



Disruption of cognition in autism

Autism remains somewhat of an enigma with its spectrum of impairments, wide range of combinations of symptom, large variations in severity and the genetic and neuropathological heterogeneity. No wonder there is no single cognitive impairment or deficit that accounts for its diverse symptoms!ⁱ

There are two broad groups of theories that attempt to explain the cognitive deficits in autism:

- A. those that suggest a primary deficit in social cognition (theory of mind)ⁱⁱ, emotion processingⁱⁱⁱ and social orienting^{iv}, and
- B. those that suggest a primary deficit in non-social or domain general processing (executive dysfunction^v, enhanced processing of local features^{vi,vii}, or abnormal attentional processes^{viii}).

In autism, there is a wide variation in strengths and weaknesses in social abilities. It is true that these abilities are on a continuum even in the typical population^{ix,x}, but their weakness is not associated with deficits in communication and repetitive behaviours, except at the extreme end of these deficits^{xi,xii}.

What these theories suggest:

Theory of Mind

Theory of Mind (ToM) refers to a person's capacity to attribute feelings, thoughts and beliefs to others, and to the understanding that actions are governed by those feelings, thoughts and beliefs. The development of social cognition involves looking beyond external behaviours to make inferences regarding desires, intentions and motivations.

There has been extensive research into the Theory of Mind capabilities of individuals with autistic spectrum disorders, giving rise to the concept of "mind blindness". Associations have been established between the ability to solve Theory of Mind tasks, pretend play, joint attention and language skills.ⁱⁱ

While ToM has been very helpful in enhancing our understanding about ASD, there are doubts regarding it as a unitary theory of autism. The variability in presentation of social skills impairment in autism does not appear to be consistent with ToM development, e.g. social impairments are present before ToM abilities are supposed to appear in young children.

Impaired attentional processes

People with ASD have abnormal mode for allocating visual attention, which results in their focus on salient local features and ignoring the whole. This affects their understanding of social process and responsiveness^{xiii}.

Emotional processing difficulties

People with ASD are impaired in their ability to perceive and show facial expressions, which affects understanding how the other person is feeling. This leads to poor social reciprocity.ⁱⁱⁱ





Social orienting deficit

People with ASD have difficulty in seeking out socially relevant cues from complex stimuli^{xiv} and perception of these social cues^{xv}.

Impaired attentional processes

People with ASD have abnormal allocation of visual attention, which results in their focus on salient local features and ignoring the whole. This affects their understanding of social process and responsiveness.^{viii}

Executive dysfunction

In ASD there is weakness in maintaining appropriate focus to attain a desirable goal, which creates problems in forward planning, dealing with novelty and unpredictability. It explains many adaptive behaviour difficulties in autism, but does not relate directly to social impairments. It is also not unique to autism; other conditions such as ADHD also show executive dysfunction.^v

Weak central coherence or enhanced processing of local features

This theory highlights the cognitive style in autism that is biased towards local rather than global information. Social deficits are explained as emanating from difficulties in integrating local and global level information such as social context.^{vi,vii}

ⁱ Happé, F., Ronald, A., & Plomin, R. (2006). Time to give up on a single explanation for autism. *Nature neuroscience*, 9(10), 1218-1220.

ⁱⁱ Baron-Cohen, S., Tager-Flusberg, H. & Cohen, D. *Understanding Other Minds: Perspectives from Autism and Developmental Cognitive Neuroscience* (Oxford Univ. Press, Oxford, 2000).

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^v Hill, E.L. Executive dysfunction in autism. *Trends Cogn. Sci.* 8, 26–32 (2004).

^{vi} Happé, F. & Frith, U. The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *J. Autism Dev. Disord.* 36, 5–25 (2006).

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^{viii} Belmonte, M.K. & Yurgelun-Todd, D.A. Functional anatomy of impaired selective attention and compensatory processing in autism. *Brain Res. Cogn. Brain Res.* 17, 651–664 (2003).

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^x Constantino, J.N. & Todd, R.D. Autistic traits in the general population: a twin study. *Arch. Gen. Psychiatry* 60, 524–530 (2003).

^{xi} Ronald, A. et al. Genetic heterogeneity between the three components of the autism spectrum: a twin study. *J. Am. Acad. Child Adolesc. Psychiatry* 45, 691–699 (2006).

^{xii} Ronald, A., Happe, F., Price, T. S., Baron-Cohen, S., & Plomin, R. (2006). Phenotypic and genetic overlap between autistic traits at the extremes of the general population. *Journal of the American Academy of Child & Adolescent Psychiatry*, 45(10), 1206-1214.

^{xiii} Neumann, D., Spezio, M. L., Piven, J., & Adolphs, R. (2006). Looking you in the mouth: abnormal gaze in autism resulting from impaired top-down modulation of visual attention. *Social cognitive and affective neuroscience*, 1(3), 194-202.

^{xiv} Sasson, N., Tsuchiya, N., Hurley, R., Couture, S. M., Penn, D. L., Adolphs, R., & Piven, J. (2007). Orienting to social stimuli differentiates social cognitive impairment in autism and schizophrenia. *Neuropsychologia*, 45(11), 2580-2588.

^{xv} Klin, A., Jones, W., Schultz, R., Volkmar, F., & Cohen, D. (2002). Defining and quantifying the social phenotype in autism. *American Journal of Psychiatry*, 159(6), 895-908.

