

Understanding of Emotional Experience in Autism: Insights From the Personal Accounts of High-Functioning Children With Autism

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In this study, the authors investigate emotional understanding in autism through a discourse analytic framework to provide a window into children's strategies for interpreting emotional versus nonemotional encounters and consider the implications for the mechanisms underlying emotional understanding in typical development. Accounts were analyzed for thematic content and discourse structure. Whereas high-functioning children with autism were able to discuss contextually appropriate accounts of simple emotions, their strategies for interpreting all types of emotional (but not nonemotional) experiences differed from those used by typically developing children. High-functioning children with autism were less inclined to organize their emotional accounts in personalized causal–explanatory frameworks and displayed a tendency to describe visually salient elements of experiences seldom observed among comparison children. Findings suggest that children with autism possess less coherent representations of emotional experiences and use alternative strategies for interpreting emotionally evocative encounters. Discussion focuses on the significance of these findings for informing the nature of emotional dysfunction in autism as well as implications for theories of emotional understanding in typical development.

Keywords: autism, Asperger's syndrome, emotion, language

Autism is a genetically based neurodevelopmental disorder characterized by qualitative impairments in social interaction and communication and markedly restricted/repetitive behaviors and interests (American Psychiatric Association, 1994). Among the most striking features to stem from this pattern of impairment is a profound difficulty in the forging of affective connections with others. This emotional discord is vividly illustrated in firsthand accounts from adults with autism, who describe a “disconnection from other people” (Grandin, 1995, p. 95) as if there were a “me and a vast other” (Jones, Zahl, & Huws, 2001, p. 396) and feelings of “being buried inside myself . . . the jailer and the captive combined” (p. 397).

Although views that individuals with autism do not experience or express emotions (e.g., Bettelheim, 1967) are no longer prominent, the centrality of social–emotional difficulty to autistic impairment is widely recognized. Indeed, problems inferring and

expressing thoughts and emotions and participating in social–emotional practices are observed across the autistic spectrum of ability. Unlike severely delayed autistic groups, however, high-functioning individuals who do not suffer mental retardation often express deep desire to engage in social–emotional interactions with others (Attwood, 1998; Frith, 1991; Grandin, 1995; Sigman & Capps, 1997) and display knowledge and expression of emotions that they were once thought not to possess (Capps, Kasari, Yirmiya, & Sigman, 1993; Capps, Yirmiya, & Sigman, 1992; Dissanayake, Sigman, & Kasari, 1996; Kasari, Chamberlain, & Bauminger, 2001; Macdonald et al., 1989).

In contrast with early views that autism involves an absence of emotional expression and indifference to others (e.g., American Psychiatric Association, 1994; Bettelheim, 1967; Kanner, 1943; 1971), rigorous investigations of the strengths and weaknesses in autism have demonstrated surprising capabilities. Particularly among high-functioning groups, evidence suggests that autistic individuals are able to recognize and express basic (i.e., simple) emotions such as happiness, sadness, and anger and are no less emotionally expressive, overall, than are comparison children (Capps et al., 1993; McGee, Feldman, & Chernin, 1991; Ozonoff, Pennington, & Rogers, 1990; Yirmiya, Sigman, Kasari, & Mundy, 1992). In laboratory settings, high-functioning individuals with autism also seem able to discuss experiences with simple emotions but have trouble with more complex or self-conscious emotions such as pride and embarrassment (Capps et al., 1992, Capps, Sigman, & Yirmiya, 1995; Kasari et al., 2001; Loveland et al., 1997).

Whereas simple emotions are associated with distinct facial expressions, exhibit little cultural variation in antecedents or expression, and are typically recognized and understood relatively early in development (Ekman, 1982, 1984, 1999; Izard, 1977; Plutchik, 1980), self-conscious emotions necessarily involve com-

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plex attributional processes hinging on later developmental achievements, such as the capacity for reflecting upon experiences and evaluating them in relation to sociocultural norms and expectations, as well as the appraisals of others (Lewis, 2001; Miller, 1995; Stipek, Recchia, & McClintic, 1992). Aptly described by C.H. Cooley, “the thing that moves us to pride and shame is not merely mechanical reflection of ourselves, but an imputed sentiment, the imagined effect of this reflection upon another’s mind” (1902, p. 153).

Considering autistic individuals’ well-documented difficulties inferring mental states (Baron-Cohen, 2001), their apparently selective impairments apprehending self-conscious emotions are perhaps not surprising (e.g., Frith & Happé, 1999). A question of further interest, and one as of yet not sufficiently examined, concerns the extent to which the reflective and interpretive activities involved in grappling with complex emotional encounters are deficient in autism. In typical development, advances in emotional understanding occur as children are increasingly able and inclined to locate emotions within causal–explanatory frameworks and evaluate their significance in relation to self and other (Dunn, 1995; Harris, Olthof, Terwogt, & Hardman, 1987; Graham, Doubleday, & Guarino, 1984; Mancuso & Sarbin, 1998; Miller, Hoogstra, Mintz, & Fung, 1993; Seidner, Stipek, & Feshbach, 1988; Wellman, Harris, Banerjee, & Sinclair, 1995). Consistent with appraisal theories of emotion, which argue that interpretive processes play a critical role in the differentiation of emotions beyond general hedonic tone (Frijda, 1986; Lazarus, 1991; Ortony, Clore, & Collins, 1988; Scherer, 1984), the development of such evaluative skills has been argued to be a key factor in the enabling of children to penetrate the psychological and sociocultural dimensions of complex affective encounters (Harris, Olthof, Terwogt, & Hardman, 1987).

Although in prior work, researchers have not dissected the structure of autistic children’s emotional accounts to fully investigate children’s strategies for interpreting emotional events, some evidence suggests possible difficulties therein. Examining the accounts of high-functioning children with autism, Capps et al. (1992) found that children with autism took significantly longer time, required more prompts, and more often produced scripted accounts when discussing complex emotions than did comparison children. Overall, however, children with autism produced more “thinking phrases” (e.g., “I think,” “I guess”), which the investigators deemed indicative of cognitive effort, suggesting that children with autism experienced some level of difficulty recounting all types of emotions.

Intriguingly, reports of their laborious, computational approaches to social–emotional tasks and interactions suggest that in lieu of the intuitive processes guiding typically developing individuals, persons with autism recruit their cognitive resources to develop compensatory techniques for contending with emotional stimuli (Frith, Morton, & Leslie, 1991; Grandin, 1995; Hermelin & O’Connor, 1985; Leslie & Roth, 1993). As poignantly described by Temple Grandin, a highly intelligent woman with autism who has written extensively about her experiences, “I had to think about every social interaction . . . a scientist trying to figure out the ways of the natives” (1995, p. 133). Yet these efforts fall far short of the interpretive tactics used by typical individuals, as even exceedingly intelligent adults with autism seem to lack the necessary tools for successfully traversing the convoluted emotional land-

scapes that undergird affective interactions and relationships. In this study, we examine the personal stories of emotional experience recounted by high-functioning children with autism in an attempt to illuminate the constellation of factors inhibiting these children from navigating such terrain. Adopting a discourse analytic perspective, we analyzed accounts for thematic content and discourse form to explore children’s strategies for evaluating emotional encounters.

The proclivity for reflecting upon and ascribing meaning to emotionally tinged events forms the basis for apprehending and engaging within our social world. When ingrained in memory, our stock of emotionally evaluated world encounters guides and shapes views of self, other, and the relationships binding the two (Harter, 1998; Sarbin & Keen, 1998). Eloquently capturing the significance of personal memories in constructing attitudes and identities, literary scholar Tobias Wolff describes memory as a storyteller that “imposes form on the raw mass of experience. It creates shape and meaning by emphasizing some things and leaving others out. It finds connections between events, suggests cause and effect, makes each of us the central figure in an epic journey toward darkness or light” (2001, p. A15). Recounting one’s memories of emotional experience unveils these attributions, as well as the blueprints guiding their construction.

Using a method pioneered by Deborah Stipek and her colleagues (e.g., Seidner, Stipek, Feshbach, 1988; Stipek & DeCotis, 1988), in this study we explore memories of emotional experience recounted by high-functioning children with autism and their typically developing peers to mine the depths of children’s emotional understanding and discern their strategies for interpreting emotional encounters. In prior studies with versions of this task, researchers have generated many insights into those types of experiences children consider emotionally evocative by concentrating on the thematic content. As noted previously, this work has shown that high-functioning autistic children demonstrate particularly limited understanding of more complex emotions such as pride, embarrassment, and shame, failing to distinguish these emotions from less complex feelings of similar hedonic tone (e.g., happiness and sadness; Capps et al., 1992; Kasari et al., 2001). Yet, without complementary analyses of discourse structure, information on children’s strategies for interpreting their emotional experiences is currently lacking.

In the present study, we address this problem and, additionally, consider whether potential differences in discourse structure are restricted to emotional memories or, rather, represent a more pervasive difficulty. We do so by comparing the structural features of children’s emotional accounts to those of nonemotional physical states. In view of recent findings of impaired episodic memories in autism (Bowler, Gardner, & Grice, 2000), the inclusion of non-emotional terms (e.g., sick and tired) is of particular value in the assessment of emotion-specific patterns not assessed in prior studies of autistic individuals’ recounted emotional experiences.

Method

Fifty children ranging from 7 to 13 years of age participated in this study. The sample comprised 28 high-functioning individuals with autism and 22 typically developing comparison children. Children with high-functioning autism were referred by clinicians affiliated with medical centers throughout the San Francisco Bay Area and at the University of

California, Los Angeles. All children had received a prior diagnosis of autism or Asperger's syndrome based on current guidelines from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV; American Psychiatric Association, 1994) and *International Classification of Diseases* (10th ed; ICD-10; World Health Organization, 1993). Diagnoses were confirmed through use of the Autism Diagnostic Interview—Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994). All children met ADI-R algorithm cutoffs for impaired reciprocal social interactions and communication, repetitive behaviors, and early onset of symptoms (see Table 1). Twenty-six children with autism attended school in mainstreamed classrooms, and two were educated in private schools specialized for children with developmental disorders. Typically developing children were recruited through contacts with San Francisco Bay Area schools and after-school program administrators. Groups were similar in racial and ethnic breakdown. The autistic group was 77% Caucasian, 13% Asian, 7% Hispanic, and 3% African American. Participants in the comparison group were also mostly Caucasian (73%), with 14% Asian, and 13% Hispanic. Children were primarily from middle-class and upper-middle-class families. No further sociodemographic information was collected.

Children's intellectual functioning was assessed through administration of the Wechsler Intelligence Scale for Children—III (WISC—III; Wechsler, 1991). Because this project involved a language-based task, groups were matched on the basis of the Verbal IQ as well as gender and chronological age. As illustrated in Table 1, groups did not differ significantly in gender ratio, age, or Verbal IQ, although children with autism tended to have lower Full-Scale and Performance IQs. Given recent evidence that autistic groups display significant peaks and valleys in performance across individual Verbal IQ subtests (Mattron, 2004), we further compared groups' performance on each Verbal IQ subtest (i.e., Information, Similarities, Arithmetic, Vocabulary, Comprehension, and Digit Span). With the exception of the Comprehension subscale, in which the autistic group performed significantly more poorly than did controls (autism $M = 9.1$ vs. control $M = 12.5$, $p < .05$), no significant differences were detected on any individual subscales ($p > .30$).

Personal Accounts of Emotional and Nonemotional Experiences

Personal accounts were elicited through use of a procedure adapted from Seidner et al. (1988). Children were given a list of simple emotions (happy, sad, angry, afraid, and disgusted), complex emotions (curious, disappointed, and surprised), and complex, self-conscious emotions (proud, embarrassed, guilty, and ashamed) as well as two nonemotions (tired and sick) that were presented in random order. They were asked to define each

and then tell the experimenter about a time in which they felt that way. We provided definitions if the child was unable to produce an appropriate explanation to ensure that children were aware of the meaning of each term before they were asked to discuss a personal experience. In cases in which children were unable to recall a personal experience, a prompt was provided in which the experimenter described a (scripted) personal experience of her own involving the term in question, followed by the prompt "Have you ever felt that way?" Once children began their accounts, however, prompts were limited to requests for elaboration and clarification in response to children's excessive pauses, trailing off, and incoherent remarks.

Coding

Interactions were videotaped and audiotaped and then were transcribed verbatim by individuals who were masked to group status. Transcripts were then annotated from videotapes for facial expressions and gestures and were reviewed for accuracy by a second transcriber before being coded for content and form by two coders, one of whom was masked to group status. Kappa coefficients assessing interrater reliability exceeded .80 for all measures. All disagreements were discussed and resolved.

Content

Following previous studies of typically and atypically developing children's recounted emotional experiences (Capps et al., 1992; Harris et al., 1987; Seidner et al., 1988), accounts were evaluated for the degree to which they involved contextually appropriate circumstances. Each account was assigned a score ranging from 0 to 3 (0 = *no response/I don't know*; 1 = *incorrect/inappropriate context*; 2 = *context with appropriate hedonic tone*; 3 = *appropriate context*).

Accounts that were judged to involve inappropriate contexts (i.e., a score of 1) included those involving actions and events that, without further explanation, would not typically elicit the emotion/nonemotion in question (e.g., "I was embarrassed one time when I got to help wash the car"). Accounts receiving scores of 2 involved episodes that would tend to elicit feelings of appropriate hedonic tone but did not contain sufficient details or explanation for distinguishing the specific emotion/nonemotion from similarly valenced feelings (e.g., "I was proud when my mom gave me a present"). Only accounts describing unambiguously evocative contexts (e.g., "I was happy when my parents took me to Disneyland last year") and/or that include explanations clarifying the reasons the particular actions or events were associated with the feeling in question (e.g., "I felt proud when I earned an award for reading more books than anyone in my class") received the maximum score of 3.

Table 1
Group Characteristics

Variable	Autistic group ($n = 28$) ^a			Comparison group ($n = 22$) ^b		
	$M \pm SD$	Range	Cutoff	$M \pm SD$	Range	Cutoff
Chronological age	11.1 \pm 2.3	8–13		10.6 \pm 1.1	8–12	
Verbal IQ score	104.1 \pm 16.1	80–145		107.0 \pm 8.9	93–127	
Performance IQ score**	95.5 \pm 16.6	60–126		109.4 \pm 6.4	100–119	
Full-Scale IQ score*	98.1 \pm 16.0	76–132		108.6 \pm 7.7	102–123	
ADI-R algorithm score						
Reciprocal Social Interaction	21.1 \pm 5.2	9–27	8	NA		
Communication	14.0 \pm 3.8	9–22	8	NA		
Repetitive Behaviors	8.1 \pm 2.3	3–12	3	NA		
Early Onset of Abnormality	2.9 \pm 1.4	1–5	1	NA		

Note. NA = not applicable; ADI-R = Autism Diagnostic Interview—Revised.

^a 4 girls, 24 boys. ^b 4 girls, 18 boys.

* $p < .05$. ** $p < .005$

Form

The manner in which children recounted their memories of emotional and nonemotional experiences was explored through analyses of discourse structure, including length, the use of narratives, evaluation of causes and of significance of experiences, and extent of experimenter prompting necessary for the eliciting of personal accounts.

We assessed length by tallying the number of clauses, defined as a verb and its arguments, in each account. We recorded the use of narrative for each account to determine whether children with autism integrated and personalized their memories of emotional experiences into specific narrative accounts. In this study, we defined *narratives* as two or more temporally ordered clauses related from an evaluative perspective and focusing on a specific event in which the child was cast as protagonist (Labov, 1972).

The structure of children's accounts was further assessed by examination of the presence of evaluative remarks. Although not used exclusively within narrative frameworks, *evaluative comments* are a requisite component of narrative (Bruner, 1986, 1990; Goffman, 1974; Labov & Waletzky, 1968) used for the imparting of experiences with a subjective perspective and for the integration of a sequence of events within an overarching theme for conveyance of how and why events are related and worthy of recounting. On the basis of functionalist views of emotional experience (Barrett & Campos, 1987; Malatesta & Wilson, 1988; Frijda, 1986), and guided by the goal of determining whether autistic children appraise the meaning of their encounters, evaluative remarks of interest include those in which the causes, as well as the psychological and social significance, of experiences were inferred and assessed through causal inferences and evaluations of meaning.

Causal inferences. Causal inferences involved explanations of the causal circumstances leading to the child's emotional experience. For example, "I felt embarrassed because everyone laughed at me."

Evaluations of meaning. Children's subjective evaluation of the meaning of their experiences was examined through their descriptions of personal and social significance of the event, including descriptions of thoughts and feelings relating to the episode (e.g., "She was so angry when I got home late [that] it made me feel guilty"), references to social comparisons and norms (e.g., "They were jealous because I was dancing better than everyone else"), and explanations of the interpersonal consequences of the event (e.g., "We're not friends anymore").

Because the types of meaning attributions varied according to the emotion in question (e.g., social comparisons are likely to occur with certain self-conscious emotions but perhaps not with simple emotions), and to limit the number of statistical analyses required to address the central question of whether children evaluated the psychological and social significance of their encounters, we noted the presence of any one of these types of attributions for each account. As a final measure of account structure, we examined the frequency of experimenter prompting to elicit a personal account to provide a measure of the ease with which children accessed and discussed their experiences. Prompting was used when children were unable to recall a personal experience with the term in question, claimed never to have felt that way, or abruptly discontinued their accounts.

Results

Because each type of emotion or nonemotion contained a different number of exemplars, mean scores were first calculated for each account type (i.e., simple emotions, complex emotions, complex self-conscious emotions, and nonemotions). We then analyzed the resulting scores using 2 (group: high-functioning autistic vs. typically developing) \times 4 (account type) analyses of variance (ANOVAs) to document group performance across different types of emotional and nonemotional experiences. Because groups dif-

ferred on Full-Scale and Performance IQ as well as on the Comprehension subtest of the Verbal IQ scale, we examined correlations with these variables to determine whether we needed to include them as covariates. Additionally, given that performance on this language-based task could hinge on language-related skills, correlations were also assessed between emotion variables and Verbal IQ. Only three variables were associated with any IQ measures: contextual appropriateness of complex emotions, causal evaluations of complex emotions, and causal evaluations of self-conscious emotions. Thus, these variables were analyzed with Full-Scale, Performance, and Verbal IQ, and the Comprehension subtest covaried. All remaining emotion variables held insubstantial relationships ($p > .35$) with each of these IQ measures. To promote clarity and consolidate otherwise lengthy statistical reporting, we describe, below, patterns of performance across measures of content and form. Accompanying statistics are presented in Table 2, and means are illustrated in the figures presented in each section.

Content

As shown in Table 2, analyses of the contextual appropriateness of children's accounts detected main effects for group and account type as well as a significant interaction. The autistic group produced contextually appropriate accounts of simple emotions and nonemotions but related significantly less appropriate accounts of both types of complex emotions (i.e., self-conscious emotions and non-self-conscious emotions). Although children with autism had difficulty with both types of complex emotions, within-group trends suggest that self-conscious emotions posed the greatest challenge to both groups. These patterns are shown in Figure 1.

To attain a more comprehensive picture of how the content of children's accounts of complex emotions differed, we further analyzed response patterns for the type of error committed. Children with autism seldom produced accounts judged to be completely inappropriate, with responses of this type accounting for only 9% of the autistic group's inappropriate accounts of complex emotional experiences. Rather, children with autism were more apt to produce accounts that contained insufficient details or explanation for distinguishing the emotion in question from others of similar hedonic tone. For instance, when describing experiences of feeling surprised or proud, many children with autism related experiences that, without further explanation, might be more readily associated with happiness (e.g., "I was proud when I got my new video game"). Similarly, for the emotions of disappointed, ashamed, guilty, and embarrassed, children with autism described experiences judged more likely to elicit feelings of sadness or anger.

Form

In contrast to the selective impairments observed in the content of the autistic group's complex emotional accounts, a broader distinction was observed between groups upon examination of measures of account form, with the exception of account length, which did not differ between groups for any type of account. Across all types of emotions, the autistic group was less inclined to relate personalized narrative accounts; evaluated the causes of emotional experiences less often; tended

Table 2
Content and Form of Personal Accounts of Emotional and Nonemotional Experiences

Test	Contextually appropriate	Use of narrative	Evaluation of causes	Elaboration on meaning	Prompts
2 × 4 ANOVA					
Group, <i>F</i> (1, 48)	9.39***	11.10***	36.94*****	20.37*****	8.45**
Account type, <i>F</i> (3, 144)	24.49*****	6.21*****	33.17*****	100.49*****	11.80*****
Interaction, <i>F</i> (3, 144)	4.098**	2.775*	11.42*****	9.75*****	2.64*
One-way ANOVAs					
Autism versus typically developing group					
Simple emotions, <i>F</i> (46)	<i>ns</i>	6.21*	21.74*****	7.88**	5.68*
Effect size		0.74	1.43	0.84	0.69
Complex emotions, <i>F</i> (46)	6.60*	20.06*****	18.44*****	7.37**	9.94***
Effect size	0.89	1.31	1.52	0.81	0.92
Self-conscious (S-C), <i>F</i> (46)	6.99**	7.16**	15.92*****	20.32*****	3.2 (<i>p</i> = .08)
Effect size	0.77	0.79	1.74	1.38	0.52
Nonemotions (N-E), <i>F</i> (46)	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>	<i>ns</i>
Typically developing group account trends across emotion type ^a					
Simple versus complex, <i>F</i> (43)	<i>ns</i>	<i>ns</i>	<i>ns</i>	10.28***	<i>ns</i>
Effect size				1.00	
Simple versus S-C, <i>F</i> (43)	6.71**	<i>ns</i>	<i>ns</i>	39.24***	7.21*
Effect size	0.59			1.82	0.52
Simple versus N-E, <i>F</i> (43)	<i>ns</i>	4.45*	<i>ns</i>	24.23***	<i>ns</i>
Effect size		0.60		1.66	
Complex versus S-C, <i>F</i> (43)	7.29**	<i>ns</i>	<i>ns</i>	89.68*****	8.26**
Effect size	0.62			3.09	0.77
Complex versus N-E, <i>F</i> (43)	<i>ns</i>	8.41**	7.84*	<i>ns</i>	<i>ns</i>
Effect size		0.88	0.85		
S-C versus N-E, <i>F</i> (43)	9.99**	<i>ns</i>	4.49*	124.99*****	11.61**
Effect size	0.75		0.55	3.99	1.04
Autism account trends across emotion type					
Simple versus complex, <i>F</i> (55)	4.26*	<i>ns</i>	<i>ns</i>	9.61**	<i>ns</i>
Effect size	.58	<i>ns</i>	<i>ns</i>	1.65	<i>ns</i>
Simple versus S-C, <i>F</i> (55)	21.73**	<i>ns</i>	8.85**	15.41**	<i>ns</i>
Effect size	1.31	<i>ns</i>	0.89	0.84	<i>ns</i>
Simple versus N-E, <i>F</i> (55)	<i>ns</i>	<i>ns</i>	<i>ns</i>	11.36**	6.65**
Effect size	<i>ns</i>	<i>ns</i>	<i>ns</i>	1.13	0.88
Complex versus S-C, <i>F</i> (55)	6.76*	<i>ns</i>	15.24**	50.27*****	<i>ns</i>
Effect size	0.56	<i>ns</i>	1.13	1.58	<i>ns</i>
Complex versus N-E, <i>F</i> (55)	8.04**	<i>ns</i>	<i>ns</i>	<i>ns</i>	4.84*
Effect size	2.59	<i>ns</i>	<i>ns</i>	<i>ns</i>	0.99
S-C versus N-E, <i>F</i> (55)	29.55**	<i>ns</i>	24.36**	53.26*****	9.73***
Effect size	3.13	<i>ns</i>	1.23	1.60	1.26

Note. ANOVA = analysis of variance.

^a Analysis of covariance was performed with the following covariates: Full-Scale IQ, Performance IQ, and Verbal IQ and scores on the Comprehension subtest of Verbal IQ.

* *p* < .05. ** *p* < .01. *** *p* < .005. **** *p* < .001. ***** *p* < .0005.

not to attribute meaning to these encounters; and required prompting to access and relate their memories more often, (see Figure 2, panels a–d). These differences were not observed in children’s accounts of nonemotional experiences, although in the cases of narrative production and evaluation of meaning, this appears to be a result of comparison children’s less frequent narrative and evaluative tendencies when discussing these types of memories.

Examination of performance within groups revealed an important pattern with respect to account form: Typically developing children overwhelmingly used narratives when relating memories of all types of emotions (with more than 80% of all emotional memories taking narrative form), but they adopted this strategy only about half the time when discussing the physical states of

“tired” and “sick.” No such distinction was noted in the autistic group, which demonstrated an equally low rate of narrative production across all types of accounts.

Given that additional structural measures (i.e., evaluation of meaning, cause, and reliance on experimenter prompting) were not dependent on narrative production, greater variability was observed for these measures. The autistic group, in some cases, even displayed patterns similar to those of typically developing children. Both typically developing children and autistic children seemed more apt to evaluate the meaning of their self-conscious emotional experiences, although these types of memories were also least likely to include explanations of causal origin for children with autism. Prompting was also most common among both groups when they were discussing self-conscious emotional expe-

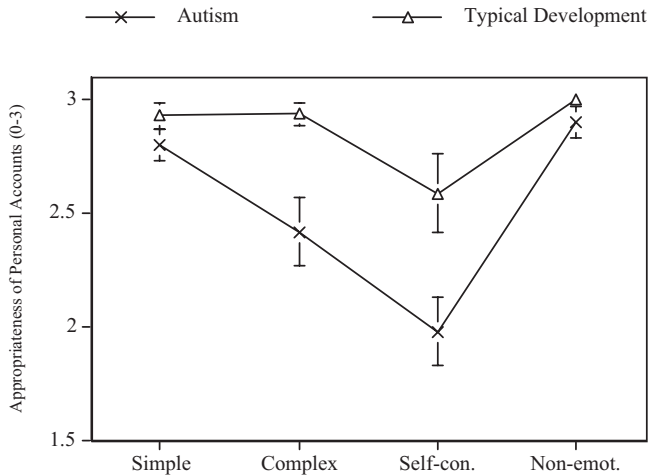


Figure 1. Contextual appropriateness of emotional and nonemotional accounts. Error bars represent standard error of measurement. Self-con. = self-conscious; Nonemot. = Nonemotional.

riences, thus suggesting that these emotions posed the greatest difficulty for both groups.

Important to emphasize, however, is the overall impoverished structure of autistic children's emotional accounts relative to those of comparison children. These divergent group practices in the relation of emotional memories—with typically developing children being inclined to produce evaluated narrative accounts and children with autism rarely relating personalized narratives and only sparsely evaluating recalled experiences—resulted in emotional accounts quite distinct in character. To illustrate this distinction, we provide several excerpts in the following paragraphs, the first excerpt from a 10-year-old typically developing boy discussing a memory of a time he felt embarrassed.

Evaluator: Can you tell me about a time when you felt embarrassed?

Child: When I wore my camouflage to school. I like it [my camouflage] 'cause it's comfortable, but everybody was looking and going "Ha-ha ha-ha! There's camel boy! Camel boy's gonna cry!" They gave me like all these weird nicknames about that.

Evaluator: Uh-huh.

Child: Like when I wore my Navy suit to school, which I really, really like because it was a really, really cold day . . . when it was about . . . well, let's put it as, the puddles were frozen.

Evaluator: Mhmm.

Child: We could ice skate on them at recess.

Evaluator: Mhmm.

Child: And I wore my wool Navy suit and I had my color bars on it and my um Annapolis pin and like the collar, and my, and everybody . . . and it's made of wool, and it looked really, really warm 'cause it was really, really cold.

Evaluator: Yeah.

Child: And everybody started making fun of me.

Evaluator: That's too bad.

Providing temporal and contextual orientation, and evaluated from a personal stance, this narrative account conveys not only what took place but why it was personally salient to this child. His initial account even triggers recollection of a related experience in which he expands on his rationale for donning military attire (i.e., "I like it because it's comfortable . . . I really, really like [the Navy suit] because it was really, really cold and it's wool"). His elaboration on the significance of these uniforms, that is, his pride in their adornment with military insignia ("I had my color bars on it and my Annapolis pin") affords even greater access to his remembered experiences and their bearing on his feelings.

Children with autism, on the other hand, tended to produce accounts encompassing nonspecific time frames and lacking any cast of participants or evaluations of cause, consequence, or subjective meaning. For instance, a boy with autism (10 years old, Verbal IQ = 115) explained a time he felt embarrassed as "usually . . . when I say things." Given that experimenter prompting was of little help in the eliciting of further relevant details, such a limited account fails to include evaluative remarks explaining why events such as "saying things" might elicit embarrassment, at least in conventional terms, leaving unclear the depth of children's understanding of their emotional encounters.

In a similar, although less extreme, example of this trend, another autistic boy (12 years old, Verbal IQ = 110) related his experience with guilt.

Evaluator: Tell me about a time you felt guilty.

Child: Well, probably like, like when I do something wrong and then, like, later I might get in trouble for it. Then I kinda feel guilty.

Unlike the previous example, in which the child expressed no clear knowledge of the circumstances that typically elicit embarrassment, this account demonstrates an understanding that guilt often arises from infractions of moral standards. Yet the child's failure to produce a specific narrative account of an experience with these characteristics leaves the impression that this more definitional description may not have been derived from his personal experiences.

Although not a part of the original coding scheme, an additional feature was noted that contrasted starkly with the narrative style favored by typically developing children. It concerned autistic children's more frequent reference to facial indices of emotions, such as smiling and crying, $F(1, 49) = 8.45, p = .005$. As an example, a 10-year-old girl with autism (Verbal IQ = 106) described feeling sad when "tears started to come." A 9-year-old boy with autism (Verbal IQ = 122) similarly described himself as "like frowning and eyebrows like up" as part of his account of a sad experience. In relying on descriptions of behavioral or visually perceptible facial features, children offered little in the way of personal reflection on past events and their imputed significance.

Finally, it is of note that these results do not appear attributable to variations in IQ, as IQ variables (i.e., Full-Scale IQ, Performance IQ, and Verbal IQ, as well as the Comprehension subscale

—x— Autism —△— Typical Development

Figure 2a. Use of Narrative

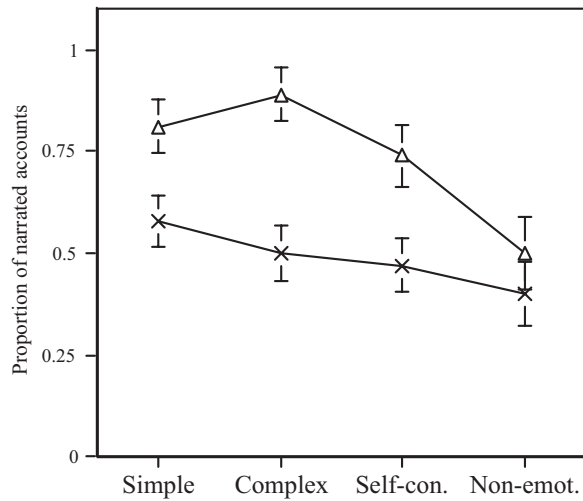


Figure 2b. Causal Evaluations

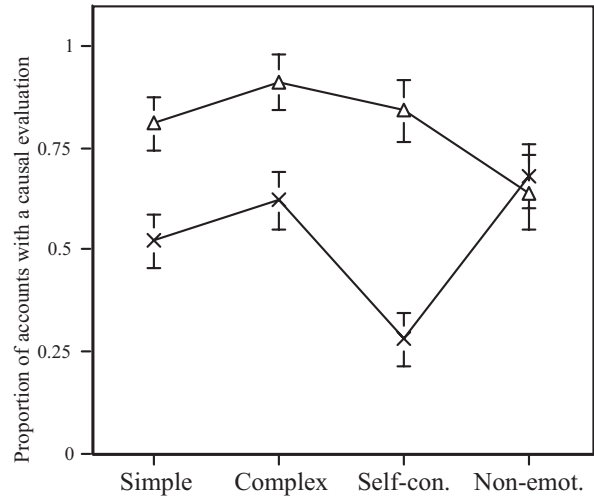


Figure 2c. Evaluation of Meaning

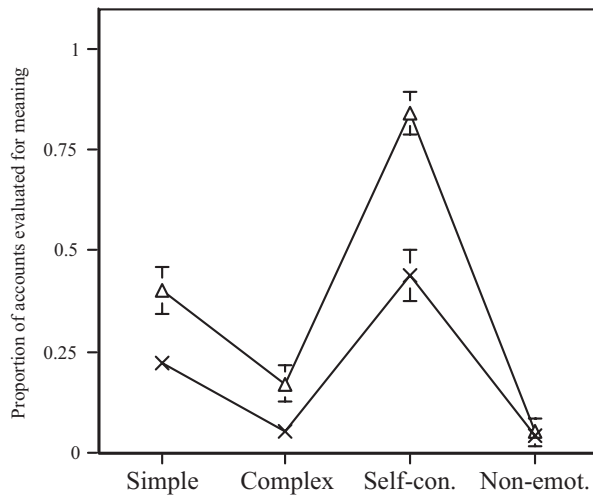


Figure 2d. Prompting

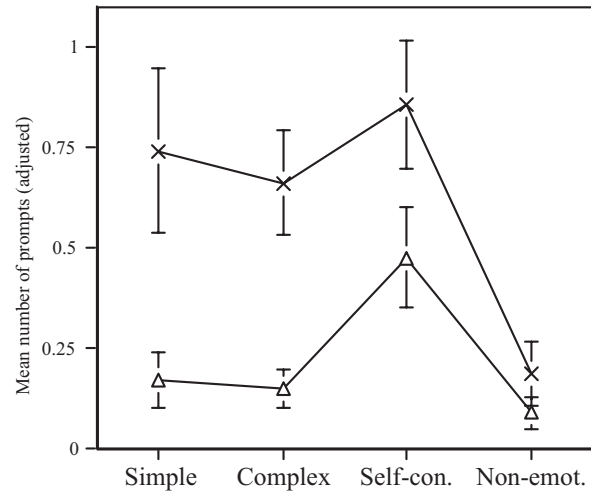


Figure 2. Performance across measures of account structure. Error bars represent standard error of measurement. Self-con. = self-conscious; Nonemot. = Nonemotional.

of Verbal IQ) held nonsignificant relationships ($p > .35$) with most emotion variables, and those few related variables maintained robust group differences after the covarying of all IQ variables in analyses.

Discussion

Through complementary analyses of content and form, findings revealed a number of important differences between the emotional accounts of autistic and typically developing comparison children and a simultaneous lack of distinction in nonemotional accounts.

Groups' performance diverged most profoundly in the manner in which children recounted their remembered experiences. Whereas high-functioning children with autism were able to discuss contextually appropriate accounts of simple emotions, as has been documented previously (e.g., Capps et al., 1992), their strategies for interpreting and conveying all types of emotional experiences differed from those strategies used by typically developing children.

In particular, although they produced accounts comparable in length to those of typically developing children, the autistic group

was significantly less inclined to organize and convey their accounts of emotional experiences in specific and personalized causal-explanatory narrative frameworks. Thus, despite their apparent ability to distinguish appropriate contexts for the expression of simple emotions, autistic children's script-like emotional accounts, lacking reference even to the causes of their emotions, leave in question the children's depth of understanding of all types of emotional experiences. Because these group differences were not observed in children's accounts of nonemotional events, and given that they were not explained by measures of IQ, it is unlikely that these difficulties stem from overall impairments in identifying causal elements or talking about past events in general. This conclusion is further supported by evidence from within-group analyses that children with autism were more likely to evaluate the causes of their nonemotional experiences and less reliant on prompting to access these memories than was the case when they related emotional memories.

Although evincing some understanding of simple emotions in their ability to discuss these feelings in contextually appropriate ways, then, the scripted and unevaluated quality of the autistic group's emotional accounts conveyed a sense of fleeting, un contemplated emotional encounters that failed to become fully engraved in autobiographical memory and, indeed, raises questions concerning the subjective nature of autistic persons' emotional experiences. The generalized accounts offered by the autistic group could have stemmed from affective experiences and memories that were, in fact, qualitatively distinct from those of typically developing children (see, e.g., Hobson, 1986). In other words, impoverished emotional experiences may leave little to discuss.

Reports from high-functioning adults seem to support this prospect (Grandin, 1995; Williams, 1992). In a recent investigation of emotion processing in autism, wherein high-functioning adults were administered a questionnaire probing their subjective emotional experiences, participants reported difficulties identifying their feelings and frequently characterized their emotions as simplified and undifferentiated (Hill, Berthoz, & Frith, 2004). As affirmed by Temple Grandin in her autobiographical writings, "my emotions are simpler than those of most people . . . I don't know what complex emotion in a human relationship is" (1995). Grandin further describes her emotional memories as faint and grounded in objects and locations, rather than internal representations, explaining how "just thinking about it isn't enough" (p. 93).

Given that autistic individuals' subjective emotional experiences and conceptual representations of emotions may be quite different from those of typically developing individuals, an important issue that researchers must disentangle in future work is the extent to which such distinct emotional experiences, and deficient emotional knowledge in general, might both underlie and stem from a lack of reflective appraisal activities and skills. For instance, in typical development, narrative is a primary tool for reflection on, organization of, and ascribing of meaning to emotional experiences. Furthermore, evidence suggests that experiences rendered through narrative are more likely to be consolidated in memory (Fivush & Hammond, 1990; Nelson, 1993, 2003; Reese & Fivush, 1993; Snow, 1990). Findings that typically developing children overwhelmingly adopted narrative form in recounting their emotional (but not nonemotional) encounters sup-

ports the prospect that narrative activities may be integrally involved in emotional appraisal processes and that autistic individuals' noted difficulties with narrative (Loveland & Tunali, 1993; Tager-Flusberg, 1995) could, in part, inhibit their capacity for appraising emotional experiences and constructing emotion concepts and memories.

Aside from these considerations, if it is indeed the case that autistic individuals possess less salient or elaborated memories of emotions, as Grandin's (1995) account and the present findings seem to suggest, the consequences for emotional functioning are significant. Our memories of emotional events comprise a complex knowledge base that guides and shapes world encounters as we continuously cull information on the causes, consequences, and subjective meaning of affectively charged happenings. Lacking such a repository could render autistic individuals seriously disadvantaged when engaging in emotional transactions.

A final finding of note concerns the autistic group's tendency to describe visually salient elements of their memories. In light of relative strengths identifying appropriate contexts for simple emotions, this finding suggests an unusual strategy at play, in which those emotions reliably associated with visually perceptible facial expressions and behaviors (such as simple emotions) may prove easier to decipher than those dependent on reflective, evaluative processes for their interpretation (i.e., complex emotions). Consistent with behaviors noted in prior studies (Capps, Losh, & Thurber, 2000) and reports that many autistic individuals "think in pictures" (Grandin, 1995), these patterns seem to imply a very different method of interpreting emotional stimuli. Whereas narrative reflection appears to be the preferred means of (re)interpreting and conveying emotional (but not necessarily nonemotional) episodes for typically developing children, those with autism may be more inclined, or confined, to reporting observable behavioral elements.

These contrasting group profiles highlight the significance of cognitive appraisals in the apprehension of emotional events and suggest that narrative may be a mechanism recruited in attributional processes by typically developing children. In addition, findings may prove relevant to clinical intervention strategies in autism, the majority of which emphasize visually salient facial characteristics when teaching emotions (e.g., smiles, frowns, etc.). Whereas this strategy may provide bootstrapping functions in early emotional knowledge development and is, in fact, a practice observed among very young typically developing children (e.g., Gnepp, 1983), these results imply that a focus on internal experiences of emotion could prove important in helping to further advance autistic persons' emotion perception strategies.

Together, these findings demonstrate the value of language practices as a window into underlying psychological functioning in typical and atypical development. Examination of the language structure of children's recounted emotional memories casts new light on questions concerning the extent to which high-functioning autistic individuals understand emotionally evocative situations, helping to identify divergent interpretive strategies employed by individuals with autism while also demonstrating the potential significance of the narrative style favored by typically developing children. In future work, researchers might investigate further the nature and basis of autistic individuals' impaired interpretive techniques by exploring associations with related cognitive skills, such as theory of mind, executive control processes, and language practices (including narrative ability). Given that individual dif-

ferences were observed in both groups, with a few autistic individuals producing more specific and evaluated accounts and some typically developing children relating experiences in a more generalized fashion, the exploration of such associations could prove important in identification of the cognitive mechanisms at play in the appraisal of emotional stimuli in both autistic and typical populations.

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