"Once upon a time there was a frog and he said frog where are you": Ambiguous Pronoun Use in the Narratives of Children with Autism Spectrum Disorders (ASD)

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Abstract

In the current study, storytelling and story retelling by children with ASD were analyzed to explore ambiguous pronoun use in narratives. Twenty-three children diagnosed with ASD aged 6;1-14;3 and 17 typically-developing (TD) children aged 5;11-14;4 participated in the study. In the retelling task, no significant difference between the groups was found, suggesting that children with ASD can use good repetition skills to produce pronouns appropriately. In the storytelling task, children with ASD produced more ambiguous pronouns than did the TD children. Moreover the ambiguous pronoun production of older children with ASD was similar to that of younger TD children, suggesting a delay in the developmental trajectory of pronoun use of children with ASD.

The findings support a model in which children with ASD show deficits in the pragmatic domain of producing narratives.

Introduction

The use of appropriate reference requires perspective-taking and pragmatic judgments about what is appropriate in the current context. Pragmatically, the use of third-person pronouns versus full noun phrases (NPs) reflects differentiation between new characters and ones that have already been introduced (Ariel, 2001). Children master the ability to produce pronouns with clear referents at the age of 9-11 (Karmiloff-Smith, 1985). Before that age they tend to use pronouns without clear antecedents (Wigglesworth, 1997).

Studies that tested the use of pronouns in children with ASD have found mixed results. Tager-Flusberg (1995) was the first to test third-person pronouns in narratives of children with ASD. She compared the pronoun use of 10 children with ASD aged 10-12;1 to a group of typically-developing (TD) children matched on verbal age based on a receptive vocabulary assessment (average chronological age: 6;8). The groups did not differ in pronouns referring to the main character in the narratives. One explanation for this result is the language age of the children with ASD: at this age TD children still use pronouns without clear antecedents (Wigglesworth, 1997). However similar results were found in a study of 23 children with ASD aged 11-15 compared to TD children matched on age and IQ (Arnold, Bennetto, & Diehl, 2009). In contrast, Collé, Baron-Cohen, Wheelwright, and van der Lely (2008) showed that adults with ASD produced more ambiguous references when referring to the other characters in the story except for the main character. The authors' explanation of these results is a deficit in Theory of Mind (ToM; Collé, et al., 2008).

There are many differences between the Arnold et al. (2009) study and the Collé et al. (2008) study which are beyond the scope of the current discussion. That said, one limitation of these two studies is that the data referring to pronouns included both pronouns (e.g. "There's a yellow *tweety bird* and *he's* in the cage) and zero anaphors (e.g. "*Tweety* started flipping out and *Ø* ran") which have different syntactic interpretations (Chierchia & McConnell, 1990) and have different developmental trajectories in TD children's narrative abilities (Bamberg, 1994). Furthermore whereas zero anaphor can only be used to refer to a referent within the same sentence, pronouns can refer to referents either within or between sentences.

In the current study, only pronouns were examined. Children with ASD were predicted to produce more ambiguous pronouns compared to TD children due to a deficit in ToM (Baron-Cohen, 1988; Tager-Flusberg & Anderson, 1991).

Methods:

Participants: Twenty-three children diagnosed with ASD, confirmed by ADI-R and ADOS, and 17 TD children participated in the study. Groups were matched on age and verbal IQ based on their performance on the Woodcock-Johnson III (Woodcock, McGrew, & Mather, 2001; see Table 1). Five TD children did not have verbal IQ scores, but their narrative scores for both story tasks as measured based on Booting's (2002) criteria were within the normal range for their age. Thus we included these participants within the TD group.

Table 1: Groups matched on age and IQ.

Group	Number	CA-mean (SD)	IQ-mean (SD)
ASD	23	10 (2)	98 (11)
Control	17	9;9 (2.8)	95 (9)

Materials: Each child participated in two tasks, story retelling (The Bus Story; Renfrew, 1991) and storytelling (The Frog Story: 'Frog, where are you?'; Mayer, 1969). In the retelling task a researcher told the child a story about a bus who escaped from his driver while showing a 12-picture story book (The Bus Story; Renfrew, 1991). The child was then asked to retell the story as closely as possible to the original while looking at the pictures. In the storytelling task, the child was asked to look through a 24-picture story book ('Frog, where are you?'; Mayer, 1969) and tell the story from the beginning, using the pictures provided as prompts. In this story, a boy and his dog go searching for a lost pet frog.

Analysis: A coder who was blind to group status coded all third-person pronouns and judged whether they referred to a clear noun phrase or were ambiguous. Pronouns were coded as *ambiguous* if there was no antecedent present prior to the pronoun (1), or if the pronoun looked like it referred to a different referent than was intended in the story (2). *Agreement error* was coded when two pronouns intended to refer to the same referent were discordant in person, number, or gender (3). A second diagnosis-blind coder rated half of the narratives for reliability. Agreement between coders exceeded 90%.

(1) No antecedent: "Once upon a time there was a frog and he said frog where are you". In the picture, a boy is looking for the frog.
(2) A different referent: "The bees were chasing the dog. He had climbed up on rock and went into a tree". In the picture, the boy climbed up the tree, not the dog.
(3) Agreement error: "and they said mom, can I go outside to play".

Results:

There was no difference in story length between groups for either task as measured by average number of utterances and words, nor was there any significant difference in the average number of pronouns (Tables 2,3).

Table 2: Average number of utterances, words, and pronouns in the retelling task

	ASD	TD	Mann-Whitney
Utterances	14.7	12.5	$z = 1.57$, $p = .12$
Words	149.2	153.5	$z = 0.36$, $p = .72$
Pronouns	12.3	12.7	$z = 0.41$, $p = .16$

Table 3: Average number of utterances, words, and pronouns in the storytelling task

	ASD	TD	Mann-Whitney
Utterances	31.5	32.6	z = 0.03, p = .92
Words	287	330	z = 0.98, p = .33
Pronouns	27.7	22.7	z = 1.04, p = .3

We predicted that children with ASD would produce more ambiguous pronouns than would the TD children. As shown in Figure 1, although the groups did not differ in ambiguous pronoun use in the retelling task ($z = 1.31$, $p = .19$), in the story telling task a significant difference was found with children in the ASD group producing significantly more ambiguous pronouns than did the TD children ($z = 2.71$, $p < .01$). There were very few pronouns with agreement errors in either task (Retelling: ASD 2%, TD: 0.1%; Storytelling: ASD: 2%, TD: 0%). This result suggests that a

syntactic deficit in agreement is not the cause of the difficulty in pronoun use of children with ASD.

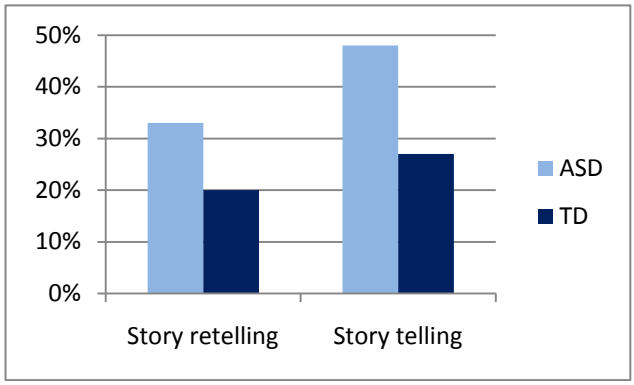

Figure 1: Average percentage of ambiguous pronouns in the two tasks

A comparison within each group using Wilcoxon ranked-order test showed no significant difference between the two tasks in the TD group (z = 1.41, p = .16). In the ASD group there were significantly more ambiguous pronouns in the storytelling task compared to the retelling task (z = 2.64, p < .01).

We further explored the developmental trajectory of pronoun use in children with ASD in the storytelling task. Each group was divided into age groups of younger versus older than 10 years-old, as the age of 9-11 is a developmental turning point in children's production of pronouns with clear referents (Karmiloff-Smith, 1985). The younger group included 11 children with ASD and 10 TD children. The older group included 12 children with ASD and 7 TD children. A two-factor ANOVA showed a significant main effect for group (F (1,37) = 9.66, p < .01) and a marginal main effect of age (F (1, 37) = 0.14, p = .07). No significant interaction between group and age was found (F (1, 37) = 1.71, *ns.*). A Mann-Whitney test was used to further compare the use of ambiguous pronouns within each age group (Table 3). In the older group, children with ASD produced significantly more ambiguous pronouns than did the TD children (z = 2.32, p = .02); in the younger group, this difference was marginal (z = 1.87, p = .06).

Table 3: Percentage of ambiguous pronouns in the storytelling task

Age	ASD	TD
Younger than 10	58%	35%
Older than 10	43%	16%

Discussion

The results of the current study showed different patterns of performance in the two tasks. While the retelling task showed no group differences in ambiguous pronoun use, in the storytelling task, the children with ASD produced significantly more ambiguous pronouns than did the TD children. This pattern was particularly prominent in the older group of children with ASD. The tasks demands of reconstructing a story versus generating one are quite different. Retelling a story requires memory ability, but places fewer linguistic demands on the child, whereas generating a new story places more narrative planning and linguistic demands on the child. One explanation for the relatively intact performance of the children with ASD on the retelling task could be the nature of the task. With a model of the story provided, children with ASD might be able to perform well due to their good repetition abilities (Diehl, Bennetto & Young, 2006). In contrast, in the storytelling task, children with ASD produced more ambiguous pronouns than did the TD children. These results are in line with Collé and colleagues' study (2008) that showed higher rates of ambiguous pronoun use in a storytelling task.

The production of ambiguous pronouns may reflect Theory of Mind (ToM) deficits, in which the child does not take the listener's perspective into account (Baron-Cohen, 1988; Tager-Flusberg & Anderson, 1991). According to Ariel (2001), using clear pronouns requires monitoring the listener's mental model of the discourse. This monitoring ability is expected to decrease in impaired ToM (Ariel, 2001). The current results suggest that when children with ASD try to refer to one of the characters in the narrative, their monitoring of the listener's

mental model is not sufficient, and thus they produce ambiguous pronouns.

The pattern shown by the ASD group, specifically in the older subgroup, is similar to that of younger typically-developing children when using pronouns without clear antecedents (Berman & Slobin, 1994; Wigglesworth, 1997). In both cases, this indicates that the child does not take into account the listener's needs: in young children, due to an immature ToM, and in children with ASD, as part of their deficit in ToM. On the other hand, the current results support the assumption that pronoun use is part of the pragmatic linguistic domain as children with ASD who are, by definition, lacking in their pragmatic abilities, also show impairments in their use of unambiguous pronouns.

In summary, the current study provides evidence that children with ASD produce more ambiguous pronouns than do their typically-developing peers when generating narratives. This finding supports a model in which children with ASD show deficits in the pragmatic feature of producing narratives.

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