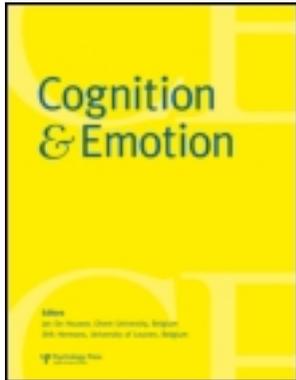


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BRIEF REPORT

The understanding and self-reported use of emotional display rules in children with autism spectrum disorders

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Two studies examined the understanding and self-reported use of rules for the expressive display of emotions in children with high functioning autism spectrum disorders (HFASD) and in typically developing children. In Study 1, children from the two groups reported display rules equally often when presented with hypothetical situations that provided clear motives for using display rules, although emotion-masking displays were more commonly identified for vignettes with prosocial rather than self-protective motives. In Study 2, children were interviewed about display rule use in real life. Children with HFASD reported display rules less often, included more prototypical examples, and referred less often to prosocial motives than typically developing children. Children with HFASD appear to be aware of display rules, but are less adept at identifying the interpersonal functions of such rules than their typically developing peers.

Keywords: Autism; Emotional display rules; Emotional development; Theory of Mind; Expression.

The social guidelines for expressing emotions are collectively known as emotional “display rules” (Zeman & Garber, 1996). For example, the appropriate display rule for receiving a gift is to respond positively, even if one is not pleased with it. Children with autism spectrum disorders (ASD),

both those with and without cognitive delays, have been found to use display rules less adequately than control children (Barbaro & Dissanayake, 2007). Findings on the understanding of display rules are less straightforward. Cognitively delayed children with ASD showed a limited understanding of

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display rules compared to matched controls (Dennis, Lockyer, & Lazenby, 2000). However, preschool children with ASD were able to explain display rules in hypothetical situations (Barbaro & Dissanayake, 2007), and children without cognitive delays—"high-functioning" children with ASD (HFASD)—were capable of reporting display rules at school age. Importantly, they were able to do so before they were able to pass a false belief task, reversing the normal sequence in which understanding false beliefs is assumed to precede display rule understanding (Peterson, Wellman, & Liu, 2005).

Such evidence, though based on just one hypothetical display rule vignette, implies a possible dissociation between display rule understanding and mind-reading abilities in children with HFASD. Indeed, children with autism may well be capable of predicting emotion-masking displays when prompted by specific vignettes, but find it difficult to reflect on the social functions of display rules in their everyday lives. In addition, display rules have often been conceived as reflecting either prosocial or self-protective motives (sparing others' feelings or protecting oneself from aversive outcomes; Josephs, 1994), with evidence from the typically developing population suggesting that prosocial displays are better comprehended than self-protective displays (Gnepp & Hess, 1986). We present two studies designed to evaluate hypotheses about the understanding and self-reported use of prosocial and self-protective display rules.

In typical development, emotional display rules require both cognitive and social skills. Mental-state reasoning or "Theory of Mind" may be required to appreciate how an emotion-masking display creates a false belief in others (e.g., Peterson et al., 2005), and certain types of display rules have been empirically related to the understanding of others' mental states (Banerjee & Yuill, 1999; Naito & Seki, 2009). There is also the possibility that children will learn to apply display rules as part of a social script (e.g., always smile when you receive a gift), without necessarily understanding how their actions affect others' mental states (DePaulo, Kirkendol, Kashy, Wyer, & Epstein, 1996).

We propose that children with HFASD may display an elementary awareness of display rules because of their strong inclination to rely on scripted information about social and emotional interactions (Klin, Jones, Schultz, & Volkmar, 2003; Losh & Capps, 2006; Rieffe, Meerum Terwogt, & Kotronopoulou, 2007). These scripts are likely to be present particularly in the case of prosocial display rules, where the displays are actively socialised by adults (e.g., "Smile and say 'thank you'", "You'll make him cry if you say that", etc.). Indeed, prosocial display rules are generally exhibited at earlier ages than self-protective display rules, and can already be observed in toddlers who, for example, hide their disappointment over an unwanted gift behind a thankful smile (Garner, 1999).

The integration of cognitive and social factors may be lacking in children with HFASD. Emerging findings suggest that they may display elementary social and emotional understanding, but only with sufficient contextual support. For instance, they were as attentive as controls to others' emotional states when focused on the social usefulness of these expressions (Begeer, Rieffe, Meerum Terwogt, & Stockmann, 2006) or when provided with explicit information (Begeer, Rieffe, Meerum Terwogt, Stegge, & Koot, 2007) and rely heavily on cognitive appraisals in the apprehension of emotional events (Lindner & Rosen, 2006; Losh & Capps, 2006; Peterson et al., 2005). Thus, children with HFASD may well be able to report appropriate emotional displays when the display rule script is explicitly prompted, particularly those involving the more heavily socialised prosocial displays. Yet, at the same time, they may be limited in their appreciation of the underlying social functions of those displays because of their limited intuitive mentalising about the motives and consequences related to emotional behaviour (see Begeer, Koot, Rieffe, Meerum Terwogt, & Stegge, 2008b, for an overview).

In the present investigation, we first measured children's reports of emotional display rules by using hypothetical vignettes, designed to provide children with sufficient contextual information to elicit appropriate display rules (Study 1). We then

conducted a structured interview, designed to assess the self-reported use of and reasoning about display rules (Study 2). The two studies included separate samples of school-aged children with HFASD, matched with two samples of typically developing control children. It was hypothesised that children with HFASD, compared to the typically developing children, would be able to report emotional display rules when provided with enough contextual information, but would show restrictions in their explanations and spontaneously reported personal use of emotional display rules.

STUDY 1: REPORT AND EXPLANATIONS OF EMOTIONAL DISPLAY RULES IN HYPOTHETICAL SITUATIONS

In the first study, children's display rule understanding was studied by investigating their responses to descriptions of hypothetical emotion-eliciting events. These descriptions explicitly provided prosocial or self-protective motives for masking the display of emotion. Children were asked to describe their feelings in the hypothetical situations and the facial expression they would display. Based on the explicit context information available, children with HFASD were expected to report display rules (i.e., to describe an expressed emotion that contrasts with the experienced emotion) equally often as typically developing children.

Method

Participants. The sample included 22 high-functioning boys from the autism spectrum (10 children with Asperger syndrome and 12 children with Pervasive Developmental Disorder [PDD-NOS]). They were recruited from three different psychiatric centres in the Netherlands. The control group included 22 typically developing children, recruited from primary schools around Amsterdam, the Netherlands. The mean estimated IQ scores of all children were measured by the short version of the Dutch Wechsler Intelligence Scale for Children (Kort et al., 2002). The diagnostic classification of the children with HFASD was based on a three-month diagnostic assessment according to DSM-IV (American Psychiatric Association, 1994) by a child psychiatrist, during which multiple informants also observed the children in the group and in school. The established diagnostic criteria were met in all cases.

Children from the control groups were matched as closely as possible with children from the HFASD group on age, gender and verbal intelligence. The children's native language was Dutch, and their teachers indicated that none of these children were known to have behavioural problems or a psychiatric or neurological diagnosis (Table 1).

Materials. The stimulus materials consisted of four descriptions of hypothetical interactions between the child and a peer. Two stories described the child in a happy state (e.g., "You got a young puppy today, you are very pleased" or "You won a

Table 1. Details of the participants of Study 1: Means (SDs) ranges

	HFASD (N = 22)	Comparison (N = 22)	Group comparison (p)
CA (years;months)	11;1 (1;9) 7;8–14;4	11;1 (1;1) 9;5–13;3	.88
Gender (male/female)		22/0	22/0
VIQ	97.8 (16.5) 75–140	96.5 (7.0) 79–107	.75
NVIQ	92.1 (17.1) 73–140	96.3 (7.7) 77–105	.89
FSIQ	95.8 (17.5) 72–140	96.4 (7.7) 78–105	.30

Notes: HFASD = high functioning autism spectrum disorders; CA = chronological age; VIQ = verbal IQ; NVIQ = non-verbal IQ; FSIQ = full scale IQ; SD = standard deviation.

bet today, you are very pleased”), and the other two described the child as angry (e.g., “A classmate accidentally ruins your drawing, you are very annoyed” or “A classmate accidentally ruins your clay figure, you are very annoyed”). All stories then continued with the description of either a prosocial (e.g., for anger story: “You feel sorry for your classmate”) or a self-protective (e.g., for anger story: “You hope your classmate won’t bully you”) motive to use display rules. The sequence of both story dimensions (happy/angry emotion and prosocial/self-presentational motive) was varied following a Latin square design (Cotton, 1993). This way, each motive condition included two stories, and each emotion condition also included two stories.

The children were asked two questions after each story: “How would you feel?”, and “What look would you have on your face?” Children could indicate both experienced and expressed emotions by pointing to drawn pictures of happy, sad, angry, fearful or neutral faces, which were presented in front of them in random order.

Procedure. After consent had been established, children were tested individually in one session of approximately 45 minutes. Children were first presented with the drawn pictures of the emotions and asked to name each emotion. Each child was then presented with the four display rule stories (angry/self-protective; angry/prosocial; happy/self-protective; happy/prosocial). The stories were read aloud to the children in counterbalanced order. Explanations were tape recorded and transcribed.

Scoring. A display rule was scored when the child referred to the “experienced” emotion as intended by the story content and referred to a different facial expression that served a functional alternative for the experienced emotion within the storyline, which could be either a neutral expression or an expression of opposite valence. Thus, experiencing anger while showing a happy face would be coded as a display rule, but experiencing sadness while showing a fearful face would not. The number of stories for which children reported an appropriate discrepancy

between experienced and expressed emotions was calculated separately for prosocial and self-protective stories (score range 0–2).

Results

Children’s report of display rules was analysed with a 2 (Group: HFASD vs. control) \times 2 (Motive: prosocial vs. self-protective) mixed-design analysis of variance (ANOVA), with repeated-measures on Motive, using the number of stories that children reported the use of display rules as the dependent variable. No main or interaction effect of Group was apparent ($F < 1$), but there was a significant main effect of Motive, $F(1, 41) = 18.34$, $p < .001$, $r = .54$, indicating that children from both groups reported more display rules following prosocial, HFASD: $M = 1.82$ ($SD = 0.40$); controls: $M = 1.67$ ($SD = 0.58$), than self-protective situations, HFASD: $M = 1.09$ ($SD = 0.75$); controls: $M = 1.14$ ($SD = 0.79$), range 0–2.

Discussion

Overall, there was no evidence of impaired report of display rules in the context of these hypothetical vignettes. All children were especially likely to report display rules in prosocial contexts, perhaps because these are more likely to be heavily socialised (see Gnepp & Hess, 1986). However, their deeper appreciation of the reasons behind the rules may still be limited, as suggested by Peterson et al.’s (2005) findings of a correctly reported display rule *before* false-belief understanding in this population.

If it is true that display rules are acquired by HFASD children as superficial behavioural rules, they are likely to be reported only when sufficient contextual information is provided, as in the explicitly described social situations used in Study 1. Spontaneous references to the use of display rules should be relatively infrequent in children with HFASD, and they should be less likely to provide appropriate and specific explanations for the use of the display rules. Thus, in a second study, we examined children’s self-reported use of display rules with no contextual prompts.

STUDY 2: SELF-REPORTED USE OF EMOTIONAL DISPLAY RULES IN REAL-LIFE SITUATIONS

A semi-structured interview was conducted, addressing children's self-perceived ability to control their display of basic emotions such as anger, fear, sadness and happiness. Children were encouraged to report examples of their personal experiences with emotional display rules. These examples were then used for further questions about the reasons for using display rules and the types of situations that elicit display rules.

In Study 2, we asked children about their personal use of display rules without presenting any contextual prompts, which was expected to yield fewer reports of display rules in HFASD than typically developing children. In addition, we expected to find especially low spontaneous references to specific motives for display rules in HFASD children. Similarly, we expected display rules reported by this group to take the form of general, formulaic scripts rather than specific, personal experiences.

Method

Participants. Participants were 25 children with HFASD (8 children with Asperger syndrome and 17 children with PDD-NOS) and 25 typically developing control children, recruited from two primary schools. None of these participants took part in Study 1. The participants with HFASD were recruited from the same child psychiatric centres as the HFASD children from the first study, according to the same diagnostic procedures. Again, children from the HFASD groups were matched as closely as possible with children from a control group on age, gender and verbal intelligence (Table 2).

Materials and procedure. Children were interviewed individually at school in one session of approximately 45 minutes. Each emotion was first introduced using schematic drawings of emotional facial expressions. Children were asked whether they ever experienced the emotion, and to indicate

which expression matched the emotion. All children reported having experienced these emotions and had no trouble identifying the appropriate expressions. Children were then asked Question 1: "Have you ever been angry while you tried not to show your anger to other people, [or if not] could you imagine trying not to show your anger?" If children responded affirmatively to the first or second part of the question, children were then asked: Question 2: "Why did/would you not want to show your anger?" and Question 3: "When did/would you not show your anger?"

Scoring.

- *Question 1 (reported use of display rules).* The number of times children responded affirmatively to the question about whether they ever actually attempted using, or could imagine using, display rules was tallied across the four emotions.
- *Question 2 (motives for display rules).* The motives mentioned for masking emotions were assigned to one of the following categories. Prosocial motives involve protecting social relationships or preventing somebody else from getting hurt (e.g., "Because it's not nice for him, and it will ruin his day"). Self-protective motives involve protecting the self from negative consequences (e.g., "Then they will start picking on me"). No motive was recorded when the child did not identify a specific motive for the display rule (e.g., "Don't know", restatement of the display rule without further explanation, or restatement of the emotion-eliciting event). We first calculated the proportion of responses where no motive was recorded, and then calculated the proportion of the remaining responses that identified prosocial rather than self-protective motives.
- *Question 3 (descriptions of display rule situations).* Children's descriptions of display rule situations, i.e., their answers to the question about when they would not show their feelings, were assigned to the following mutually exclusive categories. No situation

Table 2. Details of the participants of Study 2: Means (SDs) ranges

	HFASD (N = 25)	Comparison (N = 25)	Group comparison (p)
CA (years;months)	11;6 (2;0) 8;1–14;5	11;2 (1;0) 9;5–13;3	.36
Gender (male/female)		23/2	23/2.55
VIQ	99.9 (18.7) 76–144	97.5 (7.1) 79–107	.55
NVIQ	94.9 (15.9) 74–140	97.4 (7.8) 77–108	.53
FSIQ	98.7 (17.6) 72–140	97.4 (7.7) 78–108	.73

Note: HFASD = high functioning autism spectrum disorders; CA = chronological age; VIQ = verbal IQ; NVIQ = non-verbal IQ; FSIQ = full scale IQ; SD = standard deviation.

was recorded when the child was unable to describe a display-rule situation. Prototypical situation involved reference to formulaic scripts about prototypical situations, encompassing non-specific time frames, with no subjective meaning or mention of specific personal experiences (e.g., “When I fail at something, then sometimes I want to cry but I don’t show it”). Specific situations involved reference to subjective personal experiences, providing temporal and contextual orientation from a personal stance (e.g., “The other day my brother broke something of mine and I got angry but did not want to show it”).

Inter-rater reliability between two independent raters, graduate students who were blind to the children’s diagnoses, was monitored using Cohen’s kappa, and found to be satisfactory (κ ranging from .78 to 1.00).

Results

Question 1 (use of display rules). The number of reported attempts to conceal emotions (out of a maximum 4) was lower for the HFASD than for the control groups; means (SDs), 3.12 (1.01) and 3.76 (0.60), respectively; $t(48) = 2.72$, $p < .01$, $r = .32$. This indicates that the children with HFASD had tried to hide emotions from others less often than typically developing control children.

Question 2 (motives for display rules). When HFASD children reported using display rules, they gave a significantly higher proportion of

responses that identified no motive for the display rule than the controls; means (SDs), 0.81 (0.87) and 0.22 (0.27), respectively; $t(48) = 3.21$, $p < .01$, $r = .41$. This difference was also significant when tested with a Mann–Whitney U -test, $U = 150.00$, $p < .001$, $r = -.46$. Of the responses for which a motive was identified, children with HFASD provided a smaller proportion that referred to prosocial motives than controls; means (SDs), 0.10 (0.26) versus 0.36 (0.39), respectively; $t(41) = 2.52$, $p < .05$, $r = .33$. This difference was also significant when tested with a Mann–Whitney U -test, $U = 198.00$, $p < .05$, $r = -.39$.

Question 3 (descriptions of display rule situations). The proportion of children that could not describe a situation when the given display rule was used was higher for children with HFASD than for controls; means (SDs), 0.23 (0.25) and 0.06 (0.13), $t(48) = 3.02$, $p < .01$, $r = .39$. Of the remaining responses, where children did refer to a situation, we examined the proportions that identified a prototypical script rather than a specific situation. The analysis showed an expected significantly higher proportion of prototypical responses among the HFASD children in comparison with the controls; means (SDs), 0.68 (0.33) and 0.50 (0.36), $t(47) = 1.89$, $p < .05$, one-tailed, $r = .26$.

Effect of IQ on children’s responses. Additional analyses, with full scale IQ as co-variates yielded the same results: less self-reported use of display rules in HFASD compared to controls, $F(1, 47) = 7.86$, $p < .01$, $r = .36$, higher proportions of no motive responses in HFASD, $F(1,$

47) = 12.64, $p < .01$, $r = .44$, fewer prosocial motives in HFASD, $F(1, 47) = 6.42$, $p < .05$, $r = .33$, fewer descriptions of display rule situations in HFASD, $F(1, 47) = 10.11$, $p < .01$, $r = .41$, and more prototypical scripts in HFASD, $F(1, 47) = 3.79$, $p < .05$, one-tailed, $r = .27$. Using verbal IQ as covariate indicated similar group differences. To further exclude the possibility that the lower IQ participants with ASD were driving the group differences, we excluded participants with IQ scores below 90. Again, all the main effects remained intact: less self-reported use of display rules in HFASD compared to controls, $F(1, 36) = 9.11$, $p < .01$, $r = .44$, higher proportions of no motive responses in HFASD, $F(1, 36) = 10.25$, $p < .01$, $r = .46$, fewer prosocial motives in HFASD, $F(1, 33) = 5.49$, $p < .05$, $r = .38$, fewer descriptions of display-rule situations in HFASD, $F(1, 36) = 4.37$, $p < .05$, $r = .32$, and more prototypical scripts in HFASD, $F(1, 35) = 2.84$, $p < .05$, one-tailed, $r = .27$.

Comparison between display rule understanding (Study 1) and use (Study 2). In Study 1 we predicted that the contextual cues would lead to similar performance between children with HFASD and controls. One criticism of this study is that we did not manipulate the presence versus absence of contextual cues to verify that it was the contextual cues that reduced a pre-existing difference between the groups. Study 2 did not utilise the contextual cues of Study 1, therefore, this criticism can be overcome by combining the data from the studies to look at the interaction between Group (HFASD vs. Control) and Context (Present vs. Absent). The scores of both studies were converted into proportion scores representing the understanding of display rules (Study 1), and the use of display rules (Study 2, question 1). A 2 (Group: HFASD vs. Control) \times 2 (Context: Within context understanding in Study 1 vs. Context free reporting in Study 2) mixed-design ANOVA, using the proportion of display rules as dependent variable, indicated the expected interaction effect between Group and Context, $F(1, 89) = 6.00$, $p < .05$, $r = .25$. This effect emanates from the absence of a difference

between HFASD and control children in the Study 1 measure of understanding display rules; means (*SDs*), 0.73 (0.20) and 0.70 (0.23), respectively, $t < 1$, in comparison with less frequent reported use of display rules in HFASD than control children in Study 2; means (*SDs*), 0.78 (0.25) and 0.94 (0.23), $t(48) = -2.70$, $p < .01$, $r = .27$.

Discussion

HFASD children reported attempts to use display rules relatively frequently, but less often than children from the comparison group, despite being able to provide display rules based on explicitly described situations (Study 1). They failed to provide any reasons at all for their display rule use, at a rate much greater than that for the controls, and reported prosocial motives three times less often than typically developing children. Furthermore, children with HFASD more often than controls failed to describe situations that would elicit display rules, and more often reported prototypical scripts rather than specific personal experiences.

GENERAL DISCUSSION

The current studies suggest that children with HFASD are able to reproduce and report social rules for how and when to express or mask their emotions. However, further analysis of children's responses provides evidence for a deviant emotional display rule understanding in children with HFASD. This evidence maps neatly onto accumulating observations of emotion and mental-state understanding in children with HFASD *only* when they are given adequate contextual support (Begeer et al., 2006, 2007, 2008a; Begeer, Malle, Nieuwland, & Keysar, 2010; Losh & Capps, 2006).

In Study 1, it was observed that children with HFASD were able to report appropriate emotion-masking displays when provided with hypothetical scenarios that included explicit prosocial or self-protective motives for concealing emotional

expressions. Their ability to recognise the appropriate story elements indicates that children with HFASD are familiar with the basic principles of display rules.

In contrast, the children with HFASD in Study 2 less often reported using emotional display rules than typically developing children. This suggests that their knowledge of emotional display rules is retrieved less adequately when they are instructed to reflect on personal emotional interactions without any prompts to activate emotional scripts. However, it should be noted that their reported use was not absent, they did mention display rules in more than half the cases. Nonetheless, children with HFASD relatively often failed to provide any explanations, particularly regarding prosocial motives. Where they did cite reasons for concealing emotions, these were overwhelmingly self-protective. This is consistent with the argument that the social motives for these children's emotional behaviour could be restricted by deficits in understanding others' subjective mental states (e.g., Peterson et al., 2005). Thus, even though children can bypass such deficits and generate scripted prosocial display rules in response to contextual information (as they did entirely adequately in Study 1), their *spontaneous* identification and explanation of prosocial motives appear to be impaired. This supports Peterson et al.'s (2005) interpretation of their finding that HFASD children could report a display rule before passing the false belief task: these children have developed a "work-around" strategy for dealing with prototypical display rule situations that is not underpinned by an understanding of others' mental states.

In addition, there was a tendency among the HFASD participants to rely on prototypical scripts rather than personal experiences when describing display rule situations, which replicates earlier studies (Rieffe et al., 2007). Understanding whether the responses of the HFASD group in Study 2 are the result of a specific difficulty in emotion understanding or a more general impairment

in narrative construction and memory therefore is an important direction for future research.

Turning back to the enhanced report of prosocial display rules in both HFASD and typically developing children in Study 1, we can now surmise that this pattern reflected knowledge of scripts learned through explicit socialisation. Young children often receive explicit feedback from their environment about prosocial behaviour because it directly affects other people. More importantly, this feedback is often formulated in behavioural guidelines: "Don't laugh at him!", or "Say thank you". Children with HFASD are likely to respond to these overt social guidelines, which explains why they report prosocial display rules relatively often in response to relevant social contexts. The reliance on learned scripts can thus account not only for the children's awareness of the basic rules themselves, but also their failure to integrate these rules into their strategic interpersonal functioning.

Similar limitations in explaining prosocial rules have been found in deaf children, who, like the HFASD group in Study 2, also provide more self-protective reasons (Hosie et al., 2000). Thus, when children with restricted social experiences do generate display rules themselves, these tend to have self-serving rather than interpersonal functions. It is important to stress, however, that the inability of our HFASD children to apply a basic awareness of prosocial display rules spontaneously may not imply a permanent lack of understanding prosocial functions. Research with high-functioning clinical groups suggests that basic insights into others' mental states can indeed be found (Begeer et al., 2006, 2007, 2010; Losh & Capps, 2006; Peterson et al., 2005), and the failure to incorporate this knowledge into everyday reasoning and behaviour may be seen as a production deficiency. Direct comparisons between situations where the need for hiding emotions is varied would further enlighten the understanding of display rules in autism. Finally, an important direction for future research will be to include measures of adaptive behaviour (e.g., Barbaro & Dissanayake, 2007)

that would allow a direct comparison between theoretical abilities and everyday socioemotional behaviour in children with HFASD.

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