

Story-Telling Ability in Children with Autism or Asperger Syndrome: A Window into the Imagination

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Abstract: **Background:** Autism spectrum conditions are diagnosed on the basis of impaired imagination. The present study used a totally free story-telling method to assess if narratives produced by children with autism or Asperger Syndrome (AS) contained fewer imaginative events. **Method:** In Condition 1, children were offered an imaginary theme and asked to elaborate a story. In Condition 2, they were offered a reality-based theme with the same instructions. Comparison groups included 13 children with autism, 14 children with AS, 15 children with moderate learning difficulties (MLD), and 14 normally developing children. The non-autistic controls had a verbal mental age (VMA) either equivalent or lower than the autism and AS groups. **Results:** Both the children with autism and AS were less likely to introduce imaginary elements into their stories in Condition 2, though the children with AS were more able to produce imaginative narratives than children with autism in Condition 1. **Conclusions:** This study provides experimental evidence for imaginative impairments in story-telling in children with autism spectrum conditions. These are discussed in terms of two cognitive theories: executive dysfunction and theory of mind. **Limitations:** In this study it was not possible to match the children with autism and AS with each other on VMA, as the children with autism were not as high-functioning. Future research could examine VMA matched groups of autism and AS.

Impoverished imagination is a key symptom in the standard diagnostic criteria (1) for autism and has been documented in experimental studies of both spontaneous pretend play (2-4) and drawings produced by children with autism (5, 6). While most studies of pretend play in autism find a deficit in spontaneous production of pretence, some studies have found pretence can be produced with prompting (7). Furthermore, children with autism appear to understand aspects of pretending if given forced-choice comprehension questions (8, 9). The overall conclusion seems to be that the deficit only appears in *spontaneous* production of imaginative play. Harris (10) suggests this may reflect executive deficits, seen in other

domains (11, 12). However, it is possible that impaired spontaneous pretence may be a direct index of problems in imagination *per se*.

Just as with studies of pretend play, the study of drawings in autism suggest that under *spontaneous* conditions, their drawings are less imaginative, as demonstrated on the Draw an Impossible Man test (5, 6). Leavers and Harris (13) report that following training or forced choice techniques, children with autism can complete or transform a picture to draw an impossible man. Once again, this may indicate executive problems in disengaging from routine actions. Equally, one might argue that when assessing if there is an imaginative impairment, one should

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only focus on spontaneous, unprompted production, as anything else might reflect some different process.

Story-telling can also be used as a measure of imagination, though until now it has not been used in this way in relation to autism. In the experiment reported here, we use this paradigm for this end. In addition, it remains unknown whether, under experimental conditions, deficits in imagination also exist in the high-functioning subgroup on the autistic spectrum (14) of Asperger Syndrome (AS).

As in play or drawings, in order to examine the ability of children to produce imaginative stories, we suggest a spontaneous format is needed. In the study described here, therefore, children with autism or AS were asked to produce *unguided* stories, given only suggestions for characters. Two types of starting points were given: reality-based and imaginary-based. This allowed us to measure the importance of providing cues for imagination in their performance. Note that the distinction between reality-based vs imaginary-based stories also allowed us to test if such children's story telling mirrored the pattern of intact and impaired skills often reported in the play of children with autism — spontaneous functional (or reality-based) play may be intact while spontaneous pretend (or imaginary-based) play is usually impaired (3).

Aims

- 1) To determine if children with autism spontaneously produce less imaginary-based narratives than reality-based narratives.
- 2) To test if children with Asperger Syndrome (AS) also show imaginative impairments on this task. Whereas autism has been studied extensively, AS has not.
- 3) To investigate if such children introduce imaginary elements into a narrative where

no cues for imagination are given, or only when such cues are provided.

Defining Imaginative Stories

There is no objective measure of how imaginative a story is. A story about a dragon cannot be reliably judged as more (or less) imaginative than a story about a city under the sea. To overcome this difficulty, we used the criterion of coding elements within a story as imaginative if (and only if) they referred to impossible/unreal events or entities. This coding scheme mirrors those used in the study of children's drawings (5, 15), and has high levels of inter-rater agreement. To illustrate this, consider some examples. A story about an elephant walking through a forest would (conservatively) be coded as non-imaginative, in that it could refer to reality. In contrast, a story about an elephant that can talk to people would be coded as imaginative because such an idea can only be the product of the imagination. It is of course possible that the child has simply parroted an "unreal" event from a movie or a story-book, and this is hard to rule out. In the absence of evidence for parroting we generously give the child the credit for producing an imaginative element if it refers to an event or entity that could not possibly exist in the known physical world. Examples would include tigers with wings, trees that turn into cars, three-legged people, etc. Defined in this way, imaginative elements can be readily identified.

Method

Participants

Four groups of children took part in the study. The first was a group of 13 children with autism, all of whom met the standard diagnostic criteria (1). The second was a group of 14 children with Asperger Syndrome (AS). AS was defined following ICD-10 as meeting the criteria for autism but

with no history of language or general cognitive delay. This lack of any general cognitive or language delay had to be true at the time of diagnosis. It is noteworthy, however, that on current functioning, some of the children with an AS diagnosis had an MA lower than their CA. Children in both of these groups were diagnosed by independent clinicians and were attending special schools in Merseyside or Cambridgeshire. The third group comprised 15 children with moderate learning difficulties (MLD), attending a special school in Peterborough. These were included as controls for the children with autism. Finally the fourth group were 14 normally developing children, all attending a primary school in Merseyside. These were included to provide normative data from a group of 5 year olds. (Note that all 3 clinical groups had a mean verbal mental age of at least 5 years age-equivalent.)

The autism group and MLD group were matched on verbal mental age (VMA), calculated using the Test of Reception of Grammar (TROG; 16), which is held to give a clearer estimate of language comprehension than a simple vocabulary test. Subject details are summarized in Table 1. The AS group was matched with the autism group on chronological age (CA) and was included so as to test if the findings from the autism group were unique to that group or not. Inevitably, because AS by definition includes no history of language delay, the group with AS had a higher VMA than the autism group. This approach to matching guaranteed that both

the autism and AS groups were being compared to non-autistic controls with the same MA or lower; direct comparison between the AS and autism groups is limited by the fact that they are of different MA.

Design and Procedure

The children were seen individually in a quiet, plain room in their school, or in a similar room in the Section of Developmental Psychiatry at the University of Cambridge.

Participants were first presented with a pre-test involving event recall in which participants were asked to produce a story about what they did yesterday. They were then assessed in two test conditions. In Condition 1, they were asked to tell a story about a dragon. In Condition 2, they were asked to tell a story about a little girl (or boy) and a swan. In each case the length of the narrative was measured, as was the use of imaginary elements. The order of conditions was fixed. This was necessary in order to examine the effects of Condition 1 on Condition 2. Both conditions were given in the same testing session. Notice that the theme given in Condition 1 was unreal/impossible, while the theme given in Condition 2 was real/possible. Condition 1 therefore contained a cue to imagination. The experimenter showed the participant a Dictaphone, demonstrated how it worked and checked that the child consented to it being used.

Table 1. *Participants' Details: Chronological Age (CA) and Verbal Mental Age (VMA)*

	Mean CA (yr:m)	SD (range)	Mean VMA	SD (range)
Autism	12:9	3:1 (8:0-17:11)	6:9	2:2 (4:0-11:0)
AS	12:9	2:6 (8:6-16:1)	9:10	2:5 (5:6-11:0)
MLD	12:4	2:4 (7:3-16:1)	6:9	1:8 (4:6-11:0)
Normal	5:3	2:7 (4:10-6:7)	—	—

Pre-test: Event-based narratives

The pre-test provided a baseline indication of the narrative length, fluency and verbal cohesiveness. This was included so as to ensure that any variation in story-telling ability in Conditions 1 or 2 was not due to a purely linguistic factor. The experimenter said "*I want you to tell me a story about what you did yesterday.*" No time restrictions were imposed. If the participant paused, the experimenter asked "And what else happened?" in order to encourage the participant to produce as long a narrative as possible. If the participant responded that they had finished, they were thanked and praised for their story.

Condition 1: Novel imagination-based story

The experimenter said "*Now I want you to make up a new story — one that you have never heard before. Make up a story about a dragon that lives in a cave and eats jam sandwiches. Anything you like can happen in this story.*" As in the first story, participants were encouraged to produce as long a story as they could, using the phrase "*And what else could happen?*"

Condition 2: Novel reality-based story

The experimenter said "*Now I want you to make up another new story — one that you have never heard before. Make up a story about a little girl (boy) and a swan. Anything you like can happen in this story.*" As in Condition 1, participants were encouraged to produce as long a story as they could, using the phrase "*And what else could happen?*"

Scoring

After the testing sessions, the tapes were transcribed by an audiotypist who was unaware of the identity or diagnosis of the participants, or the aims of the study. The transcripts were then scored by two inde-

pendent raters blind to the identity of the participants and the aims of the study. The transcripts were scored on the following measures:

Introduction of imaginary elements: Of central interest to this study, it was noted if participants introduced imaginary or "impossible" elements into their narratives (e.g., "*The swan said to the little girl, 'Get on my back and let's go for a ride'*"). It should be noted that in Condition 1, participants mentioning a dragon (while this is clearly an imaginary entity) would not be scored as introducing an imaginary element, since this had been provided by the experimenter. If however they introduced a second impossible element (e.g., magic) this was scored.

Length of narrative: The length of the story was measured in terms of the number of individual elements it contained, rather than the number of words alone, to avoid introducing a disadvantage to the children with autism or MLD. For example, the sentence, "*The little girl went to the park and when she got there she fed the swan,*" would score 2 elements, "*going to the park*" and "*feeding the swan*" as would "*The little girl went to the park and fed the swan.*"

Inter-rater agreement: The inter-rater agreement on number of elements in each narrative was 0.9 (Cohen's Kappa Coefficient). The agreement on all other measures was 100%.

Results**Pre-test: Event-based Narrative**

Verbal mental age (VMA) was included as a covariate in the analysis of group variance for each measure. No results are reported from two participants in the autism group, who despite performing well on the pre-test condition refused to take part in the test conditions. Their data is therefore not

included in any analysis. Results are summarized in Table 2.

Total number of elements: When the total number of elements in each narrative was analyzed, no significant effect of group was found, using ANCOVA ($F(3,51)=2.058$, $p=.117$).

Spontaneous Narratives

Introduction of imaginary elements: A two factor ANCOVA, with VMA covaried from the group effect, was employed to analyze the data in Table 2. When the number of imaginary elements introduced was analyzed, there was a significant effect of group ($F(3,51)=5.466$, $p<.005$). Subsequent Duncan's Test analysis revealed that the autism and AS groups differed from the control groups at the .05 level, and no other group differences reached significance. A significant effect of condition was also found ($F(1,52)=7.212$, $p<.01$), condition 2 (unexpectedly) eliciting more imaginary elements than condition 1. Subsequent analysis of simple effects demonstrated a significant effect of condition for the two control groups ($p<.01$ in each case). Finally, a significant group by condition interaction was also found ($F(3,51)=3.85$, $p<.02$), the autism and AS groups performing worse than controls in condition 2 ($p<.0001$).

Introduction of any imaginary elements at all: Table 2 shows the number of children in each group introducing any imaginary elements at all, in each condition.

Significantly fewer of the children with autism (15%) and AS (43%) introduced any imaginary elements at all in Condition 2 (novel reality-based narrative) compared to the MLD group (73%) and the normal group (79%) (Fisher Exact Test, $p<.05$ in each case), and significantly fewer children with autism (13%) introduced any imaginary elements at all in condition 1, compared to the MLD group (67%) and the AS group (57%) (Fisher Exact Test = $p<.01$ in each case). No further group differences reached significance.

Total number of elements: When the total number of elements in each narrative was analyzed, a significant effect of group was found: ANCOVA ($F(3,51)=3.136$, $p<.05$). Subsequent analysis by Duncan's Test showed the autism group to be producing fewer elements than all other groups. There was no effect of condition, and no group by condition interaction.

Inter-rater agreement: The inter-rater agreement on number of elements in each narrative was 97.1%. The inter-rater agreement on introduction of imaginary elements was similarly high (96%).

Table 2: Results of Story-Telling Experiment

	Autism	AS	MLD	Normal
Mean number of elements in pre-test condition (and sd)	15.8 (12.0)	15.4 (7.6)	22.6 (14.0)	21.5 (10.8)
Mean number of imaginary elements per condition (and sd)				
Condition 1 (Imaginary)	0.2 (0.4)	0.6 (0.6)	0.5 (0.5)	0.3 (0.5)
Condition 2 (Reality)	0.2 (0.4)	0.5 (0.7)	1.1 (0.8)	0.9 (0.7)
% of children producing any imaginary elements at all, per condition:				
Condition 1	13%	57%	67%	50%
Condition 2	15%	43%	73%	79%

Discussion

This study investigated if in a spontaneous story-telling task, children with autism or Asperger Syndrome (AS) would produce less imaginative stories. As predicted, no group differences were found on the length of narrative or the number of pauses in the pre-test condition but an overall impairment (on both Conditions) in the production of imaginative stories by children with autism was found. The children with autism were impaired on imagination in both conditions, and the children with AS were less likely to introduce imaginary elements into a narrative that was reality-based (Condition 2). For the children with autism this may explain the difference in narrative length between Conditions 1 and 2, since if one introduces imagination into the story making process, as the control groups did, these narrative would be expected to be longer. This is because both real world possibilities and imaginary or hypothetical events are accessed. Note that the normal group used more imagination in Condition 2 than in Condition 1. This was not predicted and may be a result of the fact that the themes offered in Condition 2 were more familiar. This effect could be checked in the future.

This study has therefore demonstrated that a verbal task can be used with children with autism to measure their imaginative ability. As predicted both by previous studies using drawings and observing play, such children have imagination deficits. Furthermore, this impairment extends to children with AS. This is consistent with current diagnostic criteria. This still begs the question as to what might be causing this deficit. Several candidate explanations are available at the psychological level. Leslie suggests that this is simply one expression of the theory of mind deficit, since imagination (like pretence) involves reflecting one's own mental state or attitude towards repre-

sentations/propositions, and "quarantining" pretence-based representations from vertical ones (17). This theory is attractive for reasons of parsimony, in that it explains the imagination symptom in the same terms as the social and communication symptoms (see 18, for a review).

However, alternative explanations exist. For example, the executive dysfunction theory (12, 19) would explain the imagination deficits in terms of the difficulties in disengaging from reality. The problem with this theory is that it would also predict other deficits, such as reduced generativity or fluency in story telling overall, even when these are "anecdotal" or reality-based. As seen in the pre-test condition, this was not found. Nevertheless, future research needs to involve test-case experiments which will help establish which theory best explains the data.

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