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ORIGINAL PAPER

Moral and Social Reasoning in Autism Spectrum Disorders

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Abstract This study compared moral and social reasoning in individuals with and without autism spectrum disorders (ASD). Ten familiar schoolyard transgressions were shown to 18 participants with and 18 participants without ASD. They judged the appropriateness of the behavior and explained their judgments. Analysis of the rationales revealed that participants with typical development used significantly more abstract rules than participants with ASD, who provided more nonspecific condemnations of the behaviors. Both groups judged social conventional transgressions to be more context-bound than moral transgressions, with this distinction more pronounced in typically developing individuals, who also provided significantly more examples of situations in which the depicted behaviors would be acceptable. The educational implications of these findings for individuals with ASD are discussed.

Keywords Autism spectrum disorders · Social and moral reasoning · Abstract thinking

Autism spectrum disorder (ASD), a neurodevelopmental disability, is characterized by a triad of impairments including severe difficulties in communication and social reciprocal interactions, as well as repetitive, restrictive and stereotypic behaviors (APA 2000). Even more cognitively able individuals with ASD experience marked and sustained difficulties in social interactions and emotional relatedness, which continue to impede the development of intimate and effective social interactions throughout their lives (Volkmar et al. 2009). Two recurring themes which are critical to successful functioning in the social world are the ability to understand social and moral rules and the ability to apply them flexibly. These areas are the focus of the present research. In the current study, the cognitive processes which underlie social functioning were studied by comparing the understanding of social and moral rules and the flexible application of these rules in a cohort of high functioning individuals with ASD and typically developing CA- and MA-matched counterparts.

Moral reasoning was first studied by Kohlberg (Kohlberg and Kramer 1969). He presented hypothetical moral dilemmas and asked participants to judge whether a protagonist's behavior in these hypothetical problematic situations was right or wrong, and to explain their judgments. Within this approach moral reasoning is assessed through the analysis of the resultant narratives. Kohlberg claimed that moral reasoning develops, through a series of universally ordered stages, from a utilitarian approach avoiding punishment and/or obtaining social and emotional rewards (stages 1 and 2, pre-conventional morality) to an understanding of simple and then abstract behavior governing rules as issued by authority figures (stages 3 and 4, conventional morality) and finally into post conventional morality, a stage which is not attained by all. At stage 5, rules are perceived to be commonly agreed upon principles needed in order to maintain the public's welfare and subject to change according to societal needs (stage 5). Stage 6 reflects a "moral" conscience wherein individuals base their

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explanations and judgments upon universally applicable moral values which they are able to justify independently of current social norms or the mandate of authority figures. Through the study of these stages, developmental age norms have been established, although they are not universal. Generally speaking, the pre-conventional stage characterizes preschool aged children through age 10. By age 13, most children are at the conventional stage, at which stage they stop developing morally. Those who continue reach the post conventional stage along with the development of Piagetian abstract thinking as they enter adolescence, but only 10% of adults reach stage 6 (Kohlberg 1984).

Moral reasoning in autism has been studied previously using Kohlberg's conceptualization of moral development as reflected in the analysis of solutions presented to moral dilemmas (e.g., Grant et al. 2005; Takeda et al. 2007). However, although each study investigated different aspects of moral judgment and reasoning, the findings from both studies addressed the fact that Kohlberg's methodology requires the ability to use language skills in a manner which is difficult even for quite capable individuals with ASD. For example, individuals with ASD use fewer mental state words (Bishop and Norbury 2002; Tager-Flusberg and Sullivan 1995) in their descriptions of interactions and therefore their explanations for Kohlberg's dilemmas never received high scores. The Grant et al. study revealed that although the participants with autism were as likely as controls to judge culpability on the basis of motive, and to judge injury to persons as more culpable than damage to property, most of their justifications were of poor quality and simply reiterated the story line. Supporting the difficulty of using this methodology with individuals with ASD, Takeda et al. found that there were significant positive correlations between moral reasoning and verbal ability in the ASD group, while no such correlation emerged in the MA- and CA-matched typically developing children. Thus, a simpler methodology is required, which would demand a lower level of language abilities and have less of a cognitive load, while still being a valid and reliable assessment of moral reasoning in ASD.

Turiel (1983, 1989) developed such a paradigm based on the social domain theory. According to the social domain theory, there is a fundamental distinction between moral and social conventional norms of behavior. Moral norms are based on an understanding of justice, prohibiting behaviors such as lying, stealing and inflicting physical and/or emotional harm on someone else, and are universally applicable (Stich et al. 2009). Social conventions, on the other hand, facilitate social interactions by coordinating mutual behavioral expectations and unite individuals within the same social system (Killen et al. 2006a, b; Turiel and Wainryb 1998). They are arbitrary, contextually-bound, and their application is typically dependent upon the existence of specific rules issued by authority figures. Examples of social conventional norms are dress codes and table manners. Within Turiel's paradigm, which was later adapted by others (for examples, see Killen and Smetana 1999; Smetana 1981; Tisak et al. 2006), participants were presented with pictorial representations of familiar school transgressions, some of which depict moral transgressions (e.g., hitting, stealing), while others portray violations of social conventional norms (e.g., eating on the floor and daydreaming in class). Children are first asked to describe the events depicted in the pictures, in order to assess their understanding of the interaction. Smetana (1981) was the first to try this methodology with preschoolers and if the children did not successfully describe the interactions, the experimenters provided explanations and named the transgressions. Then the children were asked to judge the behaviors along a number of dimensions, such as the seriousness of the transgressions portrayed in the picture (moral transgressions considered "worse" than social transgressions), the contextuality/universality of the depicted violations (moral transgressions considered "universally wrong", while social transgressions are considered context-bound) and authority contingency (moral transgressions are judged less contingent on authority than social conventional rules).

Typically developing children as young as 3 years of age responded differentially to moral transgressions and social conventional violations, with their judgments reflecting the dimensions delineated above (Killen 1991; Nucci and Turiel 1978; Smetana 1981). The ability to distinguish between moral and social transgressions seems universal with some fluctuations for cultural norms (Humphries et al. 2000; Killen et al. 2006a, b; Smetana 2002; Song et al. 1987; Tisak and Turiel 1988). These results seem to be contradictory to Kohlberg's theory which attributed the ability to justify behavioral rules by the moral and social values they serve to post-conventional morality, a stage attained after adolescence, if at all.

The fact that young children could justify their judgments using this paradigm implies that the verbal skills required for this task may be different from those reflected in the Kohlberg dilemmas, and therefore this paradigm might be an appropriate methodology for assessing moral reasoning in individuals with ASD.

Blair was the first to use this methodology with individuals with ASD, in a paper published in this journal (Blair 1996). Using this task, he assessed the moral/social distinction through the use of three yes/no questions examining the acceptability of the action, the seriousness of the transgression, and its dependence on authority. His findings revealed that individuals with ASD were able to distinguish between moral and social transgressions and, to his surprise, no relationship between theory of mind abilities and the moral/social distinction emerged. Ten years later, Leslie

et al. (2006) also employed the moral/social distinction task as a measure of social reasoning in ASD, and investigated whether the distinction is related to the level of distress shown by the individuals involved in the interaction. They found that individuals with ASD distinguish between moral and social rules, and that their moral judgments are not based upon the protagonist victim's visually depicted level of distress but rather upon the causes of the distress, thus limiting their moral condemnation only to situations in which the protagonist victim's rights were violated. Their results support Blair's previous findings that individuals with ASD distinguish between moral and social transgressions and that the ability to discriminate between moral and social transgressions is based upon cognitive considerations rather than emotional empathy. Previous research findings regarding the ability of individuals with ASD to distinguish between social and moral transgressions imply that the depicted behaviors were understood, and yet it is not clear if their ability to discriminate between moral and social transgressions reflects an understanding which is similar to that of typically developing children, since there is evidence that individuals with ASD attend to irrelevant details, thus diminishing their ability to process complex information into a coherent total entity (Happé and Frith 2006; Frith 1997; Porter and Coltheart 2006; Teunisse et al. 2001). If such a tendency is found in the descriptions provided by the participants with ASD of the social situations presented to them in the present research paradigm, it may explain some of the difficulties individuals with ASD face as they try to assess complex social situations. To the best of our knowledge, the studies that have assessed moral judgment in individuals with ASD through the moral/social distinction task have not analyzed the participants' descriptions of the depicted behaviors nor their explanations for their judgments, although the latter has been done with typically developing children.

A review of the research literature in which children's justifications were elicited suggests a developmental trajectory inherent in moral reasoning (Smetana 2006; Turiel 2006). This trajectory is characterized by a progression from concern regarding concrete harm and specific cases in which others' welfare was compromised to a general concern with comprehensively applicable universal concepts of fairness. This trend has not been similarly delineated within the social conventional domain, although similar patterns of development occur in social reasoning (Crane-Ross and Tisak 1995; Harvey et al. 2001; Shantz 1999). In the present research, a yes/no question examining the acceptability of the portrayed behaviors was asked of all the participants, partially replicating the Blair and Leslie et al. studies. Departing from those studies, the participants' descriptions of the portrayed behaviors and their explanations for their judgments concerning acceptability were analyzed. The number of details which were included in the explanations but were not pictorially represented was calculated. The rationales concerning the unacceptability of the various transgressions given by the participants were then categorized according to the aforementioned types of moral considerations. The categories included justifications based on an awareness of general principles prohibiting the depicted behaviors and concern over the damage resulting from the specific transgression. These categories reflect Kohlberg's conventional morality. In the moral domain, both categories reflect awareness of other people's rights. In the social domain, the two categories reflect awareness of the social goals served by the violated rules (Turiel 1983). On a less complex level, explanations based on an awareness of a simple and/or specific rule prohibiting the behavior are indicative of Kohlberg's second stage of pre-conventional morality. Finally, utilitarian justifications, akin to Kohlberg's first stage of pre-conventional morality, were based on instrumental explanations. Additional categories included a category of idiosyncratic rationales and a category of non-specific answers.

Previous studies which compared individuals with ASD and those with typical development based the comparison either on matching for chronological age or on matching for IQ. In the present study the comparison group of participants with typical development was matched for overall mental ability, as measured by verbal, performance and full scale IQs, and for chronological age, thus enabling close examination of the ways in which cognitively capable individuals with ASD make sense of social and moral norms, and how they differ from closely matched, typically developing peers.

In addition to the investigation of moral reasoning, the present research also focused on the ability to flexibly apply moral and social rules appropriately according to the context. This ability requires flexible thinking, which has been shown to be an area of weakness for individuals with ASD (Geurts et al. 2009; Hill 2004; Solomon et al. 2008). In the current study, cognitive flexibility was studied by assessing participants' ability to judge transgressions which were previously evaluated by them as unacceptable in the schoolyard as acceptable in alternative circumstances. In addition, their ability to generate examples of situations in which the targeted behaviors could be considered appropriate was also included as a measure of cognitive flexibility.

The aim of the present research was to investigate the moral/social distinction task in individuals with ASD in comparison to individuals with typical development. It was predicted that both typically developing adolescents and those with ASD would correctly describe the ten familiar schoolyard interactions and be able to correctly evaluate the rightness/wrongness of the depicted behaviors.

Although no previous research has addressed the issue of analysis of differences in the descriptions provided by the two groups, we hypothesized that the descriptions provided by the participants with ASD would include more extraneous information than those of typically developing participants as a result of a difficulty in differentiating between relevant and irrelevant details in individuals with ASD (Loth et al. 2008). In addition, we hypothesized that the rationales provided by the ASD group would be simpler, more concrete, less elaborate, and less flexible, while more of the rationales provided by the typically developing participants would incorporate abstract rules, as abstraction has been identified as an area of difficulty for people with ASD (Best et al. 2010; Klinger and Dawson 1991; Shulman et al. 1995). Furthermore, we hypothesized that the moral/social distinction would be evident in the answers provided by both groups on the basis of universal applicability and specific contextuality explanations, although the participants with ASD might be less definitive than their CA- and IQ-matched typically developing peers, due to the difficulties they experience in interpreting social situations (Loveland et al. 2001). Finally, it was predicted that participants with typical development would provide more examples of situations in which behaviors that might be considered as transgressions in one context would be acceptable in other contexts, thus exhibiting more cognitive flexibility than the participants with ASD.

Method

Participants

Participants in this study included 36 preadolescents and adolescents with average intelligence who were divided into two matched groups: 18 individuals with ASD and 18 typically developing individuals. The two groups were matched on full-scale, verbal and performance IQ scores, and on chronological age. The IQ scores were derived through the WISC-III (Wechsler 1991). Forty-four high functioning adolescents with ASD and thirty typically developing students were assessed in order to match the two groups on the abovementioned parameters. The mean scores, standard deviations and age range are reported in Table 1. As is apparent, there are no significant differences in any of the matched measures, and there is more variation in the scores and ages of the group of individuals with ASD than in the typically developing group.

The participants with ASD were initially included if they were identified within the school system as having an autism spectrum disorder, which involved having an independent clinical diagnosis from a certified psychologist not associated with the study. Subsequently, each of these students was assessed using the Autism Diagnostic Interview-Revised (ADI-R: Lord et al. 1994) and the Autism Diagnostic Observation Schedule (ADOS: Lord et al. 2000). All the participants with autism in the study met diagnostic criteria on these two instruments.

The students with ASD were recruited through the Special Education Department of the Israel Ministry of Education. These students were all placed in local schools by the municipal educational placement committees. All but one (5.5%) were integrated in inclusive programs; thirteen children (72%) were in special classes for high functioning students with autism in regular schools; two children (11%) were in non-categorical programs for supporting students with special needs in the regular classrooms and two (11%) were fully included in regular classes in regular schools. Typically developing students were recruited from various elementary and junior high schools in the central region of the country. They were recruited from schools in which no program for students with autism existed. Students who were receiving any type of special treatment were excluded. All the participants came from middle-class families in the larger urban areas of Israel, and all were in Hebrew speaking educational programs. Thirty-four participants were assessed in Hebrew and two in English. All were living at home with at least one biological parent.

Instruments

The *Autism Diagnostic Interview Revised* (ADI-R; Lord et al. 1994) is a standardized semi-structured interview used to ascertain an autism diagnosis, which is designed to be used with a parent (or primary caregiver) familiar with the developmental history and current behavior of the individual being assessed. It consists of three major domains: language and communication; reciprocal social interaction; and restricted, repetitive, and stereotyped behaviors and interests. The ADI-R criteria are based on DSM-IV (APA 1994) and ICD-10 (WHO 1992) criteria.

The *Autism Diagnostic Observation Schedule* (ADOS**;** Lord et al. 2000) is a semi-structured assessment protocol that consists of various activities that facilitate the observation of social and communication behaviors related to the diagnosis of autism. Each activity provides an opportunity for the child to demonstrate social reciprocity and communication skills.

The *Wechsler Intelligence Scale for Children-Third Edition* (Wechsler 1991) was used to match the groups of participants on verbal, performance and full scale IQ scores. The WISC-III measures cognitive abilities for children who score developmentally between the ages of 6 and 16 years, 11 months. Five subtests are mandatory for computation of summary verbal scores, including:

Table 1 Sample characteristics

	Autism spectrum disorder-ASD	Typical development-TYP
Number of participants	18	18
Chronological age		
Mean (SD)	12.07 (2.76)	11.61 (2.72)
Age range	8.08–17.16	8.66–16.72
Full scale IQ		
Mean (SD)	94.31 (13.81)	97.85 (7.49)
Range	77–119	82–115
Verbal IQ		
Mean (SD)	92.66 (14.64)	96.06 (5.38)
Range	76–128	87–105
Performance IQ		
Mean (SD)	97.12 (14.64)	102.55
Range	77–133	82–122
Gender (M/F)	16/2	15/3

information about common events, places, and people; similarities in word pairs; comprehension; vocabulary; and arithmetic problems answered orally. Similarly five subtest scores are necessary to compute the performance nonverbal IQ and they include picture completion, picture arrangement, coding, block arrangement, object assembly, and mazes as an optional subtest in case one of the others is not administered for some reason. The full score IQ is derived from these two domain scores.

The Experimental Task (adapted from Smetana 1981) included 10 pictures of familiar occurrences in the classroom and schoolyard. In some of the original ten situations, individual children were portrayed, but because of the linguistic characteristics of the Hebrew language, in which a distinction is made according to number and gender, we made sure to include at least two children in each interaction and presented all questions in the plural and masculine. The illustrations of the children interacting in the pictures were drawn as older children than those used in the original study and were not clearly boys or girls, with emotions portrayed in facial expressions. Ten pictures were presented individually in a random order to the participants who were asked six questions about each picture: (1) What is happening in the picture?; (2) Is it OK to behave that way?; (3) If it's not OK, why is it wrong to behave in this manner?; (4) Would it be OK to behave in that way in any other situation, such as at home? If the answer to question 4 was positive, the participant was then asked to generate additional examples. Two additional questions regarding punishments were not included in this study.

In the present study, the five moral transgressions consisted of pictures depicting (1) one student hitting another; (2) one student pushing another; (3) one student throwing a glass bottle at another; (4) one student not sharing food with another who is requesting it; (5) one student stealing something from another's bag. The five social conventional transgressions were (1) one student eating his snack on the floor while other students in the class are eating at their tables; (2) one student daydreaming while the other students listen to the teacher; (3) two students coming in from recess, one of whom places his bag on a chair while the other one hangs his up in its place; (4) two students one of whom is tearing his book while the other is reading his; (5) one child drawing on the walls, while the other students are drawing on paper at their desks.

Coding Conventions

Accuracy of Descriptions involved the ability to correctly describe the interaction portrayed in the picture when the participants were asked question 1, "What is happening in the picture?". If the participant correctly described an interaction depicted in the picture, 1 point was scored, and if no understanding of the picture was expressed in the description, a code of 0 was given. For those who had received a code of "0", the interaction was described by the examiner, without specifically pointing out the transgression. In addition to the straightforward scoring of the participants' understanding of the depiction, descriptions which included additional information not pictorially represented in the pictures were scored. An example of this is the description given by one participant with ASD for the picture of a child tearing a book instead of reading it as the child next to him was doing: "Screany and Meany are reading books. Screany is angry because he is being punished and not allowed to go out to recess, so he is tearing the book in anger". Each additional piece of information was afforded one point. Thus, in the aforementioned example, the child received 3 points for supplementary information: 1 point for naming the participants in the picture; 1 point for describing the emotional state of the child (angry), and 1 point for his missing recess as a punishment.

Act Evaluation (justification regarding acceptability of the depicted behavior) was assessed through the judgment of the participant as to the appropriateness of the behavior (question 2: Is it OK to behave in this manner?). If the answer supplied by the participant was negative, question 3 was administered (Why is it wrong to behave in this manner?). Some of the participants supplied more than one explanation for their judgment regarding the acceptability of the behavior and each was coded, resulting in 389 responses to be coded, which were more than the expected 360 (36 participants × 10 pictures) rationales. If the judgment was that the behavior was unacceptable, the rationale provided by the participants was analyzed,

resulting in the following six categories of explanations: (a) the rationale reflected an understanding of the superordinate category of rules to which the specific behavior depicted in the picture belonged (e.g., "it is not permissible to hit others, because we should not behave in an aggressive manner" or "you can't tear that book because it's school property and does not belong to you"). This code reflects an abstraction of general principles governing behavior; (b) the rationale for the unacceptable behavior included a recognition of possible damage resulting from the action and included taking another's perspective (e.g., "he (i.e. the victim) will get hurt"; "other people might want to read the book."); (c) the explanation given rested on a simple rule specific to the transgression depicted in the picture (e.g., "it is forbidden to tear books"); (d) the rationale was utilitarian expressing a desire to prevent negative consequences to the offenders resulting from their behavior (e.g., "the teacher will be angry" or "No one will want to be his friend"); (e) the explanation presented marginal, less substantive reasons for the unacceptability of the behavior (e.g., "It is forbidden to hit others because others may imitate the behavior") or idiosyncratic reasons (e.g., "It is forbidden to hit others without the teacher's permission"); (f) the explanation consisted of simply reiterating the description of the behavior or saying it was "wrong to behave in such a manner" without further explication (e.g., "that is not allowed"). These categories reflected the type of reasoning behind the acceptability judgments and served as the basis for analysis of the manner in which the participants understood behavioral conventions.

Universal Applicability was based on the participants' explanations for all of the questions, with particular emphasis placed on the answer given for question 4 (Would it be OK to behave in that way in any other situation, such as at home?). This parameter was coded categorically: the participant received a score of "1" when the answer was "no", and this behavior was judged as unacceptable in all circumstances, "2" when the answer was "yes", it would be acceptable in another place or under other conditions, though unacceptable as depicted, or "3" if the behavior was judged as acceptable in all situations. A score of "2" in "universal applicability" was analyzed further as it was perceived as a measure of *contextuality*. In the cases in which the participants' judged that the behavior was acceptable in some but not all contexts, they were asked to provide examples of contexts in which the behavior would be acceptable. Each example was afforded one point. The mean number of examples could be compared by group (i.e., ASD/typical development) and by type of transgression (i.e., moral/social).

All the coding was analyzed from written transcripts of the answers given by the participants, and coded by the first two authors, while the third author scored all the answers concomitantly. For the items in which a discrepancy emerged, the three judges returned to the items and attained consensus scoring.

Procedure

After receiving approval from the Ministry of Education, we contacted school programs in which students with ASD were included in mainstream classrooms, thereby ensuring a high probability that the students would have at least average intelligence. After parental permission was obtained, the WISC-III was administered by a qualified psychologist who has experience working with ASD and typically developing school-aged students. All the typically developing participants and those with ASD were tested by the same psychologist. The research sample resulted from matching on all WISC-III measures (full score IQ, verbal IQ and performance IQ), which required the assessment of thirty-six children with ASD and thirty typically developing children. All thirty typically developing students completed the entire battery of pictures, in order to have the largest possible group from which to match the two groups. The WISC testing and the experimental task were presented individually in a small room in the student's educational framework.

Results

Accuracy of Descriptions

Before testing our hypotheses, it was important to establish that the participants understood the transgressions depicted in the pictures. Most of the participants correctly identified the pictorial representation of the transgressions. One participant with autism correctly described what was happening in the first picture ("a child eating") without referring to the fact that the child was eating on the floor, while the classmates were eating at their tables. In the second picture he did not see the child who was daydreaming as not paying attention but rather described the child as listening to a story that the teacher was telling and identified the child as feeling sad, as a result of the content of the story. After the examiner described each picture for the child, emphasizing the context in which the interactions were occurring, the participant with ASD then correctly interpreted the remaining 8 pictures.

The picture of the student putting his backpack on the chair instead of hanging it on its hook seemed to bewilder three of the typically developing children and two participants with ASD, who described the placing of the pack on the chair and on the hook as the same behavior. The picture

portraying a child who was not willing to share food with another child elicited two different interpretations, both of which were judged as correct interpretations as they were possible descriptions of the interaction. Most of the participants (30) viewed the interaction as a situation in which one child was unwilling to share food, while six others perceived the situation as the child with the food having taken it from the first child without permission.

The picture of the child "stealing" from another's backpack elicited three types of transgression attributions: five of the 36 participants described it as "going through another's backpack without permission", but not actually as stealing. Twenty-four participants determined that the child going through the backpack was actually stealing, while seven participants described the action as "searching for something in someone else's backpack". All three responses were coded as correct answers, since they included a coherent description of what was occurring in the picture while recognizing a behavioral transgression, with no statistically significant group differences. Thus, in summary, a near-to-ceiling effect emerged from the descriptions of the transgressions in the pictures, supporting the fact that all the participants understood what was depicted in the pictures. Consequently any differences which emerged could be interpreted as resulting from the reasoning processes employed by the participants and not from a lack of understanding of the interactions.

Extraneous Information

In the analysis of the extraneous pieces of information in the descriptions, overall interjudge reliability was 90.56%. The mean number of extraneous pieces of information for the entire sample of 36 participants was 5.28 (SD = 5.55), with some participants not adding any extraneous information. Two participants, one with autism (twenty-seven complementary descriptions) and one with typical development (seventeen complementary descriptions) were excluded as outliers from the analysis of group differences in providing extraneous information in their descriptions. After the outliers were excluded, a significant group difference emerged ($t_{(32)} = 1.97$, $p < 0.05$), with the participants with autism providing a mean of 5.47 (SD = 4.46) extraneous pieces of information and the participants with typical development adding an average of 3.12 supplementary pieces of information to their descriptions (SD = 2.09). These two participants were included in all other analyses as the number of extraneous pieces of information was not pertinent to other analyses in the study.

Act Evaluation (Justification of Acceptability of the Depicted Behavior)

The evaluation of the appropriateness of the action was assessed through the judgment of the participants as to the acceptability of the behavior (question 2—Is it OK to behave in this manner? and question 3—Why is it wrong to behave in this manner?) for all 36 participants. Interjudge reliability was calculated according to percentage of agreement for all of the responses provided by the participants and found to be 89%. Since some of the participants provided more than one explanation for each picture, 389 rationales were analyzed. No significant differences occurred on the more frequently provided rationales, which included damage resulting from the transgression (25%; $n = 97$) and the citing of specific rules prohibiting the depicted behaviors (23%; $n = 90$). Participants with typical development provided significantly more abstract rules as rationales for their judgments of the unacceptability of the behaviors ($t_{(34)} = -3.8$, $p < 0.01$), whereas the participants with ASD provided more nonspecific condemnations of the behaviors without rationales ($t_{(34)} = 2.881$, $p < 0.01$) and more answers in which a utilitarian perspective was discerned ($t_{(34)} = 2.92$, $p < 0.01$). No significant group differences emerged in idiosyncratic rationales ($n = 21$, 5.4%). The depicted behaviors were evaluated as acceptable 32 times (8%).

Universal Applicability as a Marker of the Moral/Social Distinction

After establishing that the participants understood the transgressions depicted in the pictures, it was possible to compare the moral transgressions and the social conventional transgressions on the basis of whether the participants viewed the transgression as universal or context bound, as presented in Table 2. Universal applicability as coded from the participants' response to the question regarding whether it would be acceptable to behave in that manner in any other situation for each transgression is presented in Table 3 ($n = 36$). From this table, it is clear that throwing a glass bottle, pushing a child, hitting a child, stealing, tearing a book and coloring on the walls, which were interpreted as vandalism, and not sharing food were judged by the majority of the participants in this study as unacceptable, while daydreaming instead of listening to the teacher in class, putting a backpack on a chair instead of hanging it on a hook, and eating on the floor were viewed as acceptable in some or all other contexts by the majority of the participants.

Table 2 Acceptable contexts by frequency

Behaviors	Not allowed in any context	Allowed in other contexts	Generally allowed
Dreaming in class (percentage)	8 (22%)	26 (72%)	2 (6%)
Put bag on chair (percentage)	8 (22%)	17 (47%)	11 (31%)
Eating on the floor (percentage)	10 (28%)	19 (53%)	7 (19%)
Does not share food (percentage)	21 (58%)	8 (22%)	7 (19%)
Coloring on walls (percentage)	23 (64%)	13 (36%)	
Tearing book (percentage)	26 (72%)	10 (28%)	
Steal from backpack (percentage)	27 (75%)	9 (25%)	
Hit a child (percentage)	28 (78%)	5 (14%)	3 (8%)
Push a child (percentage)	32 (89%)	4 (11%)	
Throw glass bottle (percentage)	32 (92%)	2 (5%)	1 (3%)

Examples of Possible Contexts as Marker of the Moral/Social Distinction

The number of novel examples the participants provided for contexts in which the depicted behaviors might be acceptable are presented in Table 4. Of the 85 participant-generated examples, 57 (67%) were provided in response to social conventional transgressions and 28 (33%) were provided in response to moral transgressions ($t_{(35)} = 3.64$, $p < 0.01$). Thus, overall, social conventional transgressions were more context dependent than moral transgressions.

Group Differences in Universal Applicability

In order to test the hypothesis that both groups would distinguish between moral and social conventional transgressions, and that the distinction would be more clearly pronounced within the typically developing group, we calculated the mean of the applicability judgments for the two types of transgressions within each group. Two multivariate analyses were performed: subject analysis (F1) with the type of transgressions as within-subject factor and the group affiliation as between-subjects factor, and item analysis (F2) with the type of transgressions as between-items factor and group affiliation as within-items factor. Both analyses show a main effect for the group affiliation $F1(1,34) = 7.48$, $\eta^2 = .18$, $p < 0.05$; $F2(1,8) = 8.47$, $\eta^2 = .51$, $p < 0.05$, and the subject analysis shows a main effect of the type of transgression, $F1(1,34) = 40.04$, $\eta^2 = .54$, $p < 0.001$, which wasn't replicated in the item analysis $F2(1,8) = 4.33$, n.s. The group differences are displayed in Fig. 1.

The interaction between the type of transgression and group affiliation was significant in both analyses $F1(1,34) = 10.69$, $\eta^2 = .24$, $p < 0.01$; $F2(1,8) = 9.43$, $\eta^2 = .54$, $p < 0.05$, suggesting that the distinction is more pronounced within the typically developing children. Post hoc comparisons reveal that participants with ASD tended to view social norms as more universally abiding than participants with typical development, $F_{(1,34)} = 4.88$, $p < 0.05$, whereas no difference was found between the two groups' judgments of the moral transgressions.

The results from the present study revealed that both groups judged social conventional violations to be more context-bound than moral transgressions. However, participants with ASD evaluated violations of social norms more inflexibly, with their judgments being more rule bound than the judgments of the participants with typical development. Thus, despite the ability to distinguish between moral and social transgressions, the judgments of violations of social norms in the group with ASD were more similar to those regarding moral transgressions than in the typically developing group.

Group Differences in Contextuality

We calculated the mean number of novel examples the participants generated for possible contexts in which the depicted behaviors could be judged as acceptable, despite the fact that as depicted they were judged as unacceptable. In order to test the hypothesis that both groups would provide more examples for social conventional transgressions than for moral transgressions, we compared the mean number of examples provided for each type of transgression in each group, and found that although both groups provided more examples for social conventional transgressions than for moral transgressions, the difference was significant only within the typically developing group ($t_{(17)} = 4.46$, $p < 0.001$).

Discussion

The findings from this study revealed that the participants from both groups were able to accurately describe the interactions depicted in the pictures and to identify the unacceptable behaviors as transgressions. The participants with ASD added more extraneous information in their descriptions than those with typical development. When asked to provide explanations for their judgments regarding the unacceptability of the depicted behaviors, the most frequent rationales provided by the participants included expected damage which would result from the transgressions and citing of specific simple rules prohibiting such behavior. Participants with typical development provided

Table 3 Examples for contexts in which the depicted behaviors are acceptable

Behaviors	The proposed contexts where behavior is permissible			
	Own property	With permission	Outdoors/Pubic places	Other, specific contexts
Dreaming in class		1	7	With no attention to you 2
				If uncomfortable 1
				With strangers 1
				At an unimportant place 1
				At relatives' house 1
Put bag on chair		1	3	If you don't need it 2
				In the car 1
				At other peoples' house 1
Eating on the floor		2	8	On a carpet 1
Does not share food	2	1		The owner is hungry 2
				There's plenty of food 1
				Protagonists are strangers 2
Coloring on walls	1	6		Graffiti 3
				On a page 3
				Arts room 1
Tearing book	6			By accident 2
				Book not needed 1
				Book banning rally 1
Hit a child		1		Judo lesson 1
				Pillow fight 2
				At home, if provoked 1
				A slap 1
Push a child				If provoked 2
				Among siblings 1
Throw glass bottle				If provoked 1
				Plastic bottle 1
				Launching a ship 1
Steal from backpack	3	4		Security inspection 1

Table 4 Novel examples for contextual dependency

Type of transgression[a]	Mean		Standard deviation	
	ASD[b]	TYP[c]	ASD	TYP
Social conventional	.25	.46	.25	.32
Moral	.16	.19	.24	.17

[a] There were 5 behaviors in each category

[bc] There were 18 participants in each group

significantly more abstract rules as rationales for their judgments, whereas participants with ASD provided more nonspecific condemnations of the behaviors (e.g., "that's bad", "you can't do that") and more answers in which a utilitarian perspective was discerned (e.g., "the teacher will get mad"). Supporting findings from previous studies, the results from the present study revealed that both groups judged social conventional transgressions to be less universally applicable than moral transgressions, with this distinction being more pronounced in individuals with typical development, who also provided significantly more examples of places and situations in which the depicted behaviors would be acceptable.

According to the social domain theory (Turiel 2008; Smetana 2006), cognitive structures are developed and classified within fundamental categories, or "domains", the purpose of which is to organize social knowledge. The two categories investigated in the present research were the moral and social conventional domains. Morality is structured around intrinsic issues of human welfare, fairness, and not causing damage, whereas social conventions are essentially arbitrary (Sousa et al. 2009; Wainryb 2006), based on cultural customs and shared norms, the purpose of which is to help coordinate interactions and facilitate social functioning. Previous research has shown that even very

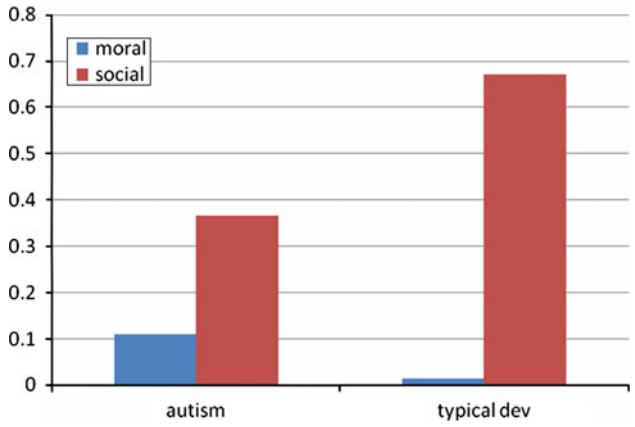

Fig. 1 Group differences in contextuality of moral and social rules

young children are aware of these principles (Smetana 1989; Smetana and Braeges 1990; Turiel 2008). The open-ended questions in the present study offered a unique opportunity to analyze the rationales upon which the participants' judgments were based. For example, when coloring on the walls was viewed as "vandalism" or as "a violation of the owner's property rights", it was judged as a moral transgression, whereas when it was perceived as behavior requiring permission by the owners of the property, it was viewed as a violation of social conventions and judged as acceptable in certain circumstances, such as coloring on the walls in art class, or at home with parental permission. Thus, although the current study's participants' evaluations of the depicted behaviors could differ from each other and from previous findings, the basic principles distinguishing between moral and social conventional domains remained germane. From our results, which are supported by previous findings (Blair 1996; Leslie et al. 2006), it seems that both groups' judgments reflected the moral/social distinction.

However, despite being matched on verbal and nonverbal cognitive abilities, a closer examination of the rationales provided by the participants revealed cognitive differences between the two groups. In order to comprehend what is happening in the world, attention must be focused on the relevant aspects of a stimulus or an action upon which judgments are made (Newell and Broder 2008). The attention of individuals with ASD is often captured by surface features or fragments of objects or interactions, not those which are the most salient for others. Because they focus on the details, it becomes difficult for individuals with ASD to discern the relevant features as different and as more important than irrelevant ones. Therefore, even after identifying the relevant aspects of the stimuli, individuals with autism continued to add irrelevant details often clouding their originally correct answer (Happé and Frith 2006). Likewise, there is evidence that people with ASD process information in a piecemeal fashion, responding to both meaningless and meaningful stimuli similarly (Frith 1997; Porter and Coltheart 2006; Teunisse et al. 2001). In the current study, participants with ASD provided more irrelevant, unsubstantiated details in their descriptions. This difference cannot be ascribed to differences in intellectual abilities since they and the typically developing participants were matched on both verbal and nonverbal intelligence. Furthermore, it is possible that difficulties in discerning the relevant aspects of the interaction undermined the ability of the participants with ASD to understand when the application of the more flexible social conventional norms was appropriate. Consequently, individuals with ASD may have judged violations of social conventional norms more stringently than the participants with typical development and perceived them as if they were moral transgressions.

Abstract thinking also involves the identification of relevant and salient characteristics of stimuli from various sources. Abstractions are established as a result of bringing together the essential parts shared by each source and assimilating them into some general scheme (Sperber and Wilson 1995; Hahn and Chater 1998). These schemes coalesce into abstract rules which are based on the distinctive aspects which have been isolated and incorporated into a prototype, which is an identified area of impairment for individuals with ASD (Best et al. 2010; Klinger and Dawson 1991; Shulman et al. 1995). In the present study, participants were asked to provide rationales explaining why the depicted transgressions were wrong, and the typically developing participants used abstract rules significantly more frequently than the participants with ASD, whose judgments regarding the transgressions remained specific and individual and did not reflect an understanding of the underlying principles behind the prohibitions. Unfortunately, the number of participants in each group was too small to allow the calculation of the correlation between participants' use of abstract rules in their justifications and the addition of extraneous information, leaving the possibility of a correlation between the ability to form abstract rules and the ability to detect relevant details in interactions to be explored in future studies.

Several cognitive processes affect the formulation of abstract rules and previous research findings have revealed that abstract thinking in ASD is compromised when faced with cognitive overload (Happé and Frith 2006). Although the social situations presented in the current experimental task were familiar and simple, they may have been inherently complex for people with ASD, because of the social (Loveland et al. 2001) and verbal load. The fact that they were asked to justify their social judgments verbally might have compounded the cognitive difficulty (Surian et al. 1996), resulting in the diminished use of abstract rules and

the higher rate of nonspecific condemnations of the transgressions.

Finally, in addition to the generation of abstractions, the flexible use of cognitive skills is imperative in formulating judgments. Flexible thinking, which refers to the ability to shift to different thoughts or actions depending on the situational demands (Monsell 2003), is another identified area of difficulty for individuals with ASD (Corbett et al. 2009; Dawson et al. 2000). Flexible thinking has been frequently assessed using rule switching paradigms (Meiran 2010). Although the differentiation between the moral and social transgressions in the current study was not made explicitly, the participants' judgments regarding universal applicability and contextuality required implicit rule changing as the moral/social distinction is a distinction between two types of interactions: those in which one rule applies (i.e., moral transgressions) and those in which the appropriateness of the behavior is contingent upon the particular set of circumstances of each interaction (i.e., violations of social conventions). The participants with ASD in the current study seemed less aware of the possibility that the rules which prohibit social conventional transgressions might change according to the specific contextual conditions of each interaction and that some of these changes could lead to a different evaluation of the acceptability of the depicted behavior.

These findings have specific implications for rule learning and specifically for social and moral education, in ASD. Evidence from earlier research (Billings 2007) suggests that even in typical development it should not be assumed that abstract thinking will be used flexibly and will be generalized to new contexts. Cognitive skills have long been perceived as situation-specific and highly dependent on domain-specific knowledge (Brown et al. 1991). When teaching moral and social rules to individuals with ASD, there is a need to deliberately teach "mindful abstraction" of principles (Zelazo and Frye 1998). In order for appropriate generalization and transfer from one situation to another to be achieved, thorough and **diverse** practice must be provided and abstraction of rules must be explicitly articulated (Perkins and Salomon 1987) together with self-monitoring practices (Forbes and Grafman 2010). Given the appropriate conditions, such as cueing, practicing, generating abstract rules, and socially cogent explanations and principles, skills can be transferred from one situation to another (Anderson 1989). Otherwise, the context, the interaction and/or the rule can become inflexible and situation-specific (Killen and Smetana 2008).

Although the results from the present study lead to important intervention strategies which might help individuals with ASD understand and reason about social and moral interactions in a more effective manner, there were several limitations in the present study which remain to be addressed in future research. The findings from this study were based on a small sample and replicating them with a larger sample, extending the ages of the participants to a younger and older cohort, and including more females, would add to the validity of the findings reported in the current study. Similarly, it is important to see if similar results would emerge when individuals with a wider range of cognitive abilities are included. Although group matching in the current study was more scrupulous, with matching on verbal, performance and full score IQ measures, whereas in previous studies, the matching was only according to a measure of verbal mental age measures (e.g., Blair 1996; Grant et al. 2005; Leslie et al. 2006), the issues examined in the current study should also be investigated among individuals with ASD of all levels of cognitive functioning.

In addition, there may have been an inherent bias in this research as only pictures of transgressions were presented to the participants. Although this is an acceptable methodology in the moral/social discrimination task, the inclusion of pictures depicting interactions which could have been judged as acceptable would add another dimension to the judgments regarding the interactions and could broaden our understanding of social and moral reasoning in ASD. Finally, it is important to stress that the use of this methodology does not predict how individuals with ASD would describe, judge and explain interactions in real life situations. The pictures were presented in order to provide straightforward stimuli to be analyzed, but it is not clear if the judgments and rationales provided by the individuals with ASD would also express themselves when they found themselves in such interactions. A discrepancy between the manner in which typically developing children understand transgressions and their behavior in actual situations has been documented (Turiel 2008). The level of moral reasoning reflected in the explanations given by the participants with ASD may rest on analytical cognitive skills and not necessarily be expressed in live interactions.

In conclusion, the findings from this research emphasize the need to understand the manner in which people with ASD think about the world around them as a basis for intervention strategies designed to maximize their understanding of and involvement in the social world. Previous research which focused on the nature of moral reasoning in the moral/social conventional transgression distinction found moral reasoning relatively intact, whereas the justifications of the participants with ASD were characterized by difficulties in abstraction of rules which govern behavior, a tendency to overgeneralize and an inflexible adherence to social norms. It is possible that these difficulties may cause some of the social impairments in ASD. Therefore, the manner in which social rules are taught needs to reflect the underlying difficulties which

individuals with ASD experience as they reason about the social world around them. When helping individuals with ASD navigate the social world it is important to teach the principles upon which behavior governing rules are based, practice transferring them from one situation to another, and stress the contextuality of behavior governed by social conventional rules, rather than simply emphasize the "immorality" of doing something wrong.

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