

# The Big Picture: Storytelling Ability in Adults with Autism Spectrum Conditions

Jennifer L. Barnes · Simon Baron-Cohen

Published online: 1 November 2011  
© Springer Science+Business Media, LLC 2011

**Abstract** Previous work on story-telling ability in autism spectrum conditions (ASC) has found a pattern of relatively intact use of story grammar in ASC narratives; however, prior analysis has concentrated primarily on whether specific story components are included, rather than *how* they are included. The present study analyzes an existing narrative dataset, concentrating on the *kind* of information that individuals with and without high functioning autism or Asperger syndrome include about story elements such as setting, character, conflict, and resolution. This analysis showed that individuals with ASC are biased toward providing *local* over *global* details about each element, regardless of whether the element involved mental content. These results are discussed in terms of the Weak Central Coherence and Hyper-Systemizing theories.

**Keywords** Autism · Story-telling · Narrative · Verbal ability · Central coherence · Film

## Introduction

Books, films, and television are pervasive in many cultures, and storytelling—as an oral tradition—is found

cross-culturally as a human universal (Sugiyama 1996). The ability to *understand* stories has been related to the ability to understand the social world (Mar 2004; Oatley 1999), and the ability to *tell* stories to pragmatic communication (Colle et al. 2008). For this reason, research has focused on storytelling ability in people with communication difficulties, such as individuals with autism spectrum conditions (ASC), characterized by narrow interests, repetitive behavior, and difficulties with social interaction and communication (DSM-IV 1994).

Because telling a story requires taking into account the informational needs of the audience, it has been suggested that individuals with ASC, who have difficulties appreciating other's thoughts (Baron-Cohen et al. 1985), may also have difficulties grounding their stories in an understanding of what their audience needs to know. Simultaneously, there are cognitive components of storytelling that may be affected by the cognitive style of individuals with ASC, such as a tendency towards being biased away from global processing (Happé and Frith 2006) or a bias toward understanding systems (Baron-Cohen 2006).

Previous research on the social aspects of storytelling has shown that adults with Asperger syndrome are less likely than typical controls to use temporal adverbs in their retellings of a simple picture book story (Colle et al. 2008), whilst controls recognized more often that their audience needs to know when time is passing in the story. Similarly, children with ASC use a smaller range of evaluative techniques to draw the audience into their story retellings, such as character voices, sound effects, and intensifiers, than do typical controls (Losh and Capps 2003); and within ASC groups, performance on tasks such as these is correlated with performance on theory of mind measures (Capps et al. 2000).

Other research into storytelling in ASC has concentrated on the attention paid to mental states in ASC narratives (Barnes

---

J. L. Barnes · S. Baron-Cohen  
Autism Research Centre, Department of Psychiatry,  
Cambridge University, 18B Trumpington Road,  
Cambridge CB2 8AH, UK

### Present Address:

J. L. Barnes  
Department of Psychology, Yale University,  
New Haven, CT, USA

J. L. Barnes (✉)  
2 Hillhouse Avenue, New Haven, CT, USA  
e-mail: jennifer.barnes@yale.edu

et al. 2009; Capps et al. 2000), the degree to which mental states are situated within a causal framework in story retellings (Capps et al. 2000), and the degree to which narratives by people with ASC are organized coherently around significant story events (Diehl et al. 2006). However, a *story*, and particularly a *fictional story*, is not simply a chain of causal events, elaborated with descriptions and exclamations, but rather a cohesive narrative structured around standard elements. When people discuss stories, books, or films, they do not center the discussion on causal frameworks, or use of mental state terms, or temporal adverbs; rather, they discuss elements such as *characterization* or *plot*.

For this reason, a growing body of research has focused on story grammar in narratives by people with ASC. The term *story grammar* refers to the use of certain standardized elements in the telling of a given story and may include the actors and setting, the central problem or conflict, a character's attempts to solve that problem, the consequences of these attempts, the characters' reactions, and ultimately a resolution (Strong 1998). In studies of narrative development in childhood, these elements are often reduced to three key components: the inclusion of an initiating goal or problem, attempts to achieve the goal, and the ultimate story outcome (e.g. Berman and Slobin 1994; Norbury and Bishop 2003). In this way, studies of story grammar directly address the storyteller's ability to relay a given plot. This ability shows a distinct developmental progression, with three-year-old children typically including none of the aforementioned components, five-year-olds reliably including the initiating events, and nine-year-olds showing mastery of initiating events and attempts, but lagging behind adults in their portrayal of a story's outcome (Berman and Slobin 1994).

Previous research has found that despite difficulties with pragmatic communication, individuals with ASC often have some success at structuring their narratives around many of the key components of story grammar. Loveland (1989) found that despite a tendency toward treating characters as objects, children with autism often included basic plot elements in their retelling of a simple puppet show. Similarly, Norbury and Bishop (2003) used a wordless picture book to elicit storytelling in children with and without high functioning autism (HFA) and examined whether or not they integrated three major elements of story grammar in their stories: an initiating goal or problem, attempts to achieve that goal, and narrative outcome. They found no group differences. A similar pattern of intact performance was found by Goldman (2008), who looked at the frequency with which children with and without HFA made reference to various components of story grammar in their personal narratives. While children with HFA referenced people less often than children with developmental language disorders, and were less likely to provide a resolution to the central conflict in

their stories, they were equally likely to include information about the place and time that the story took place, the actions and obstacles, and the ending. This led the author to conclude that children with HFA may have learned the mechanics of storytelling, but seemed to lack awareness of the kind of information that makes a story socially meaningful to the audience.

A similar dissociation between structure and meaning was found by Young et al. (2005): while adolescents with and without ASC tended to structure their story retellings in the same way, the two groups varied significantly in their comprehension of the source material. Specifically, adolescents in the two groups did not differ in their inclusion of any of the following story elements: the story's setting, the initiating event that propelled the conflict of the story, the character's internal responses and plans to overcome the conflict, the character's attempts to do so, the consequences of these attempts, or the character's reactions to the above. In contrast, however, participants with ASC were less likely than matched controls to make correct inferences about the events in the story they had just retold (Young et al. 2005).

In some ways, this pattern of results is puzzling: if children and adolescents with ASC are able to tell stories that contain the key elements of story grammar and outline the basic plot of a story, why do they have such trouble using that information to answer questions about the events they have described? One possibility is that although ASC narratives contain *some* information about elements like setting or achieving goals, they do not contain the same *kind* of information as stories told by their typically developing peers. Because narrative data can be rich and difficult to code, research into story grammar in narratives by people with ASC tends to evaluate narrative performance based on either frequency counts, looking at how often a narrative references information about a certain element (e.g. Goldman 2008; Young et al. 2005), or dichotomous coding, simply looking at whether or not a specific element is referenced at all (e.g. Loveland 1989; Norbury and Bishop 2003).

While this type of analysis has provided valuable information about the ways in which individuals with ASC succeed at structuring their stories around key story elements, it may not capture the full picture, because it is possible to include a great deal of information about a given element without including *significant* information, which captures the gist of the story more broadly. For example, "once upon a time, in a kingdom far, far away" and "there was grass" both contain information about a story's setting, but only one provides a meaningful answer to the question "where does this story take place?" Because individuals with ASC have a tendency to focus on local, over global, detail (Frith 1989; Booth et al. 2003), we hypothesized that to the extent that individuals with ASC

succeed at structuring their stories around key components of story grammar, they may do so by including *details* about a given element, without capturing the big picture.

The present study expands on previous research on storytelling ability in ASC in four ways. First, because the ability to tell a well-structured story develops throughout childhood, adolescence, and into adulthood (Berman and Slobin 1994), our research focuses on storytelling ability in *adults* with ASC, while an arguable majority of previous research (and all of the story grammar studies outlined above) examined narrative production in individuals whose narrative abilities are still developing. Second, while traditional story grammar research tends to focus primarily on a story’s plot, we also examine elements like character, which play a key role in discussions of fiction across mediums in our everyday lives. Third, rather than eliciting verbal storytelling, this experiment examines *written* stories, decreasing the social demands of the task to focus on story structure per se. Finally, we concentrate specifically on the *kind* of information included about key story elements, testing the hypothesis that while individuals with and without ASC may succeed equally at structuring their stories around elements like setting and conflict, they may do so in qualitatively different ways.

Specifically, in this experiment, we examined the degree to which individuals with and without ASC grounded their retellings of film clips using standard elements of story, including *setting, character, conflict, and resolution*. We hypothesized that while individuals in both groups would include some information about these elements in their narratives, individuals with ASC would be more likely to concentrate on specific details, compared to typical controls, who we predicted would focus more on elucidating the big picture for each of these elements.

**Methods**

To test these hypotheses, we examined data previously gathered to look at narrative comprehension (Barnes et al. 2009). In the original experiment, participants were asked to watch four short film clips taken from the television show *House* and then to write a story retelling what they had seen in their own words. In our previous analysis, the resulting narratives were then examined for the degree to which participants viewed the clips in terms of the mental states of characters and in terms of the physical objects present. Here, we turn our attention away from the way that participants viewed the stimuli (narrative *comprehension*) and instead focus on *narrative production*, specifically the way that participants structure their stories around the basic elements of story, providing a full picture of *who* the story is about, *what* happens, and *where* the action takes place.

**Participants**

Twenty-eight typical individuals and twenty-eight individuals with an ICD-10 (1994) clinical diagnosis of either Asperger syndrome or high functioning autism participated in this experiment. Participants in the two groups were matched for age, sex (14 male and 14 female in each group), verbal IQ, and writing ability, as indexed by a measure of vocabulary and syntactic complexity, the Flesch Kincaide Grade Level formula. Average scores on these measures for each of the two groups are shown in Table 1.

Participants in the control group were recruited via fliers in the city of Cambridge. Individuals in the ASC group were recruited via the Autism Research Centre volunteers database at Cambridge University ([www.autismresearchcentre.com](http://www.autismresearchcentre.com)). To register as part of the database, individuals must have been previously diagnosed by a qualified professional, such a psychiatrist or clinical psychologist, using internationally accepted criteria (APA 1994; ICD-10). Additionally, participants with ASC completed the Autism-Spectrum Quotient (AQ), a self-report questionnaire that measures the number of autistic traits an individual possesses (Baron-Cohen et al. 2001). This confirmed that the scores for the ASC group (mean = 34.25; 71% scoring 32+) were similar to those obtained by Baron-Cohen et al. (2001) (mean AQ = 35.8, 80% scoring 32+). All participants gave informed consent, and the protocol was approved by the University of Cambridge Psychology Research Ethics Committee.

**Stimuli**

The stimuli for this experiment were four self-contained scenes, taken from the first two seasons of the American

**Table 1** Participants in the control and ASC groups were matched for age and verbal IQ, as well as verbal and writing ability (Barnes et al. 2009)

	ASC group	Control group	<i>p</i>
Age	M = 30.29 SD = 7.78	M = 30.21 SD = 8.79	<i>p</i> = .97
Verbal IQ	M = 116.29 SD = 10.75	M = 116.93 SD = 10.75	<i>p</i> = .81
Length of control narratives (words)	M = 124.04 SD = 45.6	M = 126.04 SD = 27.8	<i>p</i> = .84
Flesch-Kincaide writing level (interest narrative)	M = 9.26 SD = 2.19	M = 8.50 SD = 2.13	<i>p</i> = .19
Flesch-Kincaide writing level (film narrative)	M = 6.70 SD = 2.32	M = 7.19 SD = 1.95	<i>p</i> = .30

television show, *House*. Each scene featured two characters, one of who had a moral dilemma or conflict, and all four scenes had a self-contained story arc with a beginning, middle, and end. For example, in one clip, participants watched as a homeless woman attempted to convince a bouncer to let her into a house party she desperately needed to attend, even though she could not afford the cover charge. At the end of the clip, the bouncer takes pity on the woman and decides to let her in, despite the obvious risk to his job. Other clips included: two colleagues arguing over previous romantic entanglements; a doctor telling a woman that she cannot donate an organ to her sick husband unless she terminates her pregnancy; and a young and seriously ill cancer patient trying to talk her doctor into being her first kiss. Each participant watched all four clips, and the order in which they viewed the clips was counterbalanced across participants.

### Procedure

In the original experiment, participants were asked to complete a variety of tasks to ensure that the two groups were matched on verbal ability, including the verbal subscales of the Wechsler Abbreviated Scale of Intelligence (WASI) (Wechsler 1999) and writing a passage on their interests, to ensure that all participants could produce written content of the same relative length and syntactic complexity. They then watched each of the four film clips and were asked to write about what they had seen, retelling the story in their own words. Participants were asked to spend about 5 min writing about what they had seen, but were allowed to continue writing until they had finished. In order to minimize the social demands of the task, no mention was made of the audience for participants' story retellings; they were simply asked to recount what they had seen.

### Coding

To confirm that individuals with ASC could produce film-based narratives, as well as interest-based narratives, with the same syntactic complexity as the control group, we examined each participant's first film-based narrative and found no differences in Flesch Kincaide Grade Level scores between the ASC and control groups (see Table 1).

Subsequently, each participant's four film-based narratives were coded by a professional novelist (JB) on a scale from 0 to 2 for each of four different story elements: *character* (who the story is about), *conflict* (what the story is about), *setting* (where the story takes place), and *resolution* (how the story ends). A score of 0 indicated that no information was provided about that element. A score of 1 indicated that the narrative provided one or more *details*

about the element, but did not examine the big picture; and a score of 2 indicated that the narrative provided a well-grounded and fully developed view of the element in question. Under this schema, participants' scores were not indicative of *frequency*, but rather of the scope of information provided by the narrative. For example, a participant could provide a dozen details about the setting (i.e. "the walls were white", "the floors were tile", "there was a bed", etc.), but if they did not specifically say *where* the scene took place (i.e. "a hospital room"), they would receive a score of 1. Conversely, a participant could provide a narrative laden with insignificant details about a given element, but if they provided *any* global information, they received a score of 2. In this way, the coding schema was not designed to indicate how *detailed* a narrative was, but rather, whether or not a given narrative captured the big picture "gist" of each element, or simply described some *part* (or *parts*) of that element.

Specific examples of the kind of information that was considered "detail" versus "big picture" for each of the four story elements is included in Table 2. It should be noted that under the coding schemas used by most previous story grammar research, a score of 0 (did not mention the element at all) would still be a 0; however, the difference between a 1 (provided local, but not global detail) and a 2 (provided the big picture) would not have been captured.

Scores were then summed across the four film-based narratives to obtain a participant's score, ranging between 0 and 8 for each of the four elements: setting, conflict, character, and resolution. The element scores were then summed to obtain an *overall* score (0–32) for each participant. A second independent coder, also a professional novelist, coded 25% of the narratives and inter-rater reliability was assessed ( $r = .91$ ). Both coders were naive to group identity.

### Results

A one-way analysis of variance (ANOVA) was conducted with group identity as the independent variable and overall score (0–32) as the outcome measure. As predicted, individuals in the control group had higher overall scores ( $M = 25.29$ ,  $SD = 3.25$ ) than individuals with ASC ( $M = 20.82$ ,  $SD = 3.85$ ,  $F(1,54) = 22.0$ ,  $p < .001$ ; Effect size:  $d = 1.25$ ). (Fig. 1).

We then examined whether this pattern of results held up for each element individually by conducting four additional ANOVAs, with group identity as the independent variable, and summed scores for each of the four elements (setting, conflict, character, and resolution) as the outcome measures. As predicted, group differences were significant for all four variables ( $p$  values ranging from

**Table 2** Examples of how the coding schema was applied to each of the four major elements of story

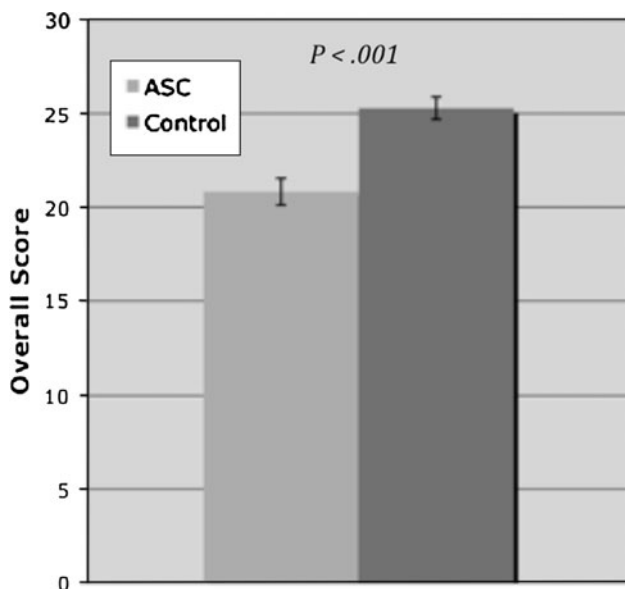
	Score of 0: no mention of element	Score of 1: mentions a detail about element	Score of 2: provides big-picture
Setting	No mention of where the story takes place	Mentions some physical aspect of setting, such as the presence of a bed or a chair	Narrative labels the setting with a broad term, such as “hospital” or “office building”
Character	No mention of either of the story’s characters	Mentions the characters (i.e. “a man” or “a woman”), but does not define their relationship to each other or their role in the scene	Defines the characters in relationship to each other (i.e. “a woman and her doctor” or “two friends”)
Conflict	Does not identify the character’s desires or goals	Narrative defines a character as wanting something, but does not pinpoint an obstacle to that goal	Narrative defines both a goal and an obstacle standing in the way of the character achieving that goal
Resolution	Does not mention what happens at end of conflict	Narrative mentions an action that takes place at the end of the scene	Narrative describes an ending action and ties that action into the overall arc or theme of the scene

$p < .05$  to  $p < .001$ , see Table 3), with the control group receiving higher scores than the ASC group about setting, conflict, character, and resolution. Significantly, one of the strongest effects was found for *setting*, an element that is unrelated to mental or social content in the scenes, suggesting that the group differences found here go beyond differential attention paid to the social elements of the scenes.

To ensure that this result reflected a difference in the inclusion of big picture information—and not just a generalized tendency in the ASC group to omit mention of key elements for some clips (earning a score of 0 for those clips) and provide big picture information on others (earning a score of 2)—we ran a secondary analysis that looked specifically at inclusion of big picture information.

For each of the four story elements, we examined how often participants included global information on items for which they included *some* information. The total narrative score for each element (out of 8) was divided by the number of clips on which the participants included that element in any form (out of 4). A score between 1 and 2 was derived for each participant, with scores closer to 2 indicating a greater likelihood of including big picture information. ANOVAs revealed that the control group was significantly more likely to include global information for three of the four elements: setting, character, and resolution (see Table 4). For conflict, the results showed a trend toward significance ( $F(1,54) = 3.085, p = .085$ ).

Finally, because previous research has revealed a dissociation between narrative production ability and narrative comprehension (Young et al. 2005), we examined whether or not participants’ scores on this test correlated with our previous analysis of narrative comprehension



**Fig. 1** Mean ( $\pm$ SD) narrative scores (0–32) for the ASC and control groups

**Table 3** ANOVA results for each of the four elements of story individually

	Mean	Standard deviation	F(1,54)	p	Effect size
<b>Setting</b>					
ASC	4.61	2.18	9.72	$p < .005$	$d = .83$
Control	6.25	1.73			
<b>Character</b>					
ASC	6.43	1.03	7.67	$p < .01$	$d = .74$
Control	7.14	.89			
<b>Conflict</b>					
ASC	6.64	1.68	4.35	$p < .05$	$d = .56$
Control	7.43	1.07			
<b>Resolution</b>					
ASC	3.14	1.04	21.16	$p < .001$	$d = 1.23$
Control	4.46	1.11			

**Table 4** Global bias ANOVA results for each of the four elements

	Mean	Standard deviation	F(1,54)	<i>p</i>	Effect size
<b>Setting</b>					
ASC	1.74	.43	5.98	<i>p</i> = .018	<i>d</i> = .66
Control	1.95	.13			
<b>Character</b>					
ASC	1.61	.25	7.67	<i>p</i> = .008	<i>d</i> = .76
Control	1.79	.22			
<b>Conflict</b>					
ASC	1.79	.28	3.09	<i>p</i> = .085	<i>d</i> = .48
Control	1.90	.16			
<b>Resolution</b>					
ASC	1.11	.18	13.477	<i>p</i> = .001	<i>d</i> = .95
Control	1.34	.29			

(Barnes et al. 2009). Specifically, we looked at whether or not participants' scores on each of the four story elements were related to the frequency with which they referenced characters' mental states in their narratives, viewing the clips in terms of mental, rather than physical content. While significant correlations were found within the control group for the elements of setting, conflict, and resolution, a different pattern of results was seen for individuals with ASC: the only element that correlated with mental state attribution was *conflict*, which requires an explicit description of characters' goals (See Table 5).

## Discussion

The present study tested if during a narrative task describing film clips, participants with ASC would be less likely than controls to situation information about the characters, conflict, setting, and resolution within the scene as a whole. This prediction was confirmed. For example, while control participants were likely to describe stories as taking place *in a hospital* or *in an office building*, participants with ASC were less likely to do so, with many of them describing the setting by talking about a computer in the background of the scene, or the chairs in which the characters were sitting. These results cannot simply be attributed to differences in the lengths of ASC and control narratives: it takes fewer words to say that a scene takes place

“in a waiting room” than to write that “the wallpaper was orange and the chairs were grey with tubular steel frames” (excerpted from example control and ASC narratives respectively, from Barnes et al. 2009), and an additional analysis revealed that ASC narrative scores were not related to narrative length. Rather, independent of the length of narratives, ASC stories seemed to concentrate on specific objects, actions, or dialogue, rather than more generalized descriptions that communicated the gist of the story.

Significantly, the only element analyzed here for which the ASC and control groups did not significantly differ on their tendency toward incorporating global information was *conflict*. In some ways, this is surprising, since conflict is the only element of the four that requires attributing mental states to the characters in a given scene, and yet, it is the element on which individuals in the ASC group received the highest scores, with nearly half of the participants providing the big picture of both the goal and the obstacle standing in the main character's way of achieving it. One possible explanation for this success is that the clips used in this study, like many conventional narratives, are centered *around* a conflict: while a viewer may have to actively search for information about the characters' relationships or the setting in which a scene takes place, a great deal of dialogue is devoted to elucidating the conflict, with characters explicitly stating their desires and the clip ending only once the conflict has been in some way resolved. Given that previous research has focused strongly on elements related to conflict (e.g. initiating event, plans to overcome conflict, outcome of those plans, characters' responses to those outcomes), this pattern of results is consistent with the relative successes seen in previous research (e.g. Young et al. 2005; Norbury and Bishop 2003). However, it should also be noted that the ASC and control groups did show a trend toward performing differently on this element in terms of including global information, and did vary significantly when both local and global information (as well as omissions) were taken into account.

Similarly, our analyses revealed significant group differences in the way that adults with ASC and typical controls describe a story's setting, its characters and their relationships to each other, and the way a story ends. These results may explain the disassociation seen by Young et al. (2005) and others, where there seems to be a disconnect between an individual's *understanding* of a narrative and

**Table 5** Pearson correlation between story element scores and the use of mental state language in film retellings

	Character		Setting		Conflict		Resolution	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
ASC group	.054	.80	.14	.48	.405	.033*	.171	.38
Control group	.024	.92	.374	.04*	.503	.006**	.474	.01**

their ability to retell that narrative in a way that appears to contain the structural elements thought to underlie meaning. It could be the case that individuals with ASC have indeed “learned the mechanics of story-telling” (Goldman 2008, p. 1986), but that they go about fulfilling these structural requirements in a different way, plugging in bits and pieces of information, rather than concentrating on the meaning of the whole.

These results can be interpreted in several ways. First, it is possible that the differences found on the current task arise from differences in participants’ abilities to place themselves in the mind of a naïve audience: if a story revolves around a man and a woman, knowing that the man is a doctor and the woman his patient is more helpful in parsing the meaning of the scene than being told that the man is wearing a lab coat. This aspect of story-telling—mind-reading the audience—relies on the ability to empathize, or imagine and react to the mental states of others (Baron-Cohen et al. 2003), and many theorists have suggested that the function of story-telling (and fiction more broadly) is the fact that it taps into social cognitive abilities also key for functioning in the everyday world (e.g., Mar and Oatley 2008).

However, this explanation seems insufficient for the current pattern of results for several reasons. First, a comparison of participants’ story element scores with an index of mentalizing on the same task revealed no relationship for ASC group between the quality of information they provided about the setting, characters, and resolution, and the number of mental states they attributed to characters in the films, suggesting that their performance on our storytelling measures may be distinct from abilities relating to thinking about and reading the minds of others. Equally significant is the fact that in this task, there was no explicit audience to be mind-read: participants were simply asked to write about what they had seen. While it is possible that participants in the control group nonetheless wrote for an imagined audience as some kind of default and were better at imagining this audience’s needs, it seems odd to attribute a social cause to a task in which there was no actual social interaction.

If anything, the written task employed in the current experiment may more closely mirror the demands of retelling a story *to yourself*, a skill that may play a key role in everyday life as we reflect on and recall event that we have witness or those in which we were involved (Goldman 2008). From this perspective, it is possible that the differences seen between ASC and control narratives are due to executive deficits in the ASC group, rather than deficits in theory of mind. Under this view, individuals with ASC may have been less successful at capturing the gist of the stories they had viewed due to difficulties strategically planning and organizing their narratives (e.g. Bennetto and Pennington 2003).

An alternative explanation focuses not on the ability to strategically structure a narrative per se, but on the ability to identify and attribute significance to the big picture of a given story more broadly. The weak central coherence theory posits that individuals with ASC have a superior ability to process featural or local information, and have a cognitive style that is biased away from global processing (Happé and Frith 2006). Just as individuals with ASC produce more detail-focused drawings (Booth et al. 2003), participants in this experiment may fixate on details about the setting, characters, and plot of a story, rather than the larger structure of the scene.

This result is consistent with previous research looking at the way that ASC narratives incorporate the gist, or essential events, of a story into their narratives. Children with ASC often have difficulty stringing together the events of a story in a meaningful way (Losh and Capps 2003), and fail to weight significant story events appropriately (Bruner and Feldman 1993). While they show a bias for remembering causally important story events, they have difficulty using this *gist* to create causally coherent narratives themselves (Diehl et al. 2006). This pattern of results has been interpreted as reflecting a difficulty viewing stories in global terms, and the results presented here support the idea that individuals with ASC may have difficulty incorporating the “big picture” into their story retellings. However, unlike previous studies looking at gist, which focus on story *events*, the current results showed this pattern across a variety of story elements, including two—setting and character—which are not encompassed by the plot or action of the story per se. This suggests that individuals with ASC may differ from controls not only in their tendency to prioritize certain story elements (such as plot-related action) over others (such as setting), but also in their tendency to communicate the big picture gist of those elements individually.

While previous research has investigated the claim that engaging in fiction might facilitate social cognition (Mar et al. 2006), it is equally plausible that engaging in fiction and telling stories are exercises in *relevance* (Sperber and Wilson 1986). A given book or movie throws a great deal of information at its audience; in order to make sense of any of it, one must distinguish those elements which are relevant to the big picture from those that are not, and this extends beyond the realm of mental states or social cognition. A gun that shows up in the first act could go off in the third; the same cannot be said for a sofa or a chair or a doctor’s lab coat. While this experiment did not focus on relevance per se (a person who mentioned the color of the wallpaper and one who commented on a patient’s IV would have received the same score for setting if neither one indicated that the scene took place in a hospital), it seems likely that, to the extent that we see differences in the

inclusion of the big picture in ASC and control narratives, we might see similar differences in the big picture relevance of the local details a given individual chooses to include. Despite the extensive body of previous research on storytelling in autism spectrum conditions, this is an area ripe for future research.

It should also be noted that the Weak Central Coherence theory is not the only cognitive account of autism that predicts a bias towards local over global processing. A second account is the Hyper-Systemizing theory (Baron-Cohen 2006) that argues that in autism the bias towards local detail is in the service of understanding a system. This theory overlaps with the Weak Central Coherence theory in predicting excellent attention to detail in autism (Shah and Frith 1983, 1993; O’Riordan et al. 2001; Jolliffe and Baron-Cohen 1997) but differs in predicting that whilst people with autism may have difficulty in getting the gist in fictional material, they may nevertheless be able to master the understanding of information that can be ‘systemized’. That is, they can achieve understanding of how a system works. Weak Central Coherence predicts difficulties in integration, which should apply to understanding systems just as much as fictional text. The present results are at least consistent with both of these two theories but further experiments are needed that pit one against the other.

Finally, it should be noted that this task examined the spontaneous inclusion of various story elements in film-based narratives. It is an open question as to whether or not ASC performance could be facilitated if participants were instructed to pay attention specifically to setting, conflict, character, and resolution, with an eye to the big picture. Because previous research has found that spontaneous and forced-choice measures can produce different results in individuals with ASC (Klin 2000; Beaumont and Newcombe 2006), future research is needed to address this issue.

In summary, the present experiment provides new evidence that while individuals with ASC may be proficient at structuring their narratives around certain standardized story elements, they appear to do so by concentrating on specific details, rather than capturing the big picture of a story’s setting, characters, or resolution. Further, for individuals with ASC, performance on this task was not related to an index of theory of mind, but may instead depend on a cognitive predisposition to view scenes in terms of parts, rather than whole. While the practice of storytelling is rooted in social communication, many of the skills necessary to tell a good story—or understand fiction as it is presented to you—may themselves not be intrinsically social but may instead relate to domain-general aspects of cognition.

**Acknowledgments** This research was supported by a Fulbright Fellowship to JB and by funding from the MRC to SBC. The authors would like to thank Sally Wheelwright and Michael Lombardo for their help on the original study, from which this paper draws its data. A version of this paper was presented at the Biennial Meeting of the Society for Research on Child Development. Stimuli were taken from the following episodes in the first two seasons of the television show *House: “Sports Medicine”* © 2005 Universal Network Television LLC; “Histories” © 2005 Universal Network Television LLC; “Autopsy” © 2005 Universal Network Television LLC; “Need To Know” © 2006 MORATIM Produktions GmbH & Co. KG. Clips furnished through the courtesy of Universal Network Television LLC. We are grateful to Ilona Roth and Johnny Lawson for valuable discussions, to Michael Lombardo for his help gathering data, and to the participants for their generous cooperation.

## References

- APA. (1994). *DSM-IV diagnostic and statistical manual of mental disorders* (4th ed.). Washington DC: American Psychiatric Association.
- Barnes, J., Lombardo, M., Wheelwright, S., & Baron-Cohen, S. (2009). Moral dilemmas film task: A study of spontaneous narratives by individuals with autism spectrum conditions. *Autism Research*, 2(3), 148–156.
- Baron-Cohen, S. (2006). The hyper-systemizing, assortative mating theory of autism. *Progress in Neuro-Psychopharmacology and Biological Psychiatry*, 30(5), 865–872.
- Baron-Cohen, S. et al. (2001). The Autism-Spectrum Quotient (AQ): Evidence from asperger syndrome, high functioning autism, males and females, and scientists and mathematicians. *Journal of Autism and Developmental Disorders*, 31(1), 5–17.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition*, 21(1), 37–46.
- Baron-Cohen, S., Richler, J., Bisarya, D., Gurunathan, N., & Wheelwright, S. (2003). The systemizing quotient: An investigation of adults with Asperger syndrome or high-functioning autism, and normal sex differences. *Philosophical Transactions of the Royal Society, Series B, Special issue on Autism: Mind and Brain*, 358, 361–374.
- Beaumont, R., & Newcombe, P. (2006). Theory of mind and central coherence in adults with high-functioning autism or Asperger syndrome. *Autism*, 10(4), 365–382.
- Bennetto, L., & Pennington, B. F. (2003). Executive functioning in normal and abnormal development. In S. Segalowitz & I. Rapin (Eds.), *Child neuropsychology, part II* (2nd ed., Vol. 8). Amsterdam: Elsevier.
- Berman, A., & Slobin, B. (1994). *Relating events in narrative: A crosslinguistic study*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.
- Booth, R., Charlton, R., Hughes, C., & Happe’, F. (2003). Disentangling weak coherence and executive dysfunction: Planning drawing in autism and ADHD. *Philosophical Transactions of the Royal Society*, 358(1430), 387–392.
- Bruner, J., & Feldman, C. (1993). Theories of mind and the problem of autism. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from autism* (pp. 267–291). Oxford: Oxford University Press.
- Capps, L., Losh, M., & Thurber, C. (2000). “The frog ate the bug and made his mouth sad”: Narrative competence in children with autism. *Journal of Abnormal Child Psychology*, 28(2), 193–204.
- Colle, L., Baron-Cohen, S., Wheelwright, S., & van der Lely, H. (2008). Narrative discourse in adults with high-functioning



- autism or Asperger syndrome. *Journal of Autism and Developmental Disorders*, 38(1), 28–40.
- Diehl, J. J., Bennetto, L., & Young, E. C. (2006). Story recall and narrative coherence of high-functioning children with autism spectrum disorders. *Journal of Abnormal Child Psychology*, 34(1), 87–102.
- Frith, U. (1989). *Autism: Explaining the enigma*. Oxford: Blackwell.
- Goldman, S. (2008). Brief report: Narratives of personal events in children with autism and developmental language disorders: Unshared memories. *Journal of Autism and Developmental Disorders*, 38, 1982–1988.
- Happé, F., & Frith, U. (2006). The weak coherence account: Detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 36(1), 5–24.
- Jolliffe, T., & Baron-Cohen, S. (1997). Are people with autism or Asperger's syndrome faster than normal on the embedded figures task? *Journal of Child Psychology and Psychiatry*, 38, 527–534.
- Klin, A. (2000). Attributing social meaning to ambiguous visual stimuli in higher-functioning autism and Asperger syndrome: The social attribution task. *Journal of Child Psychology*, 41(7), 831–846.
- Losh, M., & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's syndrome. *Journal of Autism and Developmental Disorders*, 33, 239–251.
- Loveland, K. A. (1989). *Narrative story-telling in autism and Down syndrome*. Paper presented at the Society for Research in Child Development, Kansas City, MO, April 27–30.
- Mar, R. A. (2004). The neuropsychology of narrative: story comprehension, story production and their interrelation. *Neuropsychologia*, 42(10), 1414–1434.
- Mar, R., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on psychological science*, 3(3), 173–192.
- Mar, R. A., Oatley, K., Hirsh, J., de la Paz, J., & Peterson, J. B. (2006). Bookworms versus nerds: Exposure to fiction versus non-fiction, divergent associations with social ability, and the simulation of fictional worlds. *Journal of Research in Personality*, 40, 694–712.
- Norbury, C., & Bishop, D. V. M. (2003). Narrative skills of children with communication impairments. *International Journal of Language & Communication Disorders*, 3, 287–313.
- Oatley, K. (1999). Why fiction may be twice as true as fact: Fiction as cognitive and emotional simulation. *Review of General Psychology*, 3, 101–117.
- O'Riordan, M. A., Plaisted, K. C., Driver, J., & Baron-Cohen, S. (2001). Superior visual search in autism. *Journal of Experimental Psychology: Human Perception and Performance*, 27(3), 719–730.
- Shah, A., & Frith, U. (1983). An islet of ability in autism: A research note. *The Journal of Child Psychology and Psychiatry*, 24, 613–620.
- Shah, A., & Frith, U. (1993). Why do autistic individuals show superior performance on the block design task? *The Journal of Child Psychology and Psychiatry*, 34(8), 1351–1364.
- Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition*. Oxford: Blackwell.
- Strong, C. J. (1998). *The strong narrative assessment procedure*. Madison, WI: Thinking Publications.
- Sugiyama, M. (1996). On the origins of narrative: Storyteller bias as a fitness-enhancing strategy. *Human Nature*, 7, 403–425.
- Wechsler, D. (1999). *Wechsler abbreviated scale of intelligence*. San Antonio: Psychological Corporation.
- Young, E. C., Diehl, J. J., Morries, D., Hyman, S., & Bennetto, L. (2005). The use of two language tests to identify pragmatic language problems in children with autism spectrum disorders. *Language, Speech, and Hearing Services in Schools*, 36, 62–72.