

## AUTISM ENIGMA: THE NEED TO INCLUDE SAVANT AND CRYPTO-SAVANT IN THE CURRENT DEFINITION

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### ABSTRACT

*Autism is a syndrome with co-morbid subtypes and varying degrees of severity. The American Psychiatric Association published the first official clinical definition for autism in the Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1980. The term Pervasive Developmental Disorder (PDD) is used to refer to autism in the current DSM-IV-TR (APA, 2000). However, the term Autism Spectrum Disorders (ASD) is more widely known and often used to describe a range of neuro-developmental conditions with different underlying etiologies and behavioral manifestations. With the coming fifth edition of DSM to be published in 2013, ASD soon will replace PDD as the official diagnostic term. This concept paper attempts to examine the current definition of autism and its limitations and suggests the need to re-define the syndrome more holistically by including two categories of autistic individuals: the savants and the crypto-savants.*

**Keywords:** *autism, autistic savant, autistic crypto-savant, empathizing deficits, and systemizing ability*

### INTRODUCTION

Talk about autism, the first thing comes to mind is the movie *Rain Man* in which Dustin Hoffman played the character Raymond Babbitt, who displayed a fantastic memory for baseball player statistics, memorized parts of the telephone directory, and counted cards in Las Vegas. This composite character was based on several real individuals with *Autism Spectrum Disorder* (ASD for short), including Kim Peek, an autistic savant from Salt Lake City, Utah, and Mark Rimland, the son of the late Dr Bernard Rimland, the founder of the Autism Research Institute in San Diego, California.

Many who have watched the movie might think or assume that all individuals with ASD are savants like Raymond Babbitt. The fact is they are not in most cases. According to Exkorn (2005), only 10 percent of individuals with ASD have savant abilities; the prevalence in the general population without ASD is less than 1 percent. Autistic savants are four to six more times more likely to be male than female.

The term “autism” comes from the Greek word “autos” that means self. There have been some earliest published descriptions of autistic behaviors dating back to the 18th century. However, it was not until 1911 that Dr Eugen Bleuler, a Swiss psychiatrist, coined the term “autism” in his work while working with schizophrenic patients, whom he observed to be socio-emotionally isolated and extremely self-absorbed.

Our knowledge and understanding of autism come from the early writings of Dr Leo Kanner and Dr Hans Asperger. Both men have been regarded as the pioneers in the autism field. Dr Kanner published his paper on autism in 1943; Dr Asperger, in 1944. Dr Kanner’s definition of autism was known as early infantile/childhood autism that displays a triad of impairments: impaired social interaction, lack of imaginative play, and verbal communication problems. On the other hand, Dr Asperger’s description of children with similar traits except that his subjects were of higher IQs and precocious language skills. Both described symptoms of two different sub-groups among a wide range of

disorders affecting social interaction and communication. In between them, there are various subtypes of autism and related anomalies whose causes remain very much unknown although research studies are currently being done in the following areas: brain, genetics and epigenetics, environmental factors, immune and gastro-intestinal systems, immunization, and pregnancy and perinatal anoxia (see Exkorn, 2005). I shall not delve on these issues here as they have been covered elsewhere.

The term *Autism Spectrum Disorders* (ASD for short) has been used widely to encompass autistic disorder (i.e., the classical autism as described by Dr Kanner in 1943) and non-autistic *Pervasive Developmental Disorders* (PDD for short), which include Asperger Syndrome, Fragile-X Syndrome, Rett Syndrome, Childhood Disintegrative Disorder, and PDD-Not Otherwise Specified (PDD-NOS), and correspond exactly to what the DSM-IV-TR (American Psychiatric Association, 2000) refers to collectively as PDD.

### **Autism as Described in Diagnostic and Statistical Manual**

The description of autistic disorder – the actual term used in the current Diagnostic and Statistical Manual (DSM) – uses twelve diagnostic criteria categorized under three areas: (1) impaired social interaction; (2) impaired communication; and (3) restricted repetitive and stereotyped patterns of behavior, interests and activities (American Psychiatric Association, 2000). These are often referred to as the triad of impairments in autism. Within each of the three areas are four sets of specific criteria. Each criterion represents a different area of symptoms. Generally, the first criterion in each area is the one that can be observed at the earliest age, and the latter ones in each are those that become apparent in later development. Each criterion is to be evaluated according to the child's level of mental development to avoid confusion between developmental delay and autistic symptoms. We need to evaluate possible autistic signs according to the child's level of mental development. This is one reason why it is essential to have both IQ and adaptive behavior assessments administered.

The description of autism given in the DSM-IV-TR (American Psychiatric Association, 2000) is a good starting point for all to understand what the disorder is like. However, there are still many signs and symptoms associated with the disorder not described in these criteria. We need also to consider autism from a biological rather than a behavioral perspective and that involves looking beyond the outward signs to what is happening on the inside.

The definition of autism provided by the DSM-IV-TR (American Psychiatric Association, 2000) is most widely used. However, the revised criteria of ASD in the coming fifth edition of the DSM to be published in 2013 would exclude Asperger Syndrome and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) (The Straits Times, 2012). Under the proposed new definition, a person would have to exhibit three deficits in social interaction, communication and at least two repetitive behaviors. The proposed narrower definition would put an end to the autism epidemic, whose international prevalence rate of 60 per 10,000 is applied across cultures. However, today's prevalence rate is an average of 1 in 110 children in the United States diagnosed with autism, while it is about 1 in 100 children in the United Kingdom. In Singapore, the number of children diagnosed with ASD has risen in recent years. In 2010, 528 autism cases were reported, up 46 per cent from 361 cases in 2005 (The Straits Times, 2012). Autism is four times more prevalent in boys than girls and knows no racial, ethnic, or social boundaries. Family income, lifestyle, and educational levels do not affect the chance of autism's occurrence.

### **Empathizing Deficits in Autism**

The current definition of ASD emphasizes on problems in empathizing, which involves two main steps: firstly, the ability to attribute mental states to other people as a natural way of understanding them; and secondly, having an automatic appropriate emotional reaction to other people's mental states. These two steps form a major ingredient in successful social interaction. Empathizing concerns what is known as the theory of mind, mind-reading, or mentalizing. Empathizing deficits, therefore, refer to one's failure to make connection to another individual's experience and to respond appropriately to that person. According to Di Martino and Castellanos (2003), functional imaging studies have implicated medial prefrontal cortex and posterior superior temporal sulcus as components of this ability to empathize.

## Systemizing Ability in Autism

However, Myers et al. (2004) suggest that though individuals with autism display empathizing deficits, they have intact or even superior systemizing ability. Systemizing refers to that ability to analyze and build systems so as to understand and predict the functional behavior of impersonal events or inanimate or abstract entities. Myers et al. (2004) have listed the following six systems: Mechanical systems such as machines and tools (Hoffman & Reeves, 1979); natural systems such as biological processes (e.g., respiration) and geographical phenomena (e.g., earthquakes) (Grandin & Johnson, 2005); abstract systems such as mathematical concepts (e.g., integration, 3x3 matrices) and computer programs (including digital games) (Chia, 2008); motoric systems such as 3-D drawing, piano finger technique or a lawn tennis shot (Charness et al., 1988); organizable systems such as Dewey Classification System used in library catalogue or a stamp collection (Shah & Frith, 1993); and social systems such as a business management or a football team (Golan & Baron-Cohen, 2006).

The way an individual with ASD makes sense of any of these systems is not in terms of mental states, but in terms of underlying rules and regularities. Such superior systemizing ability can be seen in those termed as autistic savants, who may have two or more savant abilities (Treffert, 2000). However, there is also another lesser known sub-group of autistic crypto-savants, who, "because of their inability to communicate, have savant skills that are hidden, or secret, and unknown to those around them" (Rimland, 1990, p.3). This aspect is often ignored in the current definition of ASD.

### WHAT IS AUTISTIC SAVANT?

Treffert (2000) describes autistic savant, which he termed as *Savant Syndrome*, as "a rare, but extraordinary, condition in which individuals with serious mental disabilities, including autistic disorder, have some 'islands of genius' that stands in marked incongruous contrast to the overall handicap" (p.15). In other words, an autistic savant is a person with autism or mental retardation who has extraordinary mental abilities in a specific area of intellectual functioning. While it is true that "the majority of autistic savants have low IQs (and hence, mentally retarded), there are some autistic savants who are highly intelligent" (Exkorn, 2005, p.69).

As mentioned earlier, as many as one in 10 people with autistic disorder have such remarkable abilities in varying degrees, although Savant Syndrome occurs in other developmental disabilities or in other instances of central nervous system injury or disease as well. Whatever the particular savant skill, it is always linked to massive memory. Since approximately 50% of people with Savant Syndrome have autism, while the remaining half are people with other developmental disabilities, I prefer to use the term *Autistic Savant Syndrome* than Savant Syndrome.

On the other hand, Edelson (1995) refers "autistic savant" strictly to individuals with autism who have extraordinary skills not exhibited by most persons. In other words, an autistic savant is a person with autism who has a special skill. Individuals with this condition were once known as "idiot savants", since "idiot" was an acceptable word for mental retardation in the late 19<sup>th</sup> century, when the phenomenon was first medically investigated, and "savant" comes from the French word for "knowing" and means "a learned person". It was much later when Rimland (1978) introduced a more appropriate term "autistic savant" (rather than idiot savant) to describe such individuals.

It has been found that about 10 percent of individuals with ASD, who may be intellectually disabled in most ways, show special or even remarkable skills. They can be classified under three categories of autistic savant skills as follows (Exkorn, 2005): Firstly, there are splinter skills which are most common of all. Autistic savants with splinter skills display obsessive preoccupations with and memorization of trivia and obscure information such as license plate numbers of vehicles and sports statistics, e.g., names of all the recent and past soccer players in the Liverpool or Manchester United Football Club, which they commit to memory. Secondly, there are talented skills. Autistic savants with talented skills have a more highly developed and specialized skill. For instance, they can be very artistic and paint beautiful sceneries, or for some, have a fantastic memory that allows them to work out difficult mathematical calculations mentally (Chia, 2008). Lastly, there are prodigious skills, which are the rarest type. These prodigious savants have spectacular skills that would be remarkable

even if they were to occur in non-handicapped individuals. There are only about 25 autistic savants in the world who display prodigious skills, which could include for instance, the capability to play an entire concerto on the piano after listening to it only once (Charness et al., 1988).

Autistic savants can have either a single special skill or display multiple skills. In most cases, if not all, of autistic savants, these specialized skills are concrete, non-symbolic, right cerebral hemisphere skills (rather than left cerebral hemisphere skills, which tend to be more sequential, logical and symbolic), and most reliant on memory. In general, such savant skills include music, art, mathematics, language and other skills such as knowing time without having to look at the clock, an uncanny ability to know and understand how animals feel, untaught mechanical or computer literacy skills, an unexplainable capability to commit maps to memory, and so on (Baron-Cohen & Bolton, 1993).

### **What causes some Autistic Individuals to possess Savant Abilities**

Autistic savant behavior, first described over a century ago by Down (1887), is so far unexplainable. According to Treffert (2000), significance of the savant syndrome lies in our inability to explain it. The savants stand as a clear reminder of our ignorance about ourselves and more so, our limited understanding of how our brains function. The etiology of Autistic Savant Syndrome can be either congenital or the result of disease or injury to the central nervous system.

In his explanation of Autistic Savant Syndrome, Treffert (2000) posited that pre- or post-natal insult to the left cerebral hemisphere of the brain causes right cerebral hemispheric compensatory growth, reflected in impairment of languages as well as analytic thought. Hence, there is a heightened capacity for right-brain-dominated functions such as, musical and visuo-spatial abilities (Di Martino & Castellanos, 2003). Any insult to the cerebral cortex causes memory functions to shift to a more primitive area of the brain (i.e., the corticostriated system), resulting in memory being non-associative, habitual, emotionless, and non-volitional – a conditioned response (Feldman & Morelock, 2003). According to Treffert (2000), the autistic savant's extensive access to the structural rules of domains may be dependent on some inherited ancestral memory transmitted across generations and inherited separately from general intelligence. Treffert (2000) was not the first to suggest then possibility of genetically transmitted qualities of intellect. The idea has had a fair amount of support since Galton (1892) raised the issue more than a century ago in his book *Hereditary Genius* and had also proposed inherited transmission of domain-specific gifts as a factor in lightning calculator abilities.

Another theory proposed by Snyder et al. (2003) suggests that savant skills exist in all of us although not normally accessible. The normal brain is highly concept-driven, i.e., it allows us to function automatically, using unconscious mechanisms to sift through a world of unconscious information and arrive at final judgments and mindsets.

Autistic savants lack this ability for conceptualization. They have to rely heavily on the lower levels of neural information from which we abstract our conceptual schema. Hence, autistic savant artists draw with naturalistic detail, even at pre-school age (Myers et al., 2004); autistic savant calculators perform lightning-fast integer arithmetic computation (Chia, 2008); and autistic savant musicians rely on perfect pitch (Revesz, 1925). All savants recall detail by accessing underlying processes common to all brains, but inaccessible to normal ones (Feldman & Morelock, 2003).

### **Who are these Autistic Savants?**

Many parents and teachers are rather unsure if an autistic savant is the same as a child diagnosed with high-functioning autistic disorder (HFAD for short) or one with Asperger Syndrome? Even professionals themselves are not too sure about the last two terms, i.e., HFAD and Asperger Syndrome. Do they mean the same thing? Or are they totally two different disorders ... different from the Autistic Savant Syndrome?

Let me first all examine HFAD and Asperger Syndrome. McLaughlin-Cheng (1998) in her meta-analysis of reports on HFAD and Asperger Syndrome found various features that differentiate children with Asperger Syndrome from those with HFAD. In general, the differences between the two

disorders can be traced down to the social arena and in language development. Children with HFAD have been found to lack socially competent behaviors. On the other hand, those with Asperger Syndrome have the capability to initiate and respond to be awkward and inappropriate in any given speech situation. In language development, children with HFAD often have delayed and disordered language and cognitive abilities, whereas those with Asperger Syndrome commonly display appropriate grammar, good vocabulary, and typical comprehension (McLaughlin-Cheng, 1998).

### ***Distinction between HFAD and Asperger Syndrome***

To distinguish between HFAD and Asperger Syndrome, let me examine the two disorders under five categories of behaviors proposed by McLaughlin-Cheng (1998):

1. Intelligence test (based on standard scores): The Full-Scale IQ (FSIQ) of children with HFAD falls in the range between borderline and average (50-85 range), while the FSIQ of children with Asperger Syndrome falls in the range between average and high average (90-120 range).
2. Development of language (pragmatic, verbal and non-verbal usage): Children with HFAD have been found to have developmental language delay and such deficits can be observed easily. However, children with Asperger Syndrome develop their language quite normally.
3. Receptive and expressive communication skills: Children with HFAD have obvious speech delay in both receptive and expressive skills (hyperlexic tendency is quite obvious), while communication skills of those with Asperger Syndrome fall within the normal limits of development.
4. Social interaction, attachment, and emotional self-regulation: For children with HFAD, their social cognition skills are impaired and they appear to be aloof, indifferent and unresponsive; those with Asperger Syndrome often display strange behaviors related to their self-interests and their social cognition deficits vary in quality.
5. Stereotypical behavior: This refers to physical or motor skills in terms of gross motor and repetitive behaviors. No such deficits in this area are observed in children with HFAD but such as echopraxia, probably due to executive dysfunction) might be seen in those with Asperger Syndrome.

### **What about the Autistic Crypto-Savants?**

In my own research and private practice as an educational therapist, from the numerous ASD cases that I have encountered to date, talented children with Asperger Syndrome are found to display characteristics of *autistic savantism* closer to Autistic Savant Syndrome. On the other hand, those talented children with HFAD show characteristics that are closer to the lesser known *Autistic Crypto-Savant Syndrome*, as already described earlier, by Rimland (1990) as those, "because of their inability to communicate, who have savant skills that are hidden and unknown to all around them" (p.3).

little has been written about or researched on autistic crypto-savants since the time when Rimland (1990) reported the phenomenon and backed up with three cases that he had encountered.

#### ***Case #1: Michael M***

In the first case, the autistic crypto-savant (call him Michael M) was a non-participating boy, who kept striking his himself hard on the face and ears, or biting his hand. His face was a mass of callouses and bruises, and his hands were covered with bloody scars and scabs. His eyes were bloodshot and he had not spoken a word in his ten years. However, Michael M was assessed by a psychologist and found to have high IQ and communicated best through typing on a typewriter although he was nonverbal.

#### ***Case #2: Michael H***

In the second case, another non-verbal autistic crypto-savant (call him Michael H) would go rocking and grunting when left on his own. He was found to have an encyclopedic memory. For instance, Dr Rimland gave him the B volume of an encyclopedia set and turned to the page on bees. Then he picked a sentence that contained obscure information and wrote the following multiple-choice question: "The substance that a bee uses to make its sting irritating is: (a) hydrochloric acid, (b) nitric

acid, (c) acetic acid, (d) formic acid, (e) muriatic acid, and three other acids. The boy was able to circle the correct answer: formic acid! The procedure was repeated on a few other pages to make sure the boy's answer was not a mere coincidence. It turned out that Michael H showed a strong interest in science.

### **Case #3: Joey B**

In the last case, the autistic crypto-savant (call him Joey B), a second year kindergartener, could not or would not speak, but he was able to write. His answers to questions posed orally to him were very remarkable and showed an amazing amount of information and conceptual grasp. Joey B would write his answer in response to the oral question asked when his teacher's hand touched his.

Nobody knows what proportion of non-verbal or non-communicating autistic individuals have savant skills. The little known group of autistic crypto-savants poses an intriguing phenomenon. There is a need to explore ways of reaching out to them and also to help them. Certainly more research is needed.

### **CONCLUSION**

In sum, based on the past and current research studies, I would see the need to re-define and expand the term *autism spectrum disorder* (ASD) as a neuro-developmental syndrome of constitutional origin (genetic) and whose cause could also be epigenetic, and its onset is usually around first three years of birth, with empathizing or mentalizing deficits that result in a triad of impairments in communication, social interaction, and imagination, with manifestation of repetitive stereotyped behaviors, but may, on the other hand, display (especially by autistic savants) or hide (especially by autistic crypto-savants) a strong systemizing drive that accounts for a distinct triad of strengths in good attention to detail, deep narrow interests, and islets of ability.

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