



Communication, interventions, and scientific advances in autism: A commentary

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ABSTRACT

Autism spectrum disorders (ASD) affect approximately 1 in 150 children across the U.S., and are characterized by abnormal social actions, language difficulties, repetitive or restrictive behaviors, and special interests. ASD include autism (autistic disorder), Asperger Syndrome, and Pervasive Developmental Disorder not otherwise specified (PDD-NOS or atypical autism). High-functioning individuals may communicate with moderate-to-high language skills, although difficulties in social skills may result in communication deficits. Low-functioning individuals may have severe deficiencies in language, resulting in poor communication between the individual and others. Behavioral intervention programs have been developed for ASD, and are frequently adjusted to accommodate specific individual needs. Many of these programs are school-based and aim to support the child in the development of their skills, for use outside the classroom with family and friends. Strides are being made in understanding the factors contributing to the development of ASD, particularly the genetic contributions that may underlie these disorders. Mutant mouse models provide powerful research tools to investigate the genetic factors associated with ASD and its comorbid disorders. In support, the BTBR T+tf/J mouse strain incorporates ASD-like social and communication deficits and high levels of repetitive behaviors. This commentary briefly reviews the reciprocal relationship between observations made during evidence-based behavioral interventions of high- versus low-functioning children with ASD and the accumulating body of research in autism, including animal studies and basic research models. This reciprocity is one of the hallmarks of the scientific method, such that research may inform behavioral treatments, and observations made during treatment may inform subsequent research.

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1. Introduction

Autism spectrum disorders (ASD) include autism (autistic disorder), Asperger Syndrome, and Pervasive Developmental Disorder not otherwise specified (PDD-NOS or Atypical Autism). ASD are highly-prevalent neurodevelopmental disorders that vary considerably in expression, and affect approximately 1 in 150 children across the U.S. [1], yielding greater prevalence than that of pediatric cancer, diabetes, and AIDS combined [2–4]. ASD are characterized by an impairment of social and communication abilities that range from very mild to severe [5,6]. The onset of ASD symptoms in at least one of the key areas must be before three years of age, while diagnosis may not occur until 6 years of age or later [7]. Individuals with ASD have life-long

difficulties with novelty and environmental stressors, such as changing routines, and may suffer from co-morbid neurobiological disorders, such as seizures [8]. Few therapeutic interventions are effective, and a cure for ASD has not been found [8–10]. Although, the associated characteristics of ASD are, in many cases, detrimental, the degree of communication impairment varies widely between individuals.

Communication deficits in those with ASD can create difficulties in conversing with others, and the condition makes learning to communicate a greater challenge. Discussed below are communication difficulties, which comprise a predominant phenotype in ASD, followed by information about interventions used to improve communications among higher- and lower-functioning children and adolescents diagnosed with ASD, based upon the work of Susan DeLuke of the College of Saint Rose, Albany, NY and Myra Batista of the Kevin G. Langan School, Albany, NY, along with the work of others in the treatment of autism. Approaches in animal models that are being

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utilized to examine communicative anomalies similar to those observed in ASD, such as those used by Jacqueline Crawley, NIMH, Bethesda, MD and other researchers, are discussed in this commentary. This commentary concludes with a discussion of some of the steps that are being taken to provide outreach to those afflicted with ASD and to educate the general public regarding these pervasive disorders, such as the Center for Autism and Related Disabilities directed by Kristin Christodulu, University at Albany, State University of New York (SUNY), Albany, NY. The reciprocal relationship between behavioral observations made during evidence-based behavioral interventions and the accumulating body of research in autism, including animal studies and basic research models, is discussed.

2. Diagnostic criteria for Pervasive Developmental Disorders

According to the Diagnostic and Statistical Manual for Mental Disorders IV-TR, Pervasive Developmental Disorder (PDD) comprises autistic disorder, Asperger Syndrome, atypical autism, Rett Syndrome, and Childhood Disintegrative Disorder. The following four criteria to be met for diagnosis of autistic disorder, Asperger Syndrome or atypical autism between three and six years of age are described [5].

1. Reciprocal social actions are uniformly abnormal in some way, including: lack of eye contact, joint attention, and empathy problems [5,11–19]. These interactions are fundamental components to everyday social interactions, and include: initiating, maintaining, shifting, and/or terminating conversation, bridging topics, monitoring and/or demonstrating interest, and paying attention to multiple cues. Social barriers can be formed when difficulties in conversation are present. Some examples include difficulties understanding social cues, sensing the feelings or reactions of others, reading/caring about boredom that others may feel, interpreting another's perspective, as well as carrying on one-sided conversations and focusing on unusual interests [20].
2. Language delays that occur in beginning language as well as in interactive conversation. However, Asperger Syndrome does not include a delay in the acquisition of language. The individual lacks subtleties of language such as: the jokes, sarcasm, humor, and possibly the melodies and rhythms of language, as well as interpretation of facial expressions, body language, and connotations behind questions [5,11–19].
3. Repetitive or restrictive behaviors, and special interests, often consisting of hand flapping, toe walking, or repeatedly engaging in the same choice behavior (doing the same jigsaw puzzle, watching the same scene out of a movie) [5,11–19]. As a result, a wall is formed between the child and his/her surroundings that can exacerbate communication difficulties. The child focuses on narrow or restricted interests, such that he/she begin to lose perspective of the world around them. Emphasis is usually placed on categorizing, such as statistics of sports, rock collecting, or a skill involving mathematics. In this way, skills can be more pronounced and allow those with ASD to excel in a specific area. This is particularly true for savants, who can master skills in math or music, which may be due to expression of extraordinary abilities and encouragement of their development early on. However, expression of these skills is infrequent and striking, especially when compared to their lack of other skills and interests. Narrowed interests, repetitive actions, and prominent problems with communications, are classic examples of how the outside world can be a difficult environment for a child with ASD to socialize and thrive in.
4. Diagnosis only occurs if behaviors are not better accounted for by Rett Disorder or another Childhood Disintegrative Disorder [5,11–19]. Those with autism may be diagnosed co-morbidly with other disorders, as one diagnosis sometimes does not encompass the range of deficits associated with ASD [21]. Described below are some

of the various ways ASD can be expressed, and interventions used for treatment, of higher- and lower-functioning persons diagnosed with ASD. Higher-functioning individuals diagnosed with ASD are those who have minor issues with communication and sociability and score of more than 70 on the non-verbal intelligence test (NVIQ) [22]. Lower-functioning individuals are those who have communication and/or sociability issues to an extent that it impairs their ability to convey basic needs and/or wants to caregivers, and an NVIQ score of less than 70 [22]. Thus there are distinct differences between high- and low-functioning individuals and different interventions may be used to improve behaviors.

3. Speech/language deficits and subsequent communication problems among high-level functioning persons with ASD

Communication is an important factor when working with those diagnosed with ASD. About one-third to one-half of individuals with ASD do not develop enough natural speech to meet their daily communication needs [23]. Lower-functioning individuals can experience severe problems in socialization and every day activities due to their lack of normal social interactions [23]. High-functioning individuals diagnosed with ASD demonstrate better language skills, and perform better in tests involving spelling and vocabulary than their low-level functioning counterparts. However, both high- and low-functioning groups fail at complex language tasks involving figurative language, comprehension and inferences [24]. For example, central coherence, known as the ability to process information in context to grasp a higher level of meaning at the expense of memory, is a main problem both groups encounter [25].

High-functioning individuals with ASD have a higher IQ and generally less difficulties with language than those exhibiting higher expression of circumscribed interests, repetitive behaviors or social dysfunction. Although they typically have adequate vocabulary, their comprehension is generally behind their neurotypical peers. In contrast, those individuals diagnosed with Asperger Syndrome do not have a delay in the acquisition of language [5]. High-functioning individuals use less emotional content in speech and are less able to interpret non-verbal cues, such as when listeners are bored or distracted compared to Asperger Syndrome individuals [20,26,27]. In addition, high-functioning individuals are also similar to Asperger Syndrome in some aspects. For example, Barbaro and Dissanayake found groups did not differ on their use or understanding of self-presentational display rules, and both used less compared to typically developing children [28]. Others have argued the differentiation between the two disorders is unnecessary as there are few differences between high-functioning autism and Asperger Syndrome [29]. Though levels of understanding and using language in communication differ between individuals who have higher versus reduced expression of ASD, methods of teaching language can improve effective communication in both groups.

Those who work with high-functioning individuals will recognize there may be some consistent “autistic” personalities, which vary in how afflicted individuals approach and initiate interactions. First, there is the commonly known “aloof” personality, wherein the child avoids physical contact and eye contact. There is the “passive” personality, in which the individual does not avoid physical contact, but does not initiate interactions with others. The third, known as the “Socially Extremely Awkward Person”, is less common, and described as an individual who initiates interactions with others, but is often socially awkward resulting in others reacting inappropriately [30].

4. Social skills deficits and effects upon communication

The core problem that underlies the numerous difficulties seen in social interactions is the lack of joint attention in children with ASD. Joint attention involves actively sharing attention rather than

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