



Review

Implications of the idea of neurodiversity for understanding the origins of developmental disorders

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Received 4 November 2016; accepted 4 November 2016

Available online 9 November 2016

Communicated by L. Perlovsky

Abstract

Neurodiversity, a term initially used mostly by civil and human rights movements since the 1990s, refers to the notion that cognitive as well as emotional properties characteristic of developmental disorders such as autism spectrum disorders (ASD) are not necessarily deficits, but fall within normal behavioural variations exhibited by humans. The purpose of the present article is to examine the relevance of this notion to scientific research on ASD. On the assumption that one crucial survival advantage of intelligent activity is vigilance toward dangers in the external world, and such vigilance must work in the social domain as well as in the non-social domain, the author argues that the pattern of operation of an individual person's mind can be categorized according to the domain toward which that individual is more oriented. Individuals with ASD, overall, do not rely upon their social relationships but rather are predisposed to process perceived non-social objects in more depth, which manifests itself as hyper-sensation and hyper-attention to detail. It can be assumed that underconnectivity among cortical areas and subcortical areas underlies such mental operation neurologically. One of the main predictions based on this assumption is that all facets of psychological function are susceptible to disruption in ASD. Indeed, it has traditionally been thought that there are such general deficits in this disorder. However, contrary to the prevalent belief that people with ASD lack empathy, in fact people with ASD are capable of empathizing with the minds of others if those others are people with ASD. Thus, the neurological underconnectivity in ASD certainly leads some processing of information in the mind to work with less coordination, but has in fact contributed to providing *Homo sapiens* with behavioural variants. Finally, the clinical implications of the advantages of viewing ASD as a variation in neurodiversity are discussed.

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Keywords: Neurodiversity; Autism spectrum disorder; Developmental disorder; Survival advantage; Vigilance; Polymorphism

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1. Introduction

Neurodiversity refers to the notion that seemingly ‘impaired’ cognitive as well as emotional properties characteristic of developmental disorders such as autism spectrum disorders (ASD) are not necessarily deficits, but fall into normal behavioural variations exhibited by humans, or “an idea which asserts atypical (neurodivergent) neurological development is a normal human difference that is to be recognized and respected as any other human variation” [1]. The term was first coined in the late 1990s by people participating in civil rights movements, and has contributed to helping people with special needs to live their social lives. In particular, it has gathered momentum in the ASD community and is spreading beyond it to include groups with other categories of developmental disorders, including learning disabilities, intellectual disabilities and attention deficit/hyperactivity disorder (ADHD) because it urges one to discuss brain diversity using the same sort of discourse that one employs when talking about biodiversity and cultural diversity. In fact, after the period when the term had been coined, a journalist, Harvey Blume, wrote “Neurodiversity may be every bit as crucial for the human race as biodiversity is for life in general. Who can say what form of wiring will prove best at any given moment? Cybernetics and computer culture, for example, may favor a somewhat autistic cast of mind [2].”

The implications of neurodiversity have been most remarkable for education. The notion has successfully changed the view of intervention with such people, from attempting to overcome what is their weakness to that of enhancing what is their strength: a paradigm shift has occurred. Rather than putting children into separate disability categories and using outmoded tools and language to work with them, teachers engaging in both special and regular education are able to use tools and language inspired by the ecology movement to diversify learning and assist children to succeed in the classroom. As compared to these advances in the field, however, the scientific implications of viewing variable developmental disorders in the conceptual framework of neurodiversity still appear to be restricted, though there are some studies that have investigated how the strengths of individuals with ASD relate to systems thinking in fields such as computer programming and mathematics [3]. Skepticism has been expressed about even the usage of the term among scientists. The current review aims to argue that the notion is also scientifically important, particularly when considering mechanisms underlying such disorders psychologically, neurologically as well as genetically, with reference to survival advantage people with the disorders enjoy from the evolutionary view.

While a lot of the attention concerning ASD focuses on negative behaviours such as hand flapping, emotional meltdowns, and avoidance of eye contact, a number of positive attributes associated with ASD have been revealed by scientists. Individuals with the disorder are likely to be particularly skilled at perceiving details as opposed to whole gestalts. Children with ASD perform better than typically developing (TD) children on the block design test of the Wechsler Intelligence Scale for Children (WISC-IV), which requires taking blocks that are all white, all red, or a mixture of red and white, and putting them together to match a preexisting pattern [4]. They also perform better than TD children on tests of detection of patterns embedded in more complex patterns or drawing [5]. Such findings have led some researchers to suggest that individuals with ASD experience what has been termed “weak central coherence”, namely, they fail to grasp the whole of a situation and perceive mainly the constituent parts [1]. Obviously, this is a deficit-oriented view of the disorder, quite opposite to the view based on neurodiversity regarding which the author here attempts to summarize recent findings about biobehavioural, neural and genetic characteristics of people with ASD. As already noted, the term neurodiversity was coined, having been inspired by biodiversity, a term initially that was used among ecology movements and has ultimately led to establishment of a discipline of conservation biology as an independent science. The current review indeed indicates that the same possibility exists for the term neurodiversity.

2. Absence of the anger superiority effect in individuals with ASD

ASD are developmental disorders that are characterized by social communicative difficulties and restricted behaviours and interests [6]. According to a report published in 2012 [7], ASD affects approximately 1 in every 88 individuals in the US and is believed to be lifelong, congenital, and highly heritable [8]. Accumulated evidence suggests that as many as 300 to 500 distinct genes are involved in the etiology, with no single locus accounting for more than 1 % of cases [9]. Consequently, ASD must be a diagnosis made purely on the basis of behaviour [10]. The genetic heterogeneity of ASD poses a stark challenge for understanding the condition biologically: with so many

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