development and that the difference levels off over time.”



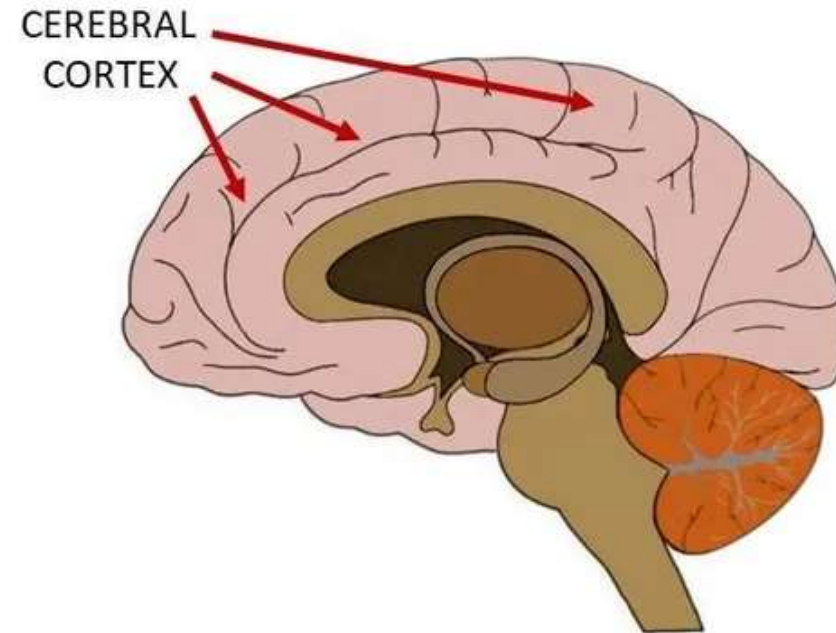
# Cerebellum

- “Autistic people have **decreased amounts of brain tissue in parts of the cerebellum**... Scientists long thought the cerebellum mostly coordinates movements, but they now understand it plays a role in cognition and social interaction as well.”



# Cerebral Cortex

- “...the cortex — the brain’s outer layer — seems to have a **different pattern of thickness ...**”





# Brain Changes During Development

Unusually fast growth in certain brain regions

Enlarged heads and brains in a fraction of autistic people

The brains of some people with autism start to shrink prematurely, before their mid-20s

Some children who are later diagnosed with autism also have excess cerebrospinal fluid which may contribute to having an enlarged head.

# Structural Changes of the Connections Between Brain Regions

People who lack all or part of the **corpus callosum**...have an increased likelihood of being autistic or having traits of the condition

Significant differences in the structure of multiple white-matter fibers

An enlarged amygdala is associated with more severe emotional problems specifically in autistic girls



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[Transl Neurosci](#). Author manuscript; available in PMC 2012 May 3.

PMCID: PMC3342777

*Published in final edited form as:*

NIHMSID: NIHMS373186

[Transl Neurosci](#). 2010 Jun; 1(2): 177–187.

PMID: [22563527](#)

doi: [10.2478/v10134-010-0024-9](#)

## Early-stage visual processing abnormalities in high-functioning autism spectrum disorder (ASD)

[Joshua M. Baruth](#),<sup>1,\*</sup> [Manuel F. Casanova](#),<sup>1,2</sup> [Lonnie Sears](#),<sup>3</sup> and [Estate Sokhadze](#)<sup>2</sup>

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# **Motion processing in autism: evidence for a dorsal stream deficiency**

Janine Spencer,<sup>CA</sup> Justin O'Brien,<sup>1</sup> Kevin Riggs,<sup>2</sup> Oliver Braddick,<sup>1</sup> Janette Atkinson<sup>1</sup> and John Wattam-Bell<sup>1</sup>

Department of Psychology, London Guildhall University, Calcutta House, Old Castle Street, London E1 7NT; <sup>1</sup>Visual Development Unit, Department of Psychology, University College London, Gower Street, London WC1E 6BT, UK; <sup>2</sup>The School of Psychology, University of Birmingham, Edgbaston, Birmingham B15 2TT

<sup>CA</sup>Corresponding Author

Received 31 May 2000; accepted 14 June 2000



## Research in Autism Spectrum Disorders


Volume 69, January 2020, 101456



# Exploratory study of dorsal visual stream dysfunction in autism; A case series

I Hay <sup>a</sup>  , G N Dutton <sup>b</sup>, S Biggar <sup>c</sup>, H Ibrahim <sup>b, e</sup>, D Assheton <sup>d</sup>

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<https://doi.org/10.1016/j.rasd.2019.101456>

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Clinical Trial

> *Neuropsychologia*. 2005;43(7):1044-53.

doi: 10.1016/j.neuropsychologia.2004.10.003. Epub 2004 Dec 8.

# Abnormal global processing along the dorsal visual pathway in autism: a possible mechanism for weak visuospatial coherence?

Elizabeth Pellicano <sup>1</sup>, Lisa Gibson, Murray Maybery, Kevin Durkin, David R Badcock

Affiliations + expand

PMID: 15769490 DOI: 10.1016/j.neuropsychologia.2004.10.003

**Free article**

# Early Signs Of ASD In Toddlers





> [J Autism Dev Disord.](#) 2019 Jan;49(1):209-215. doi: [10.1007/s10803-018-3690-y](#).

# Applying Eye Tracking to Identify Autism Spectrum Disorder in Children

Guobin Wan <sup>1</sup>, Xuejun Kong <sup>2</sup>, Binbin Sun <sup>1</sup>, Siyi Yu <sup>3</sup>, Yiheng Tu <sup>3</sup>, Joel Park <sup>3</sup>, Courtney Lang <sup>3</sup>, Madelyn Koh <sup>2</sup>, Zhen Wei <sup>1</sup>, Zhe Feng <sup>1</sup>, Yan Lin <sup>4</sup>, Jian Kong <sup>5</sup>

Affiliations [+ expand](#)

PMID: [30097760](#) DOI: [10.1007/s10803-018-3690-y](#)

# Eye tracking technology holds promise for earlier autism diagnosis

NIH-funded research shows new, simpler testing has 86 percent accuracy rate



# Autism & Vision Connection

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- Abnormal eye movements and visual behavior are hallmark for ASD
  - Poor eye contact
  - Difficult with joint attention



# VEP

[PLoS One](#). 2016; 11(10): e0164422.

PMCID: PMC5055293

Published online 2016 Oct 7. doi: [10.1371/journal.pone.0164422](https://doi.org/10.1371/journal.pone.0164422)

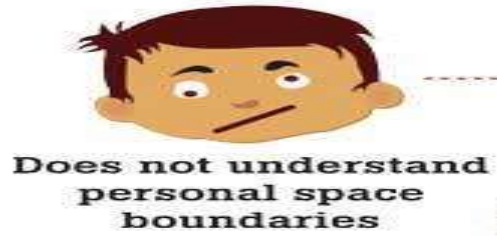
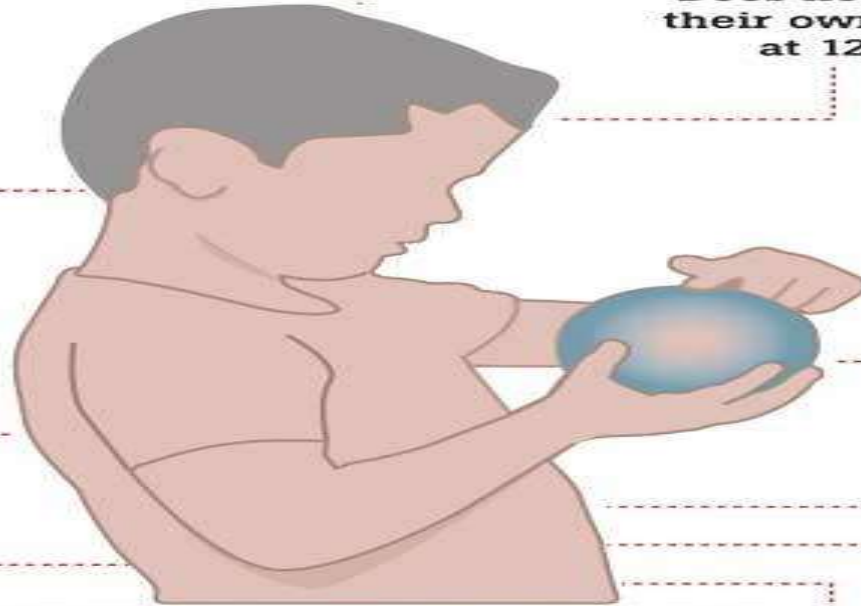
PMID: [27716799](https://pubmed.ncbi.nlm.nih.gov/27716799/)

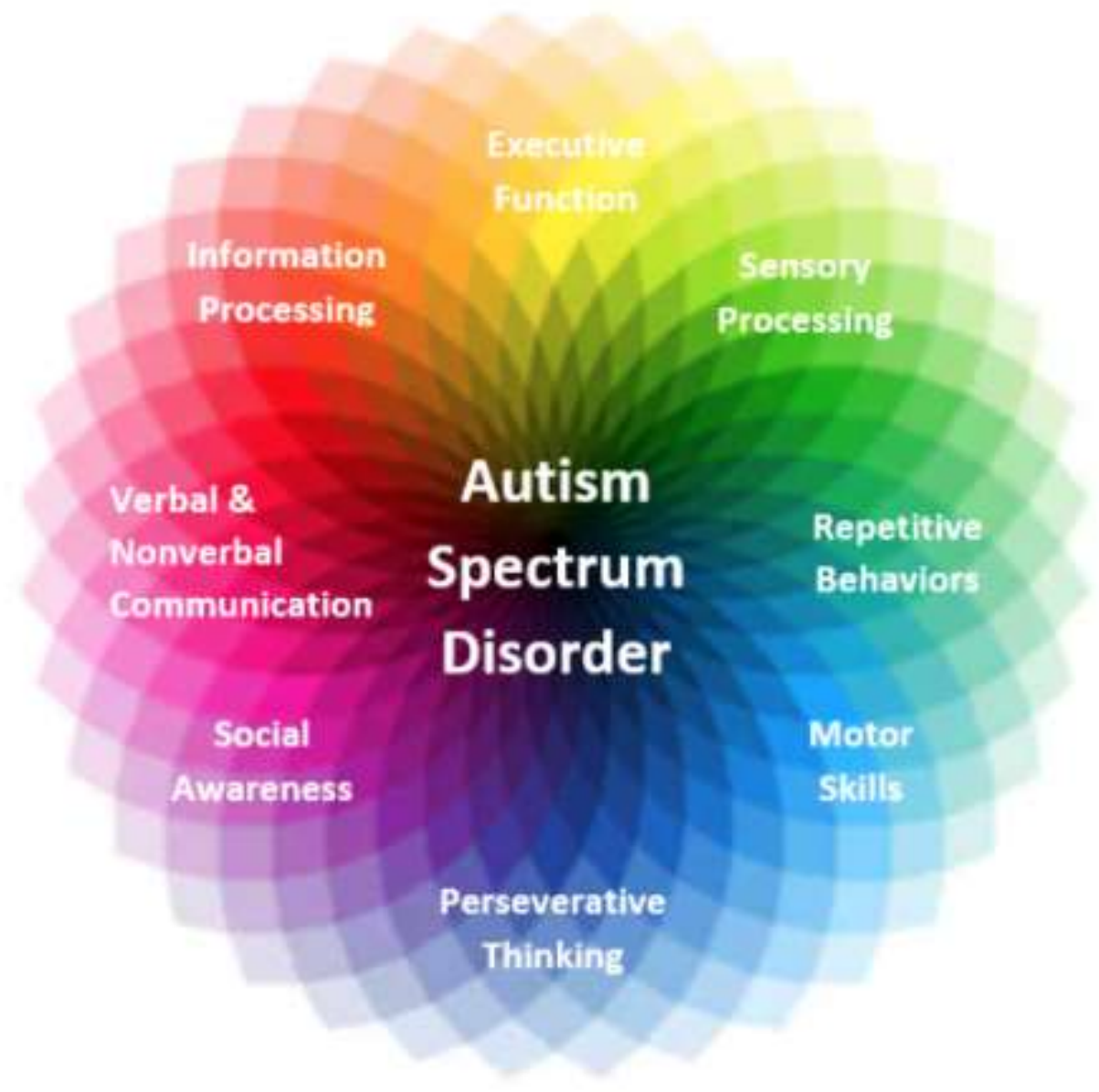
## Rapid and Objective Assessment of Neural Function in Autism Spectrum Disorder Using Transient Visual Evoked Potentials

[Paige M. Siper](#),<sup>1,2,\*</sup> [Vance Zemon](#),<sup>3</sup> [James Gordon](#),<sup>4</sup> [Julia George-Jones](#),<sup>1,2</sup> [Stacey Lurie](#),<sup>1,3</sup> [Jessica Zweifach](#),<sup>1,3</sup>  
[Teresa Tavassoli](#),<sup>10</sup> [A. Ting Wang](#),<sup>1,2,5,6</sup> [Jesslyn Jamison](#),<sup>1,2</sup> [Joseph D. Buxbaum](#),<sup>1,2,5,6,7,8</sup> and  
[Alexander Kolevzon](#)<sup>1,2,6,8,9</sup>

Manabu Sakakibara, Editor

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# Vision

Every lobe of the cerebral cortex, the midbrain and the cerebellum are all involved with vision



“If you don’t  
like the road  
you’re  
walking,  
start paving  
another one.”





# Building the New Road

- Work developmentally!
- Repetition with appropriate feedback helps develop intentionality and control

The image features two glass fishbowls against a dark blue background. The bowl on the left is filled with water and contains several goldfish. One goldfish is captured mid-air, having jumped out of the water, with a trail of bubbles following its path. The bowl on the right is empty of water and is mounted on two black wheels with silver hubcaps, resembling a toy car. The text "Success Stories" is written in a white, outlined, sans-serif font across the center of the image, overlapping both bowls.

# Success Stories

# Changes from Vision Therapy

Improved visual efficiency

Improved body and space awareness

Improved visual perception

Improved visual motor integration

Improved visual-verbal integration

Improved central-peripheral visual processing

Improved visual-vestibular integration



# Changes from Vision Therapy

Improved  
visual-auditory  
integration

Improved  
attention

Improved  
balance and  
posture

Improved social  
interaction and  
awareness

Decreased  
adverse  
behaviors

Decreased self  
stimulatory  
behaviors



# Challenges working with patients with ASD



Difficulty maintaining attention



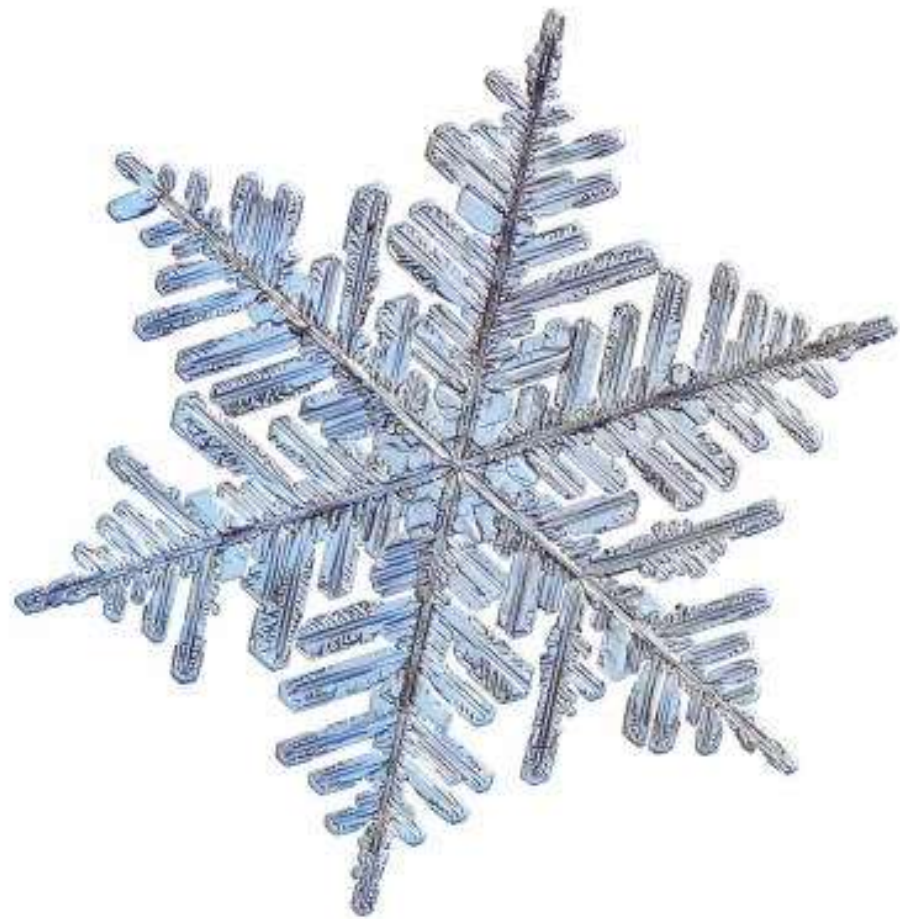
Poor receptive and expressive language skills-poor comprehension and limited verbal language skills

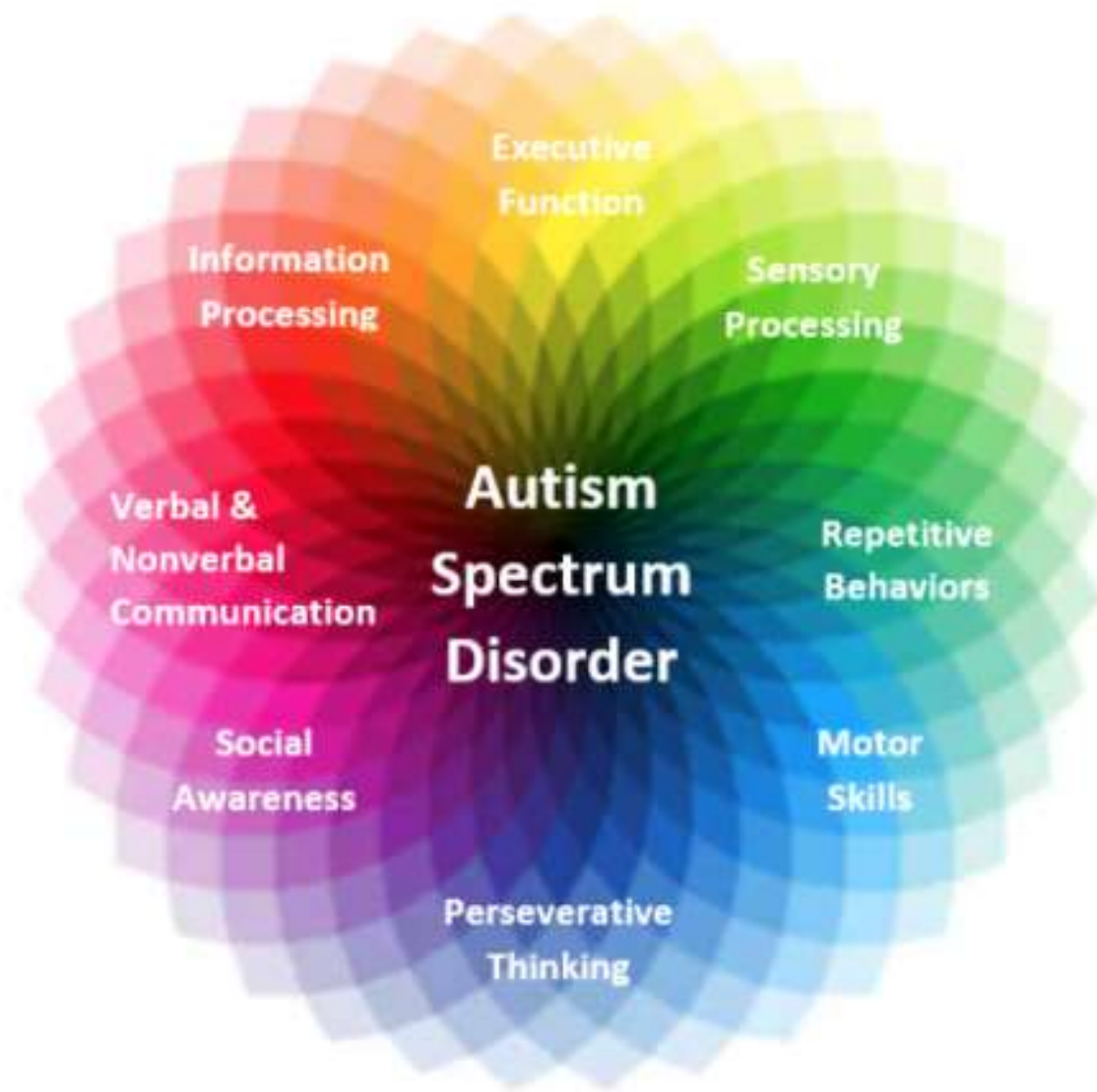


Limited motor skills to handle typical optometric equipment



Tactile sensitivities or defensiveness to putting on glasses or patches









## Visuo- Cognitive Profiles

- Work with the team to help understand the patients complete cognitive and sensory profile
- Modifications/accommodations for home, school, work, and recreational activities

AUTISM

IT'S NOT A DISABILITY



IT'S A DIFFERENT ABILITY





# Neuroscience & Biobehavioral Reviews

Volume 37, Issue 2, February 2013, Pages 209-228



Review

## Veridical mapping in the development of exceptional autistic abilities

Laurent Mottron <sup>a</sup>  , Lucie Bouvet <sup>c</sup>, Anna Bonnel <sup>a, b</sup>, Fabienne Samson <sup>a</sup>, Jacob A. Burack <sup>a, b</sup>, Michelle Dawson <sup>a</sup>, Pamela Heaton <sup>d</sup>

Did you know



The creator of  
**Pokémon** is autistic?

Satoshi Tajiri was inspired by his special interest of bugs to create Pokémon!

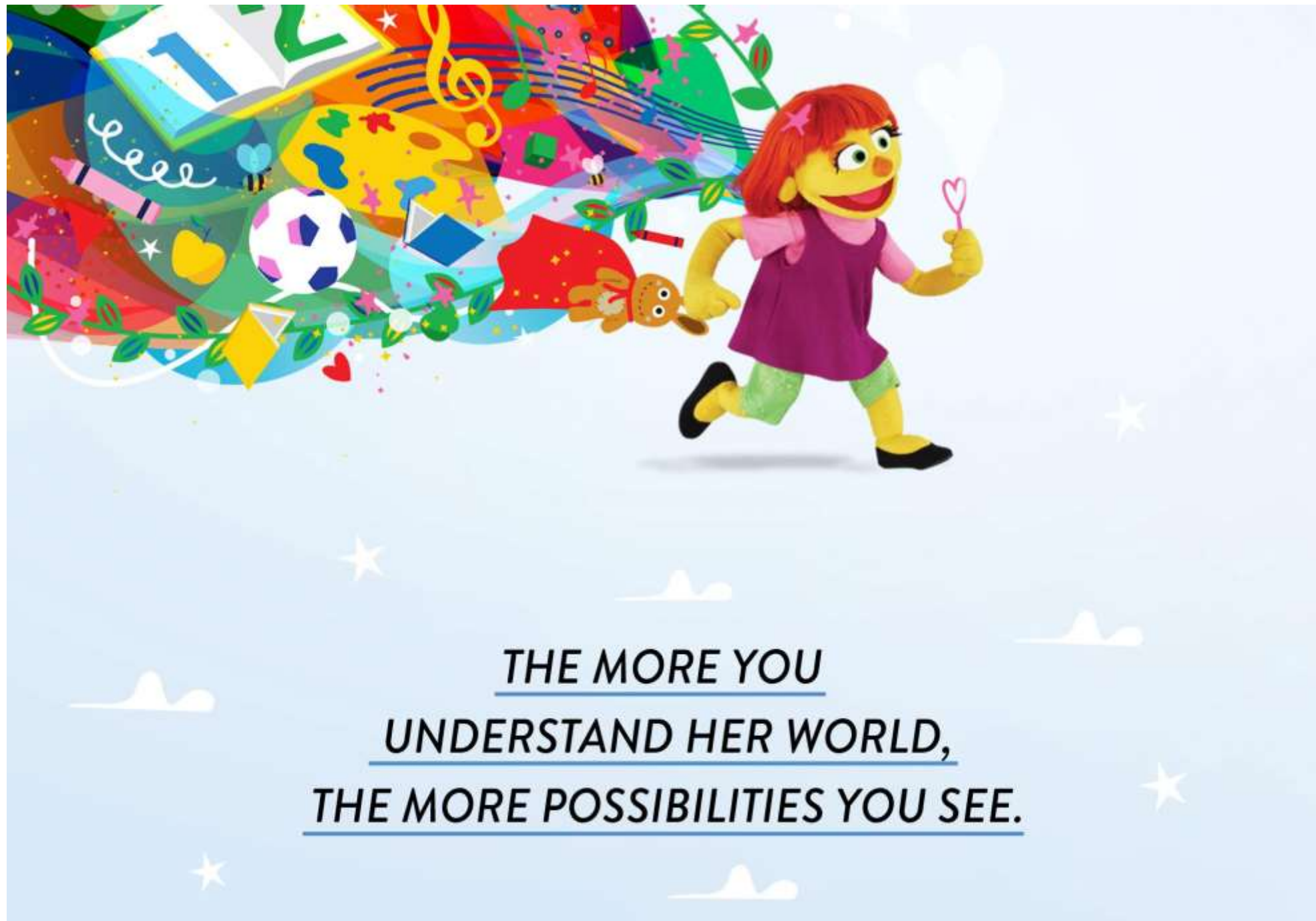


The Autistic Brain  
THINKING ACROSS THE SPECTRUM

TEMPLE  
GRANDIN  
AND RICHARD PANEK







THE MORE YOU  
UNDERSTAND HER WORLD,  
THE MORE POSSIBILITIES YOU SEE.



**THANK YOU**