

## FEATURED ARTICLES

# Is Autism the Price for a Human Brain?

Temple Grandin, Ph.D.



The same genetic mechanism that makes humans have a large brain may be the same genes that cause autism and schizophrenia. Researcher J.M. Sikela, at the Colorado School of Medicine and V.B. Searles at the University of California, have found that copy number variation in the chromosome locus 1q21 may cause both autism and schizophrenia. Copy

numbers of genetic code are like volume controls for different traits. A particular piece of genetic code may be either duplicated many times or have copies deleted. Extra copies may cause autism and a larger head and too few copies may cause schizophrenia. Just the right amount of copies will create a so-called normal human brain.

For years, I have maintained that a person's brain can be either more cognitive (thinking) or more social/emotional. A certain amount of variation in copy number would probably be part of normal human personality variation. Too much variation in copy number by adding too many extra copies or deleting too many copies may cause an obvious abnormality such as speech delay or hallucinations.

Autism and schizophrenia are brain development opposites. Autism may cause the brain to develop extra processing power in the back of the brain for memory, math, art or music, and people with schizophrenia may develop a brain that does not have enough connections. This might explain why schizophrenic symptoms develop in late adolescence. At this time, a process called synaptic pruning trims and fine-tunes neural connections. Since the network is skimpy, normal synaptic pruning may cause the network to start failing. When the network loses too many connections, symptoms such as hallucinations and delusions may start.

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## Human Brain Development is Unstable

The genetic systems that have created the huge human brain may lack stability. The genetic locus 1q21 contains a gene called NOTCH2NL. To create a large human brain, it allows undifferentiated stem cells to greatly multiply. This provides more cells that can turn into brain cells. Dr. I.T. Fidler and his associates (2018) state that "NOTCH2NL genes may have contributed to the rapid evolution of the larger human neocortex, accompanied by loss of genomic stability of the 1Q21 locus and resulting in recurrent neurodevelopmental disorders."

## Further Evidence of Autistic Traits are Part of Normal Personality Variation

In the animal kingdom, there are animals that are more social and animals that are more solitary. Lions are more social than tigers or leopards. Other common solitary mammals are polar bears and chipmunks. Jared Reser at the University of California conducted an extensive literature review. He found that solitary mammals share many characteristics with autism. Compared to the animals that live in social groups, the solitary mammals have less oxytocin (social hormones) signaling an increased stress response during social encounters. They also have a reduced reaction to social separation from herdmates. In other words, they have a greater tolerance for being alone. Autism in its milder forms is simply normal personality variation.

Reading these papers was an eye-opening experience. They indicate that the genetics of autism are also the genetics of normal brain variation in both human and animal social behavior. Additionally, the genetic mechanisms that cause autism are the same genetic mechanisms that gave humans a greatly expanded brain. ▲

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References are available on the LACPA Website [www.lacpa.org](http://www.lacpa.org).