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A case study on the narrative skills of a high-functioning autism spectrum disorders child

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Abstract

This study investigates the oral narratives of a primary school student with High-Functioning Autism (HFA) compared to a Typically Developing (TD) peer, focusing on narrative retelling abilities. A two-episode narrative task was administered, and analyses targeted macrostructural elements (e.g., story structure: setting, characters, goals, attempts, conclusions) and microstructural aspects (e.g., narrative length, lexical diversity, syntactic complexity, and connective use). Results showed comparable verbal working memory and expressive vocabulary between participants but significant differences in Theory of Mind and grammaticality. At the macrostructural level, the narratives produced by the HFA student displayed minor differences, notably the omission of the narrative setting. The most pronounced distinctions emerged in the microstructural analysis. While the HFA student's narrative was unexpectedly longer, it exhibited lower syntactic complexity. Both participants achieved similar lexical diversity; however, the HFA student demonstrated more ambiguity in character references. These findings highlight specific challenges for children with HFA in narrative production, particularly in syntactic complexity and clarity. Interventions targeting these areas may enhance narrative skills, supporting academic and social communication. Additionally, this research underscores the importance of analyzing both macrostructural and microstructural aspects to obtain a comprehensive understanding of narrative abilities in school-aged children with HFA. By identifying nuanced strengths and weaknesses, this study contributes to the development of targeted strategies to support the narrative competence of children with ASD.

Keywords: autism spectrum disorders, high-functioning ASD, oral narratives, macrostructure, microstructure

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1. Introduction

Narration is a crucial form of communication used in everyday life, allowing individuals to express their personal experiences, feelings and thoughts (Karmiloff & Karmiloff-Smith, 2002). A high-quality narrative requires not only knowledge of the story's overall structure (setting, goal, attempt, conclusions), but also knowledge about various linguistic aspects (e.g. vocabulary or morphosyntax) (Aksu-Koç & Aktan-Erciyes, 2018; Košutar, Kramarić & Hržica, 2022). The knowledge of all these aspects in order to produce a complete narrative is a complex and demanding process, especially for children, and takes significant time to develop (Košutar et al., 2022). Narrative ability has been primarily investigated through the analysis of the two fundamental levels underlying narrative structure, namely macrostructure and microstructure (Gagarina et al., 2012, 2019). Macrostructure focuses on evaluating children's cognitive abilities to produce a coherent, well-structed narrative. In contrast, narratives are assessed at the microstructure level according to the linguistic skills required to create a coherent story (Justice et al., 2006; Manolitsi & Botting, 2011; Košutar et al., 2022).

Research examining the above two levels of narrative (macrostructure and microstructure) in children with Autism Spectrum Disorder (ASD) has produced contradictory results, leading to a lack of consensus about their narrative skills. The available literature indicates deviations from typical development at various points of the macro- and microstructure. For instance, some researchers have argued that children with ASD produce narratives that lack coherence and syntactic complexity (Peristeri, Andreou & Tsimpli, 2017), while others have not observed such deviations (Tager-Flusberg & Sullivan, 1995). This study aims to examine the narrative skills of a 9-year-old child with High-Functioning Autism (HFA) at both macrostructural and microstructural levels, comparing these skills with those of an age-matched, typically developing (TD) peer to identify potential differences.

2. Assessment of narrative skills

Oral or written narratives can be elicited in narrating or retelling modes using a variety of techniques, such as picture prompts or video stimuli (Andreou, 2015). The most effective way to analyze narratives is related to both macro- and microstructure levels (Liles, Duffy, Merritt, & Purcell, 1995). A story's macro-structure is defined as how its grammatical elements—such as characters, settings, and plot—are arranged and made sense of in order. Lexical semantic knowledge, structural language proficiency, pro nominal referents and narrative register are examples of micro-structure level skills (Justice et al., 2006; Manolitsi & Botting, 2011).

More specifically, the macrostructure of a narrative is its overall hierarchical organization and coherence. It is defined by the setting (time, place), the episodic framework of the story's plot, the sequence in which events unfold, and the internal motivations or reactions of the protagonists to those events (Liles et al., 1995; McCabe & Peterson, 1984; Tsimpili et al., 2016). All stories, according to the story grammar model, should have a setting and an episode system. The setting should contain background information, character introductions, and contextual statements, while the episode system should contain the following: (a) an initiating event that spurs the main characters into the action; (b) internal plans (i.e., planned actions to accomplish a goal and solve the problem); and (c) outcomes (i.e., success or failure in achieving a goal). Every episode needs each of these three essential elements to be considered complete (McCabe & Peterson, 1984). Research has indicated that the quantity of significant plot points identified in oral storytelling is growing, and that the capacity to communicate a character's feelings or inner monologues is completely developed by the time a child reaches the age of ten (Bishop & Donlan, 2005).

It has also been suggested that the effective creation of characters' emotions is dependent on Theory of Mind (ToM) skills (Tomasello, 2003; Lorusso et al., 2007). Since the narrator needs to understand the protagonist's inner thoughts and motivations for produce a complete, high- level narrative, ToM plays an important role in predicting and explaining the behavior of others (Norbury & Bishop, 2003). In their research, Tager- Flusberg and Sullivan (1994) identified in TD preschoolers and children with ASD a link between a false-belief test, which is used to assess ToM, and a test of the ability to explain human actions.

Unlike macrostructure, microstructure is associated with the syntactic and lexical aspects of the story. It has been characterized in terms of both productivity and complexity (Hughes, McGillvray, & Schmidek, 1997). As reported by Tsimpli, Peristeri, and Andreou (2016) (2016) linguistic form, has been evaluated using the mean length of utterance in words (Miller, 1981), the number of C-units (i.e., one main clause with all dependent clauses; Hunt, 1965), and various measures of sentence complexity, such as grammatical forms (e.g., verbal tense/aspect/voice inflectional morphology), lexical forms (e.g., lexical aspect and manner of motion/cause verbs), and lexicogrammatical features (e.g., locative particles, prepositional phrases, and connectives; Nippold, Hesketh, Duthie, & Mansfield, 2005; Schuele & Tolbert, 2001; Scott & Stokes, 1995). At the same time, Type–Token Ratio (TTR) measures lexical diversity by dividing the number of unique words (types) by the total words (tokens) in a language sample. It helps assess the variety in a child's vocabulary and is commonly used to evaluate language development (Templin, 1957; Miller & Klee, 1995). A related metric, the Mean-Segmental Type–Token Ratio (MSTTR), is calculated by averaging the TTR across consecutive segments of a text. This approach, often used in linguistic studies, provides a more stable measure of lexical diversity by accounting for variability within text segments (Koizumi & In'nami, 2012; Dosi, Kouki, Lada, & Keulen, 2024).

2.1 Narrative skills in typical development children

Narrative ability develops before reading and involves oral or written sequences of events that either come from one's imagination or from real life (Lynch et al., 2008) and they are connected chronologically and causally to form a cohesive whole (Boudreau, 2007). These sequences are based on understanding and proper use of story structure (Lynch et al., 2008). It has been demonstrated that the capacity to produce a high-quality narrative requires the perception of linguistic, cognitive and social domains (Tager-Flusberg & Sullivan, 1995). An excellent story has favorable correlations with literacy, structural language, and social skills; also, enhancing storytelling abilities in TD children is linked to increased more developed reading comprehension (Johnston, 2008). To organize the story's events in a clear and intelligible manner while considering the listener's needs for comprehension of the story's setting, characters, and resolutions (Rumpf, Kamp-Becker, Becker, & Kauschke, 2012), a skilled narrator must also consider the perspectives of the story's characters in order to shed light on their motivations and actions. Children's stories therefore represent a blend of mental and verbal knowledge (Tsimpli et al., 2016).

In both academic and daily social communication contexts, narratives are crucial. Semantic skills are required to communicate meanings through a variety of vocabulary, syntactical skills are needed to produce sentence-level expressions, and linguistic strategies are needed too to connect sentences and convey relationships between them in well-formed oral narratives (Mäkinen et al., 2014). Furthermore, the storyteller must convey the story logically, keep the listener's requirements in mind, and create a mental model of the tale using the provided context (such as the physical background and prior knowledge). As a result, the storyteller should narrate the story with just the right amount of detail and employ allusions and terminology that are sufficiently authentic (Mäkinen et al., 2014). According to Cummins (2009), narratives appear to combine the pragmatic and linguistic components of language, providing a wealth of related language examples for evaluation.

It is perceived that creating a story is a difficult process. However, children from age of 3 or 4 are capable of developing stories with basic frameworks (Košutar et al., 2022), but only around the age of 9 can produce story with elaborated language, such as employing connectives, applying modifying, and developing discourse (Reilly, Losh, Bellugi, & Wulfeck, 2004; Ukrainetz et al., 2005; Kantzou, 2010). Preschoolers are unable to arrange their

thoughts in an episodic fashion (Petersen et al., 2014). Rather, they establish chronological or thematic connections between those concepts (Baldimtsi, 2017). Children between the ages of 5 and 7 begin to develop the ability to create organized narratives, structuring their stories around schemas, locations, and episodic storylines with clear beginnings, middles, and ends (Khan et al., 2016; Zacks, 2020). By ages 9 to 10, their narrative skills typically improve, approaching those of adults (Motsiou, 2014). However, some children may still struggle to achieve the expected levels of narrative complexity even by age 11 (Diakogiorgi et al., 2021).

According to Blankenstijn and Scheper (2003), the microstructure of TD children's narratives takes a long time to form and is still developing by the age of 10. Young TD children's narratives have shorter length and less variance in content terms as compared to older children (Botting, 2002; Justice et al., 2006). Children start to develop more complicated concepts and a diverse vocabulary around the age of 4 (Elbers & van Loon-Vervoorn, 2000; Justice et al., 2006; Kaderavek & Sulzby, 2000; Reilly et al., 2004). Character reference tracking also takes a long time to develop (Karmiloff-Smith, 1985; Wigglesworth, 1997).

2.2 Narrative skills in ASD

The storytelling abilities of children with ASD have not been extensively studied, and the available research contacted has had inconsistent results (Norbury & Bishop, 2003; Diehl, Bennetto, & Young, 2006). Therefore, such result raises the question whether children with ASD would find this kind of work difficult (Norbury & Bishop, 2003). If so, this is probably due to deficits in central cohesion. As a result, they face difficulties in the overall structure and in organizing the story coherently. Individuals with ASD have a propensity to manage input stimuli more locally than globally, and they are less adept at extracting contextual notions. In tests of narrating a story through pictures, children with ASD may not be able to tell the story as a coherent sequence of events but simply describe the objects they see in the picture (Loveland & Tunali, 1993; Norbury & Bishop, 2003). In addition, some research suggests that children with ASD produce narrative with greater ambiguity (Manolitsi & Botting, 2011; Novogrodsky, 2013; Suh et al., 2014), while the use of words related to emotions (Siller, Swanson, Serlin, & George, 2014) and dialogues between the heroes of the story is limited (Stirling et al., 2017). At the same time, in many cases they use language in a way that does not fit the context (Losh & Capps, 2003). The pragmatic deficits exhibited by ASD are likely to be related to the above peculiarities in their narrative (Kjelgaard & Tager-Flusberg, 2001; Tager-Flusberg, Paul, & Lord, 2005).

The use of terms that reveal emotions in the narratives of children with ASD has been associated with their performance on ToM tests, which examine their ability to understand the mental state of others (Peristeri et al., 2017), such tests being for example pretend play (Blanc, Adrien, Roux, & Barthélémy, 2005) and false- belief (Baron- Coren, Leslie, & Frith, 1985). Research has not yet offered a comprehensive picture of the connections between storytelling repetition and ToM (Kimhi, Kadosh & Tubul-Lavy, 2022). Capps, Losh and Thurber (2000) discovered that higher first-order ToM abilities[1] of children with ASD were associated with superior macrostructure ability to retell a story from a picture book. Siller et al. (2014) found a similar relationship between a series of first- and second-order ToM tests and children's narrative recounting, particularly their use of emotional terminology. They said that these results provide credence to the theory that children with ASD may have difficulties telling stories because they struggle to understand the inner states of others. Conversely, Losh and Capps (2003) found no correlation between children with ASD's second-order ToM and their capacity for narrative. Thus, the nature of the connections between tale recounting and ToM is still up for debate (Kimhi et al., 2022).

Regarding microstructure, Tager-Flusberg and Sullivan (1994) compared the narratives skills of children

[1] The concept of ToM has been further refined by distinguishing between first- and second-order beliefs (Baldimtsi, 2017). A first-order belief refers to an individual's belief about something in the external world, whereas a second-order belief pertains to an individual's belief about another person's belief (Miller, 2012).

with ASD relative to TD children matched for nonverbal and language abilities. Their analysis revealed that children with ASD did not exhibit significant deficits in terms of the total number of words and unique words or the number of sentences used. Additionally, no significant differences were observed in the syntactic complexity of the sentences used by the two groups. This finding is consistent with descriptions of children with HFA as possessing relatively intact syntactic abilities (Minshew, Goldstein, & Siegal, 1995). However, subsequent research has indicated that the narratives of children with ASD are characterized by less syntactically complex sentences compared to their TD peers (Eigsti, Bennetto, & Dadlani, 2007; Marinis, Terzi, Kotsopoulou, & Francis, 2013; Norbury, Gemmell, & Paul, 2014).

Norbury and Bishop (2003), also, have studied narrative skills in three different clinical groups, one of which involved HFA (n=12) compared to TD children (n=18) with similar cognitive and language level. Children's narrative skills were assessed through the creation of a story based on a picture book. The results showed that HFA group did not differ from TD in terms of number of words they used, demonstrating that they provided the same amount of information. However, in contrast to Tager- Flusberg and Sullivan (1994), they observed that HFA children used simpler syntax. Additionally, no differences in the structure of the story were identified, showing that both participants with HFA and TD children understood the main theme of the story and the HFA group generally produced a coherent narrative. Nevertheless, there were ambiguities in their narratives as they often did not use the appropriate reference.

On the other hand, Diel et al. (2006) analyzing the narratives of 17 children with HFA and 17 TD peers, with the same language and cognitive abilities, found no differences in the length of the story or the syntactic complexity chosen by the two groups, nor in their understanding of the "gist of the story". The deficits of children with HFA relative to the TD group concerned the coherence of the story, since they produced less coherence narratives. Similarly, in a recent study, Peristeri et al. (2017) studied narrative skills in two groups of children with ASD (mean age: 9,2) compared to TD peers. The first group included children with ASD and high language skills (HFA), while in the other, children with ASD were characterized by low languages skills. The assessment of narratives skills was carried out through oral repetition of the story named 'Giraffe/Elefant story'. The results showed that macrostructure wise, both children with HFA and TD peers used words that denote emotions. The differences were found in the cohesive structure of the story, with the two ASD groups performing lower than their peers without ASD. In terms of microstructure, no group differed from the TD in terms of word diversity. Also, the HFA group did not differ significantly in syntactic complexity, demonstrating that syntactic complexity is associated with language ability in ASD. However, Carlsson et al. (2020), argued that language competence is not sufficient to justify simpler syntax in ASD, as their study showed that although children with ASD and TD peers had the same language level, the ASD group produced shorter and simplified sentences.

The inability of children with ASD to produce a coherent narrative and connect the events of the story was also identified by Kimhi et al. (2022), but there are no differences in the amount of story information they provided. Mäkiken et al. (2014), in their study of Finnish-speaking children with ASD and typically developing peers aged 5–10, further emphasized the challenges faced by children with ASD in drawing conclusions. Moreover, they observed that the ASD group used fewer complex sentences. Contrary to previous research (e.g., Norbury & Bishop, 2003), no differences in referential accuracy were found. Generally, the repetition of story, including the setting, characters, events, results, but also the motivations and heroes' thoughts, is a process of increased difficulty required high pragmatic skills. However, the difficulties children with ASD face in this area obviously affect the ability to produce coherence structure in a narrative regardless of language level (Peristeri et al., 2017).

Dosi and Boni (2023) explored the pragmatic and language skills of Greek-speaking children with HFA. The study involved a sample of three children with HFA, aged 9, 11, and 15 years. Among the assessment tools employed was a narrative task designed to evaluate macrostructural and microstructural aspects of storytelling, as well as ToM abilities. The findings revealed that, although all participants demonstrated a basic capacity to follow a logical sequence of events, their narratives frequently lacked cohesion and coherence. Specific

challenges included inadequate differentiation of characters, omission of mental state references, and an emphasis on action-related details at the expense of emotions and thoughts. Developmental differences were particularly evident, with older participants showing greater skill in various aspects of narration, such as character description, the use of subordinate structures, and the incorporation of temporal markers. However, pragmatic challenges persisted across all ages, particularly in character reference and perspective-taking. Semantic limitations were also identified, such as difficulties in lexical retrieval and reliance on a restricted core vocabulary. Additionally, the youngest participant exhibited morphosyntactic deficits, including grammatically incorrect utterances, which may suggest the presence of comorbid language impairment. The findings of this research highlight the unique and diverse needs of individuals with ASD, emphasizing the importance of targeted interventions to support their linguistic and pragmatic abilities.

In summary, the results regarding narrative skills in ASD are conflicting. On the one hand, some research suggests that children's stories with ASD are shorter (King, Dockrell,, & Stuart, 2013; Siller et al., 2014) and syntactically simple (Norbury & Bishop, 2003; King et al. 2013; Mäkiken et al., 2014; Carlsson et al., 2020), without much coherence (Diehl et al., 2006; Peristeri et al., 2017; Kimhi et al., 2022), with a reduced number of different words or mental state terms (Tager Flusberg, 1995; Capps et al., 2000; Siller et al., 2014) and with a tendency to handle information more locally than globally (Loveland & Tunali, 1993; Diehl et al., 2006;). On the other hand, other studies have recommended that narratives in ASD do not differ in productivity, i.e. the number of words or sentences they use (Novogrodsky, 2013), the syntactic units (Norbury & Bishop, 2003; Peristeri et al., 2017), syntactic complexity, especially when groups fit carefully, in terms of language and cognitive ability (Tager-Flusberg & Sullivan, 1994; Norbury & Bishop, 2003; Diehl et al., 2006; Mäkinen et al., 2014). It is possible that these contradictory results are due to different methodologies among studies (Baldimtsi, 2017), which focus on different aspects of storytelling such as story retelling or creating and preserving stories (Kimhi et al., 2022), as well as differences in the nature of the disorder itself.

3. The present study

3.1 Objectives, Research Questions, and Predictions

The purpose of this research is to examine the narrative skills of a child with HFA compared to his TD peer. To achieve this objective, a storytelling test was administered to the children in a retelling mode. Our analysis concentrated on both macrostructure, which includes the overall organization of narrative, and microstructure, exploring the finer aspects of linguistic use. We developed specific research questions and associated hypotheses to guide this investigation.

1. Are there any differences in the macrostructure of the narratives (e.g. setting, characters, events, conclusions) between the participants?

We expect that the HFA participant is likely to perform lower overall on structure of the story (macrostructure) (Peristeri et al., 2017) and that his narrative may contain several character references ambiguities compared to TD peer (Norbury & Bishop, 2003; Manolitsi & Botting, 2011; Novogrodsky, 2013; Suh et al., 2014).

2. Is the use of ToM- related words observed in both participants' narratives?

We anticipate that both participants will produce words that indicate emotions (Peristeri et al., 2017), but the number of these words may be limited for the child with HFA (Siller et al., 2014; Dosi & Boni, 2023).

3. Are there any differences in the microstructure of narratives, specifically in lexical diversity, syntactic complexity and the use of connectives for accurate referencing?

We assume that the two participants will probably differ neither in narrative length (Norbury & Bishop,

2003; Diehl et al., 2006) nor in lexical diversity (Peristeri et al., 2017). However, obvious differences are anticipated in terms of syntactic complexity, as the participant with HFA is likely to produce sentences with simpler syntax (Norbury & Bishop, 2003; Mäkinen et al., 2014; Terzi, Marinis, Kotsopoulou & Francis, 2014; Carlsson et al., 2020).

3.2 Participants

This study examined the narrative skills of two 9-year-old monolingual Greek boys, both attending the 4th grade in a public primary school in Thessaloniki. One of the participants, diagnosed with HFA, received an official diagnosis of ASD from the Interdisciplinary Assessment, Counselling, and Support Centers (KEDASY) in Thessaloniki. Participants were matched based on their chronological age and socioeconomic status.

3.3 Materials

Before administering the narrative test, several preliminary assessments were conducted to evaluate the children's cognitive and linguistic abilities. These included measuring mental age through a non-verbal intelligence test (Raven et al., 2008), verbal working memory using a digit backwards test (Alloway, 2007), grammatical proficiency via a sentence repetition task (Tsimpli, Andreou & Peristeri, 2019), vocabulary knowledge through an expressive vocabulary test (Vogindroukas et al., 2009), and ToM using a first-order false belief task based on Baldimtsi (2017). The following section provides a detailed overview of these assessments.

3.3.1 Background tests

Non-verbal intelligence task

To assess fluid (non-verbal) intelligence, the standardized Greek adaptation of the Raven's Colored Progressive Matrices (Sideridis, Antoniou, Mouzaki, & Simos, 2015) was employed. This psychometric instrument, designed for children aged 4 to 12 years, comprises 36 problems divided into three subscales (A, AB, B), each consisting of 12 items. The tasks involve non-verbal stimuli, such as geometric shapes or combinations of shapes. During the test, the examiner presents an incomplete non-verbal stimulus, and the participant selects, from six colored images, the one that best completes the given pattern. The tool is widely recognized for its reliability and validity in measuring non-verbal reasoning and problem-solving abilities in children.

Digit span backwards task

The Reverse Digit Recall Test (Alloway, 2007) is designed to evaluate verbal working memory. The assessment comprises six levels, each containing six sequences of two to seven digits. During the test, the examiner orally presents a sequence of digits, and participants are required to repeat the digits in reverse order. Progression to the next level occurs if the participant provides at least four correct responses out of six. The test is discontinued after three consecutive errors within a given level. This tool is widely utilized for its efficacy in assessing the capacity for verbal information manipulation and working memory processing.

Sentence repetition task

To assess the language proficiency of the two participants, with an emphasis on grammar, a Sentence Repetition Test was utilized (Tsimpli et al., 2019). This test comprises 32 sentences, each read aloud by the examiner, which participants are required to repeat verbatim while preserving grammaticality. The sentences encompass a range of grammatical structures, including simple declaratives (SVO sentences), sentences with negation, clitic left-dislocation structures, coordination, complement clauses, relative clauses, adverbial clauses, and wh-clauses. This approach offers valuable insights into the participants' grammatical competence. Notably, the focus of this task was not on how accurately the sentences were recalled but solely on whether they were grammatical.

Expressive vocabulary task

The Expressive Vocabulary Test is the Greek adaptation of the English Word Finding Vocabulary Test (4th Edition) by C. Renfrew (1968), standardized for Greek by Vogindroukas et al. (2009). The test consists of 50 images depicting objects and concepts familiar to children, often derived from everyday life, fairy tales, or television programs. During administration, the examiner presents each image to the participant, who is required to name the depicted item. The test is discontinued if the participant makes five consecutive errors. This tool is widely used to assess expressive vocabulary and lexical retrieval in children.

Theory of Mind task

To evaluate ToM, a first-order false belief task was administered, specifically an unexpected content task (Caprice box task), based on Baldimtsi (2017) and adapted for the purposes of the study. This task assesses children's ability to attribute false beliefs to others and to recognize their own false beliefs (Hogrefe, Wimmer, & Perner, 1986). The task involved the use of a box containing pencils. The examiner presented the closed box to the child and posed an initial knowledge-based question: "What do you think is in this box?" After the child responded, the box was opened to reveal its actual contents—pencils. The box was then closed, and the child was asked a false-belief question: "What did you think was inside the box before I opened it?" Two additional questions followed: "Your friend hasn't seen inside the box. What do you think they would say is inside the box before opening it?" (false-belief question) and "Why would they say that?" (explanation question). The total score ranged from 0 to 4, with 1 point awarded for each correct response and 0 points for each incorrect or no response. This scoring framework provides a quantitative measure of children's ability to understand and explain false beliefs.

3.3.2 Main test

Narrative task

To assess the children's narrative skills, we used an oral repetition test, which was based on ENNI stories (Andreou, 2015). In particular, the B2 story was used included two episodes with three characters in total and was considered appropriate for this age group. More specifically, the story revolves around a dog and a rabbit who are close friends and go on a picnic together. After overeating, the rabbit falls ill, leading the dog to seek help from a rabbit doctor who provides treatment and helps the rabbit recover. The story contained 8 pictures and a total of 230 words, 20 simple clauses and 22 subordinate clauses. The children listened to the story and saw the 8 pictures at the same time. Then, they were asked to oral retell the story.

3.4 Procedure

Prior to the main test (narrative task), the background tests were administered in the specified order. Following this, the storytelling task was conducted. Each child was assessed individually in a quiet classroom at their school, free from significant distractions such as noise or overly stimulating decorations (e.g., numerous paintings on the walls). During the storytelling task, one of the researchers read the story aloud while the child viewed eight accompanying pictures on a sheet of paper. After completing the narration, the researcher prompted the child to retell the story orally using the pictures as visual cues. The instructions provided were: *"As you listen to the story, observe the corresponding pictures on the sheet of paper. Once the story is finished, please retell the story as best you can."*

3.5 Assessment of macro- and microstructure

The participants' responses were recorded and transcribed to be analyzed further. To obtain reliable results, the responses were evaluated separately by both researchers.

We evaluated the story grammar components of time, place, character introduction (three characters), and

the narrative structure of the episodes using the coding scheme described in Andreou (2015) (goal-attempt-outcome for two episodes) to analyze macrostructure. A scoring framework was implemented wherein 0 to 1 point was assigned for references to time, place, and characters, while 2 points were given for each distinct aspect of the episode. The overall score achieved amounted to 17.

Moreover, several parameters were taken into consideration for microstructure analysis: (a) the word count is used to quantify the length of the narrative; (b) the Mean-Segmental Type-Token Ratio (MSTTR) refers to the average Type-Token Ratio (TTR) calculated across consecutive 50-word segments of a text (Koizumi & In'nami, 2012). To compute the MSTTR, the total number of unique words (types) is divided by the total number of words (tokens) within each 50-word segment. Since the participants produced narratives with varying word counts, we decided to compare the first 50 words to examine the individual elements of microstructure (Dosi et al., 2024; Koizumi & In'nami, 2012). This approach ensured an equal word count across all participants, allowing us to obtain more comparable and reliable results; (c) the number of different noun types is divided by the total number of noun tokens; (d) the number of different verb types is divided by the total number of verb tokens; (e) the syntactic complexity is assessed by dividing the number of subordinate clauses by the total number of main clauses; (f) the frequency of the usage of connectives.

3.6 Data analysis

Given the small sample size, we relied on descriptive statistics. Additionally, we conducted a qualitative analysis of the responses provided by the two children.

4. Results

4.1 Background tests

In the background tests, both participants achieved similar results. The non-verbal intelligence test confirmed that their mental age was equivalent, at 8 years—approximately one year below their chronological age. Similarly, in the reverse digit recall test, which assessed verbal working memory, both children achieved the same score (44%) and successfully completed the 4-digit recall block. In the Sentence Repetition Task, both participants performed well, although the TD child scored at ceiling (97%), while the child with HFA scored slightly lower (81%). Regarding expressive vocabulary, both children demonstrated strong skills: the TD child scored an average of 82%, and the child with HFA scored 80%, indicating a comparable level of expressive vocabulary proficiency. However, differences emerged in the first-order belief task of ToM. The TD participant achieved the maximum score of 100%, while the child with HFA scored significantly lower, performing at chance level with a score of 50%.

4.2 Narrative macrostructure

The performance of the two participants was comparable. In particular, the TD participant achieved an average score of 94,1%, while the HFA child scored lower at 88,2%. Although the child with HFA identified all the three characters (rabbit, dog and doctor), goals, attempts and outcomes from both episodes, he omitted mentioning the setting of the story (time and place). Conversely, the TD participant referred to the setting only in terms of time, while omitting any mention of place. Moreover, it is important to note that both narratives were coherent, as they followed a clear structure with a beginning, middle, and end. However, the narration by the child with HFA was occasionally marked by repetitive phrases and unnecessary details. This may be attributable to a characteristic of the disorder, which involves a tendency to focus on details. Also, he tended to use ambiguous references, especially in the second episode (e.g. then she/he was looking for someone to do something for him). More specifically, the child with HFA omitted the subject in their sentences. Although Greek is a pro-drop language where subject omission is grammatical, this led to pragmatic ambiguity, making it difficult to identify the agent in the context. In some cases, the child with HFA also omitted articles, resulting in

ungrammatical sentences. Such errors were not observed in the TD child, whose narrative was consistently clear and unambiguous. Both participants used clitics, but not extensively; they generally preferred to use determiner phrases instead.

Table 1
Macrostructure/Story Grammar scores for both participants (Mean %)

	TD	HFA
Total score	94.1	88.2
Time	100	0
Place	0	0
Character1 intro	100	100
Character2 intro	100	100
Episode 1 - goal	100	100
Episode 1 - attempt	100	100
Episode 1 - outcome	100	100
Character3 intro	100	100
Episode 2 - goal	100	100
Episode 2 - attempt	100	100
Episode 2 - outcome	100	100

4.3 Using words related to ToM

Regarding the use of words denoting emotions or mental state, it appears that both participants used a limited number of such terms. This is likely due to the narrative itself containing few references to the emotional and mental states of the characters. Notably, the HFA participant used more words suggestive of emotions than his TD peer. Specifically, in HFA participant's narrative, we identified the words "help", "happy", "don't worry" and "understand", whereas in the TD participant's narrative, only the first two were present. However, unlike the TD peer, the HFA child used several ambiguous references like in (1) where he should have said something more specific, i.e., "The dog guided the doctor to the location where her friend, the rabbit, was".

(1) Tin 'arpakse ce tin 'travikse
(pro) her.ACC.FEM.SG grab.PAST.3SG and (pro) her.ACC.FEM.SG pull.PAST.ACT.IND.3SG
e'ci pu 'itan
there where be.PAST.ACT.IND.3SG
He grabbed her and pulled her to where he was.

The presence of these ambiguities suggests that, on several occasions, he did not adequately consider the listener's need for clarity, resulting in the omission of crucial information.

4.4 Narrative microstructure

The narrative produced by the child with HFA was longer, comprising 140 words, compared to the TD peer's narrative, which totaled 98 words. This difference can be attributed to the HFA child being more verbal. In terms of lexical diversity, both participants demonstrated a moderate range, with a MSTTR of 72%. However, a slight difference was observed in noun diversity, where the child with HFA exhibited slightly lower diversity (77.7%) compared to the TD peer (81.8%). In contrast, verb diversity revealed a more pronounced difference, with the TD child exhibiting significantly higher performance (100%) compared to the child with HFA (85,7%). In terms of syntactic complexity, both participants exhibited limited complexity, with the child with HFA showing lower complexity (44.4%) compared to the TD child (66.6%). Notably, both participants displayed similar patterns in their use of subordinate clauses. Specifically, they primarily utilized complement clauses with the complementizers *na* and *oti* (that), while the use of adverbial (temporal) and relative clauses was less frequent. Additionally, the TD child incorporated two concessive clauses featuring the adversative conjunction *eno* (while).

Finally, regarding the use of connectives, both participants demonstrated minimal usage. The child with HFA used three connectives—*omos* (however), *molis* (as soon as), and *ce* (and)—while the TD peer used only two—*eno* (while) and *ce* (and).

5. Discussion

The present case study aimed to explore the narrative skills of a child with HFA in comparison to a TD peer. Specifically, it sought to identify potential differences or challenges in the narrative abilities of the child with HFA by analyzing both the macrostructure and microstructure of their narratives.

Before analyzing each participant's narratives, we first ensured that the two children matched their cognitive level and did not have any language deficits, as suggested by previous research (e.g. Norbury & Bishop, 2003; Diehl et al., 2006). Additionally, we administered a ToM tasks, as this study also attempted to examine whether the child with HFA used words related to emotions or mental states in his narrative. Several studies (e.g. Tager-Flusberg & Sullivan, 1994; Tomasello, 2003; Lorusso et al., 2007) have exhibited a correlation between ToM and narrative skills. In fact, some studies have even included the usage of ToM- related words in analysis of narrative macrostructure (Peristeri et al., 2017).

Our initial hypothesis regarding macrostructure was partially confirmed, as the child with HFA used character references ambiguities and scored lower than TD peer, but still high. So, regarding the structure of the story, no significant differences can be identified between them. The primary challenge for the child with HFA concerned the setting of the story, since both place and time were omitted. Contrary to previous studies (e.g. Diehl et al., 2006; Peristeri et al., 2017), we observed that the narrative of the child with HFA was coherent, and he seemed to have fully understood the "gist of the story" (Norbury & Bishop, 2003). This finding suggests that when children with HFA possess high language abilities, their narrative coherence and understanding of the main topic may not differ significantly from their TD peers. Similarly, certain studies have demonstrated that while children with ASD often recall fewer event details than TD peers, their narrative coherence, including the use of story grammar elements, is comparable when matched for age and ability (Henry et al., 2020; Norbury et al., 2014). However, Peristeri et al. (2017) investigated the relationship between language abilities and story coherence, concluding that even participants with HFA and high language skills scored lower on story coherence than their TD peers. Therefore, it is essential to further investigate the relationship between language proficiency and story coherence through studies involving larger participant samples. In addition, as predicted, the narrative produced by the child with HFA presented numerous character reference ambiguities (Norbury & Bishop, 2003; Manolitsi & Botting, 2011; Novogrodsky, 2013; Suh et al., 2014; Dosi & Boni, 2023) indicating that it did not consistently took into account the listener's needs for understanding the story. This may be due to difficulties in understanding the emotions and thoughts of others, a common characteristic of children with ASD (Siller et al., 2014). This is further supported by the fact that the child with HFA scored significantly lower than the TD child on the first-order ToM task.

Our second hypothesis was only partially confirmed. While we anticipated that both children would use emotion-related words, we incorrectly assumed that the child with HFA would use fewer of these terms. The results showed that both children employed a limited number of connectives and emotion-related words (Mäkinen et al., 2014). Interestingly, despite the TD child outperforming the child with HFA on the ToM task, he produced very few words indicating mental states or feelings in his oral narrative repetition. The relationship between ToM and narrative abilities has been explored by several researchers (e.g., Capps et al., 2000; Siller et al., 2014), but no definitive conclusions have been reached thus far (Kimhi et al., 2022). However, we do not suggest that children with ASD possess a similar ability to use terms related to mental and emotional states. Instead, this result likely reflects the nature of the narrative test itself, which does not include many expressions of mental states or emotions. Additionally, it is possible that the TD child's narrative style focuses more on actions rather than feelings. In any case, this issue requires a larger sample size and further investigation.

With respect to the third and final research question, our hypothesis was only partially supported. Contrary to existing literature, our findings showed that the narrative produced by the child with HFA was longer than that of the TD peer. This outcome likely reflects the HFA child's greater verbosity, characterized by frequent repetition of phrases or the inclusion of additional details (Dosi & Boni, 2023). Additionally, as we predicted, there was no significant difference in lexical diversity between the two participants. This aligns with existing research suggesting that children with HFA do not differ significantly from their TD peers in this respect (Tager-Flusberg & Sullivan, 1994; Peristeri et al., 2017). However, when comparing noun and verb diversity, the child with HFA performed lower, particularly in verb diversity. This indicates that, unlike his TD peer, the child with HFA frequently relied on the same nouns and verbs when retelling the story. A significant difference was observed in syntactic complexity between the two participants. While both demonstrated moderate use of subordinate clauses, the HFA child's performance was notably lower. This finding aligns with previous research suggesting that narratives in children with HFA often feature simpler syntax and fewer subordinate clauses, particularly adverbial clauses (Norbury & Bishop, 2003; Eigsti et al., 2007; Marinis et al., 2013; Norbury et al., 2014; Mäkinen et al., 2014; Clarsson et al., 2020). The HFA participant's syntactic challenges were also reflected in his lower performance on the sentence repetition task compared to the TD child, further indicating difficulties in handling more complex syntactic structures, as also suggested by Terzi et al. (2014).

6. Conclusions, limitations and future research

In conclusion, the primary objective of this case study was to investigate narrative skills of a child with HFA compared to TD peer with equivalent cognitive and linguistic abilities. To achieve this aim, we analyzed the participants' narratives in terms of both macrostructure and microstructure. Our findings revealed differences between the two participants, with the child with HFA performing slightly lower overall in macrostructure. Despite this difference, he was able to produce a complete and coherent narrative. However, challenges were observed in character reference, which was often ambiguous due to the omission of determiner phrases. At the microstructure level, the HFA participant's narrative was longer, with no significant differences in the overall lexical diversity between the two children, although differences were observed in verb diversity. The most pronounced difficulty for the HFA participant was in syntactic complexity, a finding supported by his lower performance, compared to the TD child, on the sentence repetition task. These results suggest that children with HFA may require additional support in developing syntactic abilities.

The study has several limitations that should be acknowledged. Firstly, as a case study, the results cannot be broadly generalized. Secondly, our TD participant did not use ToM-related terms, which may be due to individual differences or environmental factors, such as less developed storytelling abilities. As a result, no firm conclusions can be drawn, and further research is needed. Studies with larger sample sizes are essential to obtain more reliable results, which could inform the development of effective intervention programs. Moreover, since autism is a spectrum disorder, future research that includes a broader range of participants with diverse individual characteristics will provide a deeper understanding of narrative skills in children with HFA.

7. Educational implications

The findings of this study offer valuable insights for educators, speech-language pathologists, and other professionals working with children with HFA. To support narrative coherence and improve character references, educators can provide explicit instruction on structuring narratives by teaching students to include key elements such as setting, character references, and clear temporal markers. Visual aids like story maps or graphic organizers can help children organize their thoughts and ensure their stories are comprehensible. Learners with HFA may benefit from practice activities that focus on using determiner phrases and pronouns appropriately.

Enhancing syntactic complexity is another key area for intervention. Teachers and therapists can include exercises like sentence combining, where students practice creating sentences with subordinate clauses or more varied structures. Scaffolding techniques, such as sentence stems or templates, can also support learners as they

experiment with more complex syntax in their storytelling. Similarly, fostering emotional and mental state vocabulary is crucial. Since children with HFA may struggle to use emotion-related words, educators should incorporate explicit teaching of such vocabulary through role-playing activities, storytelling prompts emphasizing characters' emotions, or discussions about mental states in literature or real-life scenarios. Pairing this vocabulary instruction with ToM activities, such as discussing characters' thoughts and motivations in stories, can strengthen connections between language use and understanding others' perspectives.

To promote lexical diversity, vocabulary-building exercises should focus on expanding the range of verbs and nouns used by children with HFA. Word banks, thesaurus exercises, and games that encourage creative word choices can support this goal. Activities like retelling the same story in different ways or incorporating prompts that require the use of specific word types can also promote lexical variety. On the other hand, educators can help children with HFA manage verbosity by teaching strategies such as summarizing and identifying the key points of a narrative. Structured story templates that limit excessive detail or exercises like time-limited retellings and written summaries can further help manage verbosity.

Regular narrative assessments are essential for identifying specific areas of difficulty for learners with HFA. Tailored intervention plans can then focus on addressing these challenges, whether they relate to coherence, syntax, or vocabulary use. Collaboration with parents and caregivers is also important, as providing families with tools and activities to support narrative development at home can enhance learning outcomes. Additionally, promoting inclusive practices within the classroom can foster an environment where all students feel supported in developing storytelling skills. Peer modeling, group storytelling activities, and collaborative projects can encourage children with HFA to learn from their typically developing peers, while positive reinforcement and celebrating small achievements can boost their confidence and motivation.

Finally, educators should emphasize the long-term development of narrative skills, which are critical for academic success, social communication, and future employment. Embedding narrative practice into broader curriculum areas, such as history or science, can provide meaningful contexts for skill application, making learning more engaging and practical. By addressing these areas, educators can help children with HFA develop the narrative and language skills needed to succeed academically, socially, and emotionally.

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