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Theory of mind, severity of autistic symptoms and parental correlates in children and adolescents with Asperger syndrome

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ABSTRACT

This study addresses the theory of mind (ToM) ability of Asperger's syndrome/high-functioning autism (AS/HFA) children and their parents and the severity of the autistic symptoms. Fifty-three families, each consisting of a mother, father and a child, participated in this study ($N = 159$). The 53 children in the sample included 25 children diagnosed with AS/HFA and 28 typically developing (TD) children. The Social Attribution Task (SAT) and tests assessing autistic symptoms were used. AS/HFA children had lower scores than TD children on three of the SAT indices (Person, ToM Affective, and Salience). Fathers of AS/HFA children did not have lower scores than fathers of TD children on the SAT task, whereas mothers of AS/HFA children had lower scores on the Person index, a pattern similar to seen in their children, suggesting a possible genetic contribution of mothers to ToM deficit in AS/HFA children.

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1. Introduction

The theory of mind (ToM) model posits that the capacity to conceive of mental phenomena is the basic feature of human social interaction. A deficit to this mechanism has been proposed to be involved in autism in its divergent manifestations (Baron-Cohen, 1995). This article addresses the ToM ability of Asperger's syndrome/high-functioning autism (AS/HFA) children and their parents, the severity of the autistic symptoms, and the relations between these parameters.

Social communication deficits are central to AS/HFA syndrome, though they vary in extent. With regard to actual conversation skills, children with AS/HFA have shown more problems with pragmatic responses and with the emotional content of communication (Blacher et al., 2003). One explanation for the lack of social skills in AS/HFA individuals may be difficulties in integrating affective and cognitive aspects of a situation. There is a tendency of AS/HFA individuals to pay attention to parts of the social situation rather than to the whole (Shamay-Tsoory et al., 2002).

One of the most intriguing questions posed by investigations of autistic individuals is the discrepancy between what they achieve on explicit tasks of social reasoning and what they fail to do in more naturalistic situations (Klin et al., 2003). In order to address this discrepancy, Klin (2000) developed a social cognitive procedure comprising the following components:

1. Reducing the confounding potential of the verbal mediation of task presentation by minimizing verbal instructions.
2. Reducing explicit definitions of the task and measuring the social elements of the task.
3. Using stimuli that can be interpreted at different levels of social cognitive ability, from absence of social attributions to attributions including mental states and interactions.

The paradigm developed by Klin focuses on people's ability to attribute social meaning to ambiguous visual stimuli: geometric shapes that act like people (Klin, 2000).

The common view today is that the autistic spectrum of disorders – including autism (Bailey et al., 1995), Pervasive Developmental Disorder (Szatmari et al., 1998), and Asperger syndrome (Volkmar et al., 1998) – is composed of various clinical entities that have a strong genetic component (Gillberg and Coleman, 2000). Gillberg and Coleman's (2000) family studies have shown that the frequency of autism among siblings of probands with autism is between 2 and 5%, i.e. 20–60 times more frequent than in the general population. Later studies demonstrated again that monozygotic concordance rates exceed the dizygotic concordance rate (Folstein and Rutter, 1977; Ritvo et al., 1985; Steffenburg et al., 1989). Results of later British studies showed 60% concordance for 25 pairs of monozygotic twins and no concordance for 20 pairs of dizygotic twins (Bailey et al., 1995). The

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researchers concluded that the heritability rate is between 91 and 93%. Furthermore, several studies of multiple-incidence (multiplex) families have demonstrated that the genetic liability for autism may be expressed in some of the non-autistic relatives in a phenotype that is milder but similar to the autistic symptoms (Le Couteur et al., 1996; Bailey et al., 1998). Thus a British family study found that 20% of first-degree relatives were affected with autism or with milder social and or cognitive disorders (Bolton et al., 1994).

To summarize, autism and AS are biologically and genetically based disorders with a strong pattern of impaired social behavior in other family members of the autistic child. The ability to attribute independent mental states to self and others in order to explain and predict behavior (ToM) has been a focus of recent research revealing that autistic children have a deficit in this ability. However, there are few studies testing ToM abilities in family members of autistic children, and little work has been done in assessing the relationships between ToM deficits and the severity of the clinical syndrome of autism.

The present study assessed the ability of AS/HFA children and adolescents and their parents to attribute mental states to animated shapes in order to explain and predict behavior (ToM). Such a study may clarify the role of ToM as a mediating mechanism that has a strong impact on the severity of autistic symptoms. It may also show that ToM functions as a perceptual mechanism which is transmitted genetically and enhances the risk of developing AS or autism. We hypothesized that typically developing children will show better performance on the Social Attribution Task (SAT) compared to AS/HFA children, parents of typically developing children will show better performance on the SAT compared to parents of AS/HFA children, the degree of autistic symptoms will be negatively correlated with SAT indices, and social adaptation will be positively correlated with SAT indices.

2. Method

2.1. Participants

Fifty-three families, each consisting of a mother, father and a child, participated in this study ($N = 159$). The 53 children in the sample included 25 children diagnosed with autistic spectrum disorder (ASD) and 28 typically developing children.

2.2. Materials

2.2.1. Social Attribution Task (SAT)

The Social Attribution task (SAT), developed by Klin (2000), measures the ability to make social attributions from an ambiguous visual display. The stimuli are a rectangle, a big triangle, a small triangle and a small circle. The movements of the shapes are contingent upon one another in that they move in synchrony, against one another, or as a result of the action of the other shape (Klin, 2000). Data obtained with this procedure are a series of narratives. In order to measure the social attributions contained in the narratives, Klin developed a detailed coding system containing seven index scores (Klin, 2000).

2.2.2. The Autism Diagnostic Observation Schedule—Generic (ADOS-G)

The Autism Diagnostic Observation Schedule—Generic or ADOS-G (Lord et al., 1994) is a semi-structured tool designed for the assessment of a child's communication, socialization, and play skills. It consists of 10 activities. The child receives a score in the social domain, in the communication domain, and in the combined social and communication domains. Inter-rater reliability was found to be very good for items, and excellent for totals. Internal consistency within domains of social communication and restricted repetitive behaviors was found to be excellent; test–retest reliability was found to be adequate (Lord et al., 2000).

2.2.3. The Autism Diagnostic Interview—Revised (ADI-R)

The ADI-R (Lord et al., 1994) is a semi-structured parent report interview that evaluates communication, social development, play, and restricted, repetitive, and stereotyped behaviors. The ADI-R consists of 111 questions. The interview yields separate scores for each of the three diagnostic domains. Inter-rater reliability has been good to excellent for individual items, and excellent for domain scores. Test–retest reliability, on a very small sample, was also good (Lord et al., 1994).

2.2.4. Vineland Adaptive Behavior Scales (VABS) — Interview Edition survey form

The VABS (Sparrow et al., 1984) is a parent interview that assesses adaptive functioning of the child in the areas of socialization, communication, daily living, and motor skills. The Communication domain comprises three sub-domains: Receptive, Expressive, and Written Language. The Daily Living Skills scale includes the Personal, Domestic, and Community sub-domains. The Socialization scale comprises the Interpersonal, Play and Leisure, and Coping Skills sub domains.

2.2.5. The Structured Clinical Interview (SCID)

The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders IV Axis I (First et al., 1996) is a semi-structured interview covering a wide range of psychiatric disorders in children and adults. In our study it was used for the parents. According to Zanarini et al. (2000), the test–retest reliability found for SCID categories was in the range of 0.3–0.78.

2.2.6. The Kiddie-Schedule for Affective Disorders and Schizophrenia for School-age Children — Present and Lifetime version (K-SADS-PL)

The K-SADS-PL (Kaufman et al., 1997) is a semi-structured diagnostic interview designed to assess current and past episodes of psychopathology in children and adolescents according to DSM-III-R and DSM-IV criteria. The K-SADS-PL is administered by interviewing the parents, the child, and finally by obtaining summary ratings which include all sources of information.

2.2.7. Intellectual functioning

All children were administered four subtests of the Wechsler Intelligence Scale for Children, Revised Edition (WISC-R) (Wechsler, 1999), which were chosen in order to shorten administration time and because of their relevance to the present study. The subtests were Comprehension, Similarities, Cubes and Vocabulary. All adult participants were administered three subtests of the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III) (Wechsler, 1997). The subtests were Vocabulary, Similarities, and Comprehension.

2.3. Procedure

Sixty-one families were recruited for this study, 33 families making up the research group and 28 families, the control group. The 33 families that had a child with autism spectrum disorder were recruited through the Child and Adolescent Mental Health Clinic at the Mental Health Center in Beer-Yaacov—Ness-Ziona (BN-MHC) in Israel. The 28 families with typically developing children were recruited through ads posted at Tel-Aviv University and were paid for their participation in the study.

Of the 33 families included in the research group, five families did not complete all the measures required, and were thus excluded from the study. Two families were excluded because the child participant did not meet the cut-off point for a diagnosis of autism spectrum disorder according to the ADOS-G, and one family was excluded because the child had a psychotic episode during the study.

Research group participants were tested individually in a quiet room at the Child and Adolescent Clinic in BN-MHC. Control group participants were tested in a quiet room at their homes. The testers were trained psychologists and psychiatrists.

The SAT was presented to all participants. The initial instructions were as follows: "You are going to watch a short film twice. The film lasts for less than a minute and it has no sound. I will ask you a few questions about the film later." After the complete animation was shown twice, the following instructions were given: "Now, tell me what happened in the film. Please answer as completely as you can."

After the participant provided the first narrative, the following instructions were given: "Now you will see clips of the film, and after each clip I will ask you a question; please answer as completely as you can." Six video segments, corresponding to six sequential, meaningful segments of the animation, were presented. After each segment, the participants were asked: "What happened here?" In this way, narratives 2 to 7 were obtained.

After the participant provided the seventh narrative, the following instructions were given: "Now let's say that the big triangle, the small triangle, and the circle are people. What kind of a person is the big triangle/small triangle/small circle?" Narratives 8 to 10 were thus obtained. This completed the administration of the SAT.

Children and adolescents were administered the following tests: K-SADS PL (Kaufman et al., 1997), Clinical Global Impression scale (Guy, 1976), Liebowitz Social Anxiety Scale (Liebowitz, 1987), SAT (Klin, 2000), four subscales of the Wechsler Intelligence Scale for Children-Revised 99 (Wechsler, 1999), MAASE — A Test for Spoken Language Processing (Rom et al., 1999), and the Autism Diagnostic Observation Schedule—Generic (ADOS-G; Lord and Pickles, 1996). Parents were administered the following tests: SCID (First et al., 1996), CGI (Guy, 1976), L-SAS (Liebowitz, 1987), SAT (Klin, 2000), Wechsler Adult Intelligence Scale—Third Edition — WAIS III (Wechsler, 1997), MAASE Test (Rom and Morag, 1999), ADI-R (Lord et al., 1994), and VABS, Expanded Edition (Sparrow et al., 1984).

2.4. Statistical analysis

Mann–Whitney test, χ^2 test, and Spearman nonparametric correlations were performed as appropriate. All results are expressed as mean ± standard deviation (S.D.).

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