

Subject pronoun use by children with autism spectrum disorders (ASD)

RAMA NOVOGRODSKY

Programs in Deaf Studies, Center for the Study of Communication and the Deaf, Boston University, Boston, MA, USA

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Abstract

In the current study, storytelling and story retelling by children with autism spectrum disorder (ASD) were analyzed to explore ambiguous third-person pronoun use in narratives. Twenty-three children diagnosed with ASD aged 6;1 to 14;3 and 17 typically-developing (TD) children aged 5;11 to 14;4 participated in the study. In the retelling task, no significant difference between the groups was found, suggesting that in less challenging tasks, children with ASD produce third-person subject pronouns appropriately. In the storytelling task, children with ASD produced more ambiguous third-person subject pronouns than did the TD children. The findings suggest a model in which children with ASD show deficits in the pragmatic domain of producing narratives.

Keywords: autism, pronouns, narrative, production

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 subject pronouns versus full noun phrases (NPs) reflects differentiation between characters that have already been introduced and new characters (Ariel, 2001; Bloom, Lahey, Hood, Lifter, & Fiess, 1980). For example, in the following sentence: “*Dan* went on a trip and *he* found a rare flower,” the third-person subject pronoun “*he*” refers to an already known character “*Dan*”. According to Berman (2009), age 9 is a “watershed” in the development of narrative ability including a better reference ability. Thus, narratives can be a sensitive tool to explore the development of pronoun use. In discourse, young children tend to use pronouns without clear antecedents (Wigglesworth, 1997). They master the ability to produce pronouns with clear referents in narratives only at around 10 years of age (Karmiloff-Smith, 1985). Hamann (2011) suggested that the interpretation of pronouns is subject to pragmatic sensitivity. Taking this assumption into account, third-person subject pronouns can function as a sensitive marker of the pragmatic development within narratives of children with autism spectrum disorder (ASD). It follows from the Berman (2009) and Karmiloff-Smith (1985) findings that clear referent production would be expected by age 11 years. One must be cautious in interpreting

data from narrative production, as the results may not only reflect the knowledge of the specific linguistic feature (referring to a character that has already been introduced) but also be the result of a preference of speaking style in the specific task. Condouris, Meyer, and Tager-Flusberg (2003) demonstrated that children with ASD performed worse on spontaneous language measures compared to standardized measures in the domains of lexical knowledge and morpho-syntax. Nonetheless, the correlations between the formal test scores and the measures of spontaneous speech were positive and moderate. Children who had higher performance on the formal tests performed higher on the spontaneous speech measures. The authors suggested that the low scores of spontaneous speech come from primary impairments in pragmatics and social reciprocity. These impairments prevented children with ASD from using, in conversations, the range of vocabulary and grammatical constructions that they had acquired. Narratives are more structured than spontaneous speech and thus, they might demonstrate a task between formal testing and spontaneous speech, with retelling closer to formal testing and storytelling closer to spontaneous speech.

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 subject pronouns in narratives of children with ASD. She compared the ambiguity in pronoun use of 10 children with ASD aged 10 to 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. 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), suggesting that children with ASD are not lacking in reference use. Assuming that the interpretation of pronouns is part of the pragmatic knowledge (Hamann, 2011, among others) and taking into account the above results, one could conclude that the pragmatic impairment of children with ASD is not in referential abilities. However, the results of Arnold et al. (2009) and Tager-Flusberg (1995) are in contrast with the results of Collé, Baron-Cohen, Wheelwright, and van der Lely (2008). The latter showed that adults with ASD produced more ambiguous references when referring to characters other than the main character in the story. The authors' explanation of these results is based on a deficit in Theory of Mind (ToM) in ASD. Deficit in ToM reduces the ability to take the listener's perspective into account (Baron-Cohen, 1988; Tager-Flusberg & Anderson, 1991), which decreases the use of an appropriate reference (Ariel, 2001).

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 third-person subject 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 \emptyset ran") which have different syntactic interpretations (Chierchia & McConnell, 1990) and have different developmental trajectories in TD children's narrative abilities (Bamberg, 1994). Whereas zero anaphor can only be used to refer to a referent within the same sentence, third-person subject pronouns can refer to referents either within or between sentences. Therefore, it is important to focus on just one structure. Another important measurement is the language level of children with ASD. Tager-Flusberg's results showed no difference between TD children and children with ASD. One explanation for these results is the language age of the children with ASD in her study. As noted above, the children with ASD had a language age of 6;8 years (based on receptive vocabulary assessment), an age at which TD children still use pronouns without clear antecedents (Berman, 2009; Karmiloff-Smith, 1985; Wigglesworth, 1997). Thus, no difference between the children with ASD and TD children is expected. The current study tested older children with ASD, mean of 10 year olds, and restricted the use of pronoun to reference situations other than non-zero anaphoric reference.

This study explored the use of third-person subject pronouns of high functioning children with ASD matched on verbal measurements to the TD children. Children with ASD were predicted to

produce more ambiguous third-person subject pronouns compared to TD children due to a deficit in ToM (Baron-Cohen, 1988; Tager-Flusberg & Anderson, 1991) and a linguistic pragmatic deficit of monitoring perspective-taking (Ariel, 2001). Furthermore, greater development in use of clear pronouns was predicted for the TD group with age.

Methods

Participants

Twenty-four children diagnosed with ASD, confirmed by ADI-R (Lord, Rutter, & Le Couteur, 1994) and ADOS (ADOS; Lord et al., 1999), and 17 TD children participated in the study (Table I). The ASD group included 19 boys and 5 girls. The TD group included 15 boys and 2 girls. All participants were recruited from the Boston area. The children with ASD participated in different therapy programs. Groups were matched on age and verbal proficiency based on their performance on the Woodcock-Johnson III¹ (Woodcock, McGrew, & Mather, 2001; see Table I). By matching the groups on verbal ability scores and age, we controlled for the linguistic experience of the two groups (Burack, Iarocci, Flanagan, & Bowler, 2004; Jarrold & Brock, 2004), which is an important variable when testing a complex linguistic task like narrative production, which requires a certain level of linguistic knowledge (Burack et al., 2004; Tager-Flusberg, 2004). It was also important to match the groups on a variable that incorporated more than a single language domain (Burack et al., 2004). Therefore, groups were matched on a composite measure of relevant linguistic skills according to both mean and range. The range of verbal ability scores in the current study was from 79 to 115 (Table I), thus limiting our results to a specific subtype of children with ASD, i.e. those with relatively high levels of verbal ability scores. Five TD children did not have verbal ability scores, but their narrative scores for both story tasks based on Botting's (2002) criteria were within the normal range for their age. Thus, we included these participants within the TD group.

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).² In the retelling task, a researcher showed a 12-picture story book and told the child a story about a bus that escaped from its driver. 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 wordless story book 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. The experimenter was unable to see the pictures while participants told the story.

Analysis

Narratives were audio-taped and transcribed. The software used for the language analysis was the Systematic Analysis of Language Transcripts (Miller & Iglesias, 2008). Three dependent variables

Table I. Groups matched on age and verbal score.

Group	Number	CA, mean (SD)	CA, range	Verbal scores, mean (SD)	Verbal scores, range
ASD	24*	10 (2)	6;1–14;3	98 (11)	79–115
Control	17	9;9 (2.8)	5;11–14;4	95 (9)	80–109

*Only 23 of the ASD participants completed both the tasks.

were measured: (a) narrative length and number of third-person subject pronouns, (b) sentence complexity and (c) third-person subject pronoun ambiguity. The first two variables were measured in order to control for an alternative explanation other than third-person subject pronoun ambiguity in the stories.

Narrative length was measured by the average number of utterances and words. A more direct measurement for controlling the variable of third-person subject pronoun ambiguity was the average number of third-person subject pronouns used in the stories.

Sentence complexity was calculated because complex sentences include pronouns (see the following examples), and a difference in number of complex sentences can influence pronoun use in the stories. Complex sentence types included: coordination (e.g. “the bus and the train race and *they* made funny faces”), subordinate conjunction (“when the bus saw water, *he* tried to stop”), verb complement (“the boy woke up and *he* wanted to see the frog”) and relative clause (e.g. “the dog looked at some bees who were going into their hive”). Two coders with background in syntax and experience in coding language samples coded the sentence types in the stories. These coders were not involved with the transcription.

Third-person subject pronoun ambiguity is the main variable in this study. A coder who was blind to group status coded all third-person pronouns in subject position and judged whether they referred to a clear NP or were ambiguous. Pronouns were coded as *ambiguous* if there was no antecedent present prior to the pronoun (example 1), or if the pronoun seemed to refer to a different referent than was intended in the story (example 2). *Agreement error* was coded when two pronouns intended to refer to the same referent were discordant in person, number or gender (example 3). A second diagnosis-blind coder rated half of the narratives for reliability. The two coders were psychology students who had previous experience in analyzing naturalistic language data. Agreement between coders exceeded 90%. In cases of disagreement, where at least one coder marked the reference as clear, the pronouns were coded as clear.

- (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

The main findings are that children with ASD produced more ambiguous third-person subject pronouns than did the TD children in the storytelling task. No significant difference was found between the groups in the retelling task. In addition, no significant difference was found in the use of ambiguous third-person subject pronouns between younger and older children with ASD. However, TD children used fewer ambiguous pronouns at older ages.

Control variables: narrative length and sentence complexity

There was no difference in story length between groups for either task as measured by the average number of utterances and words, nor was there any significant difference in the average number of pronouns (Table II). These results suggest that any difference in pronoun ambiguity between the two groups is not the result of story length differences, or differences in the number of pronouns used in the stories. Any difference in pronoun ambiguity between the groups would thus reflect the inability to refer appropriately and to differentiate between new characters and ones that have already been introduced. In addition, no difference between the groups was found in the average number of

Table II. Average number of utterances, words, pronouns and complex sentences in the two tasks.

	Retelling task				Storytelling task			
	ASD	TD	Mann–Whitney		ASD	TD	Mann–Whitney	
			<i>z</i>	<i>p</i>			<i>z</i>	<i>p</i>
Utterances	14.7	12.5	1.57	0.12	31.5	32.6	0.03	0.92
Words	149.2	153.5	0.36	0.72	287	330	0.98	0.33
Pronouns	12.3	12.7	0.41	0.16	27.7	22.7	1.04	0.30
Complex sentences	8.8	10.9	1.14	0.25	16.6	20	0.86	0.39

complex sentences (Table II). This result indicates that the number of complex sentences in the stories did not influence the pronoun use of the two groups.

Between-group differences in the use of third-person subject pronouns

We predicted that children with ASD would produce more ambiguous third-person subject pronouns than the TD children. As shown in Table III, the groups did not differ in third-person subject pronoun use in the retelling task. However, in the story telling task a significant difference was found with children in the ASD group producing significantly more ambiguous third-person subject pronouns than the TD children. There were very few pronouns with agreement errors in both tasks (retelling: ASD 2%, TD: 0.1%; storytelling: ASD: 2%, TD: 0%). This result suggests that a syntactic deficit in agreement is not the source of the difficulty in pronoun use of children with ASD.

A comparison within each group using Wilcoxon ranked-order test showed no significant difference between the two tasks in the TD group ($z = 1.07, p = 0.28$). In the ASD group, there were significantly more ambiguous pronouns in the storytelling task compared with the retelling task ($z = 2.69, p < 0.01, d = 0.64$).

Developmental trajectory of third-person subject pronouns

We further explored the developmental trajectory of third-person subject pronoun use in children with ASD in the storytelling task. Each group was divided into age groups of younger children versus older children, using age 11 as a cutoff point between age groups. This cut-off was selected because it is considered to be beyond the developmental turning point in children's production of pronouns with clear referents (Berman, 2009; Karmiloff-Smith, 1985). The younger groups included 16 children for the ASD group ($M = 9.3$ years) and 11 for the TD group ($M = 8.1$ years).³ The

Table III. Average % of ambiguous pronouns in the two tasks (*N*).

	Retelling task			Storytelling task		
	ASD (24)	TD (17)	Mann–Whitney	ASD (23)	TD (17)	Mann–Whitney
Ambiguous pronouns	33%	20%	$z = 1.31,$ $p = 0.19$	53%	26%	$z = 2.87,$ $p < 0.01,$ $d = 1.08$

Table IV. Average % of ambiguous pronouns in the storytelling task (*N*).

	Young group, 5;11–10;11	Older group, 11;00–14;4	Mann–Whitney
ASD	58% (<i>N</i> = 16)	40% (<i>N</i> = 7)	$z = 0.97, p = 0.17$
TD	32% (<i>N</i> = 11)	14% (<i>N</i> = 6)	$z = 1.46, p = 0.07; d = 0.98$

older groups included seven children for the ASD group ($M = 12.7$ years) and six children for the TD group ($M = 12.9$ years). The age distribution of the older ASD and TD did not differ significantly.⁴ We predicted that younger children would produce more ambiguous third-person subject pronouns than the older children in both groups. In both groups, the older children produced less ambiguous third-person subject pronouns than the younger children (Table IV). However, whereas in the ASD group, no significant difference was found between younger versus older children, in the TD group the younger children produced marginally more ambiguous third-person subject pronouns than did the older children. Note that although the findings only approached significance, the difference between the younger and older groups was about 1 SD (Cohen's $d = 0.98$). In addition, the level of ambiguous third-person subject pronouns found for the older group of children with ASD was comparable to the level for the younger TD group, 40% and 32%, respectively. Thus, although this finding should be interpreted with caution, the marginal significance is likely due to our small number of subjects in the older group.

Discussion

The aim of the current study was to explore ambiguous third-person pronoun use in narratives of children with ASD. The results showed different patterns of performance in the two tasks. Whereas the retelling task showed no group differences in third-person subject pronoun ambiguity, in the storytelling task, children with ASD produced significantly more ambiguous third-person subject pronouns than TD children. The task demands of reconstructing a story versus generating one are quite different. There is more narrative planning and linguistic demand placed on a child when he/she generates a new story compared to when the child retells a story. Furthermore, in the current study the storytelling task was longer than the retelling task. Thus, 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 (Riches, Loucas, Charman, Simonoff, & Baird, 2010). Another explanation could be preserved syntax in the ASD group which can modulate recall abilities (Bishop & Donlan, 2005). Bishop and Donlan (2005) argued that complex syntactic skills are a predictor of subsequent recall. The children with ASD in the current study produced complex syntax structures similar to the TD children, as can be seen in Table II. This result is in line with previous studies that tested high functioning children with ASD and showed intact syntax (Kelley, Paul, Fein, & Naigles, 2008). Based on the above, it is possible that a retelling task masks the limitations of reference use in the ASD group.

In contrast, during the storytelling task, children with ASD produced more ambiguous pronouns than the TD children. These results are in-line with Collé and colleagues' study (2008) that showed higher rates of ambiguous pronoun use of adults with ASD in a storytelling task. The production of ambiguous pronouns may reflect 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 when ToM is impaired (Ariel, 2001). The current results may 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.⁵ The pattern shown by the ASD group, consistent in the older subgroup, is similar to that of younger TD children who use pronouns without clear antecedents (Berman & Slobin, 1994; Karmiloff-Smith, 1985; Wigglesworth, 1997). This pattern may suggest 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.

Does this deficit have traces in younger children with ASD? When reviewing the literature, we have found reports of difficulty with pronouns for this population in pronoun reversal. This clinical observation that children with ASD tend to use *you* when referring to themselves and use *I* when referring to others in the conversation was noted in Kanner's first description of the syndrome (Kanner, 1943). The explanation was that children with ASD copy the words of their interlocutors without adjusting the message to their own point of view. This finding was shown later in other studies (Lee, Hobson, & Chiat, 1994; Tager-Flusberg et al., 1990) and was interpreted as a "confusion of speaker and listener role relations" (Tager-Flusberg, 1994: 186). In trying to identify the source of this difficulty, Tager-Flusberg and colleagues (1990) presented dissociation between 13% reversal errors out of the total errors versus 0.12% case errors (e.g. *me* for *I*) in children with ASD. A similar pattern was found in the current study with numerous ambiguous third-person subject pronouns and only 2% of agreement error (e.g. "and *they* said mom, can *I* go outside to play"). These results suggest that the core of the deficit in both studies is not syntactic in its nature.

Pronoun reversals decrease with development (Tager-Flusberg, Paul, & Lord, 2005). Does it shift at older ages to another type of pronoun error: an ambiguous use of third-person subject pronouns? Are the two phenomena of pronoun reversal and use of ambiguous third-person subject pronoun related? In typical development, Richard, Girouard, and Gouinde'carie (1999) showed that better perspective-taking ability correlated with higher production of first-, second- and third-person subject pronouns and that first- and second-person pronouns are acquired before third-person pronoun. The authors suggested that ToM development mediates both the acquisition of personal pronouns and the development of perspective-taking abilities (Richard et al., 1999). In a recent study, Hobson, Lee, and Hobson (2010) tested 14;4-year-old children with ASD on structured tasks and showed that while children with ASD were indistinguishable from controls in their comprehension and use of first-person pronouns ("we"), they were less likely to use third-person subject pronouns. Combining the evidence from typical development and the findings from children with ASD may suggest a relationship between pronoun reversals at younger ages and ambiguous third-person subject pronoun use at older ages among children with ASD. This question remains open for further longitudinal studies.

The current results also support the assumption that pronoun use is a constituent of the pragmatic linguistic domain (Hamann, 2011) as children with ASD who are, by definition, lacking in their pragmatic abilities, also show impairments in their use of clear third-person subject pronouns in challenging tasks.

In summary, the current study provides evidence that children with ASD produce more ambiguous third-person subject pronouns than their TD peers when generating narratives. This finding supports a model in which children with ASD show deficits in the pragmatic features involved in producing narratives.

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Notes

- 1 Average of the five tests of the WJ-III: Letter-Word Identification (1), Passage Comprehension (9), Story Recall (3), Story Recall – Delayed (12) and Oral Comprehension (15).
- 2 Only 23/24 children with ASD told the “Frog, where are you?” story. One child with ASD participated in the story retelling task but not the storytelling task.
- 3 Because the children in the ASD group were significantly older than the children in the TD group ($t(25) = 2.22, p = 0.04$), we conducted an additional analysis by excluding the three oldest children with ASD ($M = 8:10$ year olds). After excluding the three oldest children, the younger ASD and TD groups did not differ significantly in age ($t(22) = 1.61, p = 0.12$). The results of ambiguous pronoun use were not changed, and no significant difference was found between younger versus older children with ASD ($z = 0.79, p = 0.22$). Thus, all 16 children with ASD were retained for subsequent analyses.
- 4 No significant difference was found between the two groups ($t(11) = 0.29, p = 0.78$).
- 5 A mirror finding of this phenomenon is using referential expressions that were more specific than needed (Arnold et al. 2009; Baltaxe, 1977). Arnold et al. (2009) argue that in context of an illustration, children with ASD use pronouns deictically, and when deictic reference is not available, the errors are on the side of overspecification.

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