NARRATIVE DISCOURSE IN SCHOOL-AGE CHILDREN WITH HIGH-FUNCTIONING AUTISM

A Thesis
Presented to the
Faculty of
San Diego State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Speech, Language, and Hearing Science

by
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Summer 2011
SAN DIEGO STATE UNIVERSITY

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DEDICATION

This thesis is dedicated to my mom, my dad, and my two siblings – this thesis would not have been possible without their love, support, and guidance. My personal experience living with an individual with high-functioning autism motivated me to complete this thesis and help this population. Their insight and feedback regarding social communication added a personal touch to this paper.
I am often asked to describe the experience of raising a child with a disability – to try to help people who have not shared that unique experience to understand it, to imagine how it would feel. It's like this…

When you're going to have a baby, it's like planning a fabulous vacation trip – to Italy. You buy a bunch of guidebooks and make your wonderful plans. The Coliseum, the Michelangelo David, the gondolas in Venice. You may learn some handy phrases in Italian. It's all very exciting.

After months of eager anticipation, the day finally arrives. You pack your bags and off you go. Several hours later, the plane lands. The stewardess comes in and says, "Welcome to Holland."

"Holland?!!" you say. "What do you mean, Holland?" I signed up for Italy! I'm supposed to be in Italy. All my life I've dreamed of going to Italy. But there's been a change in the flight plan. They've landed in Holland and there you must stay.

The important thing is that they haven't taken you to some horrible, disgusting, filthy place, full of pestilence, famine and disease. It's just a different place. So you must go out and buy a new guidebook. And you must learn a whole new language. And you will meet a whole new group of people you would never have met.

It's just a different place. It's slower paced than Italy, less flashy than Italy. But after you've been there for a while and you catch your breath, you look around, and you begin to notice that Holland has windmills, Holland has tulips, Holland even has Rembrandts.

But everyone you know is busy coming and going from Italy, and they're all bragging about what a wonderful time they had there. And for the rest of your life you will say, "Yes, that's where I was supposed to go. That's what I had planned."

The pain of that will never, ever, go away, because the loss of that dream is a very significant loss. But if you spend your life mourning the fact that you didn't get to Italy, you may never be free to enjoy the very special, the very lovely things about Holland.

- Emily Perl Kingsley

Welcome to Holland
ABSTRACT OF THE THESIS

Narrative Discourse in School-Age Children with High-Functioning Autism

by

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Master of Arts in Speech, Language, and Hearing Science
San Diego State University, 2011

With each passing year, the number of children diagnosed with high functioning autism (HFA) increases. While numerous studies have documented the types and severity of linguistic and social delays in toddlers and preschoolers with HFA, limited research has been done to determine how their linguistic and social profiles change over time. As the production of narratives requires linguistic, social, and cognitive contributions, narratives are useful tools for obtaining a multi-faceted profile of children with HFA. To extend our understanding of spoken discourse in this population, the present study will examine narratives across two discourse contexts: a personal narrative elicitation task and a semi-structured conversational task. The goals of the study are: (1) to compare performance of HFA and typically-developing (TD) school-age children on personal narratives in a narrative elicitation task; (2) to determine whether school-age children with HFA produce narratives in a semi-structured conversational task similarly to TD children; and (3) to compare the quality of narratives in structured tasks to those in produced in conversation. Twelve individuals with high functioning autism, ages 8.0-12.0, and 25 typically-developing children with ages evenly distributed from eight to twelve were administered the aforementioned narrative measures. The transcripts were transcribed and coded by trained undergraduate and graduate students. School-age children performed comparably to TD peers on measures of complex syntax and evaluation, but produced more morphological errors and fewer narrative components. They produced a comparable proportion of narratives with similar topics, compared to the control group, during conversation. Deficits in executive functioning and organization of memory are discussed as explanations for these results. These results suggest that narrative tasks may provide useful information when assessing school-age children with HFA.
TABLE OF CONTENTS

PAGE

ABSTRACT ............................................................................................................................. vi
LIST OF TABLES ................................................................................................................... ix
LIST OF FIGURES .............................................................................................................. x
ACKNOWLEDGEMENTS .................................................................................................... xii

CHAPTER

1 INTRODUCTION .........................................................................................................1
   School-Age Children with High-Functioning Autism (HFA) ......................... 2
   Cognitive Processing in Children with HFA .................................................... 2
   Social and Pragmatic Deficits in Children with HFA .................................. 3
   Perspective Taking .............................................................................................. 4
   Emotional Processing .......................................................................................... 4
   Conversational Abilities .................................................................................... 5
   Structural Language Development in Children with HFA ......................... 6
   Structured Testing versus Spontaneous Speech .......................................... 6
   Articulation ........................................................................................................... 7
   Morphology and Syntax .................................................................................... 7
   Semantics ............................................................................................................ 8
   Narratives ........................................................................................................... 9
   Typical Narrative Development ...................................................................... 11
   Narrative Development in Children with HFA .............................................. 12
   Purpose of the Study ...................................................................................... 16
   Hypotheses ......................................................................................................... 17

2 METHOD .................................................................................................................... 19
   Participants ......................................................................................................... 19
   Tasks .................................................................................................................... 20
   Task 1: Standardized Measures .................................................................. 20
   Task 2: Narrative Elicitation Task ................................................................. 20
Task 3: Biographical Interview ................................................................. 21
Procedures ......................................................................................... 21
Coding Conventions ........................................................................ 21
Micro Structural Measures ............................................................... 21
Discourse Measures ........................................................................ 23
Biographical Interview Measures .................................................... 23
Reliability ......................................................................................... 24

3 RESULTS ................................................................................................. 25
Analysis 1: Results for Standardized Measures ............................... 25
Analysis 2: Results for Elicited and Conversational narratives ......... 26
Analysis Strategy ............................................................................... 26
Micro structural measures ............................................................... 27
Analysis 3: Results for Discourse Measures ..................................... 35
Analysis 4: Biographical Interview Measures ................................. 39
Analysis 5: Relations Between Standardized and Experimental Tasks 39

4 DISCUSSION, CLINICAL IMPLICATIONS, FUTURE DIRECTIONS, & CONCLUSION ................................................................. 41
Discussion ......................................................................................... 44
Clinical Implications ....................................................................... 58
Future Directions ............................................................................ 60
Conclusion ......................................................................................... 60

REFERENCES ............................................................................................... 62

A ELICITED AND CONVERSATIONAL NARRATIVE CODING SHEET ........ 67
B COMPLEX SYNTAX AND EVALUATIVE DEVICES CODING SHEETS .... 69
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standardized Composite Scores for Intelligence for the HFA Group</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>Standardized Linguistic Composite Scores for the HFA Group</td>
<td>26</td>
</tr>
<tr>
<td>3</td>
<td>Morphological Errors from a Conversational Narrative for a HFA Participant (514) – A 11 Year Old Female</td>
<td>46</td>
</tr>
<tr>
<td>4</td>
<td>Complex Syntax in Narrative Tasks for a HFA participant (518) – A 11 Year Male</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Structural Language Examples in Narrative Tasks for a TD participant (8328) – A 11 Year Old Female</td>
<td>49</td>
</tr>
<tr>
<td>6</td>
<td>Evaluative Device Examples in Narrative Tasks for a HFA participant (503): A 9 Year Old Male</td>
<td>51</td>
</tr>
<tr>
<td>7</td>
<td>Setting Components in Narratives a HFA participant (504) - A Ten Year Old Male</td>
<td>53</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1. Average length (in propositions) of the elicited narrative and the conversational narrative for both groups. On average, the high-functioning autism group demonstrated a trend towards shorter narratives compared to the typically-developing group on the elicited narrative. On the conversational narrative, the high-functioning autism group produced narratives of a comparable length to those of the typically-developing group..............................................28

Figure 2. Average proportion of morphological errors of the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly more morphological errors compared to the typically-developing group on the elicited narrative and the conversational narrative. ......................................................................................................................29

Figure 3. Average proportion of complex syntax of the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly fewer instances of complex syntax compared to the typically-developing group on the elicited narrative, but produced a comparable number of complex syntax instances on the conversational narrative. ..............................................................................................30

Figure 4. Average number of complex syntax types produced on the elicited narrative for both groups. On average, the high-functioning autism group produced significantly fewer types of complex syntax compared to the typically-developing group on the elicited narrative, but a comparable number of complex syntax types compared to the typically-developing group on the conversational narrative. ..............................................................................................31

Figure 5. Average proportion of evaluative devices of the elicited narrative and the conversational narrative for both groups. On average, the high-functioning autism group used a comparable amount of evaluative devices when telling a narrative compared to the typically-developing group on both the elicited narrative and the conversational narrative. ..............................................................................................32

Figure 6. Average number of evaluative device types used during the elicited narrative for both groups. On average, the high-functioning autism group demonstrated a trend towards fewer types of evaluative devices compared to the typically-developing group on the elicited narrative, but a comparable number of evaluative device types compared to the typically-developing group on the conversational narrative. ..............................................................................................33

Figure 7. Average number of total narrative components used during the elicited narrative and the conversational narrative for both groups. On average, the
high-functioning autism group produced significantly fewer narrative components compared to the typically-developing group on both the elicited narrative and the conversational narrative. .................................................................................................36

Figure 8. Average number of setting components (i.e., character, location, time, situation for a possible total of 4) produced during the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly fewer narrative setting components compared to the typically-developing group on the elicited narrative, and a trend towards fewer narrative setting components on the conversational narrative. .................................................................................................36

Figure 9. Average number of non-setting narrative components (i.e., problem, internal response, attempt, resolution, coda for a possible total of 5) used during the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced a comparable number of non-setting narrative components compared. .................................................................................................38

Figure 10. Average number of prompts received by both groups during the elicited narrative and conversational narrative. On average, the high-functioning autism group received a comparable number of prompts compared to the typically-developing group on the elicited narrative. However, on the conversational narrative, the high-functioning autism group showed a trend toward a higher number of prompts compared to the typically-developing group. .................................................................................................38

Figure 11. Proportion of participants that produced either a retell or a personal narrative for the conversational narrative of the biographical interview. The proportion of HFA participants that produced personal narratives was similar to the proportion of TD participants that produced personal narratives. .................40
ACKNOWLEDGEMENTS

I would like to express my gratitude for the support from the various individuals and institutions that have made this thesis possible. Completing this thesis has been a great experience. Though I must admit there were times when I questioned why I chose to embark on this endeavor, I now realize how much I have learned throughout this process – both as a researcher and a clinician. However, this would not have been possible without the support of my professors, colleagues, classmates, friends, and family.

First of all, I would like to thank all of my family and friends, who have always been supportive of my academic endeavors.

To Dr. Judy Reilly – Working in your laboratory has been an amazing experience. I am always grateful for the welcoming environment and snacks that you provide. Because of them, I enjoyed the numerous hours that I spent in the lab working on this thesis. To Dr. Marshall, thank you for your patience and guidance with the statistical analysis. To Dr. Beverly Wulfeck and Dr. Pruitt-Lord, thank you for support and guidance throughout this experience.

There were also many colleagues and classmates in the laboratory that have helped me complete this thesis. First and foremost, I wish to thank Philip Lai for teaching me about the thesis process, guiding me through the steps, and responding to all my e-mails for help! I would also like to thank Jun O'Hara and Matt Ignacio for teaching me about complex syntax and coding the numerous language transcripts. I am also grateful to Carolyn Karinen and James Hou for editing my thesis during the final stages. Finally, I would like to thank Angel Li for being my partner in crime as the only other Speech-Language Pathology student to complete a thesis in 2011!

This work has been supported by grant # P50 NS22343
CHAPTER 1

INTRODUCTION

In the past few years, clinicians and researchers have emphasized the importance of early diagnosis and intervention for children on the autism spectrum (i.e., before the age of three) to optimize the outcomes for these children (Pierce, Glatt, Liptak, & McIntyre, 2009). Early identification of the disorder makes use of behavioral clinical markers or "red flags," such as repetitive behaviors (e.g., handclapping, rocking), social interaction impairments (e.g., lack of social attention, social gestures, and social interactions), and communication deficits (e.g., lack of babbling or gesturing, single words, and/or spontaneous speech) (Loveland & Tunali-Kotoski, 2005; Pierce et al, 2009). Past research has shown that in these early years, social and linguistic impairments often go hand in hand (Kuhl, Coffey-Corina, Padden, & Dawson, 2005), suggesting an association between social and linguistic processing in this population.

On the other hand, school-age children with high functioning autism (HFA) exhibit a different linguistic and social profile. Behavior of children with HFA in their school years is characterized by fewer overt clinical signs and symptoms compared to the preschool population (Loveland & Tunali-Kotoski, 2005). Structural linguistic abilities of some school-age children with HFA, characterized by adequate performance on language tests, begin to resemble typically-developing (TD) peers (Kjelgaard & Tager-Flusberg, 2001). Despite performance within normal limits on these tests, some research has shown that these children continue to demonstrate linguistic and social deficits in their school-age years (Condouris, Meyer, & Tager-Flusberg, 2003; Loveland & Tunali-Kotoski, 2005). Thus, it is important to analyze linguistic tasks that require higher-level processing, such as narrative discourse and conversational tasks, in order to examine the nature and degree to which linguistic and social deficits are manifested in school-age children with HFA.
SCHOOL-AGE CHILDREN WITH HIGH-FUNCTIONING AUTISM (HFA)

According to the American Psychiatric Association (2000) (DSM-IV), autism is a neurological spectrum disorder characterized by deficits in three areas: social interaction, communication, and restricted repetitive and stereotyped patterns of behavior, interests, and activities. Given their behavioral inflexibility, individuals on the spectrum are often resistant to change and novel situations (Kanner, 1943; Loveland & Tunali-Kotoski, 2005; Schopler, Reichler, DeVellis, & Daly, 1980). Diagnostic measures for autism include the Autism Diagnostic Interview – Revised (Lord, Rutter, & LeCouteur, 1994), the Autism Diagnostic Observation Schedule (Lord et al., 2000), and the Childhood Autism Rating Scale (Schopler et al., 1980). As these children are typically diagnosed around the age of three (Pierce et al., 2009; Tager-Flusberg, Paul, & Lord, 2005), their original clinical signs of autism change and progress throughout the years, which will be further discussed throughout the paper.

Individuals on the autism spectrum are generally given one of three diagnoses: low-functioning autism (LFA), high-functioning autism (HFA), or Asperger's Syndrome (AS) (Boucher, 2003). The terms low-functioning and high-functioning refer to an individual’s intellectual capacity rather than their overall adaptive behavior. Both individuals with HFA and AS present with scores within the normal range on intelligence quotient (IQ) tests. However, despite normal performance on intelligence tests, individuals with HFA are distinct in that they have a history of language delay in early childhood development (i.e., at the age of three). Depending on the study, individuals with HFA represent as low as 20% to up to 70% of individuals on the autism spectrum (McElroy, 2010; Paul, 2001; Seung, 2007).

COGNITIVE PROCESSING IN CHILDREN WITH HFA

Although children with HFA have an IQ within normal range, past studies have suggested that individuals on the spectrum have different styles of processing and storing information when compared to their TD peers. With respect to sensory modalities, individuals with HFA have a tendency and preference to exchange and acquire information in visual modalities, rather than the linguistic modalities seen in the general population (Cashin, 2008; Grandhin, 1995). Furthermore, they tend to have difficulties transferring information across sensory modalities (Paul, 2001), suggesting that the initial acquisition of visual processing may not lead to storage in the linguistic modality.
Individuals with autism may also store information differently compared to TD individuals. When storing experiential information, TD individuals use a semantically organized network. In other words, they store experiences based on relatedness. However, it has been hypothesized that individuals with autism store information temporally, such that experiences are organized chronologically. In other words, memories are stored in the order in which they are perceived (Cashin, 2008). Thus, children with HFA may have underlying differences in the way they perceive, process, and store information about the world around them.

Past studies have shown that lower executive functioning abilities are also characteristic of the HFA population when compared to their TD peers (Joseph, McGrath, & Tager-Flusberg, 2005; Landa & Goldberg, 2005; Goldberg et al., 2005; Verté, Geurts, Roeyers, Oosterlaan, & Sergeant, 2005). Executive functioning refers to cognitive functions that are mediated by the prefrontal cortex; they include inhibition, working memory (e.g., spatial, visual), cognitive flexibility, organization (e.g., sequencing, planning), and verbal fluency. These cognitive functions are essential for coherent narrative production. For example, working memory is necessary to store local elements when producing a global theme, and organizational skills are important for logically sequencing the components of a story. Cognitive flexibility, also called “set-shifting,” is used daily when transitioning between activities or turn-taking during conversations. With lower executive functioning capabilities, children with HFA may have difficulties when coordinating and organizing information efficiently from various cognitive sources.

**SOCIAL AND PRAGMATIC DEFICITS IN CHILDREN WITH HFA**

By definition, deficits in social communication and presence of restricted patterns of behavior, interests, and activities are characteristic of individuals with autism (American Psychiatric Association (2000). At the preschool age, deficits in social communication are characterized by the absence of symbolic play and the presence of repetitive and stereotyped patterns of behavior (e.g., hand flapping), intense and specialized interests and activities (e.g., lining up blocks) (American Psychiatric Association [APA], 2000; Carter, Davis, Klin, & Volkmar, 2005; Pierce et al, 2009). These social deficits are reflected by different
psychiatric symptoms (e.g., avoidant behavior, intense interests) as these children enter their school-age years (Hess, Matson, & Dixon, 2010; Loveland & Tunali-Kotoski; 2005).

**Perspective Taking**

Perspective taking, often discussed in the context of Theory of Mind, has become a central argument used to describe the social impairments demonstrated by HFA children (Baron-Cohen, 1995; Paul, 2001; Sigman, Dissanayake, Arbelle, & Ruskin, 1997). Past research has used false belief tasks to test whether children with autism have difficulties inferring the intentions, emotions, and thoughts of others (Baron-Cohen, 2001; Sigman et al., 1997). In the classic version of the first-order false belief task (Wimmer & Perner, 1983), the child and the experimenter share common knowledge about an object (e.g., they take the crayons out of the crayon box and place it in a drawer). When another individual enters the room, the child is asked where that individual will look for the crayons. A response of ‘the crayon box’ indicates that the child is able to understand that the new individual has a mental representation different than his or her own.

Wimmer and Perner (1983) found that the ability to pass this false-order task typically occurs between the ages of four to six in TD children. Baron-Cohen, Leslie, and Frith (1985) administered the false-order belief task to four year old children with an autism spectrum disorder (ASD) and TD children. The authors found that 85% of TD participants passed the task, while only 20% of ASD children passed the task. Furthermore, Happé (1994) found that even HFA individuals that passed the false-belief tasks were socially handicapped and demonstrated impairments interpreting non-literal statements (e.g., irony, jokes, double bluffs). These findings suggest that school-age children with HFA present with very limited, if any, perspective taking skills (Baron-Cohen et al., 1985; Happé, 1994), which would lead to difficulties inferring others' intentions and anticipating their behaviors in complex or real-time situations. Without the ability to take others’ perspectives, school-age children with HFA often view the social world as alarming and unpredictable (Paul, 2001).

**Emotional Processing**

Emotional experience and processing has been a topic of discussion and debate within the autism population. Past literature on social development in TD toddlers has suggested that emotions are regulated by the awareness of our roles and others’ roles in social situations.
This suggests that an impairment in perspective taking would lead to difficulties with socio-emotional development. This is further supported by recent findings that children with HFA are not able to fully comprehend complex emotions (Losh & Capps, 2006). In the laboratory setting, they are able to discuss simple emotions but have trouble with more complex emotions. Losh and Capps (2006) attributed these findings to the fact that complex emotions, such as pride or embarrassment, rely on an individual's ability to reflect on cultural norms and expectations. As emotions are socially constructed and this self-awareness is critically based on the ability to view our behavior from another’s perspective, it makes sense that theory of mind deficits might naturally lead to difficulties understanding complex emotions.

With respect to emotional processing, Temple Grandhin (1995), an adult with HFA, stated that her emotional memories are "faint and grounded in objects and locations, rather than internal representations" (p. 93). If this is the case for individuals with HFA, their differential emotional experience may lead to a deficient inventory of emotional memories. Without these emotional memories to guide and shape their real world encounters, children with HFA are further hindered from using this inventory to analyze psychological and socio-emotional dimensions of on-line complex emotional encounters.

**CONVERSATIONAL ABILITIES**

Children with HFA often use their cognitive abilities to compensate for their social deficits (Goldman, 2008). Through multiple social experiences, these children are typically able to allocate cognitive resources to learn the basic social skills that are intuitive for other children (Losh & Capps, 2006). Temple Grandhin (1995) stated, “I had to think about every social interaction . . . a scientist trying to figure out the ways of the natives” (p. 133), suggesting that conversations can be a cognitively demanding task. As such, children and adults with HFA can often participate in conversations (e.g., turn taking), but continue to show difficulties with the social use of language (Paul, 2001).

During conversations between TD individuals, the conversational process involves the interaction of two personal interpretations of the world (Cashin, 2008). On the other hand, conversations between individuals with HFA are typically one-sided rather than reciprocal (Boucher, 2003; Roberts, Rice, & Tager-Flusberg, 2004), suggesting that they
present ideas but do not modify their thoughts or ideas based on the verbal interaction of others. Children with HFA tend to use language for instrumental purposes (e.g., asking for information), rather than social purposes (e.g., sharing stories to connect with others) (Boucher, 2003). As such, language produced by children with HFA is typically characterized by repetitive and egocentric content (Paul, 2001). Furthermore, they do not often provide enough background information, suggesting difficulties establishing shared frames of reference (Paul, 2001). This suggests that individuals with ASD may understand the mechanical nature of conversations (e.g., turn taking, sharing information) but not the social purpose of conversations (e.g., connecting with others).

To summarize, school-age children with HFA try to use their cognitive capabilities to compensate for their social deficits (Goldman, 2008). However, these children continue to face difficulties understanding the intentions and behaviors of others, processing their own emotional experiences, and producing appropriate comments in conversations. These social deficits continue to manifest over time and often lead to difficulties engaging with peers and maintaining friendships (Carter et al., 2005; Loveland & Tunali-Kotoski, 2005; Paul, 2001).

**Structural Language Development in Children with HFA**

The emphasis of research on autism has been on pragmatic deficits, which are universal to this disorder (Roberts et al., 2004). Furthermore, as children are diagnosed with autism around three or four, research on early language development has largely been limited to retrospective studies (Tager-Flusberg et al., 2005). The limited research on language in school-age children with autism has suggested persistent linguistic impairments, some of which are specific to autism and others that are shared with other disorders (Roberts et al., 2004; Williams, Botting, & Boucher, 2008). In general, the research on linguistic abilities in school-age children with HFA has demonstrated heterogeneity in language skills, ranging from profoundly impaired to within normal limits (WNL) (Boucher, 2003; Kjelgaard & Tager-Flusberg, 2001).

**Structured Testing versus Spontaneous Speech**

Although HFA is a disorder primarily characterized by social deficits, past research has shown that there are differences in structural language (i.e., phonology, morphosyntax,
and semantics) in this population when compared to TD peers (Boucher, 2003; Tager-Flusberg et al., 2005). Studies using standardized language tests tend to demonstrate average to mildly delayed language abilities, whereas spontaneous language measures tend to portray moderate to severely impaired language abilities (Condouris et al., 2003). These conflicting results may be due to different methodologies and selection criteria in participant recruitment, or to the differing demands of the linguistic tasks in question. As such, researchers in the field of child development have emphasized the importance of collecting and analyzing spontaneous language samples in obtaining valid measures of language in this population (Condouris et al., 2003; Tager-Flusberg et al., 2009).

**ARTICULATION**

Articulation is the ability to produce the individual sounds of a language in the context of both single words and in spontaneous speech. Kjelgaard and Tager-Flusberg (2001) used the Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 1986) to conclude that articulation is spared in children with autism, regardless of cognitive or linguistic abilities. More recent research has also found that verbal children with ASD have spared articulation (Boucher, 2003; Tager-Flusberg et al., 2005; Williams et al., 2008).

**MORPHOLOGY AND SYNTAX**

Morphosyntax refers to the rules that govern how free and bound morphemes are combined to form words and sentences. Past studies have shown conflicting results regarding morpho-syntactical development in school-age children with HFA. Some have reported that morphosyntax skills are relatively normal (Boucher, 2003; Kjelgaard & Tager-Flusberg, 2001), while recent studies have shown that grammatical errors are common in spontaneous speech (Condouris et al., 2003). When present, morphological errors are characterized by omission of articles, omission of tense markers, and pronoun reversals (Loveland & Tenali-Kotoski, 2005; Roberts et al., 2004; Tager-Flusberg et al., 2005; Williams et al., 2008). Past studies have suggested specific difficulties with the production of the third-person singular and past tense verb morphemes in elicitation probes (Roberts et al., 2004), as well as with matching verb tense in answers during narrative production (Seung, 2007). These findings suggest that some school-age children with HFA may have underlying difficulties with the
basic syntactic structures, and that these difficulties are more apparent during higher-order linguistic tasks.

Complex syntax refers to the use of multiple propositions in one sentence. This includes the use of coordinating conjunctions to combine simple sentences (e.g., and, or, then), verb complements (e.g., try + verb, keep + verb), subordinate adverbial clauses (e.g., when, how), and relative clauses. Passives are also often included as they represent a different syntax, such that the direct object becomes the subject. In narratives, such constructions are used as an optional linguistic device to connect local and global story elements of narratives and to highlight important events. Past studies analyzing complex syntax have found that children with HFA produce a more restricted range of complex syntactic structures compared to TD peers (Capps, Losh, & Thurber, 2000; Losh & Capps, 2003). These findings suggest that school-age children with HFA have an adequate knowledge of syntactic structures, but may not demonstrate the variety of structures produced by their TD peers.

**SEMANTICS**

Past literature on semantic abilities in this population has reported mild deficits, characterized by use of words in narrow, context-bound ways, and difficulty with abstract terms (Boucher, 2003; Seung, 2007). Others have reported moderate to severe deficits characterized by idiosyncratic, pedantic, or overly concrete word usage (Tager-Flusberg et al., 2005; Williams et al., 2008). These conflicting results may be due to differences in the definition of "semantics." Some studies included the understanding and use of non-literal language and abstract concepts when operationalizing semantic knowledge (Eskes, Bryson & McCormick, 1990; Tager-Flusberg, 1992). On the other hand, some studies only included concrete words in receptive and expressive standardized tests, such as the Peabody Picture Vocabulary Test – Revised (PPVT-R) (Dunn & Dunn, 1997) and the Expressive One-Word Picture Vocabulary Test (EOW-PVT) (Brownell, 2000; Condouris et al., 2003; Kjelgaard & Tager-Flusberg, 2001).

Some studies have examined semantics specific to emotional understanding. For instance, Capps, Kehres and Sigman (1998) compared children with autism to developmentally-delayed language-matched children. They did not find differential use of
mental state terms or differential use of emotion or perception terms when comparing these two groups. On the other hand, Tager-Flusberg and Sullivan (1995) compared children with autism to TD language-matched peers. They found that children with autism had impairments in the acquisition of terms referring to mental states or emotions. Taken together, these two studies suggest that children with autism produce a comparable amount of mental state terms when compared to developmentally delayed children, but fewer mental state or emotion terms when compared to TD children.

In conclusion, school-age children with HFA demonstrate differential strengths and weaknesses with regards to linguistic abilities. Regardless of cognitive ability, articulation is generally within normal limits. With respect to syntactic abilities, these children tend to demonstrate adequate knowledge of syntactic structures on standardized tests, but appear to be unable to apply this knowledge to unstructured situations. These children have strong concrete semantic inventories but present with difficulties interpreting non-literal or abstract language. As such, it has been suggested that the primary language deficits in school-age children with HFA are predominantly present in higher-order processing tasks, such as the comprehension and production of discourse.

**Narratives**

In essence, language is the filter through which individuals express their wants, needs, and thoughts (Whorf, 1956). We use language to organize our thoughts and also to share our ideas with others. Since language often serves a social function, it is often impossible to distinguish the linguistic and social components in the real world. Based on the linguistic and social deficits seen in school-age children with HFA, it is likely that children with HFA present the most difficulties when tasks require the integration of both linguistic and social abilities. Since narratives are structured, organized packages of linguistic content used for social purposes (Ochs & Capps, 1996), they are ideal for studying linguistic and social strengths and weaknesses in the HFA school-age population. The integration of cognitive, linguistic, and social abilities makes narratives a useful tool for obtaining a multifaceted profile of school-age children with HFA.

Narratives are universal to all cultures and are inherent in the way TD individuals organize the world; they are both “born out of experience” and “give shape to experience”
When narrating, individuals must organize their experiences into a sequence of events and describe their shifting perspectives throughout the experience. In this way, narratives allow individuals to impose order on the world and to better understand and interpret their experiences. After we arbitrarily break apart pieces of our day into discretely packaged narrative experiences to share with others, we group these narratives by similarity and store them by relatedness (Cashin, 2008).

When individuals are ready to share these stories with others, they must have a sufficient grasp of the linguistic structures of the language in order to express their thoughts accurately. The linguistic relativity hypothesis (Whorf, 1956) suggests that each language offers narrators different linguistic resources for portraying ideas within narratives. The filtering principle further emphasizes that narratives are filtered through the language itself, such that each language directs one's attention "to particular ways of filtering and packaging information" (Berman & Slobin, 1994, p. 612). Furthermore, the linguistic features, such as words or syntactic structures that are employed are neither neutral nor impersonal. They are chosen by the narrator and interpreted by the listener through context and experience (Ochs & Capps, 1996).

After sharing narratives with others, individuals often receive peer feedback. The listener may embellish, align, question, tease, refute, or ignore the narrator. Resistance to narratives may include minimal feedback, ridicule, or denial (Ochs & Capps, 1996). It is through this process that individuals learn the expected and unexpected behaviors of society. This process modifies the narrator's thoughts and opinions about the story; as such, social norms are communicated through peer feedback. In this way, narratives also serve a social function as a tool for learning social norms in a non-threatening way (Ochs & Capps, 1996). Furthermore, when one individual shares a personal experience with another, the listener often responds by disclosing a similar narrative from their own personal experience. It is through this mutual self-disclosure that relationships often build and develop.

To summarize, TD individuals organize the world in narrative packages stored in their memory by relatedness. To share these stories, the individual must retrieve the story from memory and possess sufficient linguistic capabilities to express his or her thoughts. After the narrative has been produced, the listener gives feedback on the narrative, which teaches societal norms. The production of one personal narrative is often followed by self
disclosure from the listener. In this way, the mutual exchange of personal narratives also builds relationships between the two individuals. As these processes involve both linguistic and social components, narratives are ideal to understanding the social-linguistic deficits of autism.

**Typical Narrative Development**

Labov and Waletzsky (1967) first introduced the notion that narratives include two types of information: referential information and evaluative information. Referential information is communicated through the use of facts or details specific to the event or story. This has often been operationalized through the use of Story Grammar analysis (Stein & Glenn, 1975), which analyzes narratives by breaking them down into basic story components (e.g., character, setting, problem, plan, attempts, and resolution). Contrary to referential information, evaluative information is used to indicate narrator's perspective of the events and reflect the significance of the events to the narrator (Labov & Waletzsky, 1967; Bamberg & Reilly, 1996). Evaluative devices often include emotional labels for characters (e.g., the dog was *sad*), evaluations of a character (e.g., he was a *mean* man), mental verbs (e.g., wondering, thinking), hedges that indicate uncertainty (e.g., probably, might, maybe), and causal markers that reflect the protagonist’s motivation (e.g., he looked under the bed *so that* he could see if his paper was there) (Reilly, Bates, & Marchman, 1998). These evaluative devices not only supply the narrator's perspective, but they also modulate and give flavor to the narrative.

Although TD children as young as 2.5 years can produce the basic elements of a story (Appleby, 1978), the ability to produce narratives continues to develop throughout the school years into adulthood (Berman & Slobin, 1994). Past research has shown stable, predictable patterns of narrative development with regards to local aspects, global aspects, and evaluative features (Bamberg & Reilly, 1996; Reilly, 1992). In the preschool years, children have a tendency to pay more attention to local details and use paralinguistic expressions to connect the various, scattered elements of their narratives (Reilly, 1992). By age five, most children have acquired the basic morphological and syntactic structures of their language. With these new linguistic abilities, kindergarteners begin to use evaluative devices to portray each character’s feelings and the motivations for their behavior. At this time, they also begin to
link events in a linear fashion, demonstrating an emerging ability to connect local aspects into a global cohesive story. By the age of nine, TD children can organize events of the story into episodes, marking the integration of local and global perspectives. They also begin to use evaluative structures to tie together narrative episodes into a single cohesive plot.

**Narrative Development in Children with HFA**

Although children with HFA may present with normal performance on IQ tests, past studies have shown differential strengths and weaknesses in the narratives produced by children with HFA compared to TD peers and developmentally-delayed groups. Past literature has focused on narrative production in three different tasks: story-book narrative retells, elicited personal narratives, and conversational narratives. In both the story-book narrative retell and the elicited personal narrative task, participants are explicitly asked to produce a narrative in a structured setting. During the story-book narrative retell, the participants narrate a wordless picture book. In the elicited personal narrative task, the participants are asked to share a personal experience (e.g., Tell me about a time when you were happy). The conversational narratives refer to narratives that are produced during a conversation.

Capps and colleagues (1998) analyzed language samples for conversational narratives of 15 children with LFA and 15 children with developmental disorders which excluded Down's Syndrome, with mean ages of 11.9 (standard deviation: 3.3) and 9.4 (2.6) respectively. On average, the children with autism had a mental age of 3 years younger than their chronological age, as determined by the *Stanford-Binet Intelligence Scale* (Thorndike, Hagen, & Sattler, 1986). Both groups were matched on language abilities, which were determined by the *Clinical Evaluation of Language Fundamentals – Revised* (CELF-R) (Semel, Wiig, & Secord, 1987). Capps and her colleagues found that children with LFA produced significantly fewer conversational narratives in a semi-structured conversational task compared to children with developmental disorders. The narratives produced by the LFA participants were concrete and minimalist (e.g., E: What are some things you did yesterday? C: Yesterday I ate French fries at McDonald's) and frequently described aspects of their immediate physical environment (e.g., "Something just made a loud noise out there. It's a truck dumping a dumpster"). Overall, the researchers concluded that although linguistic
abilities were adequate to produce "sophisticated conversational contributions," children with LFA tended to rely on "developmentally primitive ways of maintaining conversations" (i.e., repetitive and odd scripts). Children LFA that had more advanced language abilities did not demonstrate more complex linguistic performance in narratives. These findings suggested that underlying social deficits affected narrative production in children with LFA.

Capps et al. (2000) analyzed story-book narrative retells in children with LFA and language matched TD peers with mean ages of 12.6 (3.1) and 6.0 (1.6) respectively. Results for linguistic measures showed that morphological errors did not differ significantly between the two groups. Surprisingly, with respect to socio-emotional performance, the children with LFA did not differ significantly in the proportion of evaluative devices produced. However, they differed in the diversity of evaluative devices produced (i.e., the total types of evaluative devices). Children with LFA tended to simply label affective and cognitive states rather than placing them in a causal framework (e.g., providing motives, reactions). Capps and colleagues (2000) suggested that this minimal explanation of internal states implied that children with LFA did not understand the social problem-solving function of narratives. Overall, these findings suggest that children with LFA understand the need to engage the audience but do not have a vast repertoire for doing so. Another interpretation of these findings is that children with LFA do not understand the need to engage the audience; they may produce evaluative devices by rote without understanding their purpose (Tager-Flusberg, 1995).

More recent literature on children with HFA has found that linguistic and narrative performance differed between children with HFA and children with LFA. Goldman (2008) elicited eight personal narratives from school-age children with HFA, ages 9.5-13.0, and TD children matched for chronological age and performance IQ. With respect to referential information, elicited narratives of the HFA children included most of the narrative components, but lacked characters and resolutions. Goldman (2008) concluded that the HFA participants had developed scripts for producing narratives to compensate for social or linguistic deficits. In other words, these cognitively competent children had learned the schemas of basic narratives after years of story-telling (Loth, Gómez, & Happé, 2008). To further examine the role of linguistic abilities in narrative production, Goldman (2008) also compared children with HFA to a language-delayed comparison group. Compared to children
with developmental language disorders, children with HFA used more facts when producing personal narratives and provided fewer interpretations of behaviors. Similar to the findings on LFA children, these findings suggested that underlying social deficits also affected narrative production in children with HFA.

Losh and Capps (2006) examined emotional understanding in 7.0 to 13.0 school-age children with HFA and TD children by asking the participants to define 12 emotions and produce an elicited personal narrative (i.e., tell a time in which they experienced that particular emotion). Similar to the Capps et al.’s study (2000) with LFA children, results showed that children with HFA were less likely to give causal accounts for emotional events. Instead, they tended to describe visual elements of the narratives; this was unlike the TD comparison group. The tendency to focus on local, concrete elements of the story may suggest that these children do not have a “coherent representation of emotional experiences” (Losh & Capps, 2006, p. 809).

Rather than eliciting personal narratives, Losh and Capps (2003) analyzed narrative abilities of children with HFA by examining story-book narrative retells (i.e., *Frog, Where are you?*) (Mayer, 1969) and conversational narratives. Participants were 8.0-14.0 years old and included 28 individuals with HFA or AS and 22 TD children. Results for conversational narratives showed that both groups produced narratives of similar length and that topics of the narratives were similar (e.g., family, friends, and pets). Both groups averaged three narratives in the semi-structured conversational task, but the HFA/AS children produced significantly more narratives about one particular topic, computers. Similar to Capps et al.’s (2000) study with LFA individuals, these HFA/AS children were less likely to use causal language. Thus, despite having a higher IQ than the LFA group, children with HFA/AS continued to demonstrate deficits in the production of causal explanations for internal states, behaviors, and events in their narratives.

Losh and Capps (2003) found that some narrative deficits in the HFA/AS population were task specific. With respect to complex syntax, children with HFA/AS demonstrated a restricted range of complex syntax in their Conversational Narratives, but a comparable range of syntactic structures in the story-book narrative retell task, when compared to TD peers. The same interaction effect was found for evaluative devices, such that children with HFA/AS produced fewer evaluative devices in Conversational Narratives, but performed
comparably in the story-book narrative retell task. Individuals with HFA/AS also required more prompts for clarification in Conversational Narratives than in the story-book narrative retell task, suggesting that the children with HFA/AS did not provide enough information to communicate effectively during a conversation.

The results from Losh and Capps (2003) indicate that Conversational Narratives may be more difficult for children with HFA/AS compared to story-book narratives. This may be due to the dialogic nature of the conversational task. Conversations are a locally organized dialogue; therefore, children with HFA need to interpret and infer the experimenter's thoughts at every turn in order to participate appropriately in the conversation. Furthermore, each speaker's turn negotiates the direction of the conversation. Lord and Paul (1997) found that children with ASD often presented with difficulties determining the appropriate amount of information to include in a response. For instance, when asked, "Tell me about your day," one child might respond with "it was okay" while another would provide too many details (e.g., "I woke up at six thirty. I brushed my teeth...."). Given these deficits in conversations, children with HFA may present with inferior spontaneous personal narratives simply due to the social demands of the task.

Taken together, these studies suggest that the ability to produce narratives may be task specific. It appears that elicited personal narratives and spontaneous personal narrative are more difficult for children with HFA than story-book narrative retells. As such, it is still unknown which aspects of personal narratives pose the greatest challenges for children with HFA. While the performance of certain aspects of narrative performance are task dependent (e.g., production of evaluative devices and complex syntactic structures), other aspects of narratives remain impaired across tasks (e.g., embedding behaviors and emotions in causal frameworks).

In conclusion, there have been few studies, if any, that have compared elicited narratives and conversational narrative within the same HFA participants. The juxtaposition of these tasks allows us to look at each participant's social propensity to produce spontaneous personal narratives in conversation in relation to their ability to produce an elicited personal narrative in a structured setting. By comparing performance between elicited narratives and conversational narratives within the same subjects, we can tease apart the linguistic and cognitive aspects of elicited narratives from the social aspects of conversational narratives.
Inferior elicited narratives would suggest linguistic or cognitive deficits (e.g., structure, thematic focus, memory retrieval) since the HFA children are explicitly told what is expected of them. If social demands of conversations are impeding on their ability to produce narratives, the HFA children may be able to produce adequate narratives during the narrative elicitation task, but not during conversations.

**PURPOSE OF THE STUDY**

Since the number of children diagnosed with HFA increases with each passing year, it is imperative to understand how social and linguistic skills develop in these children as they progress through their school-age years. Though past literature has concluded that social deficits are persistent in this population, conflicting results have been found regarding the linguistic deficits in school-age children with high-functioning autism (HFA). Since the ability to produce narratives depends on both linguistic and social abilities, they are a useful tool for analyzing linguistic and social performance in school-age children with HFA.

Past research on children with HFA has analyzed language on standardized tests, story-book narrative retells, elicited narratives, and conversational narratives in a semi-structured conversational setting. Results of these studies have shown that language abilities of children with HFA are higher on structured tasks, such as standardized language tests and narrative retells. However, it is still unknown whether inferior performance on unstructured language tasks is related to difficulties with narrative production (i.e., the cognitive and/or linguistic demands of producing stories) or due to the unstructured nature of the task (i.e., the pragmatic demands during a conversation).

The broad question of the study is to determine the strengths and weaknesses of narrative production in children with HFA. The comparison of linguistic, cognitive, and social measures in narratives of TD children and children with HFA will provide a multi-faceted profile of the linguistic and pragmatic strengths and weaknesses in school-age children with HFA. As children with HFA have been shown to have difficulties connecting with others, studying narrative production will also have social implications and ramifications on the types of therapy provided for these children.

The present study addresses the main question by examining Conversational Narratives in a conversational task, as well as Elicited Narratives in a structured task. As the
two genres differ in social, linguistic, and cognitive demands, the juxtaposition of these two tasks can help distinguish the role of discourse context in the narrative production of school-age children with HFA. These subsidiary questions will be address:

1. Are standardized measures of language and cognition related to narrative measures of language and cognition?
2. Do school-age children with HFA perform comparably to TD children on linguistic, social, and cognitive measures of the Elicited Narratives and the Conversational Narratives?
3. Is the ability to produce Elicited Narratives related to the production of Conversational Narratives in school-age children with HFA?
4. Do children with HFA produce Conversational Narratives in conversations comparably to TD peers?

**Hypotheses**

Our overall hypothesis is that social and linguistic deficits of HFA children will be differentially revealed in varying contexts. Based on previous research, as well as our understanding of school-age children with HFA, we developed the following predictions:

**Prediction 1:** It is predicted that linguistic knowledge and intelligence, as measured by standardized tests, will not correlate with the narrative performance in the HFA group. Past literature has suggested that improvements in language are not necessarily tied to improved narrative production in children with autism (Capps et al., 1998). This implies that language and narrative abilities develop somewhat independently, such that while language abilities improve, narrative abilities may remain limited.

**Prediction 2:** It is predicted that the HFA will demonstrate inferior narrative abilities compared to the TD group, as characterized by more morphological errors, a lower proportion of complex syntax, a lower proportion of evaluative devices, and fewer story components on the Elicited Narratives and the Conversational Narratives.

Due to differences in information processing (e.g., chronological versus semantically based network), it is hypothesized that children with HFA will have a more difficult time producing personal narratives compared to storybook narrative retells, even when the narratives are elicited in a structured task. With cognitive resources allocated to retrieving the necessary information and organizing the narrative, there will be less cognitive resources available to produce linguistic and evaluative devices. As such, it is predicted that there will be a lower proportion of complex linguistic structures as well as evaluative devices. With
respect to story structure, past studies have shown that children with HFA produce fewer story components (Goldman, 2008; Losh & Capps, 2003). It is predicted that these children will also lack internal responses as causal motivations in their narratives.

**Prediction 3:** It is predicted that the ability to produce narratives will correlate with proportion of narratives in a conversation for the TD group, but not for the HFA group.

Past research has suggested that children with HFA may not understand the social purposes of narratives (e.g., forming social relationships). As such, they might be less inclined to try to produce narratives in a conversation. In addition, children with HFA may have difficulty interpreting the examiner's prompts during a conversation (e.g., Can you tell me about your favorite movie?). Children with HFA may interpret these questions as closed ended requests for information, rather than elicitations for personal narratives. Thus, their ability to produce narratives in a structured task (i.e., the Elicited Narrative) may not be reflective of their propensity to produce personal narratives in a conversational setting.

**Prediction 4:** It is predicted that children with HFA will spontaneously produce fewer personal narratives in a semi-structured conversation compared to TD individuals.

Past studies have shown that children with HFA have difficulties participating appropriately in conversations (Losh & Capps, 2003). Difficulties with transitions and taking others' perspectives make it difficult for school-age children with HFA to shift attention from one topic to another, as well as to respond appropriately to the examiner’s questions and produce personal narratives during a conversation.
CHAPTER 2

METHOD

PARTICIPANTS

Participants consisted of 12 children with high-functioning autism (HFA), ranging in age from 8.8 to 12.5. Twenty-five typically-developing (TD) children, with ages evenly distributed between the ages of 8 to 12 served as controls. In both HFA and TD groups, there was a 3:2 male to female ratio. All participants in the study were part of a longitudinal study for the Project for Cognitive and Neural Development in San Diego, CA. All children had normal or corrected auditory and visual acuity and were from an English-speaking background. Children were excluded from the study if they had a history of a chronic medical condition that might interfere with test performance (e.g., traumatic brain injury, meningitis, etc.).

The criteria for inclusion in the TD group included: normal development and medical histories, performance within normal limits on standardized tests of intelligence (i.e., Wechsler Intelligence Scale for Children) (Wechsler, 2000) and language (i.e., Clinical Evaluation of Language Fundamentals Screener), normal academic functioning, normal neurological exams, and no history of developmental or language delay. Children were excluded from TD group if they had chronic use of a medication that might minimize performance on testing (e.g., decongestants that cause drowsiness).

The criteria for inclusion in the HFA group included: meeting diagnostic criteria from the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), meeting the diagnostic criteria from the Autism Diagnostic Interview-Revised (ADI-R) and/or the Autism Diagnostic Observation Schedule (ADOS), and scoring a Performance IQ of 70 or above. Children were excluded from the HFA group if they were also diagnosed with a specific underlying genetic or metabolic diagnosis (e.g., Fragile X syndrome) or if they were uncooperative during testing (e.g., unwilling to wear EEG equipment, unable to understand directions for the tasks). All children in the HFA group had received past speech and language services.
TASKS

Standardized measures and two experimental tasks were used to examine narrative ability in school-age children with HFA. These three tasks were administered over two sessions. The standardized measures were administered during the first session with an unfamiliar adult; the biographical interview and elicited narrative were administered in a second session with that same individual. The interview opened the session, preceding the elicited personal narrative. Experimenters were aware of group identification (i.e., HFA versus TD).

 TASK 1: STANDARDIZED MEASURES

The Clinical Evaluation of Language Fundamentals – fourth edition (CELF-4) (Semel, Wiig, & Secord, 2003) and the Wechsler Intelligence Scale for Children (WISC) (Wechsler, 2000) were administered to the HFA group to further assess cognitive and linguistic abilities. On the CELF-4, standard scores for the core composite, receptive composite, and expressive composite were calculated. In addition, the Recalling sentences and Formulating sentences subtest scores were recorded. For the WISC, participants were assessed for the Full Intelligence Quotient (IQ), Verbal IQ (VIQ), and performance IQ (PIQ) scores.

 TASK 2: NARRATIVE ELICITATION TASK

To gather the Elicited Narratives, the participants were asked to tell a story about a negative personal experience. The experimenter's verbal instructions were, "People disagree and they get into fights or arguments all the time. I'm sure there has been a time when you had an argument or a disagreement or when someone hurt your feelings. I'd like you to tell me about a time when someone made you sad or mad or angry, maybe it was a friend or someone at school. Tell me how it started, what happened, and how it ended. Take your time and think about it. When you're ready, go ahead and start." After the instructions were given, each participant produced a spoken narrative. If the narrative was too general in nature, they were prompted to describe a specific instance (e.g., can you tell me something specific?).
TASK 3: BIOGRAPHICAL INTERVIEW

Conversational Narratives were obtained in a semi-structured conversational task, the Biographical Interview. At the beginning of the testing session, the examiner provided the following verbal directions, "So before we get started with our games, I'd like to ask you some questions about yourself and get to know you a little bit better okay?" The children were then asked questions about various everyday activities. After the conversation was initiated, the children were encouraged to produce short personal narratives (e.g., Tell me about when your sister did something funny) or retells of familiar movies or books. Conversations were semi-structured with respect to common themes. Questioning techniques were varied, with some questions close-ended (e.g., What is your favorite TV show?), and others open-ended (e.g., Why is that your favorite?). When responses were brief, the examiner prompted the child to provide more information.

PROCEDURES

Children were recorded with either a digital audio recorder or an audio cassette during the Biographical interview and the Narrative Elicitation task. The audio files were used to transcribe spoken language using CHAT from the Child Language Data Exchange System (CHILDES) (MacWhinney, 2000).

CODING CONVENTIONS

The Elicited Narrative from the Narrative Elicitation task and the Conversational Narrative (i.e., the longest narrative from the Biographical Interview) were coded at both the micro (i.e., linguistic, social, and cognitive) and the macro (i.e., discourse) levels (see Appendix A).

MICRO STRUCTURAL MEASURES

Coding criteria for micro structural measures were adapted from Reilly et al.'s (1998) coding schema. These measures included length, morphological errors, complex syntax, and evaluative devices.

Elicited Narrative Length: The total number of propositions produced during the Narrative Elicitation Task was tallied to quantify the length of each narrative. A proposition
was defined as a verb and its arguments. The total number of propositions was used as a denominator for micro structural measures to control for the variability of story lengths.

**Conversational Narrative Length:** For the Biographical Interview, the total number of propositions was tallied per narrative to determine the longest Conversational Narrative. The longest narrative from the Biographical Interview (i.e., the Conversational Narrative) was selected for comparison with the Elicited Narrative. The total number of propositions was used as a denominator for micro structural measures to control for the variability of story lengths.

**Morphological errors:** Total instances of morphological errors in each narrative were tallied. These errors included omission, substitution, or overgeneralization in the following subcategories: errors in pronouns, verb auxiliaries, determiners, noun plurals, verb tense, verb agreement for number, and prepositions. Colloquial syntactic structures (e.g., "Me and Jessica") or hypercorrections (e.g., "between Jessica and I") were not considered morphological errors in this study. The proportion of morphological errors was the ratio of total morphological errors to the total number of propositions.

**Complex Syntax** was used to assess linguistic complexity. Complex sentences included multiple propositions that fell within a sentence intonational contour. Subcategories included coordinate sentences, subordinate adverbial clauses, verb complements, and relative clauses (See Appendix B). Both full and "got" passives were included in this measure because they represent a different type of syntax, such that the direct object becomes the subject. The Proportion of Complex Syntax was the ratio of total instances of complex syntax to the total number of propositions. The Diversity of Complex Syntax was calculated by tallying the total different types of complex syntax used during the narrative.

**Evaluative Devices** were used to assess the ability to express the narrator's attitude towards the event and/or provide emotional comments about the event. The evaluative devices included in this study were: general evaluations, mental verbs, emotion states and verbs, causal markers that reflect motivation of a character, hedges to indicate uncertainty, physiological states, intensifiers and attention getters, negatives to indicate that events/behaviors were contrary to expectations, instances of character speech, epistemic markers that indicated intentionality, causative markers that indicated moral strictures, and adverbs (See Appendix B). The Proportion of Evaluative Devices was the ratio of total
instances of evaluative devices to the total number of propositions. The Diversity of Evaluative Devices was calculated by tallying the total different types of evaluative devices used during the narrative.

**DISCOURSE MEASURES**

Coding criteria for discourse levels were adapted from Reilly et al.'s (1998) and Losh and Capps's (2003) coding schemas. These included total number of narrative components, total number of prompts, narrative productivity, and narrative topics.

*Narrative Structure*: This measure was used to assess the ability to produce a complete narrative. Total narrative components included four setting components (i.e., place, situation, time, and character introductions) and five non-setting components (i.e., problem, internal response, attempt, resolution, and code). One point was given for each story component produced within the narrative, for a total of nine points.

*Prompts per narrative*: The total number of prompts produced by the examiner was tallied to assess the participant's ability to independently produce a complete narrative. All prompts following the initial prompt (i.e., "Tell me about…") were included in this total. Prompts were used to request a specific instance (i.e., "Can you think of a more specific example?"), to clarify information (i.e., "You mean she was a singer and an actor?"), or to request elaboration (e.g., "And then what happened?").

**BIOGRAPHICAL INTERVIEW MEASURES**

*Total Number of Propositions from the Biographical Interview*: The total number of propositions in the Biographical Interview was tallied and used as the denominator to determine the propensity to produce narratives.

*Total Number of Narratives*: The number of narratives in the Biographical Interview was tallied to assess the production of narratives in a conversational setting. Narratives were defined as sustained monologic responses, in which two temporally ordered, consecutive propositions about life experiences were produced from a particular evaluative perspective (Labov and Waletzky, 1967). In addition, narratives had to be semantically and pragmatically appropriate.
Narrative Productivity: Each participant's propensity to produce narratives was calculated as the ratio of the total number of narratives in the Biographical Interview to the total number of propositions produced during the Biographical Interview.

Narrative Topic: The Conversational Narrative was analyzed qualitatively for the topic of the narrative. Topics were labeled as personal narratives or retells of movies/books. Personal narratives included stories about participating in their favorite activities or sports games, going to amusement parks or concerts, or describing their best friends. Retells were defined as descriptions of television shows, video games, movies, and/or books.

Reliability

A second coder who was blind to the group status coded 25% of the Elicited Narratives and 20% of Conversational Narratives for reliability on productivity, linguistic, narrative, and social language measures; inter-rater reliability on all measures was greater than 85%.
CHAPTER 3

RESULTS

The ability and propensity of school-age children with HFA to produce narratives was examined through three different tasks. First, these participants were administered standardized tests of cognition and language to compare their cognitive and linguistic abilities to normed populations. In the Narrative Elicitation Task, the participants were explicitly asked to produce a personal narrative about a time when they were sad or mad. This task was used to determine their ability to produce a coherent narrative in a structured, controlled setting. In the Biographical Interview, the participants participated in a dyadic conversation with the experimenter. The purpose of the Biographical Interview was to determine each group's propensity to produce narratives during a conversation, and to assess the quality of these stories.

ANALYSIS 1: RESULTS FOR STANDARDIZED MEASURES

The Clinical Evaluation of Language Fundamentals – fourth edition (CELF-4) (Semel et al., 2003) was administered to the HFA group to further assess linguistic abilities on standardized tests. The Core Composite, Receptive Composite, and Expressive Composite standard scores of the CELF-4 were determined, as well as the Recalling sentences and Formulating sentences subtest scores. The Full IQ, Verbal IQ, and Performance IQ of the Wechsler Intelligence Scale for Children (WISC) (Wechsler, 2000) were calculated to gain a standardized measure of cognition. All HFA participants scored 70 or above on the Full IQ Composite of the WISC. With respect to the CELF-4, six of the children received scores above 80 on the Core Language composite, while the other six children received scores below 80 on the Core Language composite. Refer to Tables 1 and 2 for performance of the HFA group on standardized tests of cognition and language.
Table 1. Standardized Composite Scores for Intelligence for the HFA Group

<table>
<thead>
<tr>
<th>WISC Measures</th>
<th>M</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full IQ</td>
<td>95.58</td>
<td>5.18</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>100.58</td>
<td>4.95</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>91.42</td>
<td>6.52</td>
</tr>
</tbody>
</table>

Table 2. Standardized Linguistic Composite Scores for the HFA Group

<table>
<thead>
<tr>
<th>CELF-4 Scores</th>
<th>M</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Composite</td>
<td>83.33</td>
<td>4.99</td>
</tr>
<tr>
<td>Receptive Composite</td>
<td>82.83</td>
<td>6.41</td>
</tr>
<tr>
<td>Expressive Composite</td>
<td>85.58</td>
<td>5.35</td>
</tr>
<tr>
<td>Recalling Sentences</td>
<td>7.25</td>
<td>0.73</td>
</tr>
<tr>
<td>Formulating Sentences</td>
<td>7.75</td>
<td>0.85</td>
</tr>
</tbody>
</table>

*Full WISC and CELF tests were only administered to HFA participants. WISC scores and CELF Composite scores have a mean of 100 and a standard deviation of 15. The Recalling sentences and Formulating sentence subtests have a mean of 10 and a standard deviation of 3.

**ANALYSIS 2: RESULTS FOR ELICITED AND CONVERSATIONAL NARRATIVES**

The Elicited Narratives and Conversational Narratives (i.e., the longest narrative in each child’s Biographical Interview) were analyzed at the micro structural level by calculating the proportion of morphological errors, the proportion and diversity of complex syntax, and the proportion and diversity of evaluative devices. At the discourse level, the total number of narrative components, the inclusion of setting and non-setting narrative components, and the number of follow-up experimenter prompts were analyzed. Specific to the Biographical Interview, Narrative Productivity and the topics of the Conversational Narratives were compared between groups.

**ANALYSIS STRATEGY**

Separate analyses were carried out for each dependent variable: length, proportion of morphological errors, proportion and diversity of complex syntax, proportion and diversity of evaluative devices, total narrative components, setting components, non-setting narrative components, and experimenter prompts. The same procedure was followed in testing each of
these variables. First, a 2x2 ANOVA with repeated measures on the second factor was carried out to examine the main effect of Task, with Group (HFA, TD) as a between-subjects factor and Task (Elicited Narrative, Conversational Narrative) as a within-subjects factor. Second, simple effects tests were carried out to compare the groups (HFA versus TD) on each task (Elicited versus Conversational Narrative).

**MICRO STRUCTURAL MEASURES**

*Length*

**Description of dependent variable.** Narratives were first coded for Length as measured by number of propositions. Total number of propositions in each narrative was subsequently used as the denominator for the measures of morphological errors, complex syntax, and evaluative devices to control for varying lengths.

**Main effect of Task.** Length was significantly greater on Conversational Narratives ($M = 25.84, SE = 2.71$) compared to Elicited Narratives ($M = 15.56, SE = 2.71$), regardless of group, $F(1, 35) = 7.175, p < .009$.

**Results of Simple Effects Tests.** On the Elicited Narrative, the HFA group showed a general trend towards shorter narratives compared to the TD group, $t(35) = -1.848, p = .073$ (see Figure 1). The mean length for the TD group was 19.96 ($SE = 3.00$), while the mean length for the HFA group was 11.17 ($SE = 2.81$). The length of the Elicited Narratives ranged from 2 – 36 propositions for the HFA group, and 5 – 81 for the TD group. In the Conversational Narrative, the HFA group produced a comparable number of propositions in the Conversational Narrative compared to the TD group, $t(35) = -.631, p = .532$. The mean length for the TD group was 28.08 ($SE = 3.61$), while the mean length for the HFA group was 24.25 ($SE = 4.46$). The length of the Conversational Narratives ranged from 5 – 64 propositions for the HFA group, and 9 – 94 propositions for the TD group.

**Morphological Errors**

**Description of dependent variable.** The total number of morphological errors per narrative was divided by the Length to determine the Proportion of Morphological Errors.

**Main effect of Task.** A 2x2 ANOVA with repeated measures on the second factor did not reveal a significant main effect for task.
Figure 1. Average length (in propositions) of the elicited narrative and the conversational narrative for both groups. On average, the high-functioning autism group demonstrated a trend towards shorter narratives compared to the typically-developing group on the elicited narrative. On the conversational narrative, the high-functioning autism group produced narratives of a comparable length to those of the typically-developing group.

Results of Simple Effects Tests. When producing Elicited Narratives, the HFA group produced a significantly higher proportion of morphological errors compared to the TD group, $t(35) = 2.138$, $p = .040$ (see Figure 2). The mean proportion of morphological errors for the TD group was .03 ($SE = .01$), while the mean proportion of morphological errors for the HFA group was .10 ($SE = .04$). When producing Conversational Narratives, the HFA group also produced a significantly higher proportion of morphological errors compared to the TD group, $t(35) = -2.020$, $p = .051$. The mean proportion of morphological errors for the TD group was 0.03 ($SE = .01$), while the mean proportion of morphological errors for the HFA group was 0.07 ($SE = .03$).

Proportion of Complex Syntax:

Description of dependent variable. The total instances of complex syntax were divided by the total number of propositions in each narrative to calculate Proportion of Complex Syntax.

Main effect of Task. The main effect of Task was significant, such that Proportion of Complex Syntax was significantly lower on Conversational Narratives ($M = 0.69$, $SE = 0.04$)
Figure 2. Average proportion of morphological errors of the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly more morphological errors compared to the typically-developing group on the elicited narrative and the conversational narrative.

compared to Elicited Narratives ($M = 0.84$, $SE = 0.04$), regardless of group, $F(1, 35) = 6.748$, $p < .011$.

Results of Simple Effects Tests. Simple effects tests for group at each task were conducted to examine the relationship between group and task for Proportion of Complex Syntax. In Elicited Narratives, the HFA group produced a significantly lower proportion of complex syntax compared to the TD group, $t(35) = -2.572$, $p = .015$ (see Figure 3). The mean proportion of complex syntax for the TD group was 0.94 ($SE = .05$), while the mean proportion of complex syntax for the HFA group was 0.74 ($SE = .05$). In the Conversational Narratives, the groups did not differ in the proportion of complex sentences in their narratives, $t(35) = .762$, $p = .451$. The mean proportion of complex syntax for the TD group was 0.72 ($SE = .04$), while the mean proportion of complex syntax for the HFA group was 0.66 ($SE = .07$).

Diversity of Complex Syntax:

Description of dependent variable. This measure was calculated by tallying the total number of different types of complex syntax that were used in each narrative, for a total possible of five types.
Figure 3. Average proportion of complex syntax of the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly fewer instances of complex syntax compared to the typically-developing group on the elicited narrative, but produced a comparable number of complex syntax instances on the conversational narrative.

**Main effect of Task.** Participants produced more types of complex syntax on the Conversational Narrative \((M = 3.84, SE = .17)\) compared to the Elicited Narrative \((M = 2.99, SE = .17)\), regardless of group, \(F(1, 35) = 13.154, p < .001\).

**Results of Simple Effects Tests.** In the Elicited Narrative, the HFA group used fewer types of syntactic structures, yielding a significantly lower diversity of complex syntax types compared to the TD group, \(t(35) = -3.455, p = .001\) (see Figure 4). The HFA group produced an average of 2.42 types of complex syntax \((SE = .36)\), while the TD group produced an average of 3.56 types of complex syntax \((SE = .15)\). In the Conversational Narrative, the groups did not differ on syntactic diversity, \(t(35) = .020, p = .984\). The HFA group produced an average of 3.84 types of complex syntax \((SE = .37)\), while the TD group produced an average of 3.83 types of complex syntax \((SE = .15)\).

*Proportion of Evaluative Devices*

**Description of dependent variable.** The total instances of evaluative devices were divided by the total number of propositions in each narrative to calculate the Proportion of Evaluative Devices.
Main effect of Task. A 2x2 ANOVA with repeated measures on the second factor did not reveal significant main effect for task.

Results of Simple Effects Tests. In the Elicited Narrative, the HFA group produced a similar proportion of evaluative devices compared to the TD group, $t(35) = .179, p = .859$ (see Figure 5). The mean proportion of evaluative devices for the TD group was 0.73 ($SE = .06$), while the mean proportion of evaluative devices for the HFA group was 0.75 ($SE = .09$). Similarly, the HFA group produced a similar proportion of evaluative devices compared to the TD group, $t(35) = .429, p = .670$ in the Conversational Narrative. The mean proportion of evaluative devices for the TD group was 0.58 ($SE = .04$), while the mean proportion of evaluative devices for the HFA group was 0.55 ($SE = .07$).

Diversity of Evaluative Devices:

Description of dependent variable. This measure was calculated by tallying the total types of Evaluative Devices used in each narrative, for a total possible of eleven types.

Main effect of Task. A 2x2 ANOVA with repeated measures on the second factor did not reveal a significant main effect for task.
Figure 5. Average proportion of evaluative devices of the elicited narrative and the conversational narrative for both groups. On average, the high-functioning autism group used a comparable amount of evaluative devices when telling a narrative compared to the typically-developing group on both the elicited narrative and the conversational narrative.

Results of Simple Effects Tests. On the Elicited Narrative, the HFA group showed a general trend towards a lower diversity of evaluative devices types compared to the TD group, \( t(35) = -1.864, p = .071 \) (See Figure 6). The HFA group produced an average of 5.41 types of evaluative devices \((SE = .62)\), while the TD group produced an average of 6.68 types of evaluative devices \((SE = .36)\). When examining the diversity of evaluation types on the Conversational Narrative, the HFA group produced a comparable number of evaluative devices types compared to the TD group, \( t(35) = 1.392, p = .173 \). The HFA group produced an average of 5.00 types of evaluative devices \((SE = .58)\), while the TD group produced an average of 5.76 types of evaluative devices \((SE = .26)\).

Mental State Terms: Description of dependent variable. Within the group of evaluative devices, we were also interested at comparing task and group differences specifically for mental state terms (e.g., want to, try to, think, wonder). This measure was calculated by tallying the total number of mental state terms in each narrative.

Main effect of Task. A 2x2 ANOVA with repeated measures on the second factor revealed a trend towards more mental state terms in the Conversational Narrative \((M = 2.37, \)
Figure 6. Average number of evaluative device types used during the elicited narrative for both groups. On average, the high-functioning autism group demonstrated a trend towards fewer types of evaluative devices compared to the typically-developing group on the elicited narrative, but a comparable number of evaluative device types compared to the typically-developing group on the conversational narrative.

$SE = .39$) compared to the Elicited Narrative ($M = 1.43, SE = .39$), regardless of group, $F(1, 35) = 14.329, p < .091$.

**Results of Simple Effects Tests.** On the Elicited Narrative, the HFA group produced significantly fewer mental state terms compared to the TD group, $t(35) = 2.755, p = .009$). The HFA group produced an average of 0.42 mental state terms ($SE = .19$), while the TD group produced an average of 2.44 mental state terms ($SE = .50$). When examining the mental state terms on the Conversational Narrative, the HFA group produced a comparable number of mental state terms compared to the TD group, $t(35) = -.119, p = .906$). The HFA group produced an average of 2.42 mental state terms ($SE = .80$), while the TD group produced an average of 2.32 mental state terms ($SE = .42$).

**Emotion Terms:**

**Description of dependent variable.** Within the group of evaluative devices, we were also interested in comparing task and group differences specifically for emotion terms (e.g., sad, frustrated). This measure was calculated by tallying the total number of emotion terms in each narrative.
**Main effect of Task.** Regardless of group, there were significantly more emotion terms produced in the Elicited Narrative \((M = 1.102, SE = .192)\) compared to the Conversational Narrative \((M = .330, SE = .192)\), \(F(1, 35) = 8.055, p < .006\).

**Results of Simple Effects Tests.** On the Elicited Narrative, the HFA group produced a comparable number of emotion terms compared to the TD group, \(t(35) = .077, p = .939\). The HFA group produced an average of 1.08 emotion terms \((SE = .36)\), while the TD group produced an average of 1.12 emotion terms \((SE = .28)\). When examining the emotion terms on the Conversational Narrative, the HFA group produced a comparable number of emotion terms compared to the TD group, \(t(35) = -1.269, p = .213\). The HFA group produced an average of .50 emotion terms \((SE = .36)\), while the TD group produced an average of .16 emotion terms \((SE = .08)\).

*Causal Language*

**Description of dependent variable.** Within the group of evaluative devices, we were also interested at comparing task and group differences specifically for causal language, or explanations of behaviors and feelings. This measure was calculated by tallying the total number of causal terms (e.g., because, so) and causal inferences (e.g., he fell down so he started crying) in each narrative.

**Main effect of Task.** A 2x2 ANOVA with repeated measures on the second factor did not reveal a significant main effect for task.

**Results of Simple Effects Tests.** On the Elicited Narrative, there was a trend towards fewer instances of causal language in the HFA group compared to the TD group, \(t(35) = 1.839, p = .074\). The HFA group produced an average of 1.17 instances of causal language \((SE = .24)\), while the TD group produced an average of 2.88 instances of causal language \((SE = .63)\). When examining causal language during the Conversational Narrative, the HFA group produced a similar number of instances of causal language when compared to the TD group, \(t(35) = 1.203, p = .237\). The HFA group produced an average of 1.25 instances of causal language \((SE = .43)\), while the TD group produced an average of 1.92 instances of causal language \((SE = .33)\).
ANALYSIS 3: RESULTS FOR DISCOURSE MEASURES

Narrative Components:

**Description of dependent variable.** The total narrative components (i.e., character introductions, place, situation, time, problem, internal response, attempt, resolution, and coda) were tallied for each narrative, for a total of nine components.

**Main effect of Task.** A 2x2 ANOVA with repeated measures did not reveal a significant main effect for task.

**Results of Simple Effects Tests.** On Elicited Narratives, the HFA group produced fewer total narrative components compared to their TD peers, $t(35) = -2.469, p = .019$ (see Figure 7). On average, TD individuals produced 1.573 more narrative components compared to the HFA group. The mean number of narrative components produced for the TD group was 6.24 ($SE = .29$), while the mean number of narrative components for the HFA group was 4.67 ($SE = .70$). In the Conversational Narrative, the HFA group showed a general trend towards fewer total narrative components compared to their TD peers, $t(35) = 1.808, p = .079$. On average, TD individuals produced 1.10 more narrative components compared to the HFA group. The mean number of narrative components produced by the TD group was 5.68 ($SE = .28$), while the mean number of narrative components produced by the HFA group was 4.58 ($SE = .66$).

Setting Components:

**Description of dependent variable.** The narrative components describing the Setting (i.e., character, time, location, situation) were tallied and further analyzed.

**Main effect of Task.** The 2x2 ANOVA with repeated measures on the second factor did not reveal a main effect for Task.

**Results of Simple Effects Tests.** A significant difference was found when examining setting components specifically, such that the HFA group produced fewer setting components compared to the TD group, $t(35) = -3.054, p = .004$ (see Figure 8). The mean number of setting components produced for the TD group was 2.96 ($SE = .20$), while the mean number of setting components for the HFA group was 1.83 ($SE = .35$). When examining setting components of the Conversational Narrative, the HFA group showed a general trend towards fewer setting components compared to the TD group, $t(35) = 1.942, p = .060$. The mean
Figure 7. Average number of total narrative components used during the elicited narrative and the conversational narrative for both groups. On average, the high-functioning autism group produced significantly fewer narrative components compared to the typically-developing group on both the elicited narrative and the conversational narrative.

Figure 8. Average number of setting components (i.e., character, location, time, situation for a possible total of 4) produced during the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced significantly fewer narrative setting components compared to the typically-developing group on the elicited narrative, and a trend towards fewer narrative setting components on the conversational narrative.
number of setting components (i.e., character, time, location, characters) produced for the TD group was 2.88 (SE = .16), while the mean number of setting components for the HFA group was 2.17 (SE = .42).

Non-setting Components:

**Description of dependent variable.** Narrative ability was further explored by comparing the inclusion of non-setting narrative components: problem, internal response, attempt, resolution, and coda.

**Main effect of Task.** A 2x2 ANOVA with repeated measures on the second factor did not reveal a significant main effect for task.

**Results of Simple Effects Tests.** Results for the Elicited Narrative showed that the TD and HFA group did not significantly differ in number of non-setting narrative components produced, \( t(35) = -1.101, p = .278 \) (see Figure 9). The mean number of non-setting narrative components produced for the TD group was 3.28 (SE = .19), while the mean number of non-setting narrative components produced for the HFA group was 2.83 (SE = .44). In the Conversational Narrative, the TD and HFA group did not significantly differ in number of narrative components produced, \( t(35) = .964, p = .342 \). The mean number of non-setting narrative components produced for the TD group was 2.80 (SE = .22), while the mean number of non-setting narrative components for the HFA group was 2.42 (SE = .36).

Prompts:

**Description of dependent variable.** The total number of experimenter prompts used throughout the narrative to elaborate, clarify, or specify were tallied.

**Main effect of Task.** There were significantly more prompts used in the Conversational Narrative (\( M = 3.770, SE = .321 \)) compared to the Elicited Narrative (\( M = .733, SE = .321 \)), regardless of Group, \( F(1, 35) = 44.613, p < .000 \).

**Results of Simple Effects Tests.** In the Elicited Narratives, the experimenters gave a comparable number of prompts to both the TD and the HFA groups, \( t(35) = -.267, p = .791 \) (see Figure 10). The average number of these follow-up prompts for the TD group was .67 (SE = .43), while the average number of additional prompts for the HFA group was .80 (SE = .28). In the Conversational Task, the HFA group showed a general trend towards higher
Figure 9. Average number of non-setting narrative components (i.e., problem, internal response, attempt, resolution, coda for a possible total of 5) used during the elicited narrative and conversational narrative for both groups. On average, the high-functioning autism group produced a comparable number of non-setting narrative components compared.

Figure 10. Average number of prompts received by both groups during the elicited narrative and conversational narrative. On average, the high-functioning autism group received a comparable number of prompts compared to the typically-developing group on the elicited narrative. However, on the conversational narrative, the high-functioning autism group showed a trend toward a higher number of prompts compared to the typically-developing group.
number of experimenter prompts compared to the TD group, $t(35) = 1.921$, $p = .063$. The average number of additional prompts for the TD group was $3.04 (SE = .40)$, while the average number of additional prompts for the HFA group was $4.50 (SE = .71)$.

**Analysis 4: Biographical Interview Measures**

*Narrative productivity:*

**Description of dependent variable.** The propensity to produce narratives was examined by employing a t-test to compare the HFA and TD groups on Narrative Productivity. Narrative Productivity was the ratio of total narratives produced in the Biographical Interview to the total number of propositions from the Biographical Interview.

The groups did not differ on Narrative Productivity, $t(35) = .810$, $p = .424$. The mean narrative productivity for the TD group was .09 ($SE = 0.01$), while the mean narrative productivity for the HFA group was .10 ($SE = 0.01$).

*Topic of Longest Conversational narrative:*

**Description of dependent variable.** Conversational Narratives were labeled as personal narratives or retells of movies/books. Personal narratives included stories about participating in their favorite activities, going to amusement parks, or describing their best friends. Retells were defined as descriptions of television shows, video games, and/or books.

Of the twelve HFA participants, 6/12 (50%) produced personal narratives, while 6/12 (50%) produced retells. Of the 25 TD participants, 14/25 (56%) produced personal narratives, while 11/25 (44%) produced retells (see Figure 11).

**Analysis 5: Relations Between Standardized and Experimental Tasks**

Correlational analyses were conducted to examine the relationship between standardized measures and narrative measures. The Core Composite, Receptive Composite, and Expressive Composite standard scores were not correlated with linguistic measures (i.e., proportion of morphological errors, proportion of complex syntax) in the Elicited Narratives or the Conversational Narratives. The Recalling sentences and Formulating sentences subtests were also not correlated with linguistic measures of the Elicited or Conversational Narratives. The Formulating sentences subtest was, however, correlated with total narrative components produced in the Conversational Narrative, $r(10) = .578$, $p < .049$. The FIQ, VIQ,
Figure 11. Proportion of participants that produced either a retell or a personal narrative for the conversational narrative of the biographical interview. The proportion of HFA participants that produced personal narratives was similar to the proportion of TD participants that produced personal narratives.

and PIQ scores of the WISC were not correlated with total narrative components produced in either the Narrative Elicitation Task or the Biographical Interview.

To examine the relationship between the narrative ability and the propensity to produce narratives in a conversation, correlational analyses were conducted to compare performance on narrative ability (i.e., the total number of narrative components) and Narrative Productivity. The total number of narrative components in the Elicited Narratives and the Conversational narratives were not found to be significantly related to Narrative Productivity (i.e., the propensity to produce narratives in the conversation).
CHAPTER 4

DISCUSSION, CLINICAL IMPLICATIONS, FUTURE DIRECTIONS, & CONCLUSION

Narratives provide a unique opportunity to study linguistic, social, and cognitive aspects of individuals with high-functioning autism (HFA). Past research has shown that school-age children with HFA often score within normal limits on standardized tests of language and cognition, but are delayed in areas of social communication. However, details about how these various variables are expressed and interact with each other have not been studied in the school-age population. No study has directly compared the ability to produce narratives with their propensity to produce Conversational Narratives within the same group of HFA children. This study attempted to quantify the nature and extent of narrative ability in this population in both a structured narrative elicitation task and a semi-structured conversation task. Results showed that overall, individuals with HFA were comparable to the TD group on some measures, but performed inferiorly on others.

In this study, language and cognitive abilities were examined through the administration of standardized tests of language and intelligence tests. With respect to the standardized testing of language, half of the participants with HFA performed within normal limits compared to the normed populations of the CELF-4, while the other half fell below normal limits (i.e., standard scores below 80). All participants scored within normal limits on the WISC Verbal IQ and Full IQ scores. Two participants scored before a score of 70 on the Performance IQ. Pearson bivariate correlations were used to compare standardized language scores with linguistic measures of narrative performance (i.e., proportion of morphological errors, proportion of complex syntax), and to compare standardized intelligence quotient scores with cognitive measures of narrative performance (i.e., number of narrative components). There were no significant correlations between standardized measures of language and cognition and their respective narrative measures.

Narrative ability was examined by analyzing the linguistic, cognitive, and social aspects of Elicited and Conversational Narratives. When comparing Elicited Narratives to
Conversational Narratives, regardless of group, Elicited Narratives were shorter in length compared to Conversational Narratives. With respect to complex syntax, instances of complex syntax were more frequent in the Elicited Narratives than in the Conversational narratives, but diversity was higher in the Conversational Narratives compared to the Elicited Narratives. More experimenter prompts were used in the Conversational narrative compared to the Elicited Narrative. When looking at Task Differences, no main effects for task were revealed on measures of Morphological Errors, Evaluative devices, or Narrative components across narrative tasks.

We also examined group differences on the two narrative tasks. When looking specifically at the Elicited Narrative Task, we found significant group differences for proportion of morphological errors, proportion of complex syntax, and total number of narrative components, with the TD group outperforming the HFA group on these measures. However, there were no group differences in the use of evaluative devices between groups. The longest Conversational Narrative in the Biographical Interview was analyzed for linguistic, cognitive, and social measures. We found significant group differences for proportion of morphological errors and a trend towards significance for total number of narrative components and experimenter prompts, with the TD group outperforming the HFA group. There were no significant between-group differences on use of complex syntax or the use of evaluative devices. In both tasks, the HFA received more experimenter prompts compared to the TD participants. When analyzing the Biographical Interview as a whole, there were no significant differences found for narrative productivity or narrative topic during a conversation.

We now turn to our original predictions:

**Prediction 1:** It was predicted that linguistic knowledge and intelligence, as measured by standardized tests, would not correlate with the narrative performance in the HFA group.

Analyses confirmed this hypothesis. Standardized measures of language and cognition were not correlated with linguistic and cognitive measures of narrative performance in the HFA population. The standard scores of the CELF-4 were not correlated with the Proportion of Morphological Errors or the Proportion of Complex Syntax in either the Elicited Narratives or the Conversational Narratives. On the WISC, the Full IQ, Verbal
IQ, and Performance IQ scores were not correlated with total narrative components produced in either the Narrative Elicitation Task or the Biographical Interview.

**Prediction 2:** It was predicted that the HFA would demonstrate inferior narrative abilities compared to the TD group, as characterized by more morphological errors, fewer instances of complex syntax, fewer instances of evaluative devices, fewer story components, and more additional prompts on Elicited and Conversational Narratives.

Analyses broadly confirmed this hypothesis; however, not all measures followed this trend. In the Elicited Narrative, the measures that confirmed this hypothesis were the Proportion of Morphological Errors, the Proportion of Complex Syntax, and Total Narrative Components, with HFA performing inferiorly compared to their TD peers. On the semi-structured conversational task, school-age children with HFA performed similarly to their TD peers on the complex syntax measures and the evaluative device measures. However, the HFA group produced significantly more morphological errors, fewer narrative components, and received more experimenter prompts compared to the TD group. This supports past findings by Goldman (2008) and Losh and Capps (2003), who found that school-age children with HFA produce fewer story components.

**Prediction 3:** It was predicted that the ability to produce narratives would correlate with Narrative Propensity in a conversation for the TD group, but not with the HFA group.

Analysis did not confirm this hypothesis. The ability to produce narratives was not correlated with Narrative Propensity in a conversation in either the TD group or the HFA group. This suggests that narrative ability was not related to the number of narratives an individual participant would produce in a conversation, for both the TD group and the HFA group. These results we found may have been due to our minimalistic definition of narratives (Labov & Waletsky, 1967) or to the methodology of this study. Participants interacted with an adult experimenter, and thus, may not have been interested in forming a social bond with the experimenter. It is possible that participants may demonstrate differential narrative production in conversations with their peers.

**Prediction 4:** It was predicted that children with HFA would produce fewer Conversational Narratives in a semi-structured conversation, compared to their TD peers.

Analyses did not confirm this hypothesis. Our results showed that school-age children with HFA produced a comparable proportion of narratives compared to their TD peers.
Results also showed that Conversational Narratives did not differ in length (i.e., total number of propositions) between groups. This suggests that children with HFA are responding similarly to the experimenter’s prompts to elicit narratives compared to their TD peers. This supports past research by Losh and Capps (2003), who found that both HFA and TD groups produced the same number of narratives in a conversational task. Qualitatively, both groups produced narratives about personal stories (e.g., best friend) and retells (e.g., favorite movie). This is in contrast to findings by Losh and Capps (2003), who found that many of their HFA participants produced narratives about inanimate objects (e.g., computers). These conflicting findings may be due to different questions that were asked of the participants in each study.

**DISCUSSION**

School-age children with high-functioning autism are often characterized by rigid and perseverant behavior, in addition to social deficits in perspective taking abilities; these deficits make it more difficult for them to shift their attention from one topic to another during a conversation and to respond appropriately to their conversational partners. Our findings suggest that it is not the amount or length of narratives produced that differentiates the groups, but rather the quality of the individual narratives. School-age children with HFA are producing narratives at a comparable rate to their peers, but the narratives they produce include fewer components and are thus less informative.

**Structural Language in School-age Children with HFA:**

We were interested in exploring the ability of school-age children with HFA to produce appropriate structural language on tasks differing with regards to social and cognitive demands. On standardized linguistic tests, half of the children with HFA received standard scores above 80, while the other half fell below the normal range. When exploring linguistic abilities on narrative tasks, the HFA group produced significantly more morphological errors on both the Elicited Narrative and the Conversational Narrative, compared to the TD group. When analyzing complex syntactic structures, school-age children with HFA performed inferiorly compared to the TD group in both frequency and types of complex syntax in the Elicited Narrative. However, on the Conversational Narrative,
the HFA group performed comparably to the TD group on both frequency and diversity of complex syntax.

With respect to standardized tests of language, six HFA participants in our study received standard scores above 80, which translate to the ninth percentile or higher. The standard scores of the CELF–4 are based on a standardization sample of 2,650 students, which is representative of the United States population (the year 2000) in age, gender, race/ethnicity, socioeconomic status based on the education level of the primary parent, and geographic region (Semel et al., 2003). Spaulding, Plante, and Farinella (2006) reported that eligibility criteria for language impairment ranges from state to state (e.g., –1.5 Standard Deviations (SD) in Missouri and South Dakota, –1.75 SD in Wisconsin, –1.5 to –2.0 SD in New York and Arizona, –2.0 SD in Kentucky). A standard score of 80 falls within -1.5 and -2.0 SD from the mean, suggesting that half of our participants would be considered “language delayed” in the school districts, while the six participants would be considered within normal limits.

We used the number of propositions as a denominator to control for length across participants. Regardless of group, the length of the Conversational Narratives was significantly longer than the Elicited Narratives. When looking at group differences, children with HFA produced shorter Elicited Narratives compared to the TD children, but Conversational Narratives of comparable length. This may be due to greater motivation to communicate during the Biographical Interview. During the Elicited Narrative, the HFA were asked to discuss a time when they felt angry or sad. They may not be eager to share information about these negative experiences. On the other hand, the Biographical Interview was more dynamic; the participants were given more freedom in choosing the topics of their narratives. Furthermore, the longest sample from the Biographical Interview was selected for comparison with the Elicited Narrative. As such, it is likely that these narratives described topics that were of “intense interest” to the HFA participants. As such, the participants may have been more motivated to tell others about these topics.

Morphological inflections are obligatory. As such, individuals do not have the option of whether or not to include specific morphological inflections in their speech. Table 3 demonstrates the types of errors that were seen in our results. Two types of verb tense errors are present: overgeneralizations (i.e., hurt-ed) and verb tense errors (i.e., me and angel was
Table 3. Morphological Errors from a Conversational Narrative for a HFA Participant (514) – A 11 Year Old Female

Examples of Morphological Errors (from Conversational Narrative)

*CHI: you know where it stinged me?

*CHI: and I said a bee stung me while me and angel was playing!

As morphological inflections are obligatory, children with HFA cannot avoid the morphological inflections that may be more difficult to learn (e.g., irregular verb tense, past tense). These errors are present in younger children with HFA, and have carried over into the school-age years. This suggests that children with HFA do present with underlying morphosyntactic difficulties that become apparent during higher order processing tasks. These results support past research by Condouris et al. (2003), who found that grammatical errors were common in spontaneous speech of school-age children with HFA.

It is, however, important to note that there was a lot of variability in the morphological errors produced by the HFA group. Some participants made no errors, others made numerous errors, and others presented with errors on only one of the two narrative tasks. On the Elicited Narrative, two participants within the HFA group had more morphological errors compared to the other ten participants of the HFA group. The Proportion of morphological errors for participant 502 was 0.47, and the Proportion of morphological errors for participant 513 was 0.25. The other ten HFA participants had values ranging from 0 to 0.13. Five of the twelve (41.67%) HFA participants did not produce any morphological errors in the Elicited Narrative. Interestingly, on the Conversational Narrative, there were again outliers for the HFA group, but these participants were different than the participants that produced multiple errors on the Elicited Narrative (i.e., The Proportion of morphological errors for participant 514 was 0.30, and the Proportion of morphological errors for participant 509 was 0.22.). The other ten HFA participants had values ranging from 0 to .14.
These results suggest that there is high variability both between subjects and within subjects in the HFA population. Between subjects, some participants did not produce any morphological errors, whereas others frequently produced morphological errors in their narratives. Within subjects, performance was variable depending on the task. For example, when looking specifically at 502’s Elicited Narrative, the participant presented with prepositional errors (e.g., “the key out of [*] under his bed”) and used irregular verb tenses inaccurately (e.g., he really hurt-ed [*] me; he [*] only lay on the bed), which may have contributed to the participant 502's overall higher Proportion of Morphological Errors (0.471) on the Elicited Task. On the Conversational Narrative, his Proportion of Morphological Errors was only 0.05.

When comparing CELF scores to the Proportion of morphological errors in the narratives, the participants with low CELF Core Composites were not necessarily the participants that made the most errors on their narratives. In other words, the participants with the lowest CELF scores did not make the most morphological errors. For example, the participant that received a Core Composite standard score of 64 made no errors in the Elicited Narrative or Conversational Narrative. On the other hand, the participants with the highest CELF scores did not have the least amount of morphological errors in their narratives. The participant that received a Core Composite standard score of 121 had a 0.09 Proportion of morphological errors on the Elicited Narrative, and 0.07 Proportion of morphological errors on the Conversational Narrative.

Complex Syntax:

In narratives, complex syntactic constructions are optional linguistic devices; they are used to connect local and global story elements of narratives and to highlight important events. With respect to complex syntax, the HFA group produced significantly fewer instances and types of complex syntax compared to the TD group on the Elicited Narrative, but comparable instances and types of complex syntax on the Conversational Narrative. Table 4 and Table 5 demonstrate the trend that was seen in our results. The HFA participant produced more instances and types of complex syntax in the Conversational Narrative (i.e., six instances, four types) compared to the Elicited Narrative (i.e., four instances, two types).
Table 4. Complex Syntax in Narrative Tasks for a HFA participant (518) – A 11 Year Male

**Excerpt from Elicited Narrative: Complex Syntax**

*CHI: he said (VC)/ that most people are strong./
*CHI: matter of fact he said that (VC)/ his spine hurt./
*CHI: and (COOR) the kid grabbed him by the backpack/ and shoved them down to the ground with all his strength./
*CHI: he said (VC)/ he was even pushing up./

**Excerpt from Conversational Narrative: Complex Syntax**

*CHI: well because (ADV) Smash Brother's Brawl is the hard-est disc/ to read (VC) for my Wii./
*CHI: well now I have to play (VC) Super Mario Brother's Wii/ and search for all the coin-s on World+Two./
*EXP: oh!
*CHI: and (COOR) there-is eight worlds./
*EXP: huh wow.
*CHI: so (ADV) I have to get (VC) all the point-s from world-s one through eight./

VC = verb complements; RC = relative clauses; COORD = coordinating conjunctions
ADV = adverbial clause

The TD participant produced multiple instances of complex syntax, as well as a wide variety of complex syntax, in both narrative situations.

Past research by Capps, Kehres, and Sigman (1998) found that children with Low-Functioning Autism produced fewer personal narratives in conversation, which were "concrete" and "minimalist," compared to language-matched peers with developmental disorders. Overall, the researchers concluded that although linguistic abilities were adequate to produce "sophisticated conversational contributions," children with LFA tended to rely on "developmentally primitive ways of maintaining conversations." In our study, the HFA participants produced complex syntactic structures, comparable to their TD peers, in the Conversational Narrative. This suggests that while individuals with LFA may not be able to apply their linguistic skills to narrative production, individuals with HFA can apply core structural language abilities to produce more linguistically complex stories.
Table 5. Structural Language Examples in Narrative Tasks for a TD participant (8328) – A 11 Year Old Female

**Excerpt from Elicited Narrative: Complex Syntax**

*CHI: there was a time at school/ when (ADV) one of my friends she kinda made me (VC) feel sad and very angry one time / because (ADV) she would ask me (VC) to do (VC) something / and (COOR) if (ADV) I said (VC)/ no I don't really wanna do (VC) that right now/ or (COOR) like we play Wall Ball?

**Excerpt from Conversational Narrative: Complex Syntax**

*CHI: it's like kind of an older movie / and (COOR) it's about a lady / named Isabella (RC) and a man / named Navar (RC).
*CHI: and (COOR) the Bishop loved her / but (COOR) she was already gonna like marry (VC) Navar/ and (COOR) so (ADV) he got really upset / and (COOR) he put a curse on them.

VC = verb complements; RC = relative clauses; COORD = coordinating conjunctions
ADV = adverbial clause

This finding also contrasts with past research by Losh and Capps (2003), who found that children with HFA produced a more restricted range of complex syntactic structures than TD children on Conversational Narratives. One explanation for these results may be that the use of complex syntax is a rhetorical choice. In contrast to morpho-syntactic structures (e.g., verb tense endings, plural –s), the use of complex syntax is optional and at the discretion of the user. The increase in frequency and diversity of complex syntax seen in Conversational Narratives, compared to Elicited Narratives, may be explained by the individual participant's interest in the task. The Conversational Narrative was selected from the semi-structured conversation based on length (i.e. the longest narrative from the conversation was selected for detailed analysis). It is thus likely that the HFA participants were describing one of their “intense interests,” and as such, may have been more motivated to share their interests. Therefore, our findings suggest that school-age children with HFA may perform comparably on linguistic measures when motivated to share information with others.

These findings may also be explained by differences in the task demands. In the Elicited Narrative, the HFA participants are given a specific topic, which may be harder due to the negative emotions associated with the task. During the Conversational Narrative, the
HFA participants may choose to talk about topics that they prefer, such as their intense interests. These children are often more proficient when discussing these topics and use more familiar vocabulary, which decreases their cognitive load. If cognitive load is lower when producing Conversational Narratives compared to Elicited Narratives, children with HFA can allocate more resources to optional linguistic devices (i.e., producing more instances and types of complex syntax and evaluative devices).

Overall, with respect to micro-level measures, we found that participants with HFA produced more morphological errors on both the Elicited and Conversational Narratives, compared to their TD peers. They performed comparably to TD peers on frequency and types of complex syntax on Conversational Narratives, but not on Elicited Narratives. This was surprising as we had originally predicted inferior performance on the Conversational task due to the unstructured nature of the task.

**Social Deficits in School-age Children with HFA:**

One of the questions we wanted to answer was whether or not social language was affected by narrative context. Regardless of group, there were more emotion terms in the Elicited Narrative, compared to the Conversational Narrative. This is expected as the participants were specifically asked to talk about an emotional experience during the Elicited Narrative. As such, emotional vocabulary was inherently embedded in this task.

When analyzing group differences, school-age children with HFA performed comparably to their TD peers on Proportion of Evaluative Devices on both the Elicited Narratives and the Conversational Narratives. However, HFA participants were characterized by a trend towards fewer types of evaluative devices compared to their TD peers on Elicited Narratives, but a comparable number of evaluative devices on Conversational Narratives.

Table 6 exemplifies the trend of evaluative language seen in the HFA group. This HFA participant used evaluative language appropriately in both the Elicited and the Conversational Narrative. When looking specifically at emotion terms, the HFA group produced similar numbers of emotion terms compared to the TD group on both the Conversational Narratives and the Elicited Narratives. In Table 4, participant 503 used fewer emotion terms in the Conversational Narrative compared to the Elicited Narrative, which is appropriate because the Elicited Narrative is an emotionally-charged task. These findings suggest that the HFA children were able to appropriately adapt their use of emotional
Table 6. Evaluative Device Examples in Narrative Tasks for a HFA participant (503): A 9 Year Old Male

**Narrative Elicitation Task**

*CHI: well it started when I was walking in the aquarium and I was lost.

*CHI: and then what happened was my mom grabbed me on the hood of my sweater and *it started to choke me* (causal) and she didn't (neg) *know* (mental).

*CHI: and I was like *really* (intensifier) *angry* (emotion) at her for like ten minutes ...  

**Biographical Interview Task**

*CHI: yes they-'re like my *favorite* (intensifier) episodes and movies.

*EXP: cool.

*CHI: and this alien guy name-ed Ion he-'is a prisoner of time.

*CHI: he has this purple energy like the Ecturnite *evil* (general) Ghost Freak.

*CHI: *because* (causal) in one of the episode-s before this # Ghost Freak was actually (epistemic) trapped inside the Omnitrix and he *want-ed out* (mental).

language to the task, using more emotional language when asked to discuss a personal experience (i.e., the Narrative Elicitation Task). This also aligns with past research by Losh and Capps, stating that children with HFA were able to define simple emotions and discuss personal experiences with basic emotions (e.g., happy, sad, angry, afraid, and disgusted).

In the Conversational Narrative, participant 503 used intensifiers, general evaluations, causal markers, and mental terms to capture the audience's attention and interest (See Table 4). For the Biographical Interview, the TD peers represented a natural baseline of evaluative devices typically present in a conversation. In comparison, the HFA children did not produce significantly more or fewer evaluative devices compared to this baseline, suggesting that children with HFA again were able to match the amount of social language used by their peers. Comparable performance on Conversational Narratives may also suggest that children with HFA are more animated when discussing topics they are interested in.

Past research has indicated that children with HFA have difficulty with causal language, characterized by infrequent explanations of motives and intentions of others. When looking specifically at causal language, there were no task differences between the two narrative tasks. However, there were group differences, such that the HFA group produced fewer instances of causal language during the Elicited Narrative compared to their TD peers.
The HFA group produced comparable instances of causal language in their Conversational Narratives to their TD peers. This supports past research, which has shown that children with HFA are less inclined to organize narratives around causal information (Losh & Capps, 2006).

We were also interested in exploring the diversity of evaluative devices; the HFA participants produced fewer types of evaluative devices compared to the TD group, demonstrating significantly lesser variety in their usage of evaluative devices. These findings suggest that school-age children with HFA may be using a rule-based system for use of evaluative devices, rather than a more intuitive, dynamic system through observation that may be employed by TD children. Since evaluative devices modulate and give flavor to the narrative, a lesser variety of evaluative devices may make the narrative repetitive/less interesting.

**Perspective Taking Abilities:**

We also looked at perspective taking abilities in children with HFA by analyzing the presence of setting components in narratives and the use of mental state terms. The purpose of the setting is to set the scene for the audience, which requires perspective-taking abilities. The narrator must take into consideration the audience's knowledge or what the audience needs to know to set up this "other world" in which the story occurs. The development of providing a complete setting is a later development, occurring around the age of 12 in TD children (Ravid & Tolchinsky, 2002).

Although the HFA group produced a comparable number of narrative non-setting components (i.e., problem, internal response, attempt, resolution, and coda) compared to TD group, the HFA group had specific difficulties producing the setting components for both types of narratives (i.e., character introductions, time, place, situation). In the examples in Table 7, the HFA participant produced the character (i.e., my little brother) and immediately jumps into the problem (i.e., pulled my hair). He does not elaborate on the place, situation, or location of the setting. In the Conversational Narrative, the HFA participant includes the time and place, however, does not properly introduce the characters. The participant uses "we" without introducing the characters beforehand. The ambiguous use of anaphora, where a pronoun refers to another person, demonstrates low perspective taking abilities. The
Table 7. Setting Components in Narratives a HFA participant (504) - A Ten Year Old Male

**Narrative Elicitation Task**

*CHI: My little brother pulled my hair...
*CHI: and I pinned him down.

**Biographical Interview Task**

*CHI: I went to Disneyland last Sunday.
*CHI: Although here's something that might be a little bit bad.
*CHI: First, we went to Tom Sawyer's Island....

participant is not recognizing that the audience does not know the information that the speaker knows.

These difficulties with setting components support past comments by Paul (2001), who stated that children with autism often do not provide enough background information, suggesting difficulties establishing shared frames of reference. When applied to the conversation context, children with HFA may not fully understand how conversations are negotiations between two personal interpretations of the world (Cashin, 2008). These findings suggest that school-age children have difficulties using higher-level perspective taking abilities to provide the background necessary to set the scene for their audience when producing narratives.

*Mental State Terms:*

Mental State Terms, a subcategory of evaluative devices, are also indicative of perspective taking ability. Mental state terms include “want,” “think,” and “like;” inferring these mental states requires perspective taking abilities because they are not perceptually visible. Regardless of group, more mental state terms were produced in the Conversational Narrative compared to the Elicited Narrative. In the Elicited Narrative, the HFA group produced significantly fewer instances of mental state terms; however, they produced a comparable number on the Conversational Narrative. This supports past findings by Tager-Flusberg & Sullivan (1995) who show that children with HFA have difficulties producing mental state terms compared to their TD peers.
Narrative Performance in School-age Children with HFA:

In this study, one of the questions we had was whether or not a relationship existed between standardized linguistic and cognitive measures and measures of narrative ability. Results found that there were no significant correlations between CELF composite scores with linguistic measures (i.e., morphological errors, complex syntax). Even though half the HFA group received scores below normal limits on standardized testing of language, they performed comparably to peers on measures of complex syntax. This suggests that standardized tests and narrative tasks may assess different aspects of linguistic knowledge and performance.

With regard to cognitive measures, results showed no significant correlations between WASI composite scores with cognitive aspects of narratives (i.e., total number of narrative components). The Formulating Sentences Subtest of the CELF was correlated with the narrative components produced in the Conversational Narratives. This correlation may be due to similarities in the tasks. The participants in this task are presented with a picture and asked to produce a sentence using target words or phrases (e.g., Make a sentence with the word, "nevertheless").

We also found no correlations between IQ composites and narrative component measures. This supports recent research, which has shown that IQ does not predict academic performance in school-age children with HFA (McElroy, 2010). McElroy (2010) correlated IQ scores with academic tests for reading and spelling. Scores of 27 of the 30 participants were higher or lower on these academic tests than their IQ scores would have predicted, suggesting that IQ may not be indicative of academic performance. These findings suggest that perhaps specific subtest measures (i.e., Formulating Sentences) may be more indicative of overall narrative abilities than standard composite scores.

We also examined how well the school-age children with HFA were able to use language to produce a coherent narrative package compared to their TD peers. In the Elicited Narrative, the HFA group produced significantly fewer narrative components, and we found a trend toward fewer narrative components in the Conversational Narrative. In both tasks, the school-age children with HFA produced more impoverished settings than the control group. This supports past studies by Goldman (2008) and Losh and Capps (2003), who found that children with HFA produce fewer story components. As both Elicited and Conversational
Narratives produced by the HFA group were inferior compared to those of TD peers, these findings suggest that either (1) cognitive deficits may be related to inferior narrative production in this population or (2) that their ability to use pragmatic language is challenged in these tasks.

An explanation for these group differences may also be due to differences in executive functioning abilities. The HFA participants performed comparably to peers on formal IQ tests and on some linguistic measures of narratives, suggesting that they have the basic linguistic and cognitive skills necessary to produce a narrative. However, narrative production also requires the integration and organization of input from multiple different sources of knowledge (i.e., cognitive, linguistic, and social). Thus, problems in producing Conversational Narratives in a social context may stem from problems with executive functioning in the HFA population (Verté et al., 2005). Low executive functioning abilities in the HFA population is evidenced by past research characterizing the HFA population with low organization skills (Kenworthy et al., 2005). Furthermore, past research has found that executive functioning measures were correlated with narrative performance in neurologically intact adults (Cannizzaro, 2004), suggesting that higher executive functioning abilities are related to better narrative performance. With lower executive functioning capabilities, children with HFA may not be able to coordinate and organize information efficiently from various cognitive sources to produce narratives as complex as their TD peers.

Furthermore, children with HFA are by definition impaired in social communication. Through the use of cognitive abilities, these children can often learn to compensate for their social deficits by memorizing social rules or applying social cognitive strategies. In other words, children with HFA use their cognitive resources to learn the basic social skills that are intuitive for other children, that is, they use a top-down approach for learning social interaction. This is nicely exemplified in Grandhin’s (1995) following quote: “I had to think about every social interaction... a scientist trying to figure out the ways of the natives” (p. 133). Her comments suggest that social interactions and conversations are cognitively demanding for individuals with HFA (Losh & Capps, 2006). In other words, for children with HFA, social skills are controlled processes that require additional cognitive resources, while for TD children; social cognition is an automatic process. With cognitive resources allocated to attending to the social demands of a dyadic interaction (e.g., turn-taking,
responding appropriately, maintaining a topic), children with HFA have fewer resources for narrative production. As such, performance in narrative ability may decline as a function of decreased availability of cognitive resources. This suggests that children with HFA may have the knowledge, but cannot put that knowledge in place on-line because they are processing too many different variables at one time.

Differences in memory might also play a role in production of a coherent narrative. Differential memory storage systems and methods for processing information (i.e., chronologically versus semantically based; visually versus linguistically based) may also explain group differences in the production of narrative components. As mentioned in the introduction, individuals with autism may also store information differently compared to TD individuals. TD individuals use semantically organized networks to store experiential information, whereas individuals with autism may store information chronologically, that is, in the order it was perceived (Cashin, 2008). Thus, differences in the way they perceive, process, and store information about world around them may result in more difficulty retrieving the narrative components of a story. This initial difference in the storage of memories (i.e., in how they are organized) may make retrieval more difficult for individuals with HFA when they try to produce a coherent narrative.

Role of Adult Accommodation in Narrative Production in School-age Children with HFA:

In addition to narrative coherence, we also explored the amount of assistance the school-age children with HFA received during these narrative tasks compared to their TD peers. Specifically, we wanted to investigate their ability to produce a narrative independently. Regardless of group, there were more prompts used during the Conversational Narrative compared to the Elicited Narrative. This is an unstructured task, where the experimenters are, at each turn, essentially giving the participant the invitation to tell a story. Another explanation is that the additional prompts in the Biographical Interview are in fact, simply natural responses during a conversation. As the Biographical interview is a dialogic task, it is characterized by turn-taking between the experimenter and the participant.

We were also interested in the amount of assistance the school-age children with HFA received during these narrative tasks compared to their TD peers. Specifically, we wanted to investigate their ability to produce a narrative independently. When looking at
each task specifically, school-age children with HFA received more prompts from the experimenter during Conversational Narrative, but not the Elicited Narrative, compared to their TD peers. This suggests that they needed more experimenter assistance in the less structured tasks compared to their TD peers. Based on past research, children with HFA are known to have difficulties participating appropriately in conversations, to produce more “bizarre” comments in both narrative retells and conversational tasks, and require more prompts to stay on topic (Losh & Capps, 2003).

The increase in prompts received by the HFA group may be explained by differences in the structure of each task. Individuals on the autism spectrum are characterized by difficulties with flexible thinking, and as such, often perform more poorly in unstructured settings. In this study, the three tasks fell on a continuum from highly structured to rather unstructured. The standardized tests were extremely structured – The children were given specific instructions and asked to manipulate stimuli (e.g., make a sentence with the word “although”). The Elicited Narratives were less structured because participants were given a prompt to tell a story with a particular theme (i.e., a time when someone made you sad or mad). As such, the participants were required to recall information from their cognitive store, organize this information and convey it verbally; it was a monologic task. Finally, the conversation in the biographical interview was the least structured of the tasks administered. Conversational narratives are not simply constructed by one individual – they are created through the collaboration of the two individuals involved in the conversation. The children had to interpret each of the experimenter's questions or prompts and respond accordingly in a dialogic format.

Children with HFA may struggle with the production of Conversational Narratives due to the dialogic nature of conversations. Each speaker's turn negotiates the direction of the conversation, during which the child with HFA would need to interpret and infer the experiment's thoughts. With deficits in perspective taking abilities, the HFA group may not have accurately interpreted the experimenter’s prompts for a narrative; thus, they may not have responded appropriately. The prompts may have been necessary not only to elaborate on the story, but also to provide structure to the task and maintain the topic at hand. This supports past findings by Losh and Capps (2003), who found that school-age children with HFA performed better on more structured tasks (i.e., retells of picture books) compared to
unstructured tasks (i.e., Conversational Narratives). It is also important to note the experimenters were aware of the group identification for each participant. It may be that individuals with autism may receive differential treatment from adults compared to their TD peers. With this in mind, it is possible that the experimenters subconsciously produced more prompts due to their knowledge of each participant’s group identification.

When looking at discourse, participants produced fewer narrative components, specifically with respect to setting components. They also received more prompts from the experimenter, suggesting that they needed additional adult guidance when formulating their narratives. These results suggest overall difficulties in the organization of their narratives. Because of strengths in language and cognitive functioning, these difficulties may be attributed to deficits in executive functioning. This is aligned with past research that demonstrates organizational and memory differences in children with HFA.

**Summary:**

Overall, the HFA group presented with strengths and weaknesses in the area of narrative production. When looking at micro-structural measures, the HFA and TD groups were comparable on measures of complex syntax and evaluation devices. However, as a group, the HFA participants produced more morphological errors, although there was high variability noted in this measure. On these micro-structural measures, we were surprised to see that the HFA group performed better on the Conversational Narrative, which suggests that motivation is a high contributor to the narrative performance in the HFA group. The largest group differences were seen on cognitive and discourse measures. HFA participants received more experimenter prompts and did not include setting components in their narratives on both narrative tasks. These findings suggest that children with HFA have difficulty organizing the components of a narrative regardless of narrative context.

**Clinical Implications**

As children with HFA continue to present with language deficits in their school-age years, they often qualify for speech and language services through the school district. As such, clinical speech-language pathologists need to understand how to appropriately assess and treat school-age children with HFA.
Our findings showed that the scores on standardized language tests did not correlate with narrative abilities. This further confirms past research showing that it is important to use both formal and informal measures when assessing language in school-age children with HFA (Condouris et al., 2003; Tager-Flusberg et al., 2009). In both the Elicited and Conversational Narratives, children with HFA produced more morphological errors compared to the TD group. Elicited narratives demonstrated a trend towards a shorter length, a higher frequency of morphological errors, as well as less instances of complex syntax. On the other hand, Conversational Narratives were comparable between groups in length, complex syntax, and evaluative devices. These findings suggest that HFA children may be more motivated to share their interests in the Biographical Interview compared to the Narrative Elicitation Task. As such, Conversational Narratives may be a rich source of linguistic and cognitive knowledge during an assessment for a school-age child with HFA. This supports past research that emphasizes the importance of collecting and analyzing spontaneous language samples in obtaining valid measures of language in this population (Condouris et al., 2003; Tager-Flusberg et al., 2009).

These results also have clinical implications on narrative treatment for school-age children with HFA. If these children are struggling with the integration of multiple sources of information to create a coherent narrative, it may be useful to have a visual prompt or cue to help them organize narrative information. Programs such as Story Grammar Marker®, the Autism Collection (Moreau, 2011), may aid in the instruction of narrative production for school-age children with HFA. This treatment program uses concrete objects to teach abstract concepts by pairing narrative components with visual cues. As visual learners, children with HFA can use these visual cues to decrease their working memory load; in other words, these visual cues can serve as an external system to aid in the organization of narrative components. More specifically, our findings showed that children with HFA produced fewer setting components compared to their peers; this suggests that targeting the production of setting components may be an appropriate goal for school-age children with HFA in the clinical setting.
**Future Directions**

Future studies might explore other aspects of narrative ability, including executive functioning ability and other social measures. For example, it would be interesting to determine if measures of narrative ability correlated with measures of executive functioning (i.e., planning, working memory, digit span tasks) in school-age children with HFA. In this study, participants with HFA did not differ from TD children on instances of evaluative measures, suggesting that social language may not be the core underlying social issue. Future studies might analyze other aspects of social interactions (e.g., prosody, mannerisms, turn-taking, interruptions) in relation to narrative production.

As mentioned in the introduction, narratives are a way for individuals to share information with others and develop relations through social reciprocity. In this task, the children may not have been motivated to share their stories and to interact with the experimenter. Furthermore, the experimenter was not responding with social reciprocity (i.e., sharing similar experiences). In this sense, the task was unnatural and did not accurately portray the "social purpose" of narratives (i.e., social reciprocation). Furthermore, past studies have shown that adults are more accommodating to children than their peers are. As such, future research could analyze how HFA children respond to narrative elicitations with their peers. In addition, it would also be important to conduct clinical research to determine whether therapy focusing on enhancing narrative ability generalizes to an improved quality of social interaction in school-age children with HFA. In other words, does targeting narrative ability affect their ability to share stories with their peers and form social relationships?

**Conclusion**

Though school-age children with HFA have improved dramatically from their preschool years, they still under-perform compared to their TD peers. School-age children with HFA no longer produce behaviors characteristic of “classic autism” (e.g., head-banging, hand flapping) and many are able to function in a mainstream classroom with assistance. As "active, but odd” children (Loveland & Tunali-Kotoski, 2005), school-age children with HFA often initiate interactions with peers and adults. These children actively seek others for...
social validation. In other words, they are motivated by acceptance by their peers. However, they do not always know the appropriate ways to gain approval from their peers.

My results support this characterization of the HFA population, suggesting that school-age children with HFA have just as much of a story to tell as other children. Our results suggest that it is the interaction between the structure of the task and their motivation to participate that determines their narrative performance. Despite the structure of the Narrative Elicitation task, the HFA participants did not perform comparably to their TD peers. When motivated to share information with others during the Biographical Interview, these children demonstrated strengths in both structural language and social language; however, they continued to present with difficulties organizing and producing coherent narratives. As such, adult prompts for elaboration and clarification helped them bring out their complete story. In conclusion, school-age children with HFA are capable and willing to share their stories with others, but need a patient and accommodating audience to aid in the production of a coherent, cohesive narrative.
REFERENCES


APPENDIX A

ELICITED AND CONVERSATIONAL NARRATIVE CODING SHEET
Adapted from Reilly, R., Losh, M., Bellugi, U., & Wulfeck, B. (2004)

**Elicited & Conversational Narratives**

<table>
<thead>
<tr>
<th>Category</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Propositions</td>
<td></td>
</tr>
<tr>
<td>Morphological Errors</td>
<td></td>
</tr>
<tr>
<td>a. Pronoun Error (me and my mom)</td>
<td></td>
</tr>
<tr>
<td>b. Verb Auxiliaries (it was like make0 me sick)</td>
<td></td>
</tr>
<tr>
<td>c. Determiners (my favorite is a geese)</td>
<td></td>
</tr>
<tr>
<td>d. Noun Plurals: (four cat0)</td>
<td></td>
</tr>
<tr>
<td>e. Verb Tense Errors (I was so scared because it’s Ghost Galaxy)</td>
<td></td>
</tr>
<tr>
<td>f. Verb agreement for number (he have his horns stickin’ up)</td>
<td></td>
</tr>
<tr>
<td>g. Prepositional Errors (come along in his plan)</td>
<td></td>
</tr>
<tr>
<td>Complex Syntax/Syntactic Diversity</td>
<td></td>
</tr>
<tr>
<td>1. Coordinate Sentences (and, or, but)</td>
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<tr>
<td>2. Subordinate Adverbial Clauses (when, how, because, so)</td>
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<tr>
<td>3. Verb Complements (say(that)+S; try+V; keep+V; want+V/S)</td>
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<td>4. Relative Clauses (the boy was calling for the frog that was lost)</td>
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<td>5. Passives, both full and &quot;got&quot; passives (he got threwed in the water)</td>
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<tr>
<td>Evaluative Devices</td>
<td></td>
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<tr>
<td>1. General Evaluations (a nasty owl)</td>
<td></td>
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<tr>
<td>2. Mental Verbs (he was wondering...)</td>
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<tr>
<td>3. Emotion States and Verbs (he was laughing...)</td>
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<tr>
<td>4. Causal Markers (reflecting motivation of protagonist)</td>
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<td>5. Hedges (probably, maybe, might be)</td>
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<td>6. Physiological States (he's crying)</td>
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<tr>
<td>7. Intensifiers/Emphatics/Attention getters</td>
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<td>8. Negatives</td>
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<td>9. Character Speech</td>
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<td>10. Epistemic (e.g., he allowed me)</td>
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<tr>
<td>11. Causative (e.g., he made me)</td>
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<tr>
<td>Narrative Structure</td>
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<tr>
<td>Setting Components</td>
<td></td>
</tr>
<tr>
<td>a. Place</td>
<td>+ / --</td>
</tr>
<tr>
<td>b. Situation</td>
<td>+ / --</td>
</tr>
<tr>
<td>c. Time</td>
<td>+ / --</td>
</tr>
<tr>
<td>d. Character introductions</td>
<td>+ / --</td>
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<tr>
<td>Non-setting Components</td>
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<tr>
<td>a. Problem</td>
<td>+ / --</td>
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<tr>
<td>b. Internal Response</td>
<td>+ / --</td>
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<tr>
<td>c. Attempt</td>
<td>+ / --</td>
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<tr>
<td>d. Resolution</td>
<td>+ / --</td>
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<tr>
<td>Coda</td>
<td>+ / --</td>
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<tr>
<td>Prompts</td>
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**Biographical Interview**

<table>
<thead>
<tr>
<th>Category</th>
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<tbody>
<tr>
<td>Total Number of Propositions</td>
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<tr>
<td>Total Number of Narratives</td>
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<td>Narrative Productivity</td>
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<tr>
<td>Topic</td>
<td>Retell/Personal</td>
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</tbody>
</table>
APPENDIX B

COMPLEX SYNTAX AND EVALUATIVE DEVICES CODING SHEETS
Complex Syntax

1. Coordination Sentences: coordinate conjunctions that connected two predicates
   e.g., and, but, or
2. Subordination: adverbial conjunctions that connected two predicates
   e.g., when, how, because, so
3. Relative clause: clauses that modified nouns
   e.g. named Joe, so long that he can’t remember it
4. Verb complements include:
   (a) clauses that modified verbs
      e.g., say that, thinks that, told us that, understand that, decided that; started yelling
      started talking, ended up doing, gonna [going to] play; wanna [want to] do
   (b) all infinitives (e.g. to + infinitive)
5. Passives: sentences in which the direct object becomes the subject

Evaluative Devices

1. General evaluations: adjectives
   e.g., little brother, old dog, young, big
2. Mental verbs: indicates a mental state
   e.g., try to, want to, know, notice, remember, thinks, decided, likes to, about to,
   understand, wondering
3. Emotion states and verbs: indications of an emotional state
   e.g., feel sad, feel mad, disappointed, annoying, tired, cry, smile, laugh, scream,
   turning red, yawn
4. Causal: reflect motivation of a character
   e.g., so, because
5. Hedges: indicate uncertainty
   e.g., sometimes or like (context dependent); probably, maybe, sort of, kind of
6. Physiological states: see/saw, hear, taste, smell, hurt
7. Intensifier: attention getters
   e.g. still (still friends), so (so mad, so fast), repeated phrases (teeny teeny bit), all (all
   angry), a lot, a bunch of, really (really sad), just one, only one, even, again, all over,
   finally (depends on context)
8. negative: indicate that events were contrary to the expectations
   e.g., no, never, nobody, not
9. Character speech: direct quotes
10. Epistemic Markers: indicate intentionality
    e.g., accidentally, on purpose
11. causatives: indicate moral strictures; indicate influence on someone else's behavior
    e.g., forces me to do something; allow, permit, blame