

## **Linguistic characteristics of individuals with high functioning autism and Asperger syndrome**

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### **Abstract**

This study examined the linguistic characteristics of high functioning individuals with autism and Asperger syndrome. Each group consisted of 10 participants who were matched on sex, chronological age, and intelligence scores. Participants generated a narrative after watching a brief video segment of the Social Attribution Task video. Each participant was then asked 10 questions related to the stimulus video. The narrative samples and responses to the questions were analysed linguistically. Individuals with high functioning autism and Asperger syndrome performed similarly on most measures of language function; however, results suggest there may be pragmatically-based differences between the groups in the use of verb tense markers.

**Keywords:** *High functioning autism, Asperger syndrome, linguistic characteristics, young adults*

### **Introduction**

Autism spectrum disorders include autism, Asperger syndrome, and pervasive developmental disorders that are not otherwise specified. Autism spectrum disorders are a group of severe neurobiological conditions that are characterized by disturbances in social, cognitive, and communicative functioning. Such disorders may be associated with depressed cognitive and language functioning and in 40% of cases they are accompanied by mutism (Lord & Paul, 1997). Approximately 20% of individuals with autism spectrum disorders (i.e. those with high functioning autism or Asperger syndrome) function within the normal range on IQ tests (American Psychiatric Association, 1994; Cohen & Volkmar, 1997).

Individuals with Asperger syndrome (AS) typically present with a profile of normal IQ, well-developed language form (i.e. syntax and phonology), and large spoken vocabularies. They do not have a history of delayed language development, but they do exhibit the qualitative impairments of social interaction, play, and communication that are typically associated with autism, as well as intense circumscribed interests or obsessions, and some motor delay and clumsiness (American Psychiatric Association, 1994; Klin & Volkmar, 1997). The primary deficits for individuals with Asperger syndrome are in the areas of pragmatics and social communication (Tager-Flusberg, 1995, 1996).

Individuals with high functioning autism (HFA) have histories that include delays in both language development and symbolic play that are evidenced before three years of age. Children with high functioning autism also present with qualitative impairment of social interaction, and restricted, repetitive, or stereotypic interests and behavioural patterns (American Psychiatric Association, 1994).

Eisenmajer et al. (1996) examined clinical symptoms that purportedly distinguish high functioning autism from Asperger syndrome. Parents of children diagnosed with either high functioning autism or Asperger syndrome participated in a structured interview. A higher percentage of children diagnosed with autism experienced delayed onset of language development than of those diagnosed with Asperger syndrome. For children with Asperger syndrome, the age of diagnosis was typically older and verbal IQ scores were higher than for children with high functioning autism. Further examination of their data indicates that some children with Asperger syndrome also experienced delays in the onset of language development. Eisenmajer et al. suggest that it is important to examine details of communication development (i.e. topic maintenance, turn taking, idiosyncratic use of phrases/vocabularies, unusual voice quality, etc.) when one seeks to differentially diagnose high functioning autism and Asperger syndrome.

Howlin (2003) reports no significant differences between high functioning autism and Asperger syndrome on the basis of Autism Diagnostic Interview-Revised (ADI-R) scores. The 76 participants were young adults who were matched for age and nonverbal IQ. Participants who were reported to have been language delayed were assigned to the high functioning autism group; if they did not experience language delay they were assigned to the Asperger group. This study did not find differences between the groups on their current language level as assessed by single-word receptive and expressive vocabulary measures; however, the language levels of both groups were poorer than expected for the chronological age of the participants. This finding raises doubts about the utility of early language delay as a diagnostic indicator differentiating these two clinical groups.

#### *Language-related research in autism and Asperger syndrome*

The language characteristics of individuals with autism spectrum disorders have been of interest to many (for reviews, see Lord and Paul, 1997; Tager-Flusberg, 1981, 1994, 1996). Research has shown that individuals with autism spectrum disorders tend to have difficulty with pragmatics (Lord & Paul, 1997; Tager-Flusberg, 1995). For example, Tager-Flusberg and Anderson (1991) reported that children with autism made no developmental gains in the use of contingent discourse compared to children with Down syndrome (Mitchell, Saltmarch, & Russell, 1997).

Another well-known linguistic characteristic of children with autism is “pronoun reversal” (e.g. using *you* when *I* is appropriate; Fay, 1979; Lee, Hobson, & Chiat, 1994). In the developmental language research literature, some typically developing children show a period of pronoun misuse, but as their language develops the children resolve problems with pronoun misuse (Schiff-Myers, 1983). Baltaxe and D’Angiola (1996) studied pronoun reference in children with autism, specific language impairment (SLI), and in typically developing children who were matched on MLU, receptive vocabulary, and syntax. Children with autism used the same types of cohesive ties of reference as the other groups (pronominals were used most frequently compared to demonstrative, and comparative ties), but personal pronoun errors occurred most frequently in the autism group. In another study, Baltaxe, Russell, D’Angiola, and Simmons (1995) reported that a

high functioning autism group used referencing less frequently and less accurately than a comparison group with schizotypal personality disorder.

Despite known deficits in pragmatics and referential skills, children with autism generally are adept with the formal aspects of language, such as syntax and phonology (Lord & Paul, 1997; Tager-Flusberg, 1981, 1995). Tager-Flusberg et al. (1990) reported that children with autism used the same syntactic and morphological forms as those used by children with Down syndrome. When compared to children with SLI, children with autism spectrum disorders have shown relative strengths in grammatical development (Rapin & Dunn, 1997; Bishop & Norbury, 2002); however, one linguistic characteristic of SLI (i.e. verb tense error) has been documented for some children with autism (Roberts, Rice, & Tager-Flusberg, 2004). A subgroup of children with autism and language impairment produced high rates of uninflected forms when past tense (regular and irregular forms) and third person singular markers were elicited using pictures.

Children with autism also have been found to have difficulty answering certain types of questions. According to Rapin and Dunn (1997), verbal children with autism have trouble handling *why* and *how* questions appropriately; they also have difficulty with *either-or*, *who*, and *what* questions when the referents are not clear in context.

Although research has described certain language characteristics of speakers with autism spectrum disorders, there is little research comparing individuals at different points along the spectrum. Careful comparisons of linguistic characteristics of individuals with high functioning autism and Asperger syndrome may ultimately provide a foundation for the differential diagnosis of these two disorders. As noted previously, the primary difference between high functioning autism and Asperger syndrome is thought to be the presence/absence of language delay. Eisenmajer et al. (1996) briefly mention that this difference in communication decreases as the children become older; however, this finding has yet to be verified. Additional information is needed to determine whether individuals with high functioning autism continue to have difficulty with language compared to those with Asperger syndrome. The present study addresses this need by comparing linguistic performance in adults with autism and in those with Asperger syndrome.

### *Goals of the current study*

In the current study, linguistic characteristics of speakers with high functioning autism and Asperger syndrome were examined using two tasks that were included as part of a larger study: (1) a short task in which participants were asked to generate their own narratives after watching a brief video segment and (2) a question-answer task in which each participant was asked 10 questions related to the same video segment. The video segment consisted of the Social Attribution Task (Heider & Simmel, 1944; Klin, Jones, Schultz, Volkmar, & Cohen, 2002) involving the movements of geometric shapes (i.e. small/big circles and triangles) within a rectangular frame (see Klin, 2000 for more details). During this video segment, each shape moves as a result of other shapes acting upon it. Normal adults watching these movements attribute the shapes and their movements to be the equivalent of social plots between people. Use of this task potentially allowed for comparison of the two study groups in terms of linguistic characteristics of the language produced during such tasks.

It was hypothesized that individuals with high functioning autism would perform poorly on linguistic measures compared to individuals with Asperger syndrome. In the narrative task, the research questions addressed were: (1) Do individuals with Asperger syndrome

have higher lexical production than individuals with high functioning autism? (2) Do individuals with Asperger syndrome demonstrate better narrative cohesion skills than individuals with high functioning autism? (3) Do individuals with Asperger syndrome use verb tense more appropriately than individuals with high functioning autism?

For the question-answer task, the following research questions were addressed: (1) Are there any differences between the two groups in the frequency and type of responses to the three types of questions (i.e. *what, why, what and why*)? (2) Are there any differences in use of linguistic markers of intention (e.g. *because, to+infinitive, so [that]*) between the groups in response to *why* questions? (3) Do individuals with Asperger syndrome have higher lexical production in answering to questions than those with high functioning autism?

## Method

### Participants

The participants were 10 individuals with high functioning autism (HFA) and 10 individuals with Asperger syndrome (AS) who were matched on chronological age and IQ score. They were selected from an ongoing study at the Autism and Developmental Disabilities Clinic, Child Study Center, Yale University. Participants (all males) were a convenience sample that ranged in age between 11 and 49 years. Autism spectrum disorder is typically more prevalent in males than females—approximately a 4:1 ratio of males to females (Fombonne, 2003); therefore, it is expected that the majority of patients at a given clinic will be male. All of the participants were functioning independently and most held jobs.

The participants had completed an extensive protocol as part of two projects on the neurobiology of autism. The protocol included standardized assessments of cognitive, language, and social-adaptive functioning, and a videocassette recording of a conversational speech sample obtained during a semistructured diagnostic interview. Diagnostic characterization included the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994) and the Autism Diagnostic Observation Schedule-Generic (ADOS-G; Lord, Rutter, & DiLavore 1996). Diagnostic assignment followed DSM-IV criteria for autism and Asperger syndrome (American Psychiatric Association, 1994). In accordance with these criteria, none of the individuals with an Asperger diagnosis had speech and language delays or marked deviance in the first 3 years of life (Volkmar et al., 1994; Klin & Volkmar, 1997). Clinical diagnoses were confirmed independently by two experienced clinicians (a psychologist and a psychiatrist) with demonstrated interrater reliability (Klin, Lang, Cicchetti, & Volkmar, 2000). Table I documents characteristics of individual participants, including verbal IQ (VIQ), performance IQ (PIQ), and adaptive behaviour domains.

*Intelligence.* Intelligence was measured using the third edition of either the Wechsler Adult Intelligence Scales (Wechsler, 1997) or the Wechsler Intelligence Scales for Children (Wechsler, 1992), depending on the age of participants. There were no statistically significant differences between the groups on full scale IQ ( $M=100$ ,  $SD=26$  for AS;  $M=102$ ,  $SD=24$  for HFA), verbal IQ scores ( $M=109$ ,  $SD=25$  for AS;  $M=106$ ,  $SD=26$  for HFA), or performance IQ scores ( $M=90$ ,  $SD=23$  for AS;  $M=97$ ,  $SD=21$  for HFA). Overall, their verbal IQ scores were significantly higher than their performance IQ scores ( $F(1, 18)=15.7$ ,  $p=.001$ ).

Table I. Participants' IQs and Vineland standard scores.

ID	VIQ	PIQ	Vineland Communication	Vineland Socialization	Vineland Daily living
HFA1	83	83	72	49	93
HFA2	90	83	57	46	65
HFA3	108	95	48	46	54
HFA4	134	116	67	47	106
HFA5	77	82	46	43	61
HFA6	109	135	59	47	72
HFA7	113	99	55	61	45
HFA8	150	124	64	49	74
HFA9	69	68	46	49	62
HFA10	124	89	91	69	102
AS1	95	74	61	58	73
AS2	125	103	76	73	79
AS3	94	80	46	32	49
AS4	102	72	25	<20	27
AS5	128	111	92	86	88
AS6	138	96	66	48	63
AS7	142	122	61	41	74
AS8	113	118	76	49	101
AS9	72	58	41	43	50
AS10	76	68	54	48	64

*Adaptive behaviour skills.* Each participant's adaptive functioning skills were measured using the Vineland Adaptive Behavior Scales (VABS; Sparrow, Balla, & Cicchetti, 1984). This test provides composite scores from three domains (communication, socialization, and daily living skills). The two groups did not differ significantly on the VABS composite scores ( $M=77$ ,  $SD=25$  for AS;  $M=71$ ,  $SD=22$  for HFA); socialization sub-domain scores ( $M=50$ ,  $SD=19$  for AS;  $M=50$ ,  $SD=8$  for HFA); or communication sub-domain scores ( $M=50$ ,  $SD=19$  for AS;  $M=61$ ,  $SD=14$  for HFA). Overall, the socialization sub-domain scores were significantly lower than the communication sub-domain scores, (paired  $t(19)=-4.7$ ,  $p=.000$ ). This finding serves to confirm the primary deficit of social interaction for both groups.

*Language skills.* Language skills were measured using the Test of Language Competence (TLC, Wiig & Secord, 1989). This test consists of four subtests:

- Subtest 1: Ambiguous Sentences
- Subtest 2: Listening Comprehension: Making Inferences
- Subtest 3: Oral Expressions: Recreating Speech Acts
- Subtest 4: Figurative Language

The TLC yields three composite scores:

- Screening Composite (subtest 3 + subtest 4)
- Expressing Intent (subtest 1 + subtest 3)
- Interpreting Intent (subtest 2 + subtest 4)

There were no differences between the groups on the Test of Language Competence total composite scores, ( $M=91$ ,  $SD=21$  for AS;  $M=95$ ,  $SD=23$  for HFA). Individual data of

Table II. Test of Language Competence individual standard scores.

ID	Subtest 1*	Subtest 2	Subtest 3	Subtest 4	Subtest3&4	Subtest1&3	Subtest2&4
HFA1	3	5	5	3	65	65	65
HFA2	9	3	6	6	76	85	65
HFA3	13	6	8	10	94	103	88
HFA4	11	9	11	12	109	106	103
HFA5	3	4	6	3	65	65	65
HFA6	12	9	10	6	88	106	85
HFA7	16	10	14	10	112	131	100
HFA8	11	13	15	14	127	118	121
HFA10	9	13	15	11	118	112	112
AS1	4	9	10	9	97	82	94
AS2	8	5	6	7	79	82	76
AS3	8	6	6	4		82	69
AS4	11	8	15	9	112	118	91
AS5	11	9	12	14	118	109	109
AS7	15	9	12	12	112	121	103
AS8	12	13	12	14	118	112	121
AS9	6	3	3	4	65	65	65
AS10	9	4	5	5	69	82	65

\* *TLC Subtest Scores.* Subtest 1: Ambiguous Sentences, Subtest 2: Listening Comprehension, Subtest 3: Oral Expressions, Subtest 4: Figurative Language. TLC Composite Scores: Subtest 3&4: Screening Composite, Subtest1&3: Expressing Intent, Subtest 2&4: Interpreting Intent.

the TLC subtest scores are presented in table II. Scores were not available for two participants (one in each group). There were no statistically significant group differences on any of the TLC subtests; however, overall the Listening Comprehension (subtest 2) scores were the overall lowest in both groups. The differences between the Listening Comprehension ( $M=7.7$ ,  $SD=3.3$ ) and the Oral Expression ( $M=9.5$ ,  $SD=4.0$ ) scores were statistically significant, paired  $t(17)=-4.3$ ,  $p=.001$ .

### Procedures

Each participant was instructed that he would watch a brief video segment (about 50 seconds) and the examiner would ask questions about it afterward. During the video segment, geometric figures (triangles, rectangles, circles) moved in silence (Social Attribution Task, Heider & Simmel, 1944), enacting scenes to which normal participants usually attribute social meaning (see Klin, 2000 for details). For example, normal participants usually said that one shape was a “bully” who was “chasing” one of the other shapes and “scaring” it, until a new character appeared who “stood up for” the first. After viewing the scene, each participant was asked to describe the video segment verbally in narrative format. A sample narrative is presented in Appendix 1. Then, 10 questions were asked about the characters (e.g. *What kind of a person is the X?*), their actions (e.g. *What did the X do?*), and the reasons for their actions (e.g. *Why did the X do Z?*). The 10 questions are presented in Appendix 2.

### Language transcription

The participants’ responses were audio-taped and then orthographically transcribed by a native speaker of English who was naïve as to the nature of the tasks. Speech intelligibility of the participants’ language samples was reported to be excellent for transcription. Then,

the transcriptions were entered into and analyzed by the Systematic Analysis of Language Transcripts program (SALT, Miller & Chapman, 1992). While the transcriptions were transferred into the SALT, the accuracy of the transcription content was checked. No changes to the transcription content were required; only a few missing punctuation markings were added and typographic errors were corrected.

### *Data coding/analysis*

The lexical productions during the narrative task (the number of total words; number of different words) were generated from SALT and then examined. Narrative cohesion was examined manually by examining the number of ambiguous pronouns produced. Ambiguous pronoun use was defined as a pronoun used with no clear reference within the context (i.e. preceding and/or following sentences). For example, in the following narrative segment, *it* was considered as an ambiguous pronoun:

Triangles and a circle were used as a racket ball. Eventually they destroy the structure, in the end. In the beginning, *it* was forming the structure, enclosing the rectangle.

Use of pronoun and verb tense was manually coded by reviewing the language transcriptions.

The use of verb tense was manually examined by looking at the number of verbs produced in the narrative task. Verb tense mismatches were coded from the question-answer task using questions 6–9. These questions were selected because they are in the past tense and were thought to be more likely to yield a mismatch. Questions 1–3 were presented in present tense and many participants' responses to questions 4–5 (both why questions) were "I don't know". The percentage of verb tense mismatches was then calculated.

## **Results**

Data were analysed to address the following research questions: (1) Do individuals with Asperger syndrome have higher lexical production than individuals with high functioning autism in narrative and question-answer (Q-A) tasks? (2) Do individuals with Asperger syndrome demonstrate better narrative cohesion skills than individuals with high functioning autism in a narrative task? Do individuals with Asperger syndrome demonstrate higher frequency of responses and linguistic intentional markers than individuals with high functioning autism in a Q-A task? (3) Do individuals with Asperger syndrome use verb tense more appropriately than individuals with high functioning autism?

### *Narrative task*

Lexical productivity was measured by examining the number of different words and total number of words produced. Individuals with Asperger syndrome did not yield higher lexical productivity than those with high functioning autism ( $M=46$  different words,  $SD=22$  for AS and  $M=37$  different words,  $SD=19$  for HFA;  $M=83$  total words,  $SD=46$  for AS and  $M=67$  total words,  $SD=51$  for HFA). It is worth noting that there was a large variability in lexical production in both groups that may have masked potential group differences.

Individuals with Asperger syndrome did not produce fewer ambiguous pronouns than those in the high functioning autism group ( $M=.20$ ,  $SD=.63$  for AS;  $M=.60$ ,  $SD=.97$  for

HFA). Total frequency of ambiguous pronoun use was six out of 52 pronouns produced by the Asperger group and two out of 37 pronouns in the high functioning autism group.

When frequencies of verb tense (present and past tense) were examined, the Asperger group used the past tense more frequently than the high functioning autism group ( $M=5.1$ ,  $SD=2.8$  and  $M=2.7$ ,  $SD=1.8$  respectively), Mann-Whitney  $U=21.5$ ,  $p<.05$ . However, there was no difference in present tense use between the groups ( $M=6.4$ ,  $SD=6.1$  and  $M=6.1$ ,  $SD=7.8$  respectively).

In summary, no statistically significant differences were obtained between the two groups in terms of lexical productivity or in the use of ambiguous pronouns. There was, however, a tendency for the Asperger group to be somewhat more verbose (i.e. raw values were higher for words, pronouns, and ambiguous pronouns) than the high functioning autism group. The one statistically significant finding was that the Asperger group used past tense more frequently than the high functioning autism group. The use of past tense is of course more appropriate for the narrative description of video segments that have already been seen.

#### *Question-answer task*

The two groups did not differ in terms of lexical production when answering questions. Lexical production was assessed by total number of words produced when responding to questions ( $M=113$ ,  $SD=46$  for HFA;  $M=137$ ,  $SD=85$  for AS). Results for number of different words used was also similar for the two groups ( $M=60$ ,  $SD=22$  for HFA;  $M=66$ ;  $SD=22$  for AS).

Differences in frequency and type of responses to the three types of questions (*what*, *why*, *what and why*) were also examined. Total possible frequencies of *what* and *why* questions were 5 and 3 respectively. Mean frequencies of response were computed for *what* questions ( $M=4.5$ ,  $SD=.97$  for HFA;  $M=4.1$ ;  $SD=1.10$  for AS) and for *why* questions ( $M=2.2$ ,  $SD=.92$  for HFA;  $M=2.5$ ,  $SD=.97$  for AS). Total frequency of providing answers to either *what* ( $t(18)=.86$ ,  $p=.40$ ) or *why* questions ( $t(18)=-.71$ ,  $p=.49$ ) did not differ significantly across two groups.

The frequency of providing answers to questions requesting a reason for an action (e.g. *why did X do Y?*) was not different between the groups ( $t(18)=-.709$ ,  $p=.49$ ). When both *what and why* questions were asked (Q6 and Q7), participants with high functioning autism and Asperger syndrome tended to provide partial answers. Both groups provided answers to the *what* portion of the question significantly more often than to the *why* portion (paired  $t(19)=6.30$ ,  $p<.001$ ).

Differences in use of linguistic markers of intention (e.g. *because*, *to+infinitive*, *so [that]*) between young adults with high functioning autism and those with Asperger syndrome in response to *why* questions were then examined. Answers to the *why* questions were examined for use of linguistic markers of intention (*because*, *to+infinitive* or *so [that]*). The use of intentional markers by the high functioning autism group ( $M=1.9$ ;  $SD=.99$ ) and the Asperger group ( $M=1.2$ ;  $SD=1.03$ ) was not statistically different.

Verb tense mismatches (in which answers were given in present tense to questions that were asked in past tense) occurred more frequently in the responses of the high functioning autism group than in those of the Asperger group, ( $M=45\%$ ,  $SD=44$  and  $M=10\%$ ,  $SD=13$  respectively). This result yielded statistical significance,  $F(1, 18)=5.9$ ,  $p<.05$ .

Results are summarized in table III. No differences between the two groups were found in terms of the frequency of answering *what* questions, frequency of answering *why* questions, the total number of words produced, or the number of different words

Table III. Summary of results.

Group: Variable	HFA	AS	Significance
	M (SD)	M (SD)	
Lexical productivity (Narrative Task)			
Different words	37 (19)	46 (22)	NS*
Total words	67 (51)	83 (46)	NS
Ambiguous pronoun	0.6 (.97)	0.2 (.63)	NS
Verb tenses			
Past tense	3 (2)	5 (3)	p<.05
Present tense	6 (8)	6 (6)	NS
Lexical production (Q-A task)			
Different words	60 (22)	66 (22)	NS
Total words	113 (46)	137 (85)	NS
Frequency of answering to what-Q	5 (1)	4 (1)	NS
Frequency of answering to why-Q	2 (1)	3 (1)	NS
Intentional marker use	2 (1)	1 (1)	NS
Verb tense mismatch	45 (44)	10 (13)	p<.05

\*NS=not significant.

produced. All participants answered *what* questions more frequently than *why* questions when both components were included in the same query. There were trends in the data suggesting that participants with high functioning autism mismatch verb tense in answers to questions more frequently than those with Asperger syndrome; however, it should be noted that the mean frequency of verb tense mismatch in question-answer task was fairly low.

## Discussion

This study examined linguistic differences between speakers with high functioning autism and Asperger syndrome. These two diagnostic groups could not be distinguished on either a standardized measure of language performance (Test of Linguistic Competence) or adaptive functioning (Vineland Adaptive Behavior Scales). The results of the narrative task suggest that young adults with high functioning autism and Asperger syndrome show similar and adequate use of vocabulary and linguistic cohesive device (proper use of anaphoric pronoun) in a short narrative. These results are consistent with a study by Tager-Flusberg et al. (1990) that reported individuals with autism demonstrate strength in their use of syntactic structures.

Analysis of verb marking in the narrative and question-answer tasks revealed a difference between the groups in verb tense use. Individuals with Asperger syndrome used the past tense significantly more frequently in their narratives, compared to individuals with high functioning autism. This decreased usage of past tense marking by individuals with high functioning autism may reflect the reduced sensitivity to pragmatic conventions and to considering the listener's perspective that is characteristic of speakers with autism. A similar pattern of results was observed in the question-answer task; however the result was not statistically significant, perhaps due to large amount of variability within the small sample size.

It is worth noting that although young adults with high functioning autism and Asperger syndrome show similar frequencies in answering *what* and *why* questions when the questions are asked separately, when both *what* and *why* were included in one question, all

participants tended to respond to the *what* portion of the question more frequently, almost ignoring the *why* portion. It should be also noted that both groups used intentional markers relatively infrequently in their speech. This finding can be interpreted as consistent with the known problems in understanding others' intentions that have been demonstrated for this population (Baron-Cohen, 1995).

Taken together, these findings suggest that linguistic differences between adult individuals with Asperger syndrome and high functioning autism are rather subtle and are found more often in higher level language than in simple syntax or lexical levels. This possibility is supported by another study that examined language production by these two populations using a semi-structured interview. Ghaziuddin et al. (2000) reported that their Asperger group produced more complex sentence structures than their high functioning autism group. An alternative explanation of the current findings is that the often-observed language delay of children with high functioning autism may have been "washed out" over the course of their lifetime, which results in only subtle differences in their language characteristics in adulthood between high functioning autism and Asperger syndrome.

Szatmari, Bartolucci, and Bremner (1989) attempted to differentiate high functioning autism and Asperger syndrome; however, they were unable to identify substantially different profiles for the groups. They viewed Asperger syndrome as a milder form of high functioning autism. In a more recent study, Szatmari et al. (2000) conducted 2-year follow-ups with children between 4–6-years-old who were diagnosed with either autism or Asperger syndrome. During the follow-up, cognitive, linguistic, and behavioural profiles of verbally fluent children looked more like children who were diagnosed as Asperger initially. Initial data on IQ and language abilities did not explain the outcome at the two-year follow up. Based on these results, Szatmari et al. (2000) concluded that those with Asperger syndrome and high functioning autism display overlaps in their developmental patterns. The results of the present study, however, suggest that there may be subtle differences in certain pragmatic/syntactic usages between the two groups. Nonetheless, these differences can be interpreted as indicating a difference in degree rather than a qualitative difference in language processing between these two groups of individuals with autism spectrum disorder.

#### *Limitations and future directions*

This study has limitations that need to be addressed in future studies: (1) the small number of participants, (2) the wide range of participant ages, (3) the limited scope of linguistic tasks, and (4) the statistically insignificant results on several measures that may have been related to the large variability obtained with a relatively small sample size. Despite these limitations, the findings offer some future research direction. For example, verb tense use should be examined further in a variety of narrative samples (personal narratives and fact based narratives) to better understand the nature of the differences between these two diagnostic groups. Comparison of verb tense usage by individuals diagnosed with Asperger syndrome, high functioning autism, or specific language impairment (SLI) will also enhance our understanding of the nature of these linguistic differences (Roberts et al., 2004). In addition, analysis of language comprehension should be incorporated into the linguistic profiling. Although the groups did not differ significantly on standardized language test scores in the present study, overall listening comprehension as measured by the TLC was the lowest score for these participants. Also, when listening

comprehension and oral expression were compared, oral expression scores were higher than listening comprehension scores.

### *Clinical implications*

The results of the current study warrant the analysis of narrative language samples in addition to standardized language tests to better assess language skills of individuals with both Asperger syndrome and high functioning autism. Additional language samples focused on various topics (e.g. topics of individual interest and topics that are pre-selected by the clinician) along with standardized language tests would add important pieces of information, especially for these two groups who likely present linguistic differences in rather subtle ways.

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## **Appendix 1**

### *A sample narrative*

Oh, Ami, this is one of your swanky tests. And I have see this before in the group. You want me to give you responses and then you will analyse them to see how different they are from your neurotypicals. Well, ok. These are people arguing about their mundane concerns and failing to reach a peaceful solution. Republicans trying to screw the working class of America. The powerful figure is repressing the others. Bu the repressed come to life and defend themselves. How autistic was that? This is the opening scene. When the powerful figure is taking care of its power base, and the two little creatures come into the scene. The large triangle hits the small triangle to the pulp. The large triangle is now beating up the small circle. The small circle and the small triangle are now hitting each other. The large triangle is a unifying presence for the masses, as it is now chasing the small figures. The large triangle destroys its domain.

## **Appendix 2**

### *Questions used during the question-answer task*

- Q1. What kind of a person is the big triangle?  
Q2. What kind of a person is the little triangle?  
Q3. What kind of a person is the small circle?  
Q8. What happened to the big triangle?  
Q9. What did the little triangle and the circle do?  
Q4. Why did the two triangles fight?  
Q5. Why did the small circle go into the house?  
Q10. Why did the big triangle break the house?  
Q6. What did the big triangle do and why?  
Q7. What did the small circle do and why?