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ABSTRACT
The judgment of blame was studied in a group of 28 teenagers, 14 with Asperger syndrome (AS) and 14 typically developed. Teenagers in each group were matched by age, cognitive development and academic level. They were presented with 12 short vignettes in which they had to judge an action according to the intent of the actor (deliberate and accidental), the consequences of the action (presence and absence) and the seriousness of the situation (low, medium and high). Results showed a significant difference in the patterns of judgment of both groups. The AS group judged the action according to the physical consequence of the action more than the intent of the actor; the opposite was observed with the control group. In addition, the AS teenagers were less capable than the control group of grading injury to a person when apportioning blame especially when they were not familiar with the social situations. This result suggests that the judgement of the seriousness of the outcome of the social interaction is linked with its level of familiarity. Furthermore, result are congruent with the assumption that two different cognitive structures, deontic reasoning and perspective taking, are involved in the judgment of blame.

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KEYWORDS
Judgment of blame; teenagers; Asperger’s syndrome; cognitive development

Introduction
According to the Diagnostic and Statistical Manual of Mental Disorders (DSM V) of the American Psychiatric Association (2013), autism spectrum disorders (ASD) are a developmental disorder defined by a profound impairment in
interpersonal interaction and communication, and the presence of repetitive, restricted and stereotypical behaviours and interests. Some individuals with ASD are delayed in their cognitive, social and emotional development (autism disorders), while others are not delayed but impaired in their cognitive development and in their social interaction [Asperger syndrome (AS) or high-functioning autism (HFA)]. The ability to understand one's own and others' mental representations is commonly referred to as theory of mind (ToM; Baron-Cohen, Leslie, & Frith 1985; Kaland, Callesen, Müller-Nielsen, Mortensen, & Smith 2008). Some daily life activities such as moral judgments require the ability to attribute mental representation to another person in order to determine, according to the context, if the action is intentional or accidental.

A recent study, by Torralva et al. (2013), investigated the relationship between decision-making and ToM in individuals with AS. Results from AS participants attested to deficits in a complex ToM task linked with others’ perspective taking ability but no impairment in a decision-making test. This result is completely consistent with previous findings showing that participants with autism have trouble interpreting others’ intentions. Indeed, many prior studies converge on the finding that AS populations have difficulty taking into account the perspective of others as much as the actor's intent when judging social interactions (Grant, Boucher, Riggs, & Grayson, 2005; Moran et al., 2011; Rogé & Mullet, 2011; Zalla Barlassina, Buon, & Leboyer, 2011). Indeed, Grant et al. (2005) observed that although children with autism were able to analyse social interactions on the basis of intent and give verbal explanations for their judgments, most of them were not able to justify their opinion as accurately as the children from the control group. Rogé and Mullet (2011) reported that participants with autism assigned less importance to the intent information than their control counterparts. This result confirms other works (Zalla Barlassina, Buon, & Leboyer, 2011) showing that AS individuals have difficulty distinguishing intentional from non-intentional behaviours.

This difficulty for individuals with AS in understanding others’ mental representation affects their moral judgement not only when judging the actor’s intent but also the outcome of the action. They give more importance to the consequence than do typically developed people. Moran et al. (2011) have shown that adults from the control group, in a moral judgment task of an action with two levels of intention (neutral and negative) and two levels of outcome (neutral and negative), judged accidental harm less severely than intended harm, whereas adults with AS or HFA judge accidental and intended harms identically. Their judgment process relied more on the negative outcome of the action than on the intention of the actor.

To analyse the way people judge the outcome of the actions, Rogé and Mullet (2011) have examined the level of severity of the consequence in the judgement of blame. In their experiment, the authors measured how children, adolescents and adults with and without ASD assigned blame and their ability
to combine intent (accidental or deliberate) and seriousness of outcome (not severe, medium and severe). In this experiment, the seriousness of the outcome concerned only material damage resulting from a social interaction between two protagonists. The following example illustrates one of the six vignettes used by Rogé and Mullet (2011): “Paul uses John’s mobile radio Accidentally, Paul lets the radio receptor fall down on the ground. The receptor is broken but it is possible to have it repaired”. Two major observations were made. First, both control and ASD participants considered intent and consequence data to infer blame, but all participants with autism regardless of their age gave significantly less weight to the intent than participants without autism. This result confirms previous results. Second, no significant difference was found between both groups in the judgement of the seriousness of the consequence. This result raises the question of the judgement of the outcome. In their experiment, Rogé and Mullet (2011) present only a kind of consequence based on material damage (to break a radio). Previous research (Grant et al., 2005) has shown that children with autism were able to judge culpability on the basis of motive and to judge injury to persons as worse than damage to property. This result suggests that the judgement of the severity of the consequences would be different if the consequence is an injury to a person rather than material damage. Indeed, the kind of consequence: material damage or injury to a person does not have the same level of seriousness, therefore the different levels of seriousness for material damage or injury to a person would not lead to the same level of blame. This difference could be linked with perspective-taking ability. Indeed, if a person with ASD has difficulties in taking into account the perspective of the other she may not judge the level of seriousness or potential seriousness of the consequence as accurately as a typical person, especially if the outcome is an injury to a person. The blame assigned to the perpetrator requires perspective-taking ability of the judge who should be able to anticipate the seriousness or potential seriousness of the injury by taking the perspective of the victim. So we could hypothesise that the level of blame apportioned to the perpetrator for the seriousness of the outcome depends on the perspective-taking ability of the judge. For this reason, one can assume that an ASD population will have difficulties in discriminating and ordering the consequences’ level of seriousness as accurately as the typical population, especially if the outcome is an injury to a person.

Fontaine, Salvano-Pardieu, Renoux, and Pulford (2004) suggest that at least two structures are involved in moral judgement, one based on deontic reasoning and the other on perspective taking. Deontic reasoning is the cognitive ability to understand what is allowed or not and to judge according to the rules of social life (Manktelow, 1999; Manktelow & Over, 1991). Deontic reasoning operates in the judgment of stories, which either display deliberate intent and adverse consequence or display accidental action without consequence. Knowledge of social rules and precepts is sufficient for the
judgement of social interactions in those stories. Actions perpetrated deliberately with bad intent and resulting in adverse consequences require blame, while no blame is required for accidental action without consequence. This is the basis of social rules learned in early life. By contrast, when bad intent is present and consequence absent, an accurate judgment process requires imagining the aggressor’s harmful aim and the possible damages attached to it, that is to say perspective-taking ability. When the action is accidental but results in a bad consequence, perspective taking is also necessary to understand that the actor did not act on purpose even though an adverse consequence occurred. This perspective-taking ability develops later than deontic reasoning. Piaget’s first studies on moral judgement (1932) showed that children under 10 years old judge on the basis of consequence rather than on the basis of intent. This result has been modulated later by many other authors (Kail, 1990; Karniol, 1978; Maryniak & Selosse, 1985; Rule & Duker, 1973; Santolini, 1982) who have shown that children under 10 and as young as 5 could incorporate intent into their judgment process. Cushman, Sheketoff, Wharton, and Carey (2013) have observed than when growing up, children shift from consequence to intent and give more and more importance to the intent as they reach adulthood. This shift in moral judgement could be explained by the development of cognitive processes and perspective taking of others. This result confirms previous research (Przygotzki & Mullet, 1997; Rogé & Mullet, 2011) based on Anderson’s Functional Theory of Cognition (1981, 1996, 2008, 2013). Przygotzki and Mullet (1997) observed that in the judgment of blame, the weight given to the consequences and intent factors depended on the age of the participants (children, young or elderly adults). Children gave more weight to consequence factors whereas teenagers and adults gave more weight to intention. In addition, Rogé and Mullet (2011) have shown that the shift from consequence to intent observed with the typical age development, while weaker, was also observed with ASD population.

According to Anderson’s Functional Theory of Cognition (1981, 1996, 2008, 2013), people judge an action by weighing different factors, mainly consequences of the action and the actor’s level of intent. Judgment outcome depends on how these factors are combined, i.e., the level of importance given to each of them. The moral algebra obtained with this method has three different possible patterns: mono factorial (only one factor is taken into account), additive (no interaction between the two factors is observed) or multiplicative (the weight given to one factor shifts as regards the other factors). In this last case, the effect of one factor is reduced or amplified in correlation with another factor, and a significant interaction between both factors is observed. This pattern of moral algebra evolves with child development. Children under ten usually present an additive algebra while adolescents and young adults mainly use a multiplicative algebra.
The present study

The aim of this study was to assess the moral algebra of an AS population to better understand underlying mechanisms involved in moral judgment. We would like to know how AS teenagers combine intent and consequence in the judgement of blame and if deontic reasoning and perspective taking, identified as two different structures involved in moral judgement by Fontaine et al. (2004), are also observed with an AS population. We also would like to know if the ability of the AS teenagers to evaluate the seriousness of the consequence with material damage outcomes would still be observed with a more serious consequence such as injury to a person. Finally, we would like to better understand the link between moral algebra and social adaptation to daily life situations, and how one affects the other. The manipulation and the analysis of these three variables: Intent (with—without), consequence (with—without) and seriousness of the consequence (low—medium—high) with their interactions allowed us to study the moral algebra of the adolescents with and without AS.

In order to examine the presence of perspective taking and deontic reasoning in judgement of blame, we manipulated the presence and the absence of the intention as well as the presence and the absence of the consequence that we found crucial. We assumed that adolescents with AS use intent and consequence information but even if they reach the age to judge on the basis of the intent rather than of the consequence, they would give significantly less weight to intent than to the outcome of the action and significantly less weight to the intent than their control counterparts. Indeed, judging the intent of the actor requires perspective-taking ability especially if the negative intent does not induce a consequence. We also assumed that AS teenagers would give significantly more weight to consequence than teenagers without AS (because consequence is objective, visible and does not require perspective taking). Finally, we did not expect differences between the AS and control groups when judging social situations with bad intent and with consequence or without intent and without consequence, because in these two social situations, only deontic reasoning is required and we assume that this cognitive structure is preserved in AS.

In order to appreciate how teenagers with AS understand and judge social interactions in different situations according to different levels of seriousness of the consequence, we manipulated the level of seriousness (low, medium or high) of the outcome or potential outcome such as injury to a person, and their frequency in daily life. This would allow us to understand if AS teenagers are able to discriminate as accurately as their control counterparts the seriousness of these different social situations when apportioning blame.
Material and methods

This study based on Anderson’s Functional Theory of Cognition (2008) examines the rules of the moral judgment of blame and its algebraic structure within two groups of teenagers, one with AS and one without. The moral judgment pattern of each group was observed with the three following factors: intent of the actor, consequence of the action and seriousness of the consequence as described in Fontaine et al. (2004).

Participants

Twenty-eight volunteer participants, 14 in each group, took part in this experiment.

Group 1 was composed of 14 outpatient children (12 boys and 2 girls) with the diagnosis of Asperger’s Syndrome (M = 12.9, standard deviation (SD)=1.1, range 11.5—14.8) enrolled for the study through the Clinic of Child Psychiatry in the Autism Resource Department, Tours University Hospital (France). AS was assigned by using the Autism Diagnostic Interview — Revised (ADI-R) (le Couteur, Lord, & Rutter, 2003; Lord, Rutter, & Le Couteur, 1994) and the Autism Diagnostic Observation Schedule — Generic (ADOS-G) (Lord, Rutter, DiLavore, & Risi, 2000) by a pediatrician and a psychologist trained on the ADI-R and ADOS-G. The children with AS did not have any severe comorbid emotional or behavioural diagnoses, specific language impairments or tic disorders. Children with AS were also tested with the scale of Wechsler (2005), Wechler Intelligence Scale for Children (WISC IV). The mean full-scale IQ values were in a normal range, above the average, as was the Verbal Comprehension Index (VCI) (mean 118, SD 11.3, range 102—135).

Group 2 matched the control group (12 boys and 2 girls). Fourteen typically developed, age matched children (mean 12.8, SD 1.0, range 11.7—14.5) were enrolled. Control children were volunteer students from public schools in Tours (France). Their cognitive development was assessed at the beginning of their schooling by the medical school team and none of them suffered learning problems, psychiatric disorder or medical illness affecting brain function. Children from both groups came from comparable socio-economic backgrounds, and were native French speakers. They were all living with their families and attended ordinary school. As shown in Table 1, participants were matched in pairs with equal gender, age (no more than six months discrepancy) and academic level (ranging from year 7 to year 11. Mode: year 8). Academic level was assessed by teachers based on average grades. Participants were also matched according to their cognitive development. A Raven test: Progressive Matrices 38 (PM 38) was used and no significant difference was found between the AS group (M = 47.2, SD = 5.9, range = 41—59) and the control group (M = 46.7, SD = 3.8, range = 41—54). F (1, 24) = .07, not significant (NS).
Table 1. Age, school level and Raven score for the AS and control teenagers and VCI score (WISC IV) for the AS teenagers. Each AS adolescent is paired with a typical adolescent of the same age.

<table>
<thead>
<tr>
<th>Age</th>
<th>School year</th>
<th>Raven score</th>
<th>VCI WISC IV</th>
</tr>
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<tr>
<td>14.8</td>
<td>9</td>
<td>48</td>
<td>127</td>
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<tr>
<td>14.2</td>
<td>9</td>
<td>59</td>
<td>113</td>
</tr>
<tr>
<td>14.1</td>
<td>8</td>
<td>52</td>
<td>112</td>
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<tr>
<td>14.0</td>
<td>8</td>
<td>52</td>
<td>135</td>
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<td>13.6</td>
<td>8</td>
<td>40</td>
<td>105</td>
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<td>13.5</td>
<td>9</td>
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<td>125</td>
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<td>13.3</td>
<td>8</td>
<td>51</td>
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<td>102</td>
</tr>
<tr>
<td>11.5</td>
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<td>45</td>
<td>110</td>
</tr>
</tbody>
</table>

Materials

The materials consisted of twelve vignettes describing in a few short lines a situation between two teenagers. Each of the vignettes contained the following information: (1) the intent of the actor (with or without bad intent) and (2) the presence of the consequence of the act (with or without consequence). In addition, three different stories were used: push, punch and knife in order to arrange three different levels of the consequence’s seriousness (low, medium and high). The low level described a push “Push story” which consequence was a bruised knee. We display a fall resulting in a bruise knee caused by a push in a game between friends or by an argument between two enemies. A child pushing another is a relatively common social situation. Therefore, we assume that most of the participants have experienced this situation several times in their daily life. The medium level “Punch story” described a punch which consequence was a broken nose. In this case, two friends are playing together with a punching ball or two foes have a fight. In both cases, one gives a punch to the other’s face consequently breaking his nose. This situation is less common than the push situation. We assume that only a minority of participants will have experienced it directly. Most of them will only have virtually such a situation through medias, films, books, video games, …. The high level “Knife story” described a stab with a knife which consequence was a serious injury in the leg. In this stab situation, two friends are playing with a knife or two enemies have a serious fight, the consequence in both cases being a stabbed leg with a deep wound. This situation is uncommon and not necessarily directly observed in teenagers’ daily life but they can have heard
about it through the media. Therefore, teenagers are more or less acquainted to this particular social interaction.

Four vignettes were set up for each of the three independent levels of seriousness: Push story, Punch story and Knife story. Therefore, the four vignettes were presented as follows for each level of seriousness: bad intent — with consequence, bad intent — without consequence, no intent — with consequence and no intent — without consequence.

All the material of this experiment consists in 12 vignettes obtained by crossing orthogonally these three factors: Story, Intent and Consequence. In these vignettes, the protagonists are friends when the action is made accidentally and enemies when the action is made deliberately.

Each scenario was presented with a 16 cm response scale with two ends: “no blame” as the left anchor (0 cm) and “very severe blame” as the right anchor (16 cm). Participants had to tick a notch between “0” and “16” to record their judgment. Participants were told that the notches reflected the intensity of the blame apportioned to the perpetrator and that they were free to tick any point on the scale. The scenarios described simple and concrete social interactions between teenagers. A few adolescents who did not take part in the experiment were asked to read the scenarios to test clarity and understanding. The twelve original French vignettes as well as some translated into English are to be found in the appendix.

**Procedure**

Participants completed the questionnaire alone in a room with an experimenter who was also a psychologist. He explained the instructions to each participant. The experiment started with a familiarisation phase during which the participant had to read two short vignettes, then apportion blame to the perpetrator by ticking a notch on the scale. During this phase participants were allowed to compare their answers for both scenarios. They were not given any feedback. In the following “real” experimental phase, the 12 different vignettes were presented in a random order so as to avoid an order effect. No scenario was presented twice and no time limit was assigned. During the “real” experimental phase, participants were not allowed to compare their answers nor go back and modify previous ratings, as they had been in the familiarisation phase. Each participant’s rating in the experimental phase was converted into a numerical value expressing the distance (measured in cm) between their tick on the response scale and the left anchor “0”, serving as the origin. These values were then subjected to graphic and statistical analyses. No participants systematically answered “0: no blame” or “16: very severe blame”. They used the whole scale from the minimum “0” to the maximum “16”. No floor or ceiling effect was observed.
Results

Global result

A 2 (Group: Asperger vs. Control) × 3 (Level of seriousness: Push vs. Punch vs. Knife) × 2 (Intent: with vs. without) × 2 (Consequences: with vs. without) analysis of variance (ANOVA) was conducted on the entire sample of participants. In this ANOVA, Group was a between-subjects factor, but Level of seriousness, Intent and Consequence were within-subjects factors. The effect size of each of these factors was estimated with a partial $\eta^2$.

Effects of group, level of seriousness (Story), intent and consequences

The overall answer mean was 7.3 (SD = 5.7), for the AS group and 7.4 (SD = 5.6) for the control group. On average, both groups blamed the actions with the same level of severity. No significant difference was observed between the AS and control groups, $F(1, 26) = 0.13$, NS. But the other factors: Intent, Consequence and level of Seriousness were found statistically significant.

On average, participants judged the intentional actions significantly more severely ($M = 9.6$) than the accidental ($M = 5.1$), $F(1, 26) = 96.4$, $p < .00001$ ($\eta^2_p = .79$). They also judged actions with consequences ($M = 10.6$) significantly more severely than those without ($M = 4.1$), $F(1, 26) = 129.2$, $p < .00001$ ($\eta^2_p = .83$).

Stories were blamed with different degrees of severity, the higher the seriousness, the higher the blame. This difference is statistically significant: $F(2, 52) = 92.44$, $p < .00001$ ($\eta^2_p = .78$). A planned comparison showed that for both groups the low level of seriousness “Push” ($M = 4.11$, SD = 4.4) was blamed with significantly less severity than the medium level of seriousness “Punch” ($M = 7.49$, SD = 6.59) ($F(1, 26) = 7.5$, $p < .001$), which was significantly less severely blamed than the high level of seriousness “Knife” ($M = 10.47$, SD = 5.9) ($F(1, 26) = 11.85$, $p < .001$).

Effect of the interaction “Group × Level of Seriousness × Intent” and “Group × Level of Seriousness × Consequence”

While the interaction between all the factors (“Group × Level of Seriousness × Intent × Consequences”) was not significant [$F(2, 52) = 0.13$, NS], the interaction “Group × Level of Seriousness × Intent” was statistically significant [$F(2, 52) = 4.47$, $p < .05$ ($\eta^2_p = .15$)]. As shown in Figure 1(A), as far as the control group is concerned, actions perpetrated with bad intent were considered much more blameworthy than accidental actions. This difference of blame apportioned between intentional and accidental actions is very high except for the “Knife” story where it is reduced. This effect although observed with the AS group is much weaker. Moreover, for the AS group, the difference observed between intentional and accidental action remains stable whatever the story.
Figure 1. Mean judgment of blame and interactions between the factors: Group, Intent, Consequence and Story. Interaction “Group × Story × Intent” (A), “Group × Story × Consequence” (B) and “Group × Story” (C).
When the actions led to an adverse consequence, the blame was much higher for both groups. This effect was strongly observed with the AS group for each Level of Seriousness. This effect was more weakly observed with the control group and this difference was greatly reduced for the higher level of seriousness: “knife story”. This interaction between “Group \times Story \times Consequence” as shown in Figure 1(B), tends towards significance $F(2, 52) = 2.24, p < .12 (\eta^2_p = .08)$. In addition, we found that the following interactions were statistically significant: Group \times Intent [$F(1, 26) = 24.4; p < .0001$] and Group \times Consequence [$F(1, 26) = 30.9, p < .00001$].

**Effect of the interaction: “Group \times Level of Seriousness” and “Level of Seriousness \times Intent \times Consequence.”**

The significant interaction between group and Level of Seriousness: $F(2, 52) = 8.4, p < .001$, shows that the AS group failed to distinguish the three levels of seriousness as precisely as the control group (Figure 1(C)).

The planned comparison analysis between both groups and the three levels of seriousness does not reveal any significant difference between the AS and the control group when they judge the two lowest levels of seriousness: “Push” [4.75 (AS); 3.46 (control)] and “Punch” [7.74 (AS); 7.23 (control)], $F(1, 26) = 1.2; NS$. But there was a significant difference when they judged the one with the highest level of seriousness: “Knife” [9.29 (AS); 11.64 (control)], $F(1, 26) = 9.7; p < .01$

For each group, the planned comparison between the two lower levels of seriousness reveals that the medium level of seriousness “Punch” story is blamed more harshly than the low level of seriousness “Push” story: $F(1, 13) = 40.89, p < .00001$ (control group); $F(1, 13) = 47.60, p < .0001$ (AS group). By contrast, the planned comparison between the two higher levels of seriousness reveals that only the control group blames the highest level of seriousness “Knife” more harshly than the medium level of seriousness “Punch” $F(1, 13) = 69.29, p < .00001$. The AS group does not blame significantly more severely the highest level of seriousness “Knife” than the medium level of seriousness “Punch” $F(1, 13) = 4.26; NS$.

Finally, the interaction between the three factors (Level of seriousness x Intent x Consequences) was statistically significant $F(2, 52) = 8.92, p < .001 (\eta^2_p = .26)$.

These results show different patterns of response for each group and for each level of seriousness and a difference when combining Intent and Consequence for each level of Seriousness. Therefore, we decided to analyse more specifically the moral algebra of each group for each Level of Seriousness (story).

**Specific analysis**

A 2 (Group: Asperger vs. Control) \times 2 (Intent: with vs. without) \times 2 (Consequences: with vs. without) ANOVA was conducted on the entire sample of
participants for each Level of Seriousness (story). In this ANOVA, Group was a
between-subjects factor, but Intent and Consequence were within-subjects
factors. The effect size of each of these factors was estimated with \( \eta^2_p \).

**The low level of seriousness “Push” story**
For this level of seriousness, the AS and control groups present a different
moral algebra (Figure 2(A)). While the moral algebra of the adolescents with
autism is additive (no significant interaction observed between intent and con-
sequence: \( F(1, 13) = 4.02, \text{NS} \)), the moral algebra of the typical adolescents is
multiplicative; the interaction between intent and consequence is statistically
significant: \( F(1, 13) = 11.60, p < .01 \). In addition, the actor’s intent brings
blame about \( F(1, 13) = 46.5, p < .00001 (\eta^2_p = .78) \) as much as the conse-
quence factor \( F(1, 13) = 39.2, p < .0001 (\eta^2_p = .75) \). On the contrary, in the AS
group, consequence brings blame about much more \( [F(1, 13) = 56.2, p <
.00001, \eta^2_p = .81] \) than the actor’s intent \( [F(1, 13) = 10.1, p < .01, \eta^2_p = .44] \).

**The medium level of seriousness “Punch” story**
As shown in Figure 2(B), AS and control groups both present an additive
moral algebra; none of the interactions between Intent and Consequence are
significant, \( F(1, 13) = 1.2, \text{NS} \) (control), and \( F(1, 13) = \text{NS} \) (AS). The AS group
blamed action according to the consequence, \( F(1, 13) = 110.65, p < .00001, \eta^2_p = .89 \). But they did not blame actions according to the intent of the actor,
\( F(1, 13) = 4.6, \text{NS}, \eta^2_p = .26 \). The opposite pattern was observed with typical
adolescents who blamed the action more according to the actor’s intent,
\( F(1, 13) = 243.5, p < .00001 (\eta^2_p = .95) \) than to the action’s consequence
\( F(1, 13) = 54.2, p < .00001 (\eta^2_p = .81) \).

**The high level of seriousness “Knife” story**
For the high level of seriousness, a different pattern was observed between
both groups (Figure 2(C)). The AS group’s moral algebra is additive: \( F(1, 13) =
1.43, \text{NS} \), while the control group’s one is multiplicative. Indeed a significant
interaction is observed, \( F(1, 13) = 5.39, p < .05 \). As in the medium level of
seriousness: “Punch” story, the AS group did not really take the intent of the
actor into account. \( F(1, 13) = 2.99, \text{NS} (\eta^2_p = .18) \). On the contrary, they took
great account of consequence \( F(1, 13) = 28.95, p < .0001 (\eta^2_p = .70) \). The
opposite was observed with the control group who blamed the action more
according to the intent \( F(1, 13) = 32.9, p < .0001, \eta^2_p = .72 \) than to the conse-
quence \( F(1, 13) = 22.4, p < .001, \eta^2_p = .63 \). Because of the consequence’s gravity (stab), they blamed the action with a bad intent and an adverse
consequence (15.5) nearly as severely as the action with bad intent but no
consequence (13.1). Unintentional actions with or without consequence were
also blamed much more severely, namely 11.3 and 6.6, than in the previous
stories.
Figure 2. Mean judgement of experimental conditions for each group for the story: Push (A), Punch (B) and Knife (C).
Discussion

In this experiment, we wanted to compare AS and typically developed adolescents on their ability to incorporate intent, presence of consequence and seriousness of consequence information in their judgment process.

Our first hypothesis was that both groups, AS and typical adolescents, would use intent and consequence information but would combine them differently. We assumed that the AS group would give significantly less weight to intent and more to consequence than their typical counterparts. They would also give more weight to consequence than intent. Our result confirms that both groups were able to judge an action by taking into account both the actor’s intention and the action’s consequence thus corroborating the results of previous studies (Grant et al., 2005; Rogé & Mullet, 2011). Indeed, no difference between AS and control groups was found in the judgement of stories with intent and with consequence neither in the judgement of stories without intent and without consequence. However, our study also revealed that adolescents with and without AS did not use intent and consequence in the same manner when apportioning blame. Indeed, in stories with bad intent but no consequence the blame apportioned by the AS group was very low while it was very high for the control group. On the contrary, AS group assigned a very high blame for stories without intent (accidental) but with an adverse consequence, while the control group was much more lenient. As we had been expecting, AS teenagers, gave less importance to the intent factor and more importance to the consequence factor than typically developing teenagers. They also gave more importance to the presence of an adverse consequence than to the presence of bad intent. Our result confirms that when apportioning blame, Asperger adolescents focused on the outcome of the action rather than on the intent of the actor, thus raising the effect size of the consequence much higher than that of the intent. The analysis of the interaction between, the factors: story, intent and consequence and the specific analysis for each level of seriousness showed that the AS group took intent into account only if the seriousness of the consequence was low enough to let them focus on the intent. Indeed, albeit weak, the repercussion of intent was observed in the judgment of the “Push” story (low level of seriousness), but was absent in that of the “Punch” and “Knife” stories (medium and high level of seriousness).

Our results confirm that AS teenagers have difficulties perceiving the aggressor’s and the victim’s viewpoints. This interpersonal stiffness hinders them from judging accurately according to the intent of the perpetrator. Their judgment process relies on objective facts and focuses on consequence. This result endorses previous findings (Grant et al., 2005; Moran et al., 2011; Rogé & Mullet, 2011) on the moral judgment of individuals with AS.

Unlike adolescents with autism, the control group judged on the basis of the actor’s intention rather than the action’s outcome, and even more so if
the seriousness of the outcome increased. Indeed, the repercussion of intent was observed in the judgment of all three stories (Push, Punch and Knife) and the effect size of intent was always higher than the effect size of consequence. This result confirms many previous studies (e.g., Moran et al., 2011; Przygotzki & Mullet, 1997; Rogé & Mullet, 2011), proving that children from 10 years old judge an action by taking intention foremost into account. Moreover, teenagers in the control group were able to weigh intent with regards to the presence or absence of a negative outcome and did not systematically consider intent and consequence like two independent factors. This way of combining intent and consequence following a multiplicative algebra is observed with a typical population (Anderson, 1996; Przygotzki & Mullet, 1997) but not with the AS teenagers of this present study, who follow an additive algebra, considering intent and consequence as two independent factors. This additive algebra resulting in difficulties when judging according to intent, also applies for children under 10 (Cushman et al. 2013; Maryniak & Selosse, 1985; Santolini, 1982).

Our second hypothesis was that the AS group would not discriminate between the different levels of the consequence’s seriousness (stories) as accurately as the typical group when the consequence is an injury to a person. Indeed, unlike the experiment of Rogé and Mullet (2011), in our stories the negative outcome was not damage to property but injury to a person which is more serious and requires more the perspective taking of the victim to assign blame to the aggressor. Our results do not support Rogé and Mullet’s results. While Rogé and Mullet (2011) did not find any difference in the way ASD and control groups blame the seriousness of the consequence, our results showed a significant difference between AS and normally developed teenagers when apportioning blame according to the severity of the consequence. Typically developed teenagers apportioned much more blame in case of the high level of seriousness (knife story) than in case of the medium one (punch story) which was still significantly more than in the case of the low one (push story). This difference, while partly observed with the AS group, was much weaker especially between the two highest levels of seriousness (punch and knife stories) which were not considered really different for the AS group. Both situations are fairly uncommon and might not have been directly experienced by AS participants. This result is congruent with previous research (Zalla et al., 2011), which demonstrated that adults with HFA or AS failed to distinguish between moral transgressions with different levels of seriousness.

This result confirms that the AS group judges in the same way as the control group when the social situation is frequent in their daily life and the outcome not serious. This could explain why no difference has been observed between ASD and control group when the negative outcome was material damage because material damage is much more frequent and experienced
in daily life than injury to a person. But, as expected, when the outcome is serious and the social situations less frequent, the AS and control group judge the situations differently. AS reasoning does not follow a hierarchy based on the seriousness of the outcome consequently blaming at the same level a broken nose and a stab. This difference between the AS and control group when apportioning blame according to the levels of seriousness, is even stronger for the “Knife” story. Indeed, for the adolescents of the control group, the consequence of a stab is so serious than they nearly blame at the same level the deliberate action with and without consequence. This attitude is not observed with the AS teenagers who blame much more harshly the action with consequence than the one without and very lightly blame the deliberate intent to stab someone when it is not followed by a bad consequence. This observation opens new perspectives on our understanding of the cognitive process involved in moral judgement. In addition to perspective taking, AS teenagers seem impaired in their appreciation of the different social situations and present unlike the control group, difficulties to judge situations to which they are not accustomed in their daily life. This suggests that judging unfamiliar social interactions is certainly more complex that judging familiar situations to which the AS teenagers have learned to adapt themselves.

**Conclusion**

This research highlights difference in the cognitive process between adolescents with and without autism. Adolescents with autism are able to judge an action by taking into account the intention of the actor and the consequence of the action but impairment in the perspective taking of others seems to hold them to the typical moral algebra of younger and still egocentric children relying on an additive consequence-focused pattern as well as an inaccurate representation of the consequence’s seriousness. This inaccurate representation of the consequence’s seriousness coupled with the low frequency of occurrence could explain the misunderstanding of certain social situations and the danger attached to them. This new finding stating a neurotic difference with typical counterparts could support the suggestion of Fontaine et al. (2004) that at least two different cognitive structures are involved in moral judgment: one based on perspective taking and the other on deontic reasoning. On the one hand, deontic reasoning seems to be preserved in adolescents with autism which therefore explains their ability to perceive what is allowed or not in a given social context and judging deliberate bad intent with adverse consequence and accidental action without negative outcome in the same way than their typical counterparts do. By contrast, their impairment in perspective taking skill prevents them from taking the victim’s perspective and blaming an action according to the perpetrator’s intent. In this case, actions made deliberately with bad intent but not followed by an
adverse consequence are not blamed while accidental actions followed by an adverse consequence are more severely blamed. In addition to allowing a better understanding of the cognitive structures involved in moral judgment and which ones are preserved in the ASD, these results could broaden our knowledge of the vision AS children and adolescents have of welfare-based moral judgment as well as their understanding of social interactions. This finding could help teenagers and children with AS to cope in a group therapy with their social difficulties (Attwood, 2003; Bauminger, 2007; Macintosh & Dissanayake, 2006; Rao, Beidel, & Murray, 2008) and have a better understanding of social situations. Indeed, this result suggests that AS teenagers need to live directly a situation in order to understand the seriousness of the outcome. They judge similarly the “stab” and the “punch” stories because both situations are not real for them. They fail to use the judging skills they build through their real life experiences (push story) to assess and react to unfamiliar situations (judging punch and knife stories). Typically developed children are able to do so because they have built an objective judgment process taking intention and the consequence’s seriousness into account. They are able to distinguish between two uncommon situations, here the punch and knife story, by ranking the consequences level of seriousness thanks to their imaginative skills. They can imagine how a punch or a stab feels like and thus rank them according to the harm they cause. Similarly typical developed children can imagine the hate of the perpetrator while wanting to punch or to stab his enemy. Following the idea that a greater hate leads to a more adverse action they will in any case punish more severely the perpetrator in the knife story than in the punch story. Those results have not been observed for the AS group and therefore we assume they follow a different logic in their judgment process. Indeed in their case the difference between sanctions for the punch and knife story are non-significant. This could suggest they are unable to imagine the feeling of a broken nose or a stabbed leg and thus cannot abstractedly rank them according to pain. This idea could explain the absence of compassion AS demonstrate. Similarly they cannot picture various degrees of hate and danger that they have not themselves experienced. Therefore, failing to grasp that someone ready to stab his enemy is much more hateful and dangerous than someone ready to punch him in the face. We could imagine a concrete application of this result, in which psychologists, teachers or educators would take an active part with adolescents with AS. For example, a group therapy would consist in stimulating their imagination so that they could abstract feelings and sensations. The aim would be both enlarging their scope of reality so that it better fits real life and implementing and stimulating a creative process so that they can better deal with unknown situations. In addition, AS teenagers would be encouraged to describe, draw or mime social situations and explain their understanding of these interactions. The confrontation of the different viewpoints, namely between the AS teenagers and
between themselves and the adult in charge of the group would help the AS teenagers take different stances into account and become more aware of the actor’s intent. It would also allow them to better understand social situations they heard about in the media or that they saw in films or video games but with which they are not directly confronted in their daily life.

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**Disclosure statement**

No potential conflict of interest was reported by the authors.

**References**


Appendix

The 12 vignettes used in this experiment and translated into English are as follows.

A.1 Intent and consequence, low level of seriousness.  
**Story “Push”**

Marie and Fanny are playing together on the playground. Claire comes to join them but Fanny doesn’t like Claire. She is disappointed and pushes Claire violently. Claire falls and hurts her knee.

How much blame do you assign to Fanny?

<table>
<thead>
<tr>
<th>No blame</th>
<th>Very high blame</th>
</tr>
</thead>
</table>

A.2 Intent and no consequence, low level of seriousness.  
**Story “Push”**

Anna and Helen are playing together in the playground. Julia comes to join them but Helen doesn’t like Julia. She is disappointed and pushes Julia violently. Julia falls but she is not injured.

How much blame do you assign to Helen?

<table>
<thead>
<tr>
<th>No blame</th>
<th>Very high blame</th>
</tr>
</thead>
</table>

A.3 No intent and consequence, low level of seriousness.  
**Story “Push”**

Three friends: Alison, Suzanne and Dorothy are playing together on the playground. They run everywhere and suddenly Suzanne runs into Alison. Alison falls and hurts her knee.

How much blame do you assign to Suzanne?

<table>
<thead>
<tr>
<th>No blame</th>
<th>Very high blame</th>
</tr>
</thead>
</table>

A.4 No Intent and no consequence, low level of seriousness.  
**Story “Push”**

Three friends: Marianne, Lily and Nathalie are playing together in the playground. They run everywhere and suddenly Lily runs into Nathalie. Nathalie falls to the floor but she’s not injured.
How much blame do you assign to Lily?

A.5 Intent and consequence, medium level of seriousness.
Story “Punch”

Peter and Yan are quarrelling on the school playground. Very irritated by Peter, Yan gives a punch in Yan’s face. Yan has his nose broken.

How much blame do you assign to Yan?

A.6 Intent and no consequence, medium level of seriousness.
Story “Punch”

George and Paul are quarrelling on the school playground. Very irritated by Paul, George tries to punch Paul in the face but he misses him because Paul moves his head. Paul was not hurt.

How much blame do you assign to George?

A.7 No Intent and consequence, medium level of seriousness.
Story “Punch”

Elliott and Tony are good friends. One day while they are playing one on either side of a punching ball, Elliott misses the punching ball and hurts Tony in his face. Tony’s nose is broken.

How much blame do you assign to Elliott?

A.8 No Intent and no consequence, medium level of seriousness.
Story “Punch”

Tom and Steve are good friends. One day while they are playing one on either side of a punching ball, Tom misses the punching ball and nearly
punches Steve in his face. Fortunately Steve moves his head. Steve was not hurt. How much blame do you assign to Tom?

A.9 Intent and consequence, high level of seriousness. Story “Knife”

Jim and Jack dislike each other. One day Jack is very angry with Jim and insults him. Jim answers him and Jack can’t control himself. He takes a knife and stabs Jim’s leg. Jim is seriously injured. How much blame do you assign to Jack?

A.10 Intent and no consequence, high level of seriousness. Story “Knife”

William and Harry dislike each other. One day William, very angry with Harry, insults him. Harry answers him and William can’t control himself. He takes a knife and tries to stabs Harry’s leg. Harry move quickly and runs away. Harry is not injured. How much blame do you assign to William?

A.11 No intent and consequence, high level of seriousness. Story “Knife”

Marc and Dave are very good friends. One day Marc and Dave are playing together with a knife. The aim of this game is to throw the blade of the knife in the earth, as far as possible. Marc throws the knife very clumsily, the blade hits Dave’s leg. Dave is seriously injured. How much blame do you assign to Marc?
A.12 No intent and no consequence, high level of seriousness. Story “Knife”

John and Arthur are very good friends. One day John and Arthur are playing together with a knife. The aim of this game is to throw the blade of the knife in the earth, as far as possible. John throws the knife very clumsily and the blade nearly hits Arthur’s leg. Fortunately, Arthur is not injured.

How much blame do you assign to John?