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BEYOND STRUCTURAL ANALYSES: EXAMINING TOPICS,
COHERENCE AND ORAL INFERENTIAL COMPREHENSION WHEN
HINDI-SPEAKING CHILDREN WITH AND WITHOUT AUTISM TELL
AND UNDERSTAND STORIES

VASUNDHARA SRIVASTAVA

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The Hong Kong Polytechnic University

Department of Language Science and Technology

Beyond Structural Analyses: Examining Topics, Coherence and Oral Inferential
Comprehension when Hindi-speaking Children with and without Autism Tell
and Understand Stories

SRIVASTAVA VASUNDHARA

A thesis submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

December 2024

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_____ (Signed)

VASUNDHARA SRIVASTAVA

*To all those who have been a part of my
Life's NARRATIVE*

Abstract

The current child language narrative literature has typically focused on the structural analysis (macrostructure and microstructure), while the functional/meaning dimensions of narratives have been relatively understudied. This is an important dimension that warrants more research, given that telling personal stories about what happened to one self and understanding fictional stories so that one can infer the background and what happened to others can be viewed as an informative assessment of an individual's social-communication abilities in his/her communicative competence, and that children with language disorders, for instance, autistic children often exhibit difficulties in social communication– a key characteristic that can be more comprehensively assessed through the functional analysis of their narratives.

This dissertation will mainly focus on the functional aspects of narratives, such as contents/topics of personal stories, coherence in personal stories, and inferential comprehension of fictional stories. These functional abilities warrant more research attention when the child language literature and speech therapy practices are still heavily skewed towards structural analyses of narrative competence. Unlike many existing narrative studies, the three thesis studies will take on a functional perspective, focusing on the contents and meanings expressed in children's narratives.

Study one is an empirical first in documenting the contents/topics of personal stories told by autistic children and their TD age peers. 21 six-to-nine-year-old Hindi-speaking autistic children with low support needs and 30 age-matched TD children each told six personal stories, in response to six emotion/experience-based prompts (happy/excited, worried, annoyed, proud, problem situation, something important) in the Hindi version of the Global TALES protocol. The findings showed that despite these two groups were matched in expressive vocabulary and morphosyntax scores, the personal stories shared by autistic children were more restricted than

their TD peers, where they did not mention social participation beyond immediate family, conflict management, or offering help, reflecting fewer life experiences of such.

Study two is an empirical first in comparing the coherence of personal stories that involve positive versus negative emotional experiences shared by autistic children and their TD peers. 30 autistic children and 30 TD peers were matched in terms of vocabulary, morphosyntactic skills, and non-verbal IQ. The children were asked to narrate stories with positive and negative emotional polarity, which were then transcribed and rated for global ratings of coherence and local indicators contributing to global coherence. The findings revealed that autistic children's narratives scored significantly lower in coherence when recounting positive emotional experiences yet scored significantly higher in coherence for negative emotional experiences, even surpassing their TD peers in specific measures (e.g., global context; local temporal and thematic indicators). For both global ratings of coherence and local indicators of global coherence, between-group analysis indicated that autistic children had lower scores in “theme” compared to their TD peers when narrating positive emotional events. A qualitative analysis of thematic indicators (under local indicators to global coherence) further showed that autistic children produced no instances of opinion- or understanding-based themes in either their negative or positive narratives, a contrast to their TD peers who robustly included these thematic elements in their positive stories. These findings offer concrete guidance for parents of autistic children, practitioners, and SLPs working with these children, to strengthen thematic development, specifically by training them to incorporate opinion- and understanding-based themes into their storytelling.

Study three compared the oral inferential comprehension abilities of fictional stories in the same two groups of children as in Study 2. A conceptual contribution of this study was the mapping of the MAIN comprehension questions onto Blank's Levels of Language Abstraction. This classical framework conceptualizes language comprehension into four levels of increasing

abstraction and has influenced many researchers and clinicians in speech pathology and communication sciences and disorders. To better differentiate the quality of responses among these older children, the responses were scored using a more fine-grained, 4-point scheme adapted from the Pre-Language Assessment Instrument-2. The findings indicated that Level IV questions, which require reasoning based on perceptions and critical thinking and analysis, were particularly challenging for these autistic children relative to their TD peers. Furthermore, the refined scoring scheme was able to capture more group differences and better reveal the cognitive-linguistic vulnerabilities of the autistic children than the original, more lenient scoring scheme.

These findings are impactful as they could inform intervention planning for children with autism. Practitioners working with autistic children should prioritize supporting autistic children with low support needs to share diverse and coherent personal experiences that are of emotional and personal significance and supporting them to develop oral inferential comprehension as essential clinical goals.

These three dissertation studies are significant in various ways. First, they featured an understudied/under-documented language, Hindi, in the child language literature. Second, they examined three sets of abilities that are of functional importance to a child's narrative competence: contents/topics of personal stories, coherence of personal stories, and oral inferential comprehension of fictional stories. Third, the major assessment tools used in this dissertation, the Global Tales protocol and LITMUS-MAIN, have been adapted into numerous languages and cultures, and as such this line of investigations can be further extended into other languages and cultures to support future cross-linguistic and cross-cultural comparisons.

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List of Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
CLM	Cumulative Link Model
DLD	Developmental Language Disorder
DSM	Diagnostic and Statistical Manual of Mental Disorders
EMM	Estimated Marginal Means
GAO	Goal Action Outcome
GLM	Generalized Linear Model
ICF	The International Classification of Functioning, Disability and Health
IRR	Incidence Rate Ratio
ISAA	Indian Scale for Assessment of Autism
IST	Internal State Terms
LI	Language Impairment
Life-H	The Assessment of Life Habits
LITMUS	Language Impairment Testing in Multilingual Society
MAIN	Multilingual Assessment Instrument of Narratives
MINT	Multilingual Naming Test
NaCCS	Narrative Coherence Coding Scheme
OR	Odds Ratio
PLAI-2	Pre Language Assessment Instrument-2
PLI	Primary Language Impairment
SLP	Speech Language Pathologists
SRep	Sentence Repetition
TD	Typically Developing
TLD	Typical Language Development
ToM	Theory of Mind
WHO	World Health Organization

Chapter 1- Introduction

1.1 Background

The existing literature on child language narratives has predominantly focused on the structural aspects of narrative production, with an emphasis on the macrostructure and microstructure of narratives (Westby et al., 2023). The macrostructure of a narrative refers to its overall organization, encompassing elements such as episodic structure and story grammar components, which provide the framework for a coherent narrative (Heilmann et al., 2010), whereas, the microstructure of a narrative involves a more detailed analysis of the language used, focusing on the internal linguistic structure, including lexical items, morphosyntax, and connectives, which are essential for constructing a coherent and meaningful narrative (Gagarina et al., 2016). The functional or meaning-related dimensions of narratives have been relatively understudied. This is an important dimension that warrants more research, because telling personal stories about oneself and understanding fictional stories about others can be viewed as an informative assessment of an individual's social-communication abilities in their communicative competence and that children with language disorders, for instance, children with autism have difficulties in social communication as a key characteristic.

This thesis aims to investigate beyond the structural aspects of narratives and explore the functional aspects of narratives of children with and without autism.

The World Health Organization (WHO) also advocates focusing on the functional behaviour of individuals with disabilities through its internationally renowned framework called the International Classification of Functioning, Health and Disability (ICF) (World Health Organization, 2007).

According to the ICF, functioning encompasses an individual's ability to participate in everyday life, successfully meeting the demands of various social, environmental, and personal

contexts. A comprehensive understanding of a person's functioning is essential for knowing the factors that influence their behaviour and interactions within society (McDougall et al., 2011). Considering the full range of factors that affect a person's daily life, including their physical and mental abilities, activities, and social interactions, as well as the environmental and personal factors that impact their well-being, one can identify areas where they may need support and provide targeted interventions, accommodations, and services that help them overcome challenges and achieve their goals. This, in turn, can lead to improved overall well-being, increased independence, and a better quality of life, enabling individuals to live more fulfilling and meaningful lives, and fostering a more inclusive and supportive environment that promotes equal opportunities and social participation.

1.2 Why is Assessing Functional Aspects Important?

Assessing the functional aspects of communication is crucial for understanding the skills and abilities of children, particularly those with autism and language disorders (Miranda et al., 2023; Liu et al., 2024). Functional aspects focus on how language is used in real-life contexts to convey meaning, negotiate relationships, and construct social identities (Parcell & Baker, 2017). This approach goes beyond structural analysis, which often emphasizes on structure, to explore the practical use of language in everyday interactions. For instance, consider a child who says, "I'm happy because I ate an ice cream and didn't share with anyone. I wanted to be alone." While this sentence may be grammatically correct and convey a coherent message, a functional analysis reveals that the child may be prioritizing their own needs over others, potentially indicating difficulties with social sharing or empathy. Furthermore, the child's language use suggests that they may struggle with understanding or acknowledging others' feelings or perspectives. Examining these functional aspects, researchers, caregivers, and practitioners can gain valuable insights into a child's ability to communicate effectively, construct coherent stories, and understand others in a discourse.

One effective way to analyse functional aspects is through examining oral narratives, as storytelling is an integral part of everyday life (Hineline 2018; Rutledge 2016). Narratives inherently possess a functional nature, providing a rich context for examining how children express themselves, organize their thoughts, and engage with others. Through narratives, one can observe how children use language to convey meaning, manage social interactions, and reflect their personal experiences. Thus, this PhD project focuses on narratives produced by children with and without autism, adopting a functional perspective to examine the content and meaning conveyed in their personal stories and how they understand fictional stories. Grounded in the ICF framework, which emphasizes individual functioning, this study highlights the importance of narratives in understanding communication and social participation. The next section will discuss how the studies in this thesis are based on the ICF model.

1.3 The International Classification of Functioning, Disability and Health (ICF) Model

The ICF model provides a comprehensive framework for understanding health and disability from a biopsychosocial perspective, moving beyond a purely medical model to encompass an individual's functioning in real-world contexts (WHO, 2007). This model is particularly pertinent to the study of communication disorders, as it emphasizes how a health condition, such as autism, impacts a person's ability to engage in 'Activities' and achieve 'Participation' in various life situations. The model recognizes that an individual's level of functioning is the result of a dynamic interaction between several key components, including body functions, body structures, activities, participation, environmental factors, and personal factors.

As illustrated in Figure 1, these components are interconnected and influence one another, resulting in a unique profile of functioning for an individual.

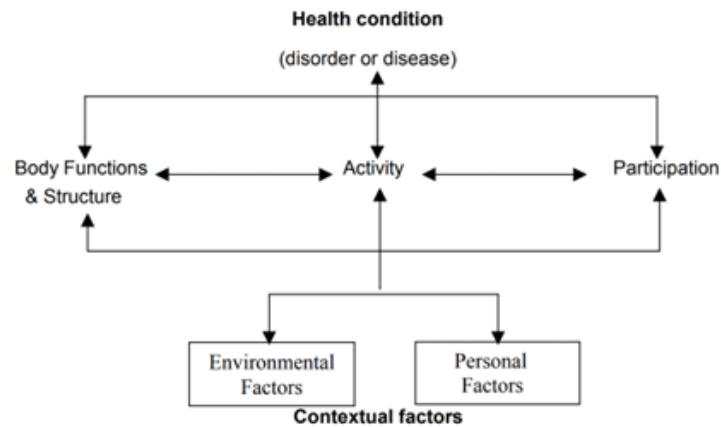


Figure 1.1 Diagram of International Classification of Functioning, Disability and Health

The ICF model consists of the following components:

1. **Body Functions & Structures:** The physiological (the anatomical parts of the body, such as organs, limbs, and systems) and psychological functions of the body, such as movement, sensation, and cognitive functions.
2. **Activities:** The tasks and actions that an individual performs in their daily life, such as eating, dressing, and communicating.
3. **Participation:** The involvement of an individual in life situations, such as education, employment, and social relationships.
4. **Environmental Factors:** The physical, social, and attitudinal environments in which an individual lives, including factors such as accessibility, support, and stigma.
5. **Personal Factors:** The characteristics of an individual, such as their age, sex, and personality, that influence their functioning.

In the context of the International Classification of Functioning, Disability and Health (ICF) components, autistic children may experience difficulties in the "Activities" component, particularly in social communication. This, in turn, can impact their "Participation" in social interactions, is essential for establishing and maintaining relationships, conveying emotions,

and negotiating meaning (Westby, 2016). These challenges can be particularly pronounced in the following areas:

Initiating and maintaining relationships: Autistic children may struggle to initiate or maintain conversations, understand social cues, and develop friendships, which can impact their ability to form and sustain meaningful relationships (Tager-Flusberg, 2007). This can be attributed to difficulties in understanding the psycho-social aspects of communication.

Producing coherent stories: Autistic children may struggle to produce coherent stories, particularly in response to emotional prompts, which can make it challenging for them to convey their thoughts and feelings (Losh & Capps, 2003). This can be due to difficulties in organizing and structuring their thoughts, as well as challenges in using language to convey emotional experiences.

Inferencing meaning from events/stories: Autistic children may have difficulty inferring meaning from oral narratives, which can impact their ability to understand and engage with stories, conversations, and social interactions (Diehl et al., 2006). This can be attributed to challenges in going beyond the literal meaning of the text and making inferences about the underlying themes, emotions, and intentions.

The Activities and Participation component comprises several domains, including Learning and Applying Knowledge, General Tasks and Demands, Communication, Mobility, Self-Care, Domestic Life, Interpersonal Interactions and Relationships, Major Life Areas, and Community, Social and Civic Life (World Health Organization, 2001). These domains provide a comprehensive framework for understanding the various activities that individuals perform and their participation in life situations.

The three studies are intricately connected and collectively contribute to a deeper understanding of the complex relationships between communication, social participation, and cognitive-linguistic abilities in children with and without autism. Study 1 provides an

exploration of the topics of personal narratives in children, shedding light on the domains of Communication, Domestic Life, Interpersonal Interactions and Relationships, Major Life Areas, and Community, Social and Civic Life. By examining the topics of personal narratives of children with and without autism, this study offers insights into their social involvement.

Study 2 examines the coherence of personal stories in response to basic emotional prompts (excited/happy vs worried) and intersects with the domains of Learning and Applying Knowledge, Communication, and Emotional Functions, because it examines how children learn and apply knowledge about storytelling and emotional experiences, communicate effectively through narrative, and understand and express their emotions in a coherent and meaningful way.

Study 3 further investigates oral inferential comprehension in children with and without autism, and maps onto the domains of Learning and Applying Knowledge and Communication. Specifically, this study examines how children extract knowledge from a given context, presented through fictional stories. It investigates how children apply their world knowledge to answer questions, such as "what" and "how", and make inferences based on the information provided. Furthermore, it explores how well children can communicate their inferences and understanding of the story, as well as their ability to recognize and express the emotions of the characters in the story.

Table 1 highlights how the studies are relevant to categories of ICF.

Table 1.1 ICF Domains Relevant to the Studies in this Thesis

Studies	Communication	Domestic Life	Interpersonal Interactions and Relationships	Major Life Areas	Community, Social and Civic Life	Emotional Functions
Study 1 (Chapter 2)	✓	✓	✓	✓	✓	✓
Study 2 (Chapter 3)	✓					✓
Study 3 (Chapter 4)	✓					✓

1.4 This Thesis

This thesis is a comprehensive examination of the narrative abilities of autistic children with low support needs, who are uniquely known to have difficulties with social communication. Autistic children with low support needs, also referred to as individuals with Level 1 autism, are characterized by low support needs for both communication and behaviors, as defined in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition, Text Revision (DSM-5-TR). According to the DSM-5-TR, Level 1 autism is typically classified as "mild" autism, and these individuals require minimal support and accommodations to navigate everyday situations. Hereafter referred to as autistic children.

Throughout this thesis, autistic children will be referred to as such, unless otherwise specified. They will be compared with a group of age- and socio-economic status (SES)-matched typically developing (TD) peers. The studies feature Hindi-speaking children from India, adding new empirical evidence to an under-studied language in the cross-linguistic child language literature and their TD peers. Two key narrative genres that index children's communicative competence will be examined: personal narratives (studies one and two) and fictional narratives (study three). As mentioned earlier, this thesis is organized into three studies that adopt a functional perspective, focusing on the contents, coherence, and comprehension

abilities in children's narratives. The three empirical studies presented in this thesis focused on autistic children with low support needs, who were identified and diagnosed based on their scores on the Indian Scale for Assessment of Autism (ISAA). Specifically, the autistic children in these studies had ISAA scores ranging from 70 to 106, indicating mild autism, and were between 6;0 and 9;1 years old (mean age = 8;0). These children were already receiving support and therapy sessions at the Kiran Society, an Indian-based non-governmental organization (NGO) that works with autistic children.

Autistic children with low support needs were identified and diagnosed as having Level 1 autism, which is typically classified as "mild" autism. According to the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition, Text Revision (DSM-5-TR), Level 1 autism is characterized by low support needs for both communication and behaviors. These children require minimal support and accommodations to navigate everyday situations. Hereafter referred to as autistic children.

The children participating in this study were bilingual, with Hindi as their first language and dominant language, and English as their second language and school language. They acquired English from the age of four, when they started attending private schools where the medium of instruction is English. Although they were exposed to English for 6 hours a day, 5 days a week, their daily communication and interaction were primarily in Hindi. All participants resided in Varanasi, an urban city in the south-eastern part of Uttar Pradesh, where the Hindi spoken is close to standard Hindi.

To ensure a fair comparison with their TD peers, the autistic children were selected based on their performance on expressive vocabulary and morphosyntactic tasks, which were assessed using alternative measures. The Multilingual Naming Test (MINT; Gollan et al., 2012) was used to evaluate expressive vocabulary, while the Hindi

version of the Sentence-Repetition (SRep) task (Marinis et al., 2015) was used to assess morphosyntax. These measures were employed due to the lack of standardized language tests available in Hindi.

The inclusion criteria for the autistic children in these studies were: (1) having low support needs, as indicated by ISAA scores between 70-106; (2) being between 6;0 and 9;1 years old; (3) already receiving support and therapy sessions; and (4) having comparable scores on expressive vocabulary and morphosyntactic tasks with their TD peers. By using these criteria and alternative measures, the studies aimed to provide a robust and fair examination of the language abilities of autistic children with low support needs. The details of the studies are highlighted below:

Study one examines the topics of personal narratives in response to six emotion-based prompts (happy, worried, annoyed, proud, problem, important). This study will analyse and compare the topics of personal narratives of children with and without autism and will also use a life habits questionnaire based on the ICF. The Assessment of Life habits (Life-H, Noreau et al., 2002) questionnaire, is used to assess whether the topics used by these children reflect their daily activities and habits. The main aim of this study is to compare the topics of personal narratives between children with and without autism, as personal narratives are experiences of real life, and to examine how social participation and content of narratives differ between these two groups (see Chapter 2).

Study two builds upon existing research by examining the coherence of narratives of both global ratings of coherence and local indicators of global coherence in response to different prompts with emotional polarity (positive and negative prompts). For the global ratings of coherence, the study used the Narrative Coherence Coding Scheme (NaCCS) by Reese et al., (2011), while for the local indicators of global coherence, I used the list of local

indicators presented in Habermas & de Silveria (2008). Unlike previous studies that have reported lower coherence in narratives of autistic children in response to neutral prompts or event related prompts, this study will investigate the effect of emotional polarity on the coherence of narratives in children with and without autism (see Chapter 3).

Study three takes a unique approach by examining oral inferential comprehension in response to questions in a fictional narrative context. Unlike other studies that have reported difficulties in responding to inferential questions in children with autism, this study will apply the Blank's levels of language abstraction to examine the different levels of inferential questions. This study will also use a more refined scoring system to better understand the inferential abilities of children with and without autism. By examining inferential comprehension through the lens of the Blank levels of language abstraction, this study will provide better understanding of the inferential abilities of children with autism and how they differ from their TD peers (see Chapter 4).

These findings are impactful for informing intervention planning for children with autism. At the end of each study, some narrative samples of autistic children have been examined, and suggestions have been provided to widen their range of topics, their thematic development contributing to coherence of personal narrative of positive emotional significance and their comprehension of fictional narratives specifically when these children had to answer comprehension questions that require more critical reasoning and thinking. These studies also focus that practitioners should prioritize supporting high-functioning autistic children in sharing diverse and coherent personal experiences and developing oral inferential comprehension as essential clinical goals. The next page presents an overview of the studies in this thesis.

Focus on the Functional/meaning Related Aspects of Narratives

Study 1

Topics of personal narratives of autistic children and their TD peers

Topics of personal narratives of autistic children vs. TD peers differ in reflecting social involvement ?

21 Hindi-speaking autistic children with low support needs



Global TALEs

<https://osf.io/ztqg6/>

Assessment of Life Habits

30 Hindi-speaking TD children

Study 2

Effect of emotional valence on the personal narrative of autistic children and their TD peers

TD: Within-group coherence differences (positive vs. negative stories)?
Autistic: Within-group coherence differences (positive vs. negative stories)?
Between-group coherence in positive and negative stories (TD vs. Autistic)?

30 Hindi-speaking autistic children with low support needs



Two prompts (Happy and Worried) from Global TALEs

<https://osf.io/ztqg6/>

30 Hindi-speaking TD children

Study 3

Oral Inferential skills in fictional narratives of autistic children and their TD peers

Considering Blank's levels of language abstraction, do level IV inferential questions differ in difficulty from level III questions?

Do children with autism vs. TD children differ in inferential question difficulty?

Is there an interaction between question level (III/IV) and clinical status (Autism/TD) on inferential question difficulty?

30 Hindi-speaking autistic children with low support needs



LITMUS MAIN Hindi version
<https://main.leibniz-zas.de/>

30 Hindi-speaking TD children

Children aged between 6 to 9 years; belonging to middle Socio-economic status and attending regular schools

Comparable performances on non-verbal IQ (Raven's Matrices), expressive vocabulary (Multilingual Naming Test (MINT) and Sentence Repetition (SRep) for expressive morphosyntax. For autistic children, they were diagnosed of autism with low support needs on the basis of their scores in Indian Scale for Assessment of Autism (ISAA)

Study 1 Findings: Topics shared by autistic children were more restricted than their TD peers, where they did not mention

- social participation beyond immediate family,
- conflict management,
- or offering help, reflecting fewer life experiences of such.

Study 2 findings: TD: Positive & Negative stories similar for global ratings of coherence and local indicators of global coherence

Autistic: Worried stories more coherent for global ratings of coherence (theme and context) and local indicators of global coherence for all the outcome measures. Between-group: Autistic > TD in worried stories; TD > Autistic in happy stories (Thematic development).

Autistic children scored lower for both global ratings of thematic coherence and thematic indicators of global coherence, specifically showing no mention of explicit 'Opinion' and 'Understanding' statements.

Study 3 findings: Level IV questions were more challenging than Level III for both groups.

Children with autism scored significantly lower than TD peers in both Level III and Level IV questions.

Autistic group showed greater difficulty with Level IV questions.

Significance

- **Study 1** highlights how personal narrative topics reveal autistic children's restricted social involvement and inform interventions to broaden their social participation.
- **Study 2** demonstrates how emotional polarity affects narrative coherence, revealing the consistent absence of interpretive markers in autistic children's narratives, with implications for their intrapersonal Theory of Mind, developing self-identity/unique-self, and social agency.
- **Study 3** provides a novel application of Blank's levels of language abstraction to inferential skills, showing autistic children's specific difficulties with higher-level abstract reasoning, which significantly informs assessment and intervention strategies.

References

- Diehl, J. J., Bennetto, L., & Young, E. C. (2006). Story recall and narrative coherence of high-functioning children with autism spectrum disorders. *Journal of abnormal child psychology*, 34, 83-98.
- Gagarina, N., Klop, D., Tsimpli, I. M., & Walters, J. (2016). Narrative abilities in bilingual children. *Applied Psycholinguistics*, 37(1), 11-17.
- Habermas, T., & de Silveira, C. (2008). The development of global coherence in life narratives across adolescence: temporal, causal, and thematic aspects. *Developmental psychology*, 44(3), 707.
- Heilmann, J., Miller, J. F., Nockerts, A., & Dunaway, C. (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children.
- Hineline P. N. (2018). Narrative: Why It's Important, and How It Works. *Perspectives on behavior science*, 41(2), 471–501. <https://doi.org/10.1007/s40614-018-0137-x>
- Liu, Y., Tian, X., Mao, H., Cheng, L., Wang, P., & Gao, Y. (2024). Research on pragmatic impairment in autistic children during the past two decades (2001–2022): hot spots and frontiers—based on CiteSpace bibliometric analysis. *Frontiers in Psychology*, 15, 1276001.
- Losh, M., & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's syndrome. *Journal of autism and developmental disorders*, 33, 239-251.
- McDougall, J., Wright, V., Schmidt, J., Miller, L., & Lowry, K. (2011). Applying the ICF framework to study changes in quality-of-life for youth with chronic conditions. *Developmental neurorehabilitation*, 14(1), 41–53. <https://doi.org/10.3109/17518423.2010.521795>
- Miranda, A., Berenguer, C., Baixauli, I., & Roselló, B. (2023). Childhood language skills as predictors of social, adaptive and behavior outcomes of adolescents with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 103, 102143.
- Noreau, L., Fougere, P., & Vincent, C. (2002). The LIFE-H: Assessment of the quality of social participation. *Technology and disability*, 14(3), 113-118. doi:10.3233/TAD-2002-14306
- Parcell, E., & Baker, B. (2017). Narrative analysis. In *The sage encyclopedia of communication research methods* (Vol. 4, pp. 1069-1072). SAGE Publications, Inc, <https://doi.org/10.4135/9781483381411.n368>
- Reese, E., Haden, C. A., Baker-Ward, L., Bauer, P., Fivush, R., & Ornstein, P. A. (2011). Coherence of personal narratives across the lifespan: A multidimensional model and coding method. *Journal of cognition and development*, 12(4), 424-462.
- Rutledge, P. (2016). Everything is story: telling stories and positive psychology. *California: ABC-CLIO LLC*, 01-25.
- Tager-Flusberg, H. (2007). Evaluating the theory-of-mind hypothesis of autism. *Current directions in psychological science*, 16(6), 311-315.
- Westby, C. (2016). Social Deficits in Children with Autism Spectrum Disorder or Specific Language Impairment. *Word of Mouth*, 27(3), 8-10.
- Westby, C. E., Chen, K. M., Lee, J. P., & Wong, A. M. Y. (2023). Topic and content of personal narratives of children from three East Asian cultures and three English-speaking cultures: a collaborative qualitative analysis. *Folia Phoniatrica Et Logopaedica*, 75(6), 431-446.
- World Health Organization. (2007). *International Classification of Functioning, Disability, and Health: Children & Youth Version: ICF-CY*. World Health Organization.

Chapter 2 - Examining the Topics of Personal Narratives of Hindi-speaking Children with and without Autism: Using Global TALES

2.1 Introduction

Personal narratives are accounts of real-life experiences that play a vital role in daily social interactions. They are indicators of social skills, being able to tell coherent stories of past own experiences supports social relationships and friendships which is important for elementary school children (Grove, 2014; Westby & Culatta, 2016). A well-formed personal narrative provides valuable insights into a child's social and communication abilities. This skill of sharing personal narratives not only facilitates social bonding but also aids in the child's overall language development and academic success. Personal stories allow children to reflect on their own experiences, connect with others and build a sense of identity and belonging within their social circles. Despite the functional and social significance of personal narratives, it has received relatively less attention from child language researchers and speech-language pathologists when compared to fictional story narratives (Westby et al., 2023; Rollins 2014). The prior existing studies on children's personal narratives have primarily emphasized the structural aspects, such as story macrostructure and microstructure, there has been limited attention given to the functional aspects like, topics and contents of the narrative.

This first empirical study in this thesis takes on a functional perspective on analysing the personal narratives of children with and without autism. The study uses Global TALES as a tool that can be useful to analyse children's personal narratives from a functional perspective in terms of the range of topics children choose to talk about when narrating their personal experiences to others. The study analyses the topics of personal narratives because topics indicate towards the content of the story. The content of the narrative can offer valuable insights into their lived experiences, interests, and connections with the people and environment around

them. The content of child's personal narratives serves as a window into their world, reflecting the people, activities, and events that are meaningful and salient to them.

The study also used ICF framework-based assessment “Assessment of Life Habits (Life-H- version 3; Noreau et al., 2002)” to analyse children's social activities and participation level. Before presenting the study, as background first, some details about what topics are and why topics are important, the Global TALEs protocol, the translation of Global TALEs protocol into Hindi, the Life-H assessment has been highlighted in the following sections.

2.1.1 What are Topics?

Topics represent the main idea of the story, the central idea. They indicate the main content of the story. Topics are important because they are developmentally significant as precursors to theme that develop in adolescence (Westby et al., 2023). As a functional outcome of a personal narrative, topics can be significant in informing the nature of social relationships and people connections of the narrator, revealing the dynamics of relationships, such as friendships, family bonds, and community ties. Being able to talk about a wide range of topics that are emotionally significant, meaningful, and special to a person, is a socio-communicative skill and important for a child’s psycho-social development (Shiner et al., 2021). The development of Global TALEs protocol provides a unique opportunity to elicit personal narratives from children where they can talk about a wide range of topics. The following section discusses the protocol and its translation to Hindi in detail.

2.1.2 The Global TALES Protocol

The Global TALES Protocol comprises six emotion-based prompts (excited, worried, annoyed, proud, problem situation, something important). Each prompt encourages the child to tell a ‘story’ about a personal experience. An initial feasibility study demonstrated that this tool was successful in eliciting language samples from 10-year-old children from 10 different countries, speaking 8 different languages (Westerveld et al., 2022). The translated versions of the protocol followed a standardized adaptation process to ensure that the elicitation procedures were consistent across languages. For full access to the translated versions of the protocol, visit <https://osf.io/ztqg6/>

2.1.3 Translation of Global TALES Protocol to Hindi

Three translated Hindi versions were created from the original English version by the PhD student who is a native speaker of Hindi with linguistic training: (1) a word-to-word translation of the original English protocol; (2) a word-to-word translation but less frequent words were replaced by more familiar words to ensure children would find all words comprehensible and familiar; and (3) a word-to-word translation, but some words and phrases were replaced by meaning-wise translations to increase naturalness. These versions were sent to five trained linguists, who were native speakers of Hindi and experienced language professionals working with children. They were asked to:

a) choose the version that is the closest match to the original English version of the Global TALES, while ensuring that it is culturally and linguistically appropriate and can be understood by Hindi speaking children ages six or older.

(b) double-check the translations to ensure that the translated versions have the same instructions, protocol prompts, and scripted follow-up prompts as the original protocol.

(c) double check the translations to ensure that the protocol prompts, and scripted follow-up prompts would tap into the same key emotions and type of events (excited, worried, annoyed, proud, problem situation, something important) and be culturally and linguistically appropriate.

The linguists were also asked to identify any incongruities with the original protocol and/or suggest changes or edits to ensure appropriateness in all aspects. All five linguists selected version three as the best version, most closely related to the original protocol. To ensure cultural appropriateness, some follow up protocol prompts and generic feedback to children's narratives were adjusted according to colloquial Hindi. For example, phrases like "it is interesting" "aha" were changed to more neutral response feedback in Hindi like "oh! I see." Moreover, it was also decided to provide a clearer explanation for certain prompts that were hard to comprehend for the children. For example, the literal translation of the protocol prompt "proud" is "garv" which is not a very frequently occurring word in day-to-day conversations in Hindi. After using the scripted prompt from the protocol, the experimenter provided an elaborate explanation of the word "proud" by adding "tell me a time when you thought that you were a very good girl/boy." The Hindi version of the Global TALES protocol can also be found at <https://osf.io/t97ny>.

2.1.4 The Assessment of Life Habits

The Assessment of Life Habits (Life-H) is a comprehensive questionnaire used to gather data on the various life habits individuals perform in their everyday environments, such as at home, school, work, or within their community, to ensure their well-being and societal integration across their lifespan. From the individual's viewpoint, the Life-H evaluates the execution of life habits and pinpoints any challenges faced that hinder full participation.

2.2 Present Study

This study compared the topics of personal narratives of Hindi-speaking autistic children with low support needs (N=21; aged 6-9 years) and their TD, language and age-matched peers (N=30).

To the best of my knowledge till date, there are only four studies that compared the personal narratives of autistic children and their TD peers. These studies typically emphasized the structural aspects like length, macrostructure, and syntactic complexity, with some also examining evaluative measures, such as use of Internal State Terms (ISTs), causal statements and evaluative devices. Losh & Capps (2003), elicited the narratives of 28 autistic children and their TD peers aged eleven years, using prompts like going on a vacation. The autistic children produced less complex syntax and used fewer evaluative devices. The study also did a cursory examination of the content of narratives and observed no group differences in mentioning family members, friends, and pets in their narratives. However, a thematic difference in content was reported, with autistic children mentioning computer games more often, while TDs mentioned outdoor games. Goldman (2008) compared the narratives of 12 eleven-years-old autistic children, 12 age-matched children with Developmental Language Disorder (DLD) and their 12 age-matched TD peers. They used different prompts like visiting a doctor, last weekend, etc., to elicit personal narratives. The results showed that autistic children needed more support/prompts to produce a coherent narrative, and their stories had fewer high points. Bang et al., (2013) compared the use of ISTs in the stories of 20 autistic children aged eleven years and their 17 age-matched peers. They asked children about their favourite hobbies. Their findings showed that autistic children produced fewer ISTs in comparison to their TD peers. King et al., (2013) examined 27 autistic children aged between eleven-fourteen years, 27 age-matched TDs, and 27 language-matched TDs in their production of personal narratives in

response to prompt, going on vacation. Autistic children's narratives were shorter with fewer ISTs than both TD groups.

Unlike previous studies, the current study focuses on a functional/meaning dimension that has not been systematically examined in the autism personal narrative literature- the “topic” of a personal story that expresses the main contents of a narrative. Specifically, the study compared the topics of personal narratives told by autistic children versus those told by their age-matched TD peers. Analysing the topics of personal narratives told by a person provide insights into the social connections of the narrator and her/his participation in these relationships, revealing dynamics such as friendships, family bonds, and community ties.

Difficulty in maintaining social relationships is one of the outcomes of autism. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM), autistic children, even those with low support needs, face challenges in establishing and maintaining relationships, reciprocating social interaction, and communicating with others (DSM5, 2013). Given these challenges, the study compared the personal stories shared by autistic children and their TD peers considering their social involvement as members of a community.

2.2.1 Research Question

The following question was asked:

How do the topics of personal narratives of autistic children differ from their TD-age peers, in terms of reflecting children's social involvement with others?

The study hypothesized that the personal narratives of autistic children, relative to their TD peers, would feature a more restricted range of social relationships and more passive interactions with others.

Global TALES protocol to elicit personal narratives from children has been used in the study because unlike other existing studies that used closed-ended prompts for eliciting

personal narratives like going on a vacation or birthday celebration, this protocol offers a more open-ended approach, allowing children to share a range of stories when they experienced basic emotions like excited, worried, and annoyed, the social emotion like feeling proud, experienced something important and sharing something important and meaningful close to their hearts.

2.3 Methods

2.3.1 Participants

Twenty-one autistic children with low support needs (Mage = 7;3; SD = 0.94; aged 6;1-9;0) and thirty age-matched TD peers (Mage=7;8; SD =1.24) participated. The autistic children were recruited from a non-governmental organization based in India that works with autistic children and adults. The autistic children in this study were classified as “autistic children with low support needs” as they were diagnosed of having mild autism on the Indian Scale for Assessment of Autism (ISAA, 2009). The TD children in this study had no developmental concerns and were recruited from a local school. Both groups were matched on age, socioeconomic status, and non-verbal IQ. The two groups also had comparable scores in expressive vocabulary ($p < .05$; using Hindi version of the Multilingual Naming Test (MINT), Ivanova et al., 2013), and morphosyntax ($p < .05$; using Hindi version of the Language Impairment Testing in Multilingual Society (LITMUS) sentence repetition task; Marinis & Armon-Lotem, 2019).

Written informed consent was provided by the children’s caregivers. Of these 51 children, the data of 30 TD children were also included in a previous study (Srivastava et al., 2023; published by the PhD student and the chief supervisor and their collaborator in Australia) which focused on a cross-cultural comparison between the topics of personal narratives told by these Hindi-speaking TD children and those told by other language and culture groups in Westerveld et al., (2022).

2.3.2 Instruments

The Hindi versions of the following tests were used: Multilingual Naming Test (Gollan et al., 2012; Ivanova et al., 2013), LITMUS Sentence repetition task (Marinis & Armon-Lotem, 2019), Global TALES. The instruments were presented to the child in the following order as detailed below.

Expressive Vocabulary: Multilingual Naming Test (MINT; Gollan et al., 2012; Ivanova et al., 2013) was used to assess the expressive vocabulary skills. The test contained 68 black and white lined pictures which were presented to the child on a computer screen using PowerPoint and the instructions were given to child in Hindi. There is no available Hindi version of this task, so the task instructions were translated to Hindi by the PhD student. After seeing the picture, the child had to name the pictures in Hindi. According to the instructions a non-target/incorrect response would be that the child did not recognize the picture; the child recognizes the picture incorrectly, the child is not sure about the name of the picture, or the child does not know the name of the picture. If the child comes across a picture that he/she does not know about then certain prompts as illustrated in the instrument instructions can be given to the child to elicit the target/correct response. Each correct response was marked '1' and the incorrect response '0'.

Morphosyntactic Ability: The Hindi version of the LITMUS SRep task was used to assess the morphosyntactic abilities of the child. The task was presented using Microsoft Power Point. The task is in form of a treasure hunting game where the child is requested to repeat sentences to help the bear find a treasure. The stimuli (sentences) in the task are divided into three blocks corresponding to three levels of difficulty. The task is presented to the child in randomized order, before beginning the actual task, the child is expected to repeat four training stimuli for warm-up. Excluding the trial stimuli, there were 35 stimuli in total. Children scored

1 mark for producing/repeating the stimuli identically. The maximum score for this task was 35.

Adaptation and Validation of the Hindi SRep

The Hindi version of the SRep was adapted from the Urdu version developed by Hamdani et al., (2025). Given the similarities between Hindi and Urdu in terms of morpho-syntax and their high mutual intelligibility, only 5 out of 35 SRT stimuli required basic changes to be suitable for children speaking Hindi as their first language. These modifications were primarily due to differences in relational terms between Hindi and Urdu.

Examples of Changes

The following examples illustrate the changes made:

- "The father has given water from the room" was changed from "Abu ne kamre se pani diya hai" (Urdu) to "Papa ne kamre se pani diya hai" (Hindi), as the word for "father" is "papa" in Hindi, not "abu".
- "The boy gives food to the father" was changed from "Lerka abu ko khana deta hai" (Urdu) to "Lerka papa ko khana deta hai" (Hindi).
- "The mother should take the ball from the girl" was changed from "Ami ko lerki se gend leni chahiye" (Urdu) to "Maa ko lerki se gend leni chahiye" (Hindi).
- "Father has no water" was changed from "Abu ke pas pani nahein hai" (Urdu) to "Papa ke pas pani nahein hai" (Hindi).
- "The sister drinks tea in the morning" was changed from "Baji subha chae piti hai" (Urdu) to "Behen subha chae piti hai" (Hindi).

In the absence of a standardized language test in Hindi, the SRep has been shown to be a useful tool for assessing children's language abilities. A recent meta-analysis by Ward et al., (2024) demonstrates that the SRep consistently differentiates children with and without language disorders. The study's design incorporates both controlled and language-independent conditions, making SRep a robust tool for assessing a child's ability to process syntactic structures. Given that SRep evaluates children's capacity to produce a broad range of syntactic forms, it can be considered a criterion-referenced assessment. While SRep appears to be a reasonable tool for this purpose, it is essential to note that there is currently limited data validating it against established external tests.¹¹

Nonverbal Ability: Children were assessed using Raven's Progressive Matrices (Raven 2003), a measure of nonverbal IQ. This was mainly done to rule out children with intellectual challenges. The Raven's Progressive Matrices test involves responding to 60 multiple-choice questions, where children must select the missing piece that fits a pattern from six to eight alternatives. A standard score of 70 or higher is considered indicative of normal intellectual functioning.

Global TALES: The Hindi version of the Global TALES protocol was used to elicit personal narratives. Experimenter read aloud each of the six scripted prompts and asked the child to narrate six stories about a time when s/he was excited, worried, annoyed, proud, had a problem and had something important. Children were individually assessed and each produced personal stories in response to the prompts and these story samples were audio-recorded for further analyses.

The Assessment of Life Habits (Life-H): Life-H-version 3, (Noreau et al., 2002) based on the ICF, was used to assess children's social activities and participation level. The

¹ SRep was used in the same way for Study 2 and Study 3 too

questionnaire encompasses various components that can be completed either by the children themselves or their parents, providing insights into the child's life habits. Specifically for this study, three components were selected, that are most relevant to social involvement: *Communication, Interpersonal Relationships, and Responsibilities* for parents to report on. Life-H provided supplementary information about a child's level of social engagement, which could assist interpretation of the child's personal narrative data, as the study examined the child's mention of social participation in her/his personal stories.

2.3.3. Procedure

For the MINT, SRep, Raven's and Global TALES, all children were interviewed in face-to-face mode in a quiet room, either in school or a place according to the child's convenience. The PhD student who was also the interviewer assured that the child is not prompted by the parents/guardians while answering to questions during the session. For audio stimuli all the participants used the same headsets for listening to the audio instructions/stimuli whenever required so that all participants could hear the stimuli in good quality and clearly.

For the Life-H questionnaire ratings, parents were directed to use a computerized version of the Life-H questionnaire. Since the Life-H questions were not available in Hindi, the PhD student ensured that all participating parents were proficient in English to respond to the questionnaire. Additionally, parents were prompted to elaborate on their questionnaire responses to ensure their comprehension of the questions, this also helped in gaining some qualitative insights about the child's habits and social activities.

2.3.4 Data Coding and Analysis

The personal narrative samples were transcribed from the audio-recordings, and assigned topics based on the main content, following methods established in Westerveld et al., (2022) and Srivastava et al., (2023). A narrative was classified as personal narrative when the narrative contained at least two restricted narrative clauses related to past events (Labov 1972).

The topic coding process was conducted in two phases. In the first phase, the first author and three other Hindi-speaking linguists who were trained with the coding principles each independently assigned the initial topics (based on the story's main content) to these transcribed narratives. The initial topic coding by all the coders was then checked by the first author. The topic codings matched in 95% of the cases, with the remaining 5% having apparent discrepancies due to the use of different wording, for example "fighting with children" was coded as a topic by one coder, while the same story was coded as "fighting with friends" by the other coder. Such apparent discrepancies were resolved via online discussion. The first phase resulted in 48 initial topics for the autistic group and 69 initial topics for the TD group. In the second phase of topic coding, the first author first merged the initial topics into broader topics following the methods in Westerveld et al., (2022). For instance, initial topics such as 'fighting with younger sister' and 'fighting with friend' were grouped into a broader topic 'peer/sibling relationships.' These broader topics were then checked by the three other Hindi-speaking linguists who coded the initial topics in the first phase. There were no disagreements at this phase. Finally, this mapping resulted in 23 broader topics for the autistic group and 31 broader topics for the TD group.

Parents completed the computerized version of the Life-H questionnaire. The questionnaire featured various activities in different domains, like 'communicating with an adult at home' in the communication domain; 'maintaining emotional relationships with parents' in the interpersonal relationship domain; 'providing assistance to parents or other members' in the 'responsibilities' domain. Parents rated these activities on a scale of 1 to 10 based on their child's participation and difficulty level of the corresponding activities. A score of 1 indicated very infrequent participation and/or huge difficulty, while a score of 10 indicated very frequent participation with no difficulty. If an activity was not performed by the child in his/her daily life, it received a score of 0. The computerized version automatically calculated

the scores for each participant. The results are presented in terms of mean scores of the two groups in each activity.

2.4 Results

This section first presents the results of the Global TALES protocol, i.e., compares the topics of children with and without autism. The consequent section then presents the results of the Life-H questionnaire.

2.4.1 Stories of the autistic and TD children

In response to the prompt “happy,” the responses of the two groups differed in terms of human involvement. Among the 30 TD children, 14 mentioned about family events like birthday parties involving immediate and non-immediate family members, they also mentioned about their sibling relationships (8 out of 30), personal achievements (4 out of 30), vacations (3 out of 30), and welcoming guests (1 out of 30). In contrast, among the 21 autistic children, most of them talk about spending time in nature (9 out of 21), watching cartoons (4 out of 21), and activities like solving puzzles and flying kites (each mentioned by one child). The TD children's topics included a broader range of family members, while the autistic children focused on immediate family and individual interests.

For the prompt "worried" there were differences in terms of human involvement and conflict management between TD children and autistic children. Among the 30 TD children 9 out of 30 talked about school tasks, injury, and illness (8 out of 30), conflicts with friends, family, and siblings (7 out of 30), making decisions related to family issues (3 out of 30), and the fear of losing something (2 out of 30). Their stories encompassed a broader setting, including school and the neighbourhood, when discussing school tasks and managing conflicts in their neighbourhood park. In contrast the stories of 21 autistic children, were centred around a more limited setting, primarily their home environment, and involved themselves and immediate family members. Most expressed concerns when their mother does not play

television (7 out of 21), worries when asked questions (6 out of 21), difficulties in playing computer games (4 out of 21), difficulties in completing homework (3 out of 21), and the fear of losing something (1 out of 21).

In response to the prompt annoyed, the topics of TD children and autistic children did not differ much. Both the groups talked about personal frustration, parental issues, and injury and pain, the TD children additionally also mentioned more about sibling and peer relationships and expectations of teachers in school.

In response to the prompt "proud," there were slight differences in the topics shared by TD children and autistic children, particularly in terms of taking up responsibilities as contributors. Among the 30 TD children, most of them shared stories about their personal achievements in academics, sports, dance, and music (26 out of 30). Some also talk about contributing by helping others, such as assisting parents with household chores or helping strangers with directions and supporting friends during injuries (3 out of 30). Only one child mentioned personal satisfaction in completing all their work on time. Similarly, the autistic children also discussed personal achievements in academics and music (16 out of 21), and some mentioned feeling proud when their immediate family members, specifically their parents, showed affection (5 out of 21). However, unlike the TD children, they did not mention instances involving strangers or taking up responsibilities to act as contributors.

In response to the prompt "problem," firstly, all but one TD child responded to the prompt, while 13 out of 21 autistic children provided a response. There were notable differences, in terms of taking up responsibilities to act as contributors. The TD children's stories focused on human involvement and taking up responsibilities as contributors beyond their immediate family. The majority (23 out of 29) shared stories about helping others in society, such as assisting a stranger crossing the road or providing clothes and food to the

destitute. Other topics included self-improvement (4 out of 29), resolving family conflicts (1 out of 29), and finding lost items (1 out of 29). In contrast, the autistic children primarily shared self-oriented problems, with a focus on personal challenges. Their topics centered around difficulties in public speaking (4 out of 13), sibling relationships (3 out of 13), managing a busy schedule (2 out of 13), and encountering parental issues or searching for lost items (two each).

For the prompt “important” there were differences in terms of human involvement and maintaining social ties. Among the TD group, 11 out of 30 children talked about family events, 6 out of 30 talked about receiving gifts as a token of appreciation, 5 out of 30 talked about their personal achievements, 4 out of 30 talked about celebrating festivities while 3 out of 30 talked about losing someone close to them. The autistic children's topics revolved around more self-centered aspects, without involving non-immediate family members and they mostly talked about receiving gifts from their parents (6 out of 21), following their hobbies (6 out of 21), playing video or mobile games (5 out of 21); spending time with parents (3 out of 21) and one child talked about keeping their room clean.

2.4.2 Differences in the stories of autistic and TD children

The results revealed differences in topics between autistic and TD children in response to the prompts happy, worried, important, proud, and problem, while similar topics were observed for the prompt annoyed.

As expected, differences in two dimensions were observed and elaborated below: the range of relationships featured in the stories and social participation that involves initiation. Table 2.1 details the topics and the number of stories for the both the groups. The table also highlights the two areas in which there were differences. In the table, yellow-coloured cells are the topics that show communication with non-immediate family members, green cells and blue cells highlight topics under conflict management and taking up responsibilities as a contributor, respectively.

Table 2.1 List of Topics of TD and Autistic Children's Stories for all Six Prompts

Prompts	TD Children (N 30)		Autistic Children (N 21)	
	Topics	No of stories (percentage)	Topics	No of stories (percentage)
Excited	Family Event (celebrating their own birthday)	14 (46.7%)	Enjoying in nature (Playing when it rains, watching clouds, walking in garden, etc)	9 (42.9%)
	Spending time with family/siblings	8 (26.7%)	Spending time with family (mention of parents only)	6 (28.6%)
	Personal achievement	4 (13.3%)	Watching Cartoon on Television	4 (19.04%)
	Vacation	3 (10%)	Solving puzzles	1 (4.8%)
	Welcoming guests	1 (3.3%)	Flying Kite	1 (4.8%)
Worried	School task	9 (30%)	when mother does not play television/ not able to watch television	7 (33.3%)
	Injury/Illness	8 (26.7%)	Asked a question	6 (28.6%)
	Resolving conflicts family/friends/siblings/	7 (23.3%)	Not able to play computer games	4 (19%)
	Decision making	3 (10%)	Leaving task incomplete	3 (14.3%)
	Losing something	2 (6.7%)	Losing something	1 (4.7%)
Annoyed	Sibling/peer relationships	12 (40%)	Parental Issues (8)	8 (38%)
	Parental Issues	10 (33.3%)	Personal Frustration (12)	12 (57%)
	Personal Frustration	5 (16.7%)	Injury/Pain (4)	
	Expectations of teachers at School	2 (6.7%)		

	Injury/Pain	1 (3.3%)		4 (19%)
Proud	Personal achievement	26 (86.7%)	Personal achievement	16 (76%)
	Contribution in helping others	3 (10%)	Parental relationship (mostly affection)	5 (23.8%)
	Personal satisfaction	1 (3.3%)		
Problem	Contribution (helping someone either by actions or by advising someone morally)	23 (76.7%)	Difficulties in speaking in front of others	4 (19%)
	Self-improvement	4 (13.3%)	Sibling Relationships	3 (14.3%)
	Discussing, or resolving family conflicts	1 (3.3%)	Deal with busy schedule	2 (9.5%)
	Finding a missing thing	1 (3.3%)	Finding a missing thing	2 (9.5%)
			Parental Issues	2 (9.5%)
Important	Family events	11 (36.7%)	Receiving new items	6 (28.6%)
	Receiving gifts or new items	6 (20%)	Playing Video/Mobile Games	5 (23.8%)
	Personal achievement	5 (16.7%)	Following hobbies (example painting, musical instruments, etc	6 (28.6%)
	Cultural: Celebrating festivals	4 (13.3%)	Spending time with parents	3 (14.3%)
	Mishaps/Personal loss	3 (10%)		1 (4.7%)
	Exams	1 (3.3%)		
Mentioning the range of relationships	Mentioning non-immediate family members	Excited: 50% (15 out of 30) Important: 50% (15 out of 30)	Mentioning non-immediate family members	0

Social participation that involves initiation	Conflict Management	Worried: 33% (10 out of 30) Problem: (1 out of 30)	Conflict Management	0
	Taking up responsibilities as contributor	Proud: 10% (3 out of 30) Problem: 76% (23 out of 30)	Taking up responsibilities as contributor	0

2.4.2.1 *The range of relationships featured in the stories*

Differences were observed in mentioning social participation with immediate family (parents and siblings) and non-immediate family members. The autistic children did not tell any personal stories that included non-immediate family members beyond parents and siblings. In contrast, TD children's stories featured a broader range of family relationships extending beyond the immediate nuclear family unit.

For example, in response to the prompt *happy*, 15 out of 30 TD children (50%, see Table 2.1), talked about family events like birthday parties and welcoming guests at home involving immediate and non-immediate family members. In contrast, among the 21 autistic children, 9 of them talked about spending time in nature, 6 about watching cartoons and pursuing activities like solving puzzles and flying kites (71%, stories without any immediate and non-immediate family members, focussing on spending self-time), and 29% of the stories about spending time with immediate family members like parents.

Regarding the prompt *important*, 15 out of 30 (50%) TD children talked about family events and celebrating festivals involving members other than immediate family. In contrast, 15 out of 21 (95.2%) autistic children's topics featured either themselves or only their immediate family members, for instance, 6 of them talked about receiving gifts from their parents, another 6 about following their hobbies, 5 shared about playing video or mobile games, and 3 shared about spending time with parents. None of the autistic children talked about non-immediate family members.

2.4.2.2 Social participation that involves initiation

The personal stories recounted by autistic children lacked social participation involving self-initiated roles. Unlike the TD children's stories, their stories did not feature conflict management nor contributing or offering help to others. In contrast, these topics were observed in TDs' stories where they took the lead in managing conflicts, exercised decision-making appropriate to the context, or assumed responsibilities as a member that contributed to the family or society. Examples are given below.

Conflict management

Regarding the prompt *worried*, 10 out of 30 TDs talked about managing conflicts with friends, family, and siblings (33%, see Table 2.1)

Taking up responsibilities as a contributor

Regarding the prompt *proud*, 3 TD children mentioned about contributing by helping others (10%), such as assisting parents with household chores and helping friends when they were injured. In contrast, the autistic children did not mention any events in which they acted as contributors to take up responsibilities in helping others. There were robust group differences, in terms of taking up responsibilities as a contributor in response to the *problem* prompt. TD children talked about taking up responsibilities as contributors to their immediate family members and even to others in the society. The majority, 23 out of 30 (76%, see Table 2.1) children, shared stories such as assisting a stranger crossing the road or providing clothes and food to a destitute. In contrast, the autistic children's stories did not feature any of such events, that required initiation to act as a contributor to others, even their immediate family members.

2.4.3 Life-H Results

The Life-H scores of TD children indicated that they have experiences in interacting with non-immediate family members, excelling in interpersonal relationships and communication. They scored 10 out of 10 in these domains, demonstrating their ease in communicating with adults and young people in both home and community settings. They can also hold conversations and use phones effectively for communication. On the other hand, the autistic children showed limited experiences in communication. They score 0 out of 10 in communicating with young people in the community and had no experience in holding conversations or expressing ideas in a community setting. The average scores of the two groups on the questions related to communication domain are shown in Figure 2.1.

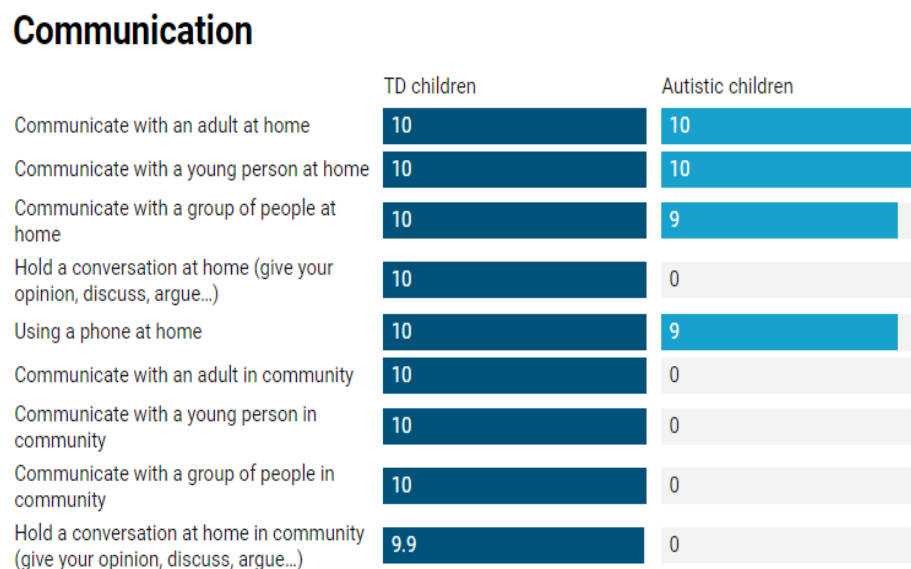


Figure 2.1 Average Scores of the Autistic and TD Children in the Questions Related to Communication Domain of the Life-H

In terms of communication and interpersonal relationships, TD children had experiences in communicating with an adult or younger member in a community or holding up a conversation

in a community, maintaining social ties with teachers, younger individuals in the community, and adults in the community. They also demonstrated skills in managing conflicts, scoring 10 out of 10 in this domain. However, autistic children did not have such experiences, scoring 0 out of 10 in the above-mentioned areas. Figure 2.2 represents the mean scores of both the groups in the questions related to Interpersonal Relationships.

Interpersonal Relationships

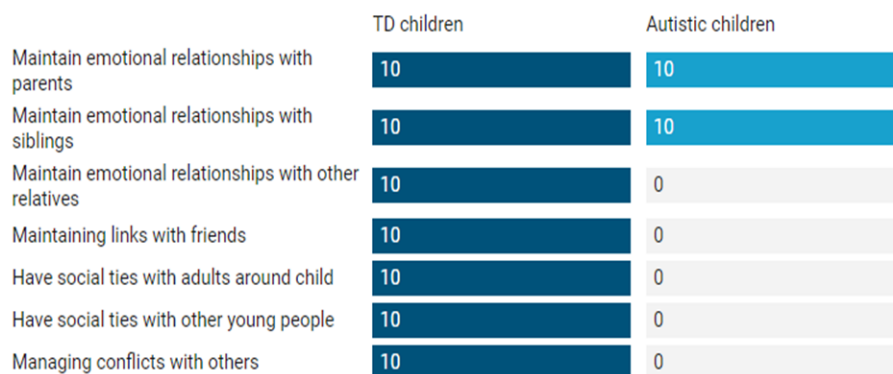


Figure 2.2 Average Scores of the Autistic and TD Children in the Questions Related to Interpersonal Relationships Domain of the Life-H

In the domain of responsibilities, TD children had ample experiences in providing assistance to parents or other family members, scoring 10 out of 10. They were actively engaged in taking up responsibilities as immediate contributors. On the other hand, autistic children did not have such experiences in taking up responsibilities and contributing in this way. However, parents report that autistic children have experiences in accepting help from parents or adults (10 out of

10), but they did not have experiences in helping others or contributing in some way. Figure 2.3 represents the mean scores of both the groups in the questions related to Responsibilities.

Responsibilities

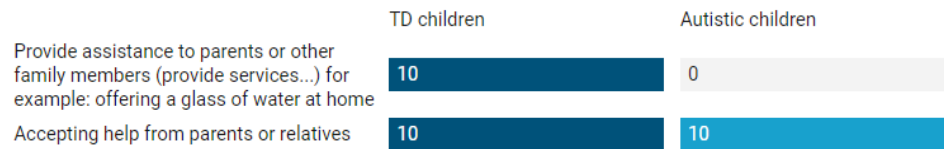


Figure 2.3 Average Scores of the Autistic and TD Children in the Questions Related to Responsibilities Domain of the Life-H

2.5 Discussion

This study reported on the differences in topics/contents of personal stories shared by autistic children and their TD peers. Unlike their TD peers, when autistic children shared their personal stories, they did not mention anything about interacting with others who are non-immediate family members, did not mention about managing social conflicts and did not mention about helping others. Rather, their narratives featured only immediate family members and self-oriented stories. Their story topics/contents reflected their limited social engagement. Their Life-H scores further supported that this limited social engagement might be a result of low social participation. On one hand this might suggest that the children's social experiences may play a role in shaping their narrative topics. However, it is essential to also note that the relationship between social participation and narrative topics causality cannot be determined without longitudinal or experimental data. The relationship could be bidirectional or mediated by other factors (e.g., restricted interests, anxiety, past negative experiences). Therefore, further research using

longitudinal or experimental designs is necessary to determine the causal relationships between these variables.

These findings offer insights in supporting autistic children with low support needs in two directions. One direction could involve offering them opportunities for social participation activities with non-immediate family members, for managing or resolving conflicts with others, and for offering help to others. Enriching their life experiences as such allows them to have richer social experiences to reminisce when sharing their personal stories. Another direction of support could involve teaching autistic children to pick up and respond to the social cues from the context when there is a conflict with others or when someone needs help. This is particularly relevant for autistic children as they are not sensitive to social contextual cues when interacting with others (see the notion of context blindness in autism by Vermeulen (2015); see also Westby (2017)). Teaching them to pick up these social cues heightens their sensitivity to these opportunities or needs and allow them to be more adept at initiating these social roles when opportunities arise.

2.5.1 Study Limitations

The present study also has some limitations. The study features children aged between 6-9 years only, so future studies can recruit older children and explore the range of topics those children choose to talk about. The study only analyses topics of these children's narratives, future studies can recruit older children and examine the theme of the personal narratives of children, as topics are precursors to theme. Researchers can also compare the topics of children with other communication difficulties such as DLD. This can further inform of appropriate intervention measures to the speech pathologists. Last but not the least, future research can consider including larger samples and explore the structural aspects of personal narratives. A

comprehensive understanding of both functional and structural elements is crucial for developing effective interventions to support autistic children's narrative abilities.

It would be interesting to explore the relationships between Life-H scores and narrative abilities in future studies. For instance, examining the correlations between Life-H scores and measures of global narrative abilities at the activity level could provide insights into how participation in everyday life relates to narrative skills. A lack of participation, as indicated by Life-H scores, could potentially be one of the contributing factors to the narrative deficits observed in our study.

2.6 Conclusion

This is the first study to document in detail the topics of personal narratives of autistic and TD children. Moreover, the study features Hindi-speaking children, documenting narratives from an understudied language. The study used the Global TALES protocol as a tool to analyse children's personal narratives from a functional perspective, focusing on the range of topics they choose to discuss when narrating their personal experiences. This functional approach, often neglected in research, can offer informative guidance for clinicians in intervention planning. The findings of this study suggest supporting autistic children by providing social participation opportunities to enrich life experiences, and by helping them pick up social cues related to conflicts/need for assistance. The study also demonstrates Global TALES as a useful tool for analysing the functional aspects of children's personal narratives in terms of range of topics children can talk about, this could be informative for intervention planning but has been often neglected.

References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5 ed. Arlington, VA: American Psychiatric Publishing; 2013
- Bang, J., Burns, J., & Nadig, A. (2013). Brief report: Conveying subjective experience in conversation: Production of mental state terms and personal narratives in individuals with high functioning autism. *Journal of Autism and Developmental Disorders*, 43(7), 1732–1740. <https://doi.org/10.1007/s10803-012-1716-4>
- Goldman, S. (2008). Brief report: Narratives of personal events in children with autism and developmental language disorders: Unshared memories. *Journal of Autism and Developmental Disorders*, 38, 1982-1988.
- Gollan, T. H., Weissberger, G. H., Runnqvist, E., Montoya, R. I., & Cera, C. M. (2012). Self-ratings of spoken language dominance: A Multilingual Naming Test (MINT) and preliminary norms for young and aging Spanish–English bilinguals. *Bilingualism: Language and Cognition*, 15(3), 594-615.
- Grove, N. (2014). Personal oral narratives in a special school curriculum: an analysis of key documents. *British Journal of Special Education*, 41(1), 6-24.
- Ivanova, I., Salmon, D. P., & Gollan, T. H. (2013). The multilingual naming test in Alzheimer's disease: clues to the origin of naming impairments. *Journal of the International neuropsychological Society*, 19(3), 272-283.
- ISAA. Report on assessment tool for autism: Indian Scale for Assessment of Autism. New Delhi: Ministry of Social Justice & Empowerment: Government of India; 2009
- King, D., Dockrell, J. E., & Stuart, M. (2013). Event narratives in 11–14-year-olds with autistic spectrum disorder. *International Journal of Language & Communication Disorders*, 48(5), 522–533. <https://doi.org/10.1111/1460-6984.12025>
- Labov, W. (1972). *Language in the inner city*. Philadelphia:University of Pennsylvania Press.
- Losh, M., & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's syndrome. *Journal of Autism and Developmental Disorders*, 33, 239-251.
- Marinis, T., & Armon-Lotem, S. (2015). Sentence repetition. In S. Armon-Lotem, J. de Jong, & N. Meir (Eds.), *Assessing multilingual children: Disentangling bilingualism from language impairment* (pp. 95-124). *Multilingual Matters*.
- Noreau, L., Fougereyrollas, P., & Vincent, C. (2002). The LIFE-H: Assessment of the quality of social participation. *Technology and disability*, 14(3), 113-118. doi:10.3233/TAD-2002-14306
- Raven, J. (2003). Raven progressive matrices. In R. S. McCallum (Ed.), *Handbook of nonverbal assessment* (pp. 223-237). Springer US.
- Rollins, P. (2014). Personal narratives in individuals with high-functioning ASD: A lens into social skills. *Perspectives on Language Learning and Education*, 21(1), 13-20.

- Shiner, R. L., Soto, C. J., & De Fruyt, F. (2021). Personality assessment of children and adolescents. *Annual Review of Developmental Psychology*, 3, 113-137.
- Srivastava, V., Chan, A., & Westerveld, M. F. (2023). What Do Children in India Talk About? Personal Narratives of Typically Developing Hindi-Speaking Children. *Folia Phoniatrica et Logopaedica* 75(6), 447–455. <https://doi.org/10.1159/000534298>
- Vermeulen, P. (2015). Context blindness in autism spectrum disorder: Not using the forest to see the trees as trees. *Focus on autism and other developmental disabilities*, 30(3), 182-192.
- Westby, C. (2017). Autism as a Problem of Context Blindness. *Word of Mouth*, 28(5), 8-12.
- Westby, C. E., Chen, K. M., Lee, J. P., & Wong, A. M. Y. (2023). Topic and Content of Personal Narratives of Children from Three East Asian Cultures and Three English-Speaking Cultures: A Collaborative Qualitative Analysis. *Folia Phoniatrica et Logopaedica*, 75(6), 431-446.
- Westby, C., & Culatta, B. (2016). Telling tales: Personal event narratives and life stories. *Language, Speech, and Hearing Services in Schools*, 47(4), 260-282.
- Westerveld, M. F., Lyons, R., Nelson, N. W., Chen, K. M., Claessen, M., Ferman, S., ... & Global TALES Consortium. (2022). Global TALES feasibility study: personal narratives in 10-year-old children around the world. *PLoS One*, 17(8), e0273114.

Chapter 3- Effect of Emotional Polarity on Narrative Coherence in Personal Narratives of Hindi-speaking Children with and without Autism

3.1 Introduction

Narrative coherence is a functional dimension that enhances the understanding of the meaning of personal narratives. A well-formed narrative reflects how well a story's elements are organized and connected to create meaning. A structurally coherent narrative provides listeners with the necessary context (Labov & Waletzky, 1967), orders events on a clear timeline (Westby & Culatta, 2016), and establishes the circumstances that frame the story's events and build on the theme (Baerger & McAdams, 1999; Peterson & McCabe, 1983). Coherence at the linguistic or propositional level can be achieved through language that clearly states the temporal and causal relationships between events, creating a logical sequence of occurrences that build upon each other to form a chain of meaning (Westby & Culatta, 2016; Habermas & de Silveria, 2008). Despite the functional importance of coherence in facilitating comprehension and conveying a narrative's progression and significance, the study of coherence in children's personal narratives remains underexplored in child language literature.

A coherent personal narrative is essential for emotional and psychological well-being (Westby & Culatta, 2016; Vanaken et al., 2021; Fivush, 2021). Research has consistently shown that individuals who can narrate their personal experiences in a coherent manner tend to have better psychological-emotional health (Frattaroli, 2006; Pennebaker & Chung, 2007). Moreover, the ability to construct a coherent personal narrative is fundamental to developing a stable sense of self and fostering agency, as it allows individuals to actively integrate and give meaning to their experiences, thereby shaping their self-perception as actors in their own life story (Goffredi & Sheldon, 2024; Zilberstein et al., 2024). Although, a fully integrated 'life story' and sense of agency

become more solidified in adolescence, the foundational understanding of oneself as a causal agent begins much earlier through how children narrate and gain a sense of control over their experiences (Nicolopoulou & Richner, 2007; Thümmeler et al., 2022).

The content and valence of shared experiences also play a crucial role in emotional well-being. By valence, here I particularly mean emotional valence, it refers to the affective content of various linguistic units in a narrative, defining the pleasantness of emotions evoked by an event in the narrative. Emotional valence can be broadly categorized into positive and negative valence, reflecting the degree to which an event or experience is perceived as pleasant or unpleasant (Gabaj et al., 2025). Research has indicated that individuals who predominantly share negative memories may be more prone to experiencing increased emotional distress (Williams et al., 2022). In contrast, individuals who tell coherent stories that include positive experiences tend to have lower levels of depression (Baerger & McAdams, 1999; Fivush, 2021; Vanderveren et al., 2019; Mitchell et al., 2020) as sharing positive experiences plays a significant role in enhancing well-being, fostering social connections, and inspiring prosocial behaviour (Gaesser & Schacter, 2014; Rasmussen & Berntsen, 2009).

Autistic children, however, have difficulties in maintaining prosocial behaviour, which can impact their social relationships and overall well-being. They often face challenges with social communication and exhibit stereotyped patterns of behavior (American Psychiatric Association, 2013). Research has also shown that autistic children tend to have difficulties with narrative coherence, often producing narratives that are less coherent and more fragmented compared to their TD peers (Harvey et al., 2023; Goldman 2008). Despite the growing body of research on narrative coherence in autistic children, systematic investigations into the *specific effect* of emotional polarity on their narratives, particularly regarding its influence on coherence, remain

largely unexplored. While some related work exists (e.g., Alle et al., 2025 involving autistic adults; Brown (2007), doctoral thesis), a comprehensive and direct examination of how positive versus negative emotional experiences impact the narrative coherence of autistic children is still nascent. Understanding how these children organize or share their experiences related to positive and negative memories is important, as it might offer valuable insights into their psychological and emotional well-being.

This study (Chapter 3) presents an empirical investigation that pioneers the comparison of coherence in personal narratives involving positive and negative emotional experiences in children with and without autism. Using the Hindi version of the Global TALES protocol (Srivastava et al., 2023; Westerveld et al., 2022), which was also used in Chapter 2 of this thesis, the current study uses the prompts 'Excited/Happy' and 'Worried' to elicit narratives representing positive and negative emotional valences, respectively. Unlike the English version of the Global TALES protocol, the Hindi version of the protocol had only one translation equivalent to the prompt Excited/Happy. The coherence of the elicited narratives was examined at the level of measuring the global ratings of coherence, assessed using Reese's coherence coding scheme (NaCCS; see Section 3.4.2 for details), and the number of local indicators contributing to global coherence, examined using the list developed by Habermas & de Silveria (2008); see Section 3.4.2 for details). The study compared the narrative coherence within both groups (children with autism and TD children) for positive and negative emotional valence prompts, as well as between the two groups for both positive and negative prompts.

The following sections will provide more details about narrative coherence and its significance in personal narratives. Specifically, Section 3.1.1 will discuss various approaches to analysing coherence, while Section 3.1.2 will explore the effect of emotional valence on personal

narratives. Section 3.1.3 will focus on the impact of emotional polarity on the coherence of personal narratives of TD children. The chapter will then proceed to review the current research status (Section 3.2) and introduce the present study (Section 3.3), which aims to investigate the research questions, followed by the results, discussion and conclusion.

3.1.1 Approaches to Analyse Coherence

Several frameworks have been developed to assess narrative coherence. One prominent method is Reese's Narrative Coherence Coding Scheme (NaCCS, Reese et al., 2011), which evaluates Context, Chronology, and Theme. This multidimensional construct has been applied to assess coherence in personal narratives of individuals aged 3 to 60 years (Reese et al., 2011; Gabaj et al., 2024). Contextual coherence refers to how well events are placed in a specific time and location, chronological coherence addresses the temporal ordering of events, and thematic coherence indicates how well events are connected by an overarching theme or idea. Each category is scored on a 0 to 3-point rubric.

In addition to the NaCCS, other coherence coding schemes have also been used to examine coherence. Ferretti et al., (2018) examined coherence in fictional narratives by analysing causal links. Their research investigated how well different story parts were causally connected, revealing that more coherent stories contained a greater number of causal links between events. Marini et al., (2020) analysed narrative accounts by calculating the percentage of both local coherence errors (e.g., shifts in topic or missing referents) and global coherence errors (e.g., tangential, incongruent, repetitive, or filler utterances). Lysaker et al., (2002) developed a coding system specifically for assessing narrative coherence in individuals with schizophrenia. This system included three dimensions, each rated on a 4-point scale: Logical Connections, which captures the temporal and causal coherence of a narrative; Richness of Detail, which assesses the extent to which the narrative

includes sufficient description of core story elements; and Plausibility, which represents how believable the narrative is perceived to be. Furthermore, Baerger & McAdams (1999) proposed an approach to assess narrative coherence in extended life story accounts from adult samples. Their approach included four dimensions, each rated on a 4-point scale: Orientation, which taps the extent to which the narrator provides sufficient background to understand the story; Structure, which captures how follow-able the narrative unfolds; Affect, which assesses the extent to which the narrator uses emotional language to make an evaluative point; and Integration, which represents how the narrator relates the episode to a broader meaning.

Beyond explicit coherence measures, some studies assumed that analysing macrostructural elements can indicate narrative coherence e.g., Henry et al., (2020), used a story grammar approach; Gillam et al., (2015), analysed coherence by counting the number of story grammar elements. Despite the various approaches to analysing coherence, but it has been observed that each of these methods has its limitations (Harvey et al., 2023). Story grammar frameworks often focus solely on the presence or frequency of specific story elements (e.g., characters, setting, initiating events) but may not account for how these elements are deployed in the narrative (Carlsson et al., 2020; Favot et al., 2018). Main events approaches do not adequately consider the chronology of story elements or their interconnections (Zalla et al., 2013). High point analysis, while offering a broad categorization of story structure (Fivush et al., 2003), may not be applicable to all narrative types, particularly personal narratives that might lack a dramatic structure (Reese et al., 2011).

Research on coherence at the propositional/local/microstructural level is more limited, yet some studies have explored specific linguistic features that contribute to it. Researchers have examined the use of referencing, evaluations, and internal state terms as indicators of local-level coherence (Losh & Capps, 2003). Conjunctive cohesion and fluency have also been used to assess

coherence at the microstructural level (Bliss et al., 1998). Habermas & de Silveria's (2008) system for analysing life stories used linguistic indicators to score each sentence or clause, providing a detailed evaluation of coherence, they term it as "*local indicators of global coherence*" Out of all the known approaches for analysing coherence, so far, for global ratings of coherence, Reese's NaCCS (Reese et al., 2011) captures the multidimensional nature of coherence (Gabaj et al., 2024). For examining local/propositional indicators, Habermas & de Silveria's (2008) exhaustive list of local level indicators contributing to global coherence provides a detailed evaluation. Their system not only allows for scoring/counting local level of indicators contributing to coherence but also enables a detailed analysis of the specific types of temporal, causal, and thematic indicators used. For instance, temporal indicators encompass categories such as life phases, age, calendar date, and distance from the present. Causal indicators include 'causally related events of long duration' (with sub-categories like extended event and personality), 'causal links between personal states and events' (further subdivided into personality explains action and event explains personality), and 'biographical arguments' (which has subtypes like developmental status, biographical background, lessons learned, life maxim/generalization, and formative experiences). Thematic indicators, lastly, include illustrations, hedges (regarding explanations and descriptions/interpretations), and complex cognitive processes (encompassing 'understanding' and 'opinion').

As previously mentioned, coherence is also affected by emotional polarity/content, the subsequent section will therefore discuss studies that have analysed the effect of emotional coherence on personal narratives.

3.1.2 Effect of Emotional Valence of Personal Narratives

The emotional valence of a narrative refers to the emotional tone conveyed by linguistic units. This emotional valence significantly shapes the coherence of a child's recounting of an event

from their experiences. For instance, when children recall events—whether a pleasant family outing or an unpleasant disagreement with a friend—the pleasantness or unpleasantness of the emotions evoked can influence the narrative's tone. Furthermore, the event's outcome and how the child processes its resolution can impact the narrative's overall coherence.

The emotional valence of a child's narrative can influence the sharing of personal narratives at multiple levels. It can affect the choice of topic, how a discourse is organized at the global level (i.e., the overall episodic organization), and the organization of utterances at the local level (i.e., the arrangement of sentences). Research indicates that children's personal narratives about positive and negative events differ in terms of lexical diversity, with positive narratives often being more lexically diverse. This suggests children may employ more varied language when describing positive experiences, which holds implications for their language development and communication skills.

Moreover, the emotional valence of an event can affect a child's ability to process and resolve it, thereby impacting the narrative's tone. Children tend to invest more effort in understanding and explaining negative experiences, leading to increased use of evaluations to express thoughts and feelings (Davidson & Welliver, 2021; Fivush et al., 2008; Peterson & Biggs, 2001). This greater effort can result in more complex and coherent narratives as children attempt to make sense of the negative experience and its consequences (Fivush et al., 2003, 2008; Kraljević et al., 2023). Conversely, positive narratives may appear less complex and coherent, as children might not feel the same need to elaborate on the details of a positive experience.

Examining emotional valence in personal narratives also provides crucial insights into children's emotional regulation. Such studies enable us to understand how children manage and process their emotions and how they develop strategies to cope with negative events.

Emotional valence is also critical in social interactions, such as reminiscing with family members, where emotions are expressed and used to communicate. A child's ability to engage in these interactions and share personal narratives is essential for developing social skills like empathy, cooperation, and communication. However, children with autism often face challenges with these interactions due to social communication difficulties and their understanding emotions, which can hinder their ability to fully grasp emotional descriptions in communication.

3.1.3 The Effect of Emotional Polarity on the Coherence of Personal Narratives of Children with Typical and Atypical Development

Research on the effect of emotional valence on children's narratives has explored how emotional polarity influences narrative coherence. Some studies analysed the effect of emotional valence on narratives of children, for example, Habermas et al., (2009) elicited personal narratives from 57 German-speaking girls aged 5-8. The children were asked to recount a total of five events that had made them angry, anxious, sad, proud, happy, and recount a funny story. The study shuffled the order of the above prompts, except the funny story, in order to end the session on a positive note. These narratives were divided into two categories of emotions: i.e., negative and positive emotions. The narratives were analysed on their content, length, and syntactic complexity, emotion labels related to global evaluations state terms/specific emotions. The results revealed that there were no significant group differences for topics of narrative content, narrative length, or syntactic complexity, but there were significant differences in terms of mentioning the emotion labels related to global evaluations. The narratives of negative events contained more specific emotions labels relative to global coherence. The study did not include direct measures of coherence. Another study that examined the effect of emotional polarity on coherence targeted specific measures of coherence. Kuvač Kraljević et al., (2023) used the Global TALES protocol (consisting of six emotion based and situation based prompts) and Reese's et al., (2011) NaCCS to

analyse the personal narratives of 60 Croatian-speaking children aged 7-13 years, examining the effect of emotional valence on coherence and finding that neutral and negative emotional valence prompts were chronologically and thematically richer than positive emotional valence prompts. It could be because children also incorporate complications more often in negative narratives, which helps to create a narrative arc (Fivush et al., 2019; Hudson et al., 1992). Narratives about negative events require more structure and coherence at the macrostructure planning level than positive experiences (Bohanek & Fivush 2010; Fivush et al., 2008).

Research on the provision of orienting information in narratives that is research examining the context of the narratives by stating the time and place of the event, has yielded mixed results. Kuvač Kraljević et al., (2023) found that positive narratives contain more information about time and place, while Fivush et al., (2008) found no difference between positive and negative events in terms of contextual information.

Another very recent study by Gabaj et al., (2025) investigated the impact of emotional valence on the personal narratives of Croatian-speaking children with DLD and those with Typical Language Development (TLD). The study employed the Global TALEs protocol to elicit personal narratives from 50 children with DLD and 50 gender-matched peers with TLD, all aged 10 years. The narratives were analysed on linguistic (lexical diversity, grammatical complexity, and accuracy), propositional (mazes, incomplete utterances, local coherence) and macrostructure (using global ratings of coherence) levels, with a focus on the influence of emotional valence on narrative production. The results showed that children with DLD exhibited difficulties in forming personal narratives at all three levels of discourse production, characterized by lower grammatical complexity and accuracy, more incomplete utterances, and lower local and global coherence. Notably, these difficulties were consistent across both positive and negative narratives. However,

the study did find that negative narratives were chronologically better ordered than positive narratives in both groups of children.

Based on the current literature, only a limited number of studies have specifically examined the effect of emotional polarity on the *coherence* of personal narratives in TD children. The consistent, albeit limited, evidence suggests that narratives about negative emotions tend to be more chronologically and thematically coherent compared to positive emotional stories. Nevertheless, research on contextual information in narratives remains contradictory, with some studies showing positive stories are richer than negative stories in terms of contextual information and some showing no differences in terms of contextual information in positive and negative emotional stories of TD children (Fivush et al., 2008). These mixed findings can be attributed to several factors, including variations in the ages of the children studied and differences in the methodologies employed across these studies. Consequently, the current findings are inconsistent, but where significant differences emerge, there is often a bias towards negative emotional polarity, except concerning contextual orientation.

Moving to population with atypical development, only a limited number of studies have investigated emotional valence in children with language difficulties, such as DLD (e.g., Gabaj et al., (2025)). Studies systematically investigating the direct effect of emotional polarity on the *coherence* of narratives in *autistic children* are exceedingly scarce. One recently published study by Alle et al., (2025) explored autistic individuals' narrative identity by assessing their life stories. The study involved 22 autistic individuals, and 22 non-autistic individuals aged around 29 years. The study used Habermas & de Silveria's (2008) approach to evaluate coherence. The findings revealed that the autistic group included personal events in their life narratives that were self-rated as more negative and associated with negative feelings at retrieval, along with having lower life

impacts. It might be possible that these patterns might also be prevalent in autistic children's narratives. Given that autistic individuals have been found to have a memory bias towards negative events (Goddard et al., 2017) and experience more negative self-experiences compared to their TD peers (Lugnegard et al., 2011), it would be interesting to examine the effect of emotional polarity on these children's narratives.

Despite the consensus that autistic children, including those with low support needs, tend to produce less coherent personal narratives compared to their TD peers (Losh & Capps, 2003; Bauxuali et al., 2016; Harvey et al., 2023), many existing studies have not systematically analysed *direct measures* of coherence in relation to emotional content. Instead, they have often relied on story grammar measures as proxies or focused solely on the chronology and sequencing of events for overall coherence.

A closer examination of three key studies that have investigated narrative aspects indicating coherence in autistic children illustrates this point:

- Losh & Capps (2003) examined the coherence of personal narratives in 28 autistic children with low support needs and 22 TD peers. The study operationalized coherence by examining the evaluative points used in the personal narratives, finding that autistic children used fewer evaluative devices compared to their TD peers. Evaluative devices are linguistic features that convey the narrator's attitude or perspective and are essential for creating a coherent narrative.
- Goldman (2008) coded the style (coherence) of the narratives of 14 autistic children with low support needs, 12 autistic children with DLD, and 12 age-matched TD peers. Coherence was scored as either '0' or '1' depending on whether the narratives were logically

interconnected. A score of '0' indicated that the story violated the logical sequencing of events, whereas a score of '1' indicated that the story followed a logical sequence. The presence of causal markers, such as "because" or "so," was used to indicate the logical sequence in the story. The study found that autistic children were less coherent in their personal narratives compared to the TD and DLD children.

- Brown's (2007) thesis systematically examined the coherence of autobiographical memories related to positive and negative events in children with and without Asperger's syndrome using the Narrative Coherence Coding Scheme (an unpublished version of Reese et al., 2011). The study found that children with Asperger's exhibited lower coherence in context for both positive and negative emotions, with specific difficulties in recalling memories, especially in self-nominated negative memory conditions. Additionally, children with Asperger's (now autism; DSM5 (APA, 2013)) tended to incorporate negative emotions more frequently and were less inclined to include positive emotions in their memory narratives compared to TD children.

Thus, only Brown's study has systematically examined the direct effect of emotional polarity on narrative coherence in children's personal narratives. This highlights the critical need for further research in this area. While the existing evidence generally suggests that autistic children's personal narratives are less coherent, the precise impact of emotional polarity on this coherence remains largely unexplored, especially within diverse linguistic and cultural contexts.

3.2 Research Status

The preceding literature review indicates that emotional polarity can significantly impact narrative coherence, with studies on TD children suggesting a bias towards negative valence in

some coherence measures (except for contextual information, where findings are mixed). While research has also established that autistic children's personal narratives are generally less detailed and less coherent compared to their TD peers, these comparisons have often relied on emotionally neutral prompts or focused on general narrative abilities.

A review by Bylemans et al., (2023) further highlights a significant gap in autism research on narrative coherence, noting that while poor micro- and macrostructure have been reported, the specific narrative dimensions of coherence that are most challenging for autistic individuals remain largely unknown. Existing studies on autistic children's narrative coherence have frequently not used direct, systematic measures of coherence, instead relying on microstructural measures as proxies or focusing solely on chronology/sequencing of events for overall coherence.

Despite the known challenges autistic children face in producing coherent narratives, there is a marked paucity of systematic research directly examining the intricate effect of emotional valence on the *coherence* of their personal narratives or specifically comparing them to TD peers in this regard. While it is generally acknowledged that autistic children may demonstrate weaker narrative coherence, the specific aspects contributing to this difference are not yet explored. Brown's (2007) thesis offered an initial exploration using a systematic coherence coding scheme, its focus primarily on overall coherence highlights a continued, pressing need for more granular investigation. Indeed, further research is critically needed to illuminate how and in what specific aspects the coherence of autistic children's narratives differs from their TD peers. Furthermore, while related research, such as Alle et al., (2025) has explored emotional valence and narrative identity in adult autistic individuals, and other studies point to a negative memory bias in autistic populations (Goddard et al., 2017), these findings underscore but do not fully address the critical

importance of understanding how emotional polarity specifically influences narrative coherence within the developing context of autistic children.

To illuminate in detail how emotional polarity influences the coherence of narratives in autistic and TD children, this study systematically investigates how the emotional polarity of personal experiences influences both the overall coherence and propositional level coherence of personal narratives in autistic children with low support needs. Furthermore, it aims to precisely identify, through a detailed comparative analysis using a granular approach to local-level indicators of global coherence such as those outlined by Habermas & de Silveria (2008), the specific aspects by which the narrative coherence of autistic children differs from that of their TD peers.

3.3 Present Study

This study aims to examine the effect of emotional polarity on narrative coherence in the personal narratives of both TD and autistic children and compare coherence between these two groups across positive and negative personal experiences. Unlike prior studies that have often adopted a more limited approach to narrative coherence (e.g., using story grammar frameworks, or focusing solely on outcome measures like fluency or internal state terms), this study used a comprehensive approach by analysing narrative ratings of global coherence and also the local indicators contributing to global coherence. Two protocol prompts, "Excited" for positive emotion and "Worried" for negative emotion, from the Global TALES protocol were translated into Hindi (as explained in the Methods section of Chapter 2).

3.3.1 Research Questions

The study asks the following questions:

- When typically developing children share personal stories of emotional significance, do their stories differ in coherence when they tell a positive emotion experience versus a negative emotion experience?
- When autistic children with low support needs share personal stories of emotional significance, do their stories differ in coherence when they tell a positive emotion experience versus a negative emotion experience?
- How do the stories of the two groups (autistic versus typically-developing) compare in coherence? Are there differences/similarities between positive and negative emotion personal stories in this between-group comparison?

While research on narrative coherence in autistic children is growing, the specific influence of positive versus negative emotional experiences on their narrative coherence remains largely unexamined (Lee et al., 2017). This study is exploratory in nature, aiming to provide initial insights into this under-researched area. Through the above-mentioned research questions, it seeks to establish a foundational understanding of how emotional polarity might affect narrative coherence in both TD and autistic children.

3.4 Methods

3.4.1 Participants

Two groups of children participated in this study:

- (i) Autistic children with low support needs (N = 30; mean age = 8;0, range = 6;0 to 9;1).

This group was termed as low support needs because they scored between the range of 70-106, termed as “mild autism” (p 12, Indian Scale for Assessment of Autism (ISAA). These children also had comparable scores than their TD peers on the expressive vocabulary task using MINT

(Gollan et al., 2012) and the morphosyntactic task using the Hindi version of Sentence-Repetition (SRep, Marinis et al., 2015) Task. (for the vocabulary and the morphosyntax task, please see the materials section for the details)

(ii) TD children (N = 30; mean age = 7;5; range = 6;4; to 9;0). These children had no developmental concerns as reported by their parents.

3.4.2 Assessment Measures

The “Excited” and “Worried” prompts of the Global TALES Protocol Prompts were used in this study. The rationale for choosing these two prompts was to investigate the effect of emotional polarity on narrative coherence. "Excited" was chosen to represent positive polarity, while "worried" was selected to represent negative polarity.

Expressive Vocabulary: The MINT (Gollan et al., 2012; Ivanova et al., 2013) was used to evaluate the children's expressive vocabulary skills. This test consists of 68 black and white line drawings displayed on a computer screen using PowerPoint, with instructions given to the child in Hindi. Since there is no existing Hindi version of this task, the PhD student translated the task instructions into Hindi. The child was required to name each picture in Hindi, and an incorrect or non-target response was scored as 0, while a correct response was scored as 1. If the child encountered a picture they did not recognize, specific prompts could be provided to help elicit the correct response.

Morphosyntactic Ability: The Hindi version of the LITMUS SRep (Marinis et al., 2015) task was employed to assess morphosyntactic abilities. This task was presented using Microsoft PowerPoint and is designed as a treasure hunting game, where the child is asked to repeat sentences to assist a bear in finding treasure. The stimuli (sentences) are divided into three blocks, each corresponding to a different level of difficulty. The tasks were presented in a randomized order,

and the child first completed four training stimuli as a warm-up. Excluding the trial stimuli, there were 35 total stimuli. Children received 1 point for producing or repeating the stimuli exactly, with a maximum possible score of 35.

Nonverbal Ability: Children's nonverbal IQ was assessed using Raven's Progressive Matrices (Raven, 2003), primarily to exclude those with intellectual challenges. This test consists of 60 multiple-choice questions, where children must choose the missing piece that completes a pattern from six to eight options. A standard score of 70 or higher indicates normal intellectual functioning.

Assessing Global Ratings of Coherence

For assessing global ratings of coherence, the Reese framework of coherence, NaCCS was used which assesses Context, Chronology and Theme. As mentioned previously, the Reese framework analyses most number of dimensions that account for coherence. Moreover, the framework also includes assessing these measures on a scale of 0 to 3. This study also included assessing overall coherence which corresponded to the sum of scores in these measures of coherence. So, the measure of “Overall score” ranged between 0-9 (sum of the scores obtained for Context, Chronology and Theme). The definition of these measures of Coherence and the details of the scales of these measures are given below.

Context: The degree to which the narrative provides a clear and relevant context for the story.

Chronology: The extent to which the narrative follows a logical and coherent chronological order.

Theme: The degree to which the narrative conveys a clear and cohesive theme or message.

The context dimension of the narrative was evaluated based on the degree to which the narrative orients the listener in time and space. This was scored on a scale of 0 to 3, with 0 indicating no information about time or location, and 3 indicating that both time and place are mentioned and specific.

For example,

Score 0: No information about time or location: I was happy. I played with my friends. We had a lot of fun. I felt excited. (This does not provide any information about when or where the event took place, so it scores a 0 for context.)

Score 1: Partial information about time or location: I was happy last year. I played with my friends and we had a lot of fun. We ran around and laughed together. I felt excited. (These sentences provide some information about time, specifically that the event took place "last year", but does not mention a location, so it scores a 1 for context.)

Score 2: Both time and place mentioned, but only one dimension is specific: I was happy last year at the beach. I played with my friends and we had a lot of fun. We built sandcastles and collected seashells. I felt excited. (This story mentions both time and place, but only the time is specific, as "last year" is a specific time period, while "the beach" is a more general location, so it scores a 2 for context.)

Score 3: Both time and place mentioned and both are specific, I was happy on my birthday last year at Juhu Beach. I played with my friends, and we had a lot of fun. We built sandcastles and collected seashells, and then we had a big birthday cake. I felt excited and happy to be

celebrating my special day. (This story provides specific information about both time, "on my birthday last year", and place, "Juhu Beach", so it scores a 3 for context.)

Chronology was also scored on a scale of 0 to 3, a score of 0 indicated that the narrative consisted of a list of actions with minimal or no information about temporal order. A score of 1 indicated that the listener can place some but not most of the events on a timeline, with fewer than half of the temporally relevant actions being ordered. A score of 2 indicated that the listener can place between 50-75% of the relevant actions on a timeline but cannot reliably order the entire story from start to finish. A score of 3 indicated that the listener can order almost all the temporally relevant actions, including cases where the speaker marks deviations from temporal order or repairs a violated timeline.

For example,

Score 0: I went to the beach. I built a sandcastle. I collected seashells. I had a birthday cake. (This narrative is a list of actions without any information about the order in which they occurred, so it scores a 0 for chronology. The listener cannot place any of the events on a timeline.)

Score 1: I went to the beach and then I think I built a sandcastle. After that, I'm not sure what happened, but I remember collecting seashells. Oh, and I had a birthday cake at some point. (This narrative provides some information about the order of events, but it is unclear, and the listener can only place some of the events on a timeline with confidence. However, fewer than half of the temporally relevant actions can be ordered on a timeline, so it scores a 1 for chronology.)

Score 2: I went to the beach and built a sandcastle. Then I collected seashells and went for a swim. After that, I had a snack and played some games. But before I went for a swim, I think I had a birthday cake. (This narrative provides more information about the order of events, and the

listener can place between 50-75% of the events on a timeline. However, the listener cannot reliably order the entire story from start to finish, so it scores a 2 for chronology.)

Score 3: I went to the beach on my birthday and first I built a sandcastle. Then I collected seashells and went for a swim. After that, I had a birthday cake and played some games with my friends. But I had the cake before I went for a swim, I just remembered that. Finally, I went home and took a nap. (This narrative provides clear and consistent information about the order of events, and the listener can order almost all of the temporally relevant actions. The speaker also marks a deviation from temporal order and repairs it, which is an example of a high level of chronological coherence, so it scores a 3 for chronology.)

For theme the scores ranged from 0 to 3, with each score representing a different level of thematic development. A score of 0 indicated that the narrative is substantially off topic and/or characterized by multiple digressions that make the topic difficult to identify, with no attempt to repair digressions. A score of 1 indicated that a topic is identifiable and most of the statements relate to it, but the narrative may include minimal development of the topic through causal linkages, personal evaluations and reactions, or elaborations of actions. A score of 2 indicated that the narrative substantially develops the topic, with several instances of causal linkages, interpretations, and/or elaborations of previously reported actions. A score of 3 indicated that the narrative includes all the above and a resolution to the story, or links to other autobiographical experiences, including future occurrences, or self-concept or identity, with a resolution that brings closure and provides new information.

For example,

Score 0: I went to the beach. Then I saw a bird. The bird was blue. I like blue. My favorite food is pizza. (This narrative is substantially off topic and includes multiple digressions that make the topic difficult to identify, with no attempt to repair digressions.)

Score 1: I went to the beach, and it was fun. I built a sandcastle and collected seashells. I also went for a swim. (This narrative has an identifiable topic but includes minimal development of the topic through causal linkages, personal evaluations and reactions, or elaborations of actions.)

Score 2: I went to the beach and it was a fun day. I built a sandcastle and collected seashells because I love the way the sand feels between my toes. Then I went for a swim and got caught in a big wave, which was scary, but also exhilarating. After that, I had a snack and played some games with my friends. (This narrative substantially develops the topic, with several instances of causal linkages, interpretations, and/or elaborations of previously reported actions.)

Score 3: I went to the beach on my birthday and it was a day I'll never forget. I built a sandcastle and collected seashells because I love the way the sand feels between my toes. Then I went for a swim and got caught in a big wave, which was scary, but also exhilarating. After that, I had a snack and played some games with my friends. As I looked back on the day, I realized that it was a turning point for me, because it was the first time I had faced my fear of the water and come out on top. This experience has stayed with me and has influenced my approach to challenges in my life, and I'm grateful for the lesson I learned that day. (This narrative includes all the above and a resolution to the story, with a link to the narrator's self-concept and identity, and a resolution that brings closure and provides new information.)

Assessing Local Indicators of Global Coherence

The indicators mentioned by Habermas & de Silveira (2008) were used. In their foundational study, these local indicators were detailed at the propositional level, derived from an analysis of personal narratives collected from 102 children and adults aged between 8 and 20 years.

Local indicators of global coherence in the current study were operationalized based on the description of Habermas & de Silveira (2008) as the frequency of temporal, causal, and thematic linguistic indicators, identified at the level of propositions. The comprehensive list provided by Habermas & de Silveira (2008) includes approximately 7 examples of temporal indicators, 14 examples of causal indicators, and 9 examples of thematic indicators. For instance, temporal indicators encompass "life phase" (e.g., "I got to know her in fourth grade") and "distance from present" (e.g., "that was last year"); causal indicators include "causally related statements of long duration" (e.g., "I would really like to have a real change in my life, because everything's gotten so confused") and "event explains personality" (e.g., "If I hadn't joined the sports-club then, I wouldn't have friends now and I would still be a shy person"); and thematic indicators feature "illustration" (e.g., "I haven't learned to do things on my own, although I am able to use the subway on my own and stuff like that") and "complex cognitive processes" (e.g., "Even then I had understood that my mother was mentally ill"). The complete list is provided in Appendix.

Given that Habermas & de Silveira's (2008) exhaustive list includes specific examples that naturally reflect the cognitive and life experiences of adolescents and adults, this study carefully adapted their framework for application to younger children. Specifically, the fundamental conceptual definitions and criteria for identifying temporal, causal, and thematic indicators from their list were consistently applied. However, it is noteworthy to mention that certain sophisticated examples from their original list, particularly those pertaining to abstract life reflections, complex

psychological insights, or bureaucratic processes, were not anticipated to be present, nor were they observed, in the narratives elicited from children aged 6-9 years in the current study.

For instance, examples such as "Personality 'I was a very shy person then. Therefore, I never dared to ask her'", "Biographical background 'When a car suddenly raced towards us, he panicked. He had been run over by a car when he was small'", "Lessons learned 'That's why I told myself, next time I fall in love, school work should not suffer from it'", "Life maxim, generalization 'Probably that's what always happens when it's the first kiss'", or "Understanding 'Even then I had already understood that my mother was mentally ill'" describe cognitive and life experiences typically associated with older adolescents or adults. While the underlying *categories* (e.g., a causal link between personality and action, or a statement reflecting understanding) were integral to the coding scheme, their manifestation in the narratives of young children was necessarily simpler or entirely absent for these specific, mature examples.

The specific sophisticated examples from Habermas & de Silveira's (2008) adult-based list were not found in the children's narratives, the foundational *categories* they represent were consistently present and scorable in developmentally appropriate ways. Children expressed these concepts in simpler, age-appropriate forms. For instance, for the "Thematic Opinion" category, a child might express a personal judgment or feeling by saying, "I felt proud of myself." Similarly, for "Causal Links" or "Lessons Learned," a child might state, "I should not have done this to my friend," indicating a realization of cause and effect or a moral takeaway from an experience in a concrete manner.

Therefore, the scoring for local indicators of global coherence was based on the detailed, propositional-level *descriptors* provided by Habermas & de Silveira (2008) applied rigorously to the linguistic content produced by the child participants, while acknowledging and accounting for

the developmental stage of the narrators. To demonstrate how the narratives were coded for both, Figure 3.1 shows the coding of a narrative sample from an 8-year-old TD child (P08TD).

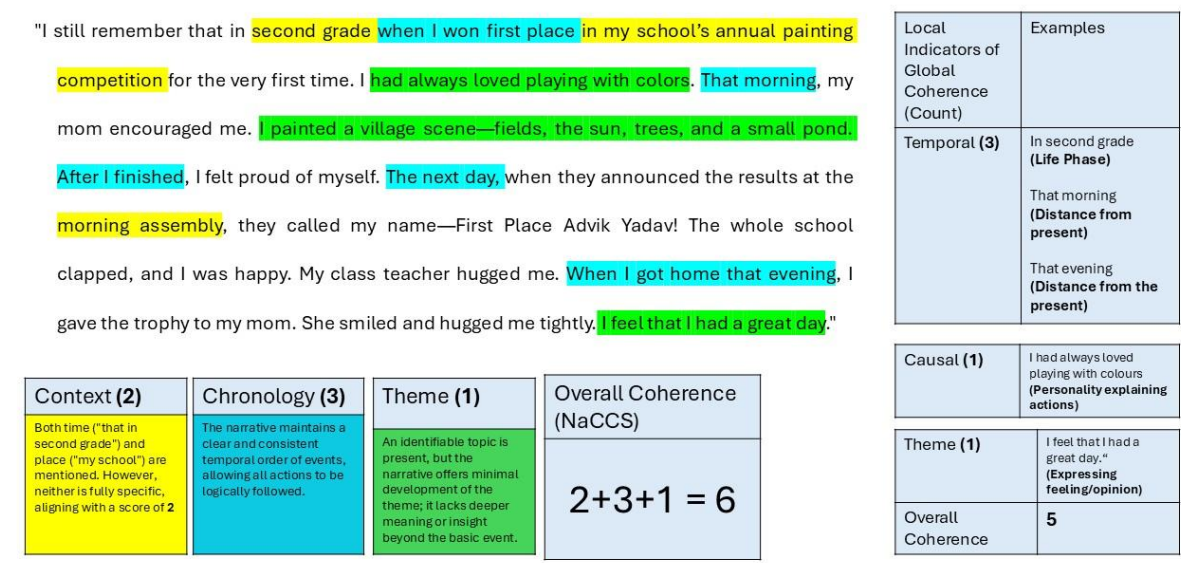


Figure 3.1 Demonstrating the Coding of Global Ratings of Coherence (following the Reese’s et al., 2011; NaCCS) and Local Indicators of Global Coherence (following the Habermas & de Silveria (2008))

3.4.3 Procedure

The interviews with participants were conducted face-to-face in India, either at school or in a location convenient for the participants. The experimenter was the PhD student herself, ensuring that each session took place in a quiet room. While parents were permitted to remain present to help the child feel comfortable, they were not allowed to prompt the child during the session or interfere in the session. Before starting, practice trials were conducted, and the personal narrative task was always positioned as the final task to encourage the child to share their stories comfortably. All sessions were audio-recorded for further analysis.

The experiment began with other assessments, including the expressive vocabulary task using the MINT (Gollan et al., 2102), the morphosyntactic ability task using the SReP (Marinis et al., 2015), and Raven’s Progressive Matrices (Raven 2003) for non-verbal IQ. The Global TALES (Westerveld et al., 2022) stories (for two prompts: happy and worried) were elicited using the same methods outlined in the methods section of Chapter 2.

3.4.4 Scoring

The audio recordings were first transcribed in Hindi by the PhD student. Subsequently, three other Hindi-speaking linguists were asked to review the 60 transcriptions. At this stage, there were no significant discrepancies, although some minor typographical errors were identified, which were resolved in a Zoom call. As per Labov (1972), narratives with at least two restrictive narrative clauses related to past events were classified as personal narratives. All 60 children, irrespective of their group, produced narratives that could be classified as personal narratives. The next phase involved scoring the narratives using the NaCCS (Reese et al., 2011) and the list of local indicators of global coherence (Habermas & de Silveria (2008)) to analyse the coherence of personal narratives of all children.

To ensure coding reliability, the PhD student initially coded all the narratives, followed by independent review from two Hindi-speaking linguists. Before finalising the manuscripts, the criteria for all three coherence dimensions—context, chronology, and theme—were further clarified through joint discussions with the two linguists. After their review, discrepancies were found in 10% of the context evaluations, 5% for chronology, and there were no discrepancies for the theme dimension. These discrepancies were further resolved.

3.4.5 Statistical Analyses

- For the analysis of global ratings of coherence

The statistical analysis was conducted using R (version 4.2.1, R Core Development Team, 2022). Cumulative Link Model (CLM) with the ordinal package (Christensen, 2015) were fitted for three different outcome measures: context, chronology, and theme. Separate models were constructed for each outcome measure to evaluate the differences between the autistic and TD groups. This study applied CLM because the dependent variables were ordered factors: $0 < 1 < 2 < 3$ on the degree of contextual information, chronological sequence and thematic development provided in the story. Rate ratios (odds ratios) were used as effect sizes for CLMs, as they provide a clear measure of the change in the cumulative odds of being in a higher response category for a one-unit change in the predictor variable, holding other variables constant (Agresti, 2015; Hosmer et al., 2013; McCullagh, 1980). Post-hoc tests for factors were conducted with the emmeans package (Lenth R, 2023) in R.

For the overall coherence a Generalized Linear Model (GLM) (Coxe et al., 2013) with a binomial distribution. The coherence variable was created by summing the ratings on context, chronology, and theme. Given that the maximum possible score for overall coherence was 9 (sum of three 0-3 point scales), the variable was treated as a binomially distributed outcome with 9 trials. The GLM function in R was used to fit the model, with the overall coherence score as the response variable and group as the predictor variable. The cbind function was used to create a matrix with two columns: the number of "successes" (the obtained coherence score) and the number of "failures" (the maximum possible score minus the obtained coherence score, i.e., $9 - \text{Coherence_Score}$). This allowed for specifying both the number of successes and the number of trials, which is required for a binomial distribution.

- For the analysis of local indicators of global coherence

Poisson regression models were chosen because the dependent variables were count variables, and they followed a Poisson distribution. A count variable is defined as a variable reflecting the number of occurrences of certain events and it takes on positive discrete values such as 0, 1 and 2 (Coxe et al., 2009). For example, the number of temporal indicators produced by the child in the narrative, the number of causal indicators produced by the child, and the number of thematic indicators produced by the child. For GLMs with a Poisson family, rate ratios (incidence rate ratios, IRRs) were used as effect sizes to indicate the multiplicative change in the expected count for a one-unit change in the predictor (Cameron & Trivedi, 2013; Hilbe, 2014). Story length and the age of the participants were added as covariates in the maximal model.

Post-hoc tests for factors were conducted with the emmeans package (Lenth R, 2023) in R, using pairwise comparisons of estimated marginal means with p-values adjusted for multiple comparisons using False Discovery Rate (FDR) correction.

Note: All R codes and statistical analysis outputs are deposited on the Open Science Framework and can be found at [link](#) under the 'Files' tab, in the 'Chapter 3' folder.

3.5 Results

The two groups did not differ in their he autistic group and the typically developing group did not differ in their scores on the Multilingual Naming Test (MINT; *Autistic: $M=54.93$, $SD=1.23$; TD: $M=55.40$, $SD=2.43$), the Sentence Repetition Task (SRep; *Autistic: $M=89.90$, $SD=2.43$; TD: $M=90.5$, $SD=2.40$), or the Raven's Progressive Matrices (*Autistic: $M=103$, $SD=2.45$; TD: $M=106$, $SD=1.98$).***

The story length, calculated in terms of total number of words, did not differ significantly between the two groups for either the excited (positive emotional polarity) prompt or the worried (negative

emotional polarity) prompt. Age was found to have no significant effect on any of the independent variables. The section below presents the results of the research questions.

3.5.1 Results for Coherence of Positive vs. Negative Emotion Experiences in TD Children

3.5.1.1 Results for the global ratings of coherence

There was no significant effect of emotional polarity for the context ($\chi^2(1) = 0.43$, $p = 0.82$), chronology ($\chi^2(1) = 1.82$, $p = 0.18$), theme ($\chi^2(1) = 0.73$, $p = 0.39$), and the overall ratings of global coherence ($\chi^2(1) = 0.91$, $p = 0.34$). Although for overall coherence the difference was not significant, the TD group scored higher in their positive stories compared to their negative stories known from the estimated marginal means for the positive emotional stories (1.82) and for the negative emotional stories (1.79). Figure 3.2, shows the frequency of scores of TD children in the outcome measures of context, chronology, theme and Figure 3.5 plots the mean for overall coherence for the Happy and Worried prompts.

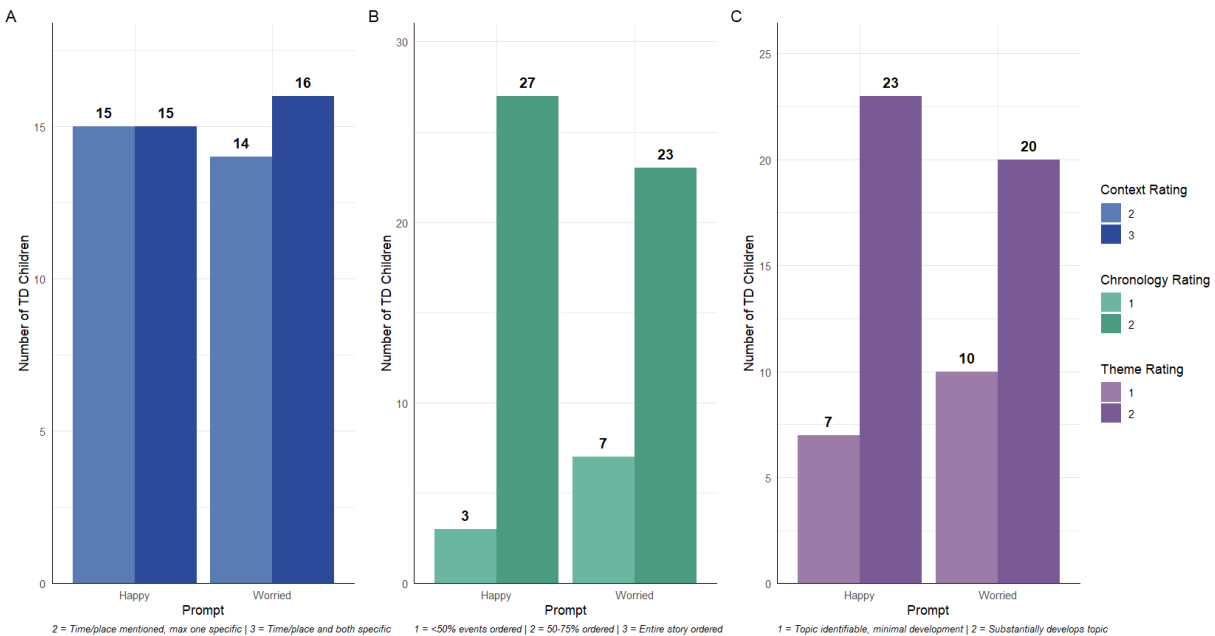


Figure 3.2 Frequency Rating in Context (A), Chronology (B) and Theme (C) for Happy and Worried Prompts for TD Children

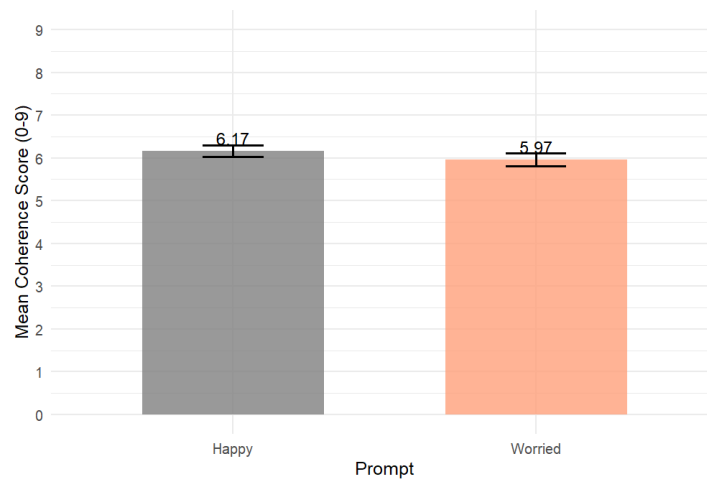


Figure 3.3 Mean Total of Global Ratings of Coherence scores for the Happy and Worried Prompts for TD Children

3.5.1.2 Results for the local indicators of global coherence

For temporal coherence, there was a significant effect of emotional polarity (Estimate = -0.35, SE = 0.16, $z = -2.22$, $p = 0.026$). Positive emotional stories were scored significantly higher in temporal coherence (estimated marginal mean = 1.19, SE = 0.10) compared to negative emotional stories (estimated marginal mean = 0.85, SE = 0.12). The Incidence Rate Ratio for negative emotional stories relative to positive emotional stories was 0.707, indicating that the expected count of temporal indicators in negative stories was about 71% of that in positive stories (a 29.3% decrease).

For causal coherence, a significant effect of emotional polarity was observed (Estimate = 0.83, SE = 0.32, $z = 2.58$, $p = 0.010$). Negative emotional stories had significantly higher causal coherence (estimated marginal mean = 0.06, SE = 0.18) than positive emotional stories (estimated marginal mean = -0.76, SE = 0.27). The IRR for negative emotional stories relative to positive

emotional stories was 2.286, indicating that the expected count of causal indicators in negative stories was approximately 2.29 times that in positive stories (a 128.6% increase).

However, no significant effects of emotional polarity were found for thematic coherence (Estimate = 0.03, SE = 0.23, $z = 0.11$, $p = 0.909$) or overall local indicators of global coherence (Estimate = -0.07, SE = 0.12, $z = -0.59$, $p = 0.558$).

Figures 3.4 shows the number of temporal, causal, thematic indicators and Figure 3.5 shows the overall local indicators of global coherence produced by TD children for the positive and negative valence prompts, respectively.

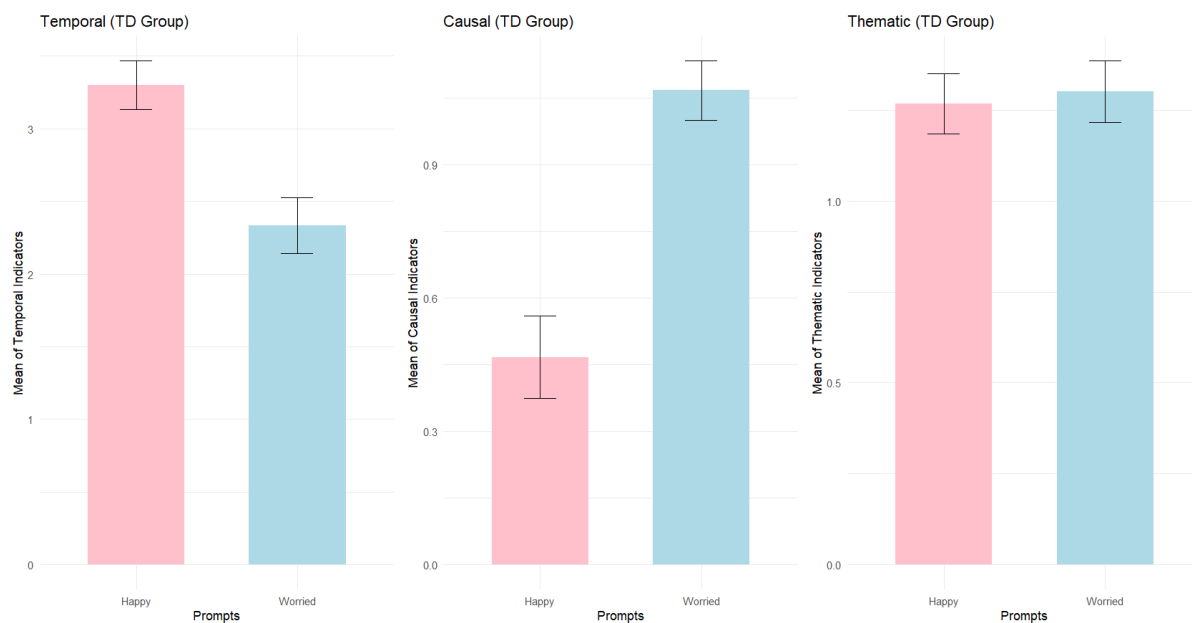


Figure 3.4 Mean of the Number of Temporal, Causal and Thematic Indicators for the Prompts Happy and Worried for the TD Group.

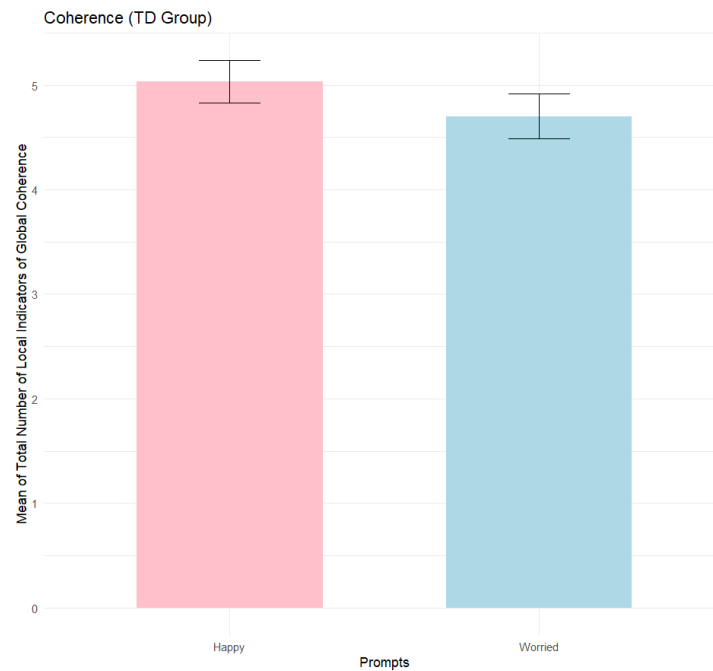


Figure 3.5 Total Local Indicators of Global Coherence for Happy and Worried Prompts for TD Children

3.5.2 Results for Coherence of Positive vs. Negative Emotion Experiences in Autistic Children

3.5.2.1 Results for the global ratings of coherence

There was a significant effect of emotional polarity for the negative prompt on the measures of context ($\chi^2(1) = 2.31, p = 0.021$) and theme ($\chi^2(1) = 2.77, p = 0.006$). Meaning that the autistic children's negative stories were more coherent contextually and thematically than their positive stories. While no significant effect of emotional polarity was observed for chronology ($\chi^2(1) = 1.78, p = 0.07$) and overall coherence (Estimate = 0.07, SE = 0.10, $z = 0.74, p = 0.45$). Figure 3.6, shows the frequency of scores of autistic children on the measures of context, chronology, theme

respectively. Figure 3.7 shows the mean scores of autistic children on overall coherence on the happy and worried prompts.

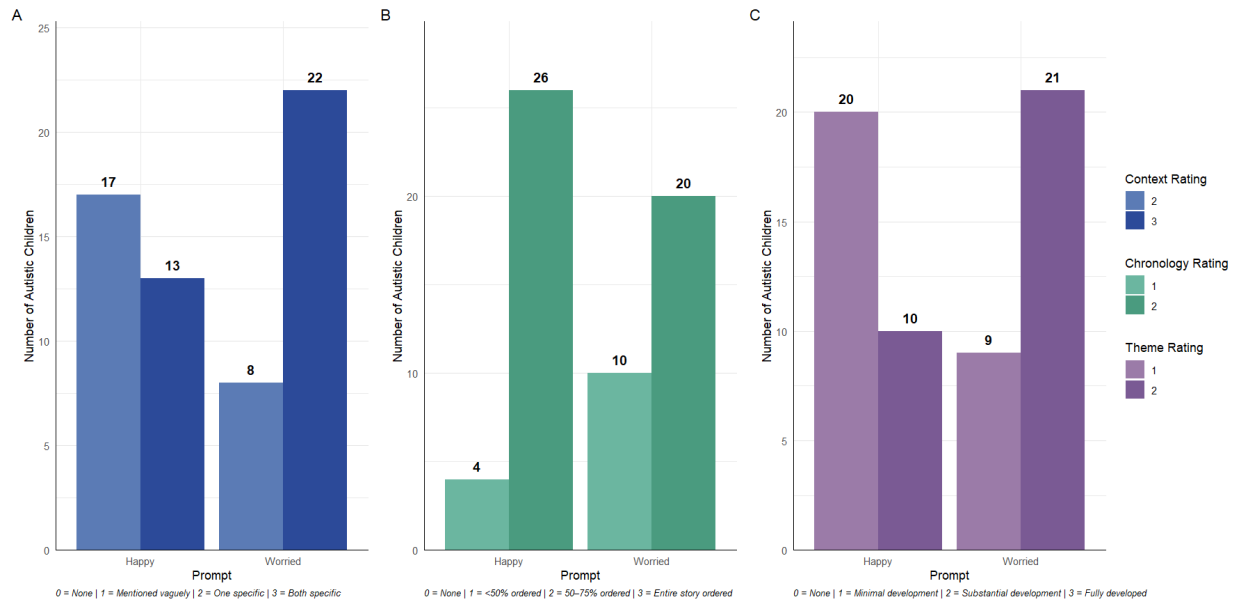


Figure 3.6 Frequency Rating in Context (A), Chronology (B) and Theme (C) for Happy and Worried Prompts for Autistic Children

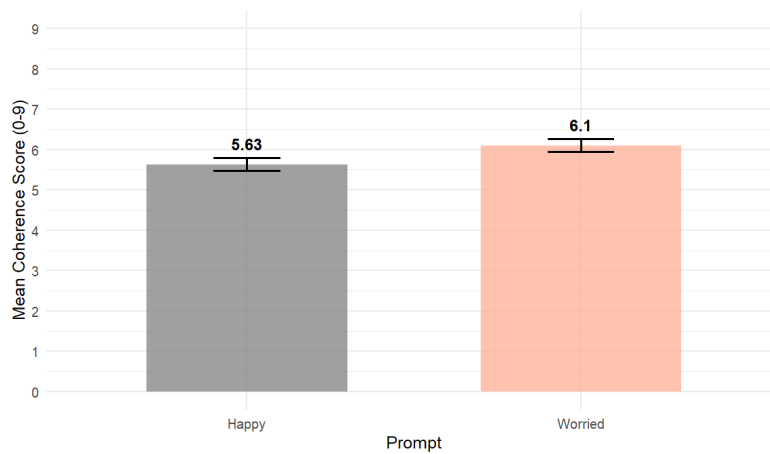


Figure 3.7 Mean Total Ratings of Coherence for the Happy and Worried Prompts for Autistic Children

3.5.2.2 Results for the local indicators of global coherence

For the autistic group, there was a significant effect of emotional polarity for all coherence measures.

Temporal coherence was significantly higher for negative stories (Worried; Estimate = 0.29, SE = 0.14, $z = 2.06$, $p = 0.039$). Negative stories (estimated marginal mean = 1.39, SE = 0.09) were scored higher in temporal coherence than positive stories (Happy; estimated marginal mean = 1.10, SE = 0.11). The IRR for negative emotional stories relative to positive emotional stories was 1.33, indicating that the expected count of temporal indicators in negative stories was 1.33 times that in positive stories (a 33.3% increase).

Similarly, causal coherence was significantly higher for negative stories (Worried; Estimate = 1.00, SE = 0.28, $z = 3.51$, $p < 0.001$). Negative stories (estimated marginal mean = 0.43, SE = 0.15) were better than positive stories (Happy; estimated marginal mean = -0.57, SE = 0.24). The IRR for negative emotional stories relative to positive emotional stories was 2.70, indicating

that the expected count of causal indicators in negative stories was 2.70 times that in positive stories (a 170.6% increase).

Thematic coherence also showed a significant effect of emotional polarity (Estimate = 2.32, SE = 0.40, $z = 5.85$, $p < 0.001$). Negative stories (Worried; estimated marginal mean = 0.86, SE = 0.12) had higher thematic coherence than positive stories (Happy; estimated marginal mean = -1.46, SE = 0.38). The IRR for negative emotional stories relative to positive emotional stories was 10.14, indicating that the expected count of thematic indicators in negative stories was 10.14 times that in positive stories (a 914.3% increase).

Finally, overall local indicators of global coherence were significantly higher for negative stories (Worried; Estimate = 0.73, SE = 0.11, $z = 6.42$, $p < 0.001$). Negative stories (estimated marginal mean = 2.07, SE = 0.07) showed greater overall coherence than positive stories (Happy; estimated marginal mean = 1.34, SE = 0.09). Based on these estimated marginal means, the IRR for negative emotional stories should logically be greater than 1, indicating an increase in the expected count of overall local indicators of global coherence compared to positive emotional stories.

Figures 3.8 shows the number of temporal, causal, thematic, and Figure 3.9 shows the total number of local indicators of global coherence produced by the autistic children, respectively.

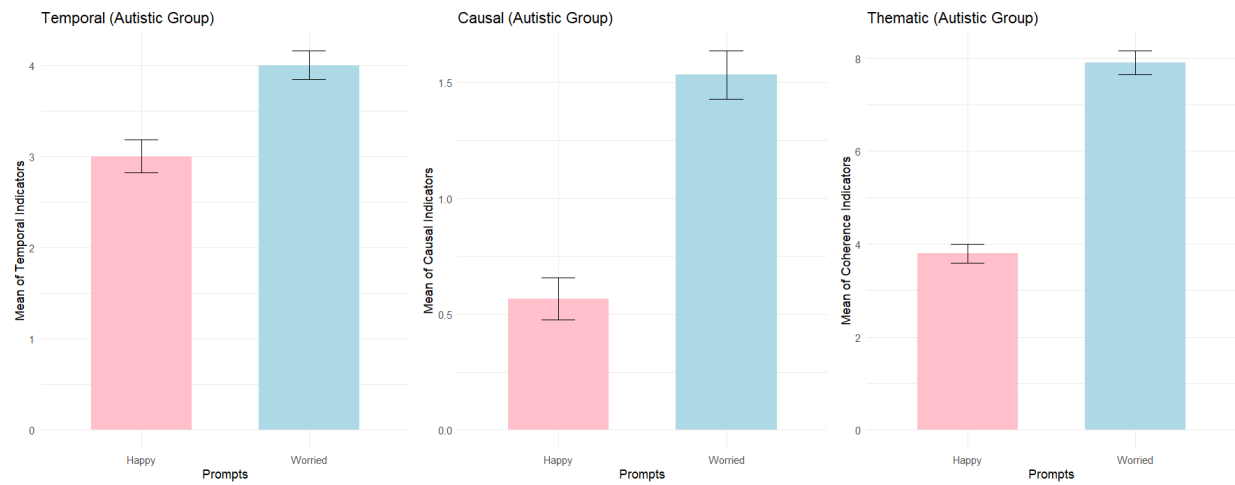


Figure 3.8 Number of Temporal, Causal and Thematic Indicators for the Prompts Happy and Worried for the Autistic Group

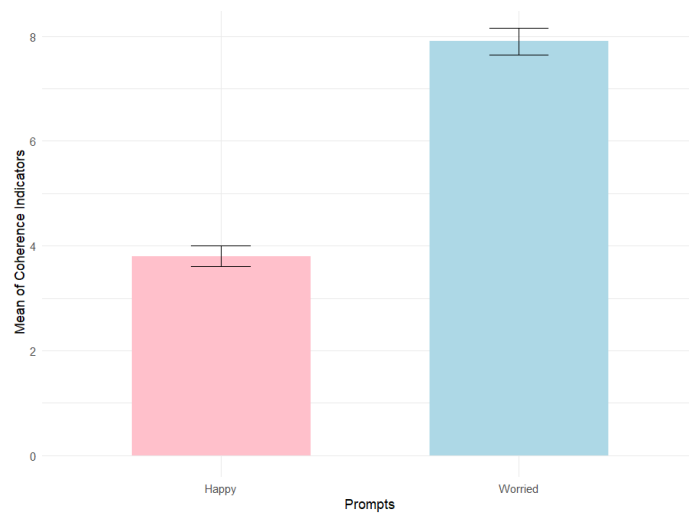


Figure 3.9 Total Number of Local Indicators of Global Coherence Produced for Happy and Worried Prompts by Autistic Children

3.5.3 Results for Between-group Comparison on Coherence

3.5.3.1 Results for the global ratings of coherence

For the positive emotional polarity, results revealed a significant group difference on theme ($\chi^2 = 3.25, p = 0.001$), where the TD group scored significantly higher than the autistic group. The OR for the TD group was 6.57 (95% CI: 2.20, 21.73), indicating that individuals in the TD group were approximately 6.57 times more likely to exhibit higher thematic coherence compared to those in the autistic group. This represents a large effect size. No significant group differences were found for context ($\chi^2 = 0.51, p = 0.600$), chronology ($\chi^2 = 0.40, p = 0.68$), or overall ratings of global coherence ($z = 1.45, p = 0.15$). Figure 3.10 shows the number of children rated on different descriptors of context, chronology, and theme, respectively, for the TD and autistic groups across both positive and negative valence prompts. Figure 3.11 shows the mean scores of overall ratings of global coherence for TD and autistic children when sharing positive and negative valence stories.

For the negative emotional polarity, there was a significant group difference for the context measure ($\chi^2 = 16.95, p < 0.001$). The OR was 0.011 (95% CI: 0.001, 0.065), indicating that the TD group had substantially lower odds of higher context ratings compared to the autistic group. This represents a large effect size, with the autistic group demonstrating better performance than the TD group. A significant group difference was also observed on overall ratings of global coherence ($\chi^2 = 7.022, p = 0.008$), where the autistic group again scored significantly higher than the TD group. For group, the OR was 0.62 (95% CI: 0.44, 0.88), indicating that the TD group had significantly lower odds of higher overall coherence ratings compared to the autistic group. This represents a moderate-to-large effect. No significant group differences were found for chronology ($\chi^2 = 1.15, p = 0.390$) or theme ($\chi^2 = -0.012, p = 0.780$).

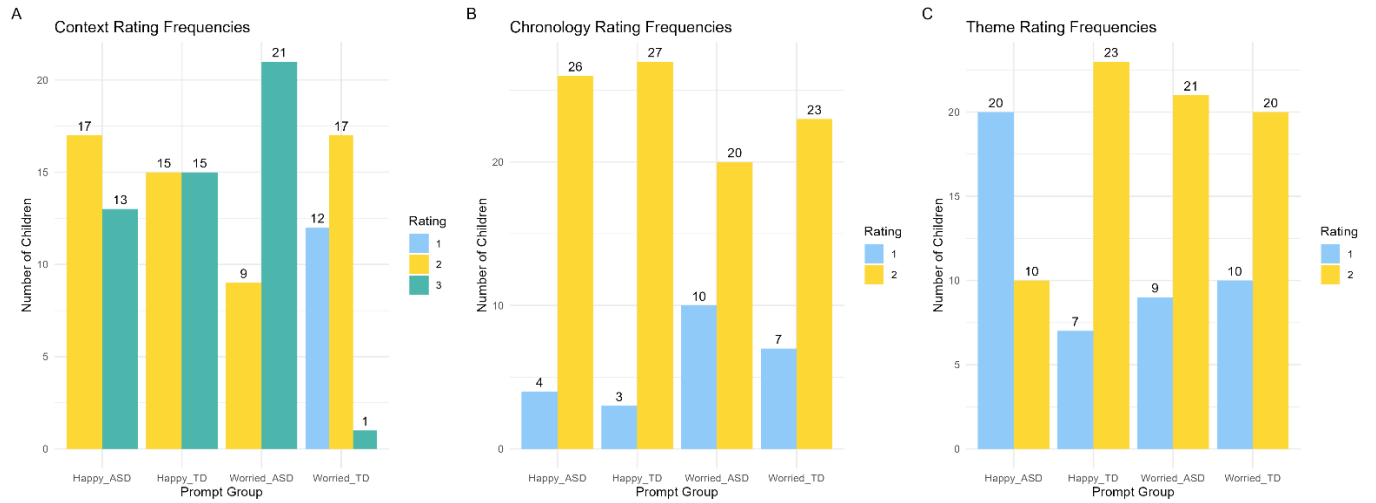


Figure 3.10 Frequency of Ratings for Context, Chronology and Theme for the Prompts Happy and Worried in Autistic and TD Group

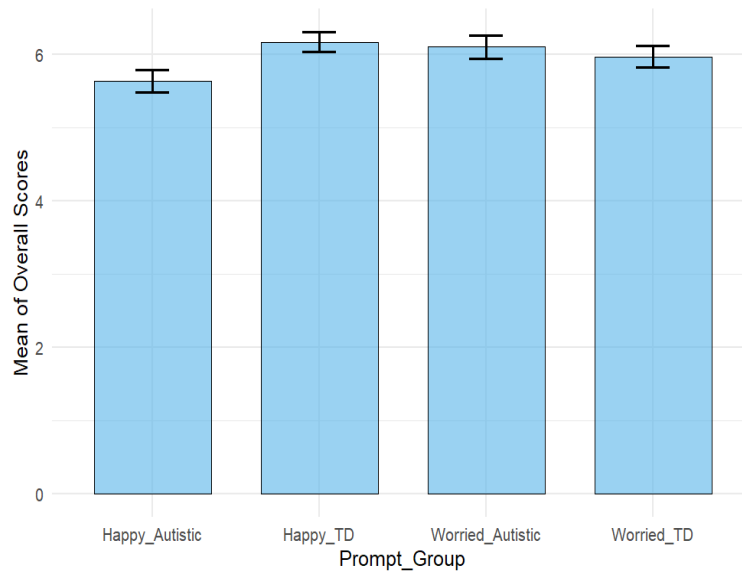


Figure 3.11 Mean Scores on Global Ratings of Coherence Between Autistic and TD Group for the Positive and Negative Valence Prompts

3.5.3.2 Results for the local indicators of global coherence

For positive emotional stories, results revealed that TD children scored significantly higher thematic coherence (Estimate = 1.69, SE = 0.41, $z = 4.11$, $p < 0.001$) and total local indicators contributing to coherence (Estimate = 0.28, SE = 0.12, $z = 2.26$, $p < 0.02$) compared to autistic children. Specifically, TD children showed an estimated marginal mean of 0.24 (SE = 0.16) for thematic coherence, while autistic children showed an estimated marginal mean of -1.46 (SE = 0.38). The IRR for the TD group relative to the autistic group was 5.43 (95% CI: 2.42, 12.16), indicating that the expected count of thematic indicators in the TD group was approximately 5.43 times higher than in the autistic group. This represented a large effect size. However, no significant differences were observed for temporal indicators (Estimate = 0.10, SE = 0.15, $z = 0.65$, $p = 0.510$) or causal indicators (Estimate = -0.19, SE = 0.36, $z = -0.54$, $p = 0.590$) in positive stories.

For negative emotional stories, autistic children scored significantly higher in temporal indicators (Estimate = -0.86, SE = 0.17, $z = -5.12$, $p < 0.001$). The IRR for the TD group relative to the autistic group was 0.43 (95% CI: 0.31, 0.59), indicating that the expected count of temporal indicators in the TD group was substantially lower (approximately 43% of that) compared to the autistic group. This represented a large effect.

Additionally, for overall local indicators of global coherence, the autistic group scored significantly higher compared to TD children (Estimate = -0.41, SE = 0.10, $z = -4.00$, $p < 0.001$). The IRR for the TD group relative to the autistic group was 0.66 (95% CI: 0.54, 0.81), indicating that the expected total coherence scores in the TD group were significantly lower (approximately 66% of that) compared to the autistic group. This represents a moderate-to-large effect, with the autistic group demonstrating better overall coherence.

Autistic children also showed higher thematic coherence (estimated marginal mean = 0.86, SE = 0.12) than TD children (estimated marginal mean = 0.64, SE = 0.13) in negative stories, although this difference was not statistically significant (Estimate = -0.22, SE = 0.18, $z = -1.24$, $p = 0.220$).

Figure 3.12 shows the total number of temporal, causal, thematic indicators, and Figure 3.13 shows the total number of local indicators of global coherence, respectively, produced by both groups of children on prompts with positive and negative emotional polarity.

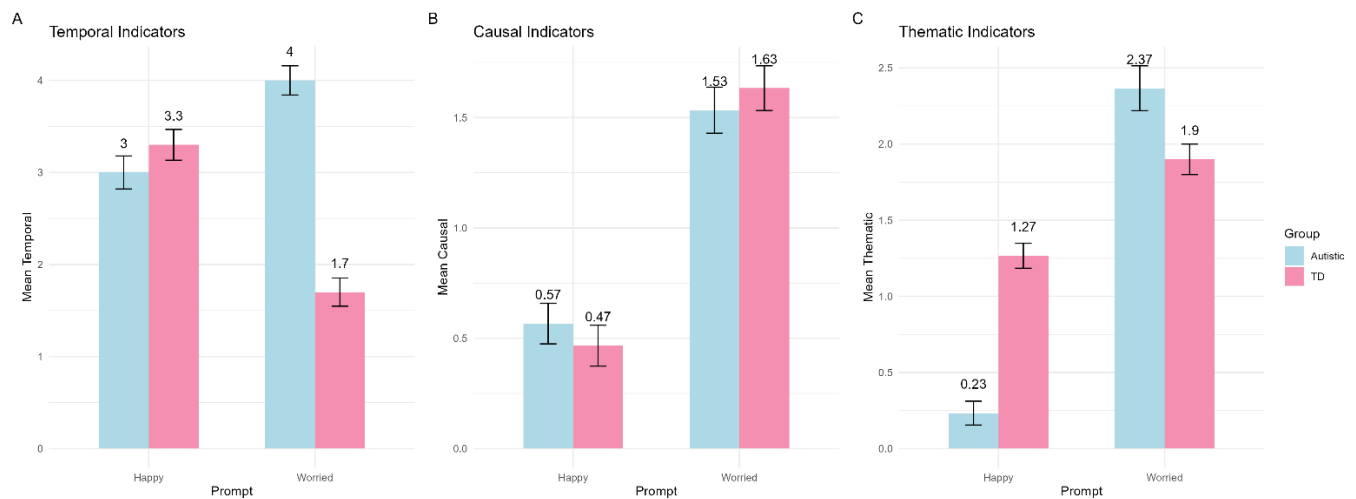


Figure 3.12 Number of Temporal, Causal and Thematic Indicators for the Prompts Happy and Worried produced by Autistic and TD Children

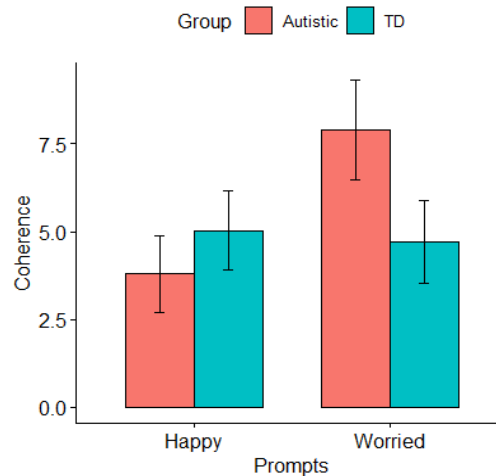


Figure 3.13 Total Number of Local Indicators of Global Coherence for the Prompts Happy and Worried Produced by Autistic and TD children

3.6 Discussion

This study investigated the effect of emotional polarity on the coherence of personal narratives in children with and without autism, adopting a comprehensive approach that encompassed both within-group and between-group analysis. Within-group comparisons examined how emotional polarity (positive and negative prompts) influenced the narrative coherence of TD children and autistic children separately. The between-group comparisons focused on contrasting the coherence scores and the qualitative differences in the narratives of autistic and TD children, providing a clear understanding of the differences and similarities between the two groups.

Coherence in Personal Narratives of TD Children

The first research question investigated whether TD children's narratives differed in coherence when recounting positive versus negative emotional experiences. This exploratory

study provides initial insights into an area where narrative coherence research is still developing, particularly regarding the influence of emotional polarity. For the global ratings of coherence, the results for Hindi-speaking TD children showed no significant differences between narratives of negative and positive emotional events across any of the assessed measures. Moving to the local indicators of global coherence, the current study found an effect of emotional polarity for two out of four outcome measures: temporal and causal indicators. Specifically, when narrating positive experiences, TD children used more temporal indicators. For the negative experiences, the number of causal indicators used were more than the positive stories/experiences. Despite these specific differences in local indicators of global coherence, when considering both global ratings of coherence (four measures; context, chronology, theme, and the overall coherence) and local indicators of global coherence (four measures: temporal, causal, thematic, and the overall coherence) together, there was no consistent or uniform effect of emotional polarity, whether negative over positive or positive over negative, across all coherence measures suggesting that while some effects of polarity were registered with temporal and causal indicators (both local indicators of global coherence), a broad, consistent pattern was not observed.

These findings are particularly noteworthy as they suggest that previously reported biases in narrative coherence, such as a preference for coherence in negative stories over positive ones, may not be a universal phenomenon. Cultural context plays a significant role in shaping narrative patterns (Goyal et al., 2019). This aligns with research indicating that emotional systems and their expression vary across cultures, with some East Asian cultures exhibiting a more balanced system of emotions compared to Western contexts that may prioritize positive over negative emotions (Miyamoto et al., 2017). It is possible that in Indian culture, positive emotional stories are more likely to be shared in a detailed and temporally oriented manner. The finding that TD children

produced more temporal indicators in their positive narratives than their negative narratives may be influenced by cultural values that prioritize social harmony and relationships (Chadda & Deb, 2013; Rajkumar, 2023). The emphasis on interpersonal relationships and social context in Indian culture may lead to a greater focus on sharing positive experiences with rich temporal details. For example, Miller, (1984) found that when asked to describe their happy experiences, 40% of Indian adults' references were about dispositional attributes, such as social, spatial, and time references, whereas only 18% of American responses referred to such contextual information. This cultural tendency to emphasize temporal information may contribute to the observed pattern of TD children using more temporal indicators in their positive narratives, although further research is needed to fully understand this pattern. The results also align with some research showing that narratives about both high and low emotional points can exhibit comparable levels of vividness, meaning, and coherence (Cox & McAdams, 2019). The extent to which these specific patterns are a unique feature of Indian adult and child speakers, particularly regarding the observed emphasis on temporal indicators for positive narratives and causal indicators for negative narratives, and whether this reflects a cultural tendency to emphasize temporal information in positive personal narrative recall (Miller, 1984), and causal information while sharing negative personal experiences awaits future research.

Coherence in Personal Narratives of Autistic Children

The second research question explored whether autistic children with low support needs demonstrate differences in narrative coherence when recounting positive versus negative emotional experiences. Results provided initial, robust evidence that Hindi-speaking autistic children's stories differed significantly in coherence based on emotional polarity.

For the global ratings of coherence, a key finding revealed that two out of four measures, specifically context and theme, showed patterns that differed significantly between positive and negative narratives. Autistic children's narratives scored significantly higher with negative stories coherence in these specific measures when recounting negative emotional experiences. While existing literature often notes that individuals with autism can report difficulties with qualitative aspects and organizing coherent chains of events (Ferretti et al., 2018), these findings highlight how emotional polarity plays a crucial role in shaping narrative coherence for autistic children.

For the local indicators of global coherence, the autistic group scored significantly higher for negative prompts across all measures of coherence, including temporal, causal, thematic, and in the total local indicators of global coherence. This might indicate that autistic children may use more detailed and organized linguistic structuring when processing and recounting negative experiences. The observed greater coherence in negative narratives can be attributed to several interconnected mechanisms, which at this point is difficult to tease apart:

More Frequent Encounters with Negative Experiences: Autistic individuals often experience a higher frequency of negative life events and social adversities compared to their neurotypical peers (Ng-Cordell et al., 2022). If these Hindi-speaking autistic children also encounter more negative events, they might have had simply have more opportunities to practice narrating and making sense of these experiences, leading to more developed and coherent narratives for such events.

Negative Memory Bias: Autistic individuals exhibit tendencies towards repetitive cognition, including rumination, which is more prevalent in this population than in TD peers (Cooper et al., 2021; Keenan et al., 2017). These patterns of results might also suggest that autistic children's narratives are more coherent when they share stories of negative emotional significance,

which is consistent with the hypothesis of a negative memory bias. This finding in terms of memory bias aligns with previous research indicating that autistic individuals may engage in sustained processing of negative information (Mazefsky et al., 2020), which can be more salient. This negative memory bias, which can lead to increased rumination and preoccupation with negative emotions (Williams et al., 2021), might have led to a more detailed and organized narrative.

Comparison of Narrative Coherence: Autistic vs. TD Children

The third research question aimed to compare the narrative coherence of stories shared by autistic children with low support needs and TD children, examining differences and similarities across positive and negative emotional personal stories.

For positive emotional polarity, both groups performed comparably, with the exception of thematic development for both the global ratings of coherence and local indicators of global coherence. For the outcome measure “theme” the TD group scored significantly higher than the autistic group. While autistic children had comparable coherence in certain aspects of positive narratives for example, context, chronology and the overall coherence, a key difference lies in their ability to articulate and integrate an overarching theme or central idea.

For negative emotional polarity, the results revealed a pattern where autistic children significantly scored higher than their TD peers in context and overall coherence for the global ratings of coherence. Similarly, for the local indicators contributing to global coherence, autistic children scored significantly higher in temporal coherence and overall local indicators of global coherence. Autistic children's narratives, when recounting negative experiences, thus scored significantly higher in coherence, particularly in terms of contextual detail and overall organization.

These findings collectively contribute a significant perspective to the existing literature on narrative coherence in autistic children. While previous research has often highlighted that autistic children's narratives may be less coherent than their TD peers (Ferretti et al., 2018; Lee et al., 2017), the current study indicates that narrative coherence can be influenced by emotional polarity (even for TD children). Specifically, within this study's scope, autistic children scored significantly higher (in certain outcome measures) or comparable to, their TD peers, particularly when narrating negative emotional experiences.

A consistent and significant finding for the positive stories for both global ratings of coherence and local indicators of global coherence was that the autistic children scored significantly lower in thematic coherence within their positive stories compared to TD children highlighting a critical area of difference, suggesting that while autistic children can achieve strong coherence in certain aspects of recounting negative experiences, their ability to articulate and integrate a theme when discussing positive experiences is lower compared to their TD peers.

Despite autistic children scoring significantly lower thematic scores in positive narratives in the between-group comparison with TD children, their within-group comparison (as detailed in Research Question 2) revealed significantly higher thematic coherence in their negative stories. This on the other hand also suggested that autistic children possess the capacity to produce themes within their narratives. The diminished use of thematic indicators for both global ratings of coherence and local indicators of global coherence observed in their positive stories, given that they scored significantly higher in thematic indicators while recalling negative experiences, is a curious question. And so, to further explore how thematic differences are manifested between groups, particularly concerning the subtypes of thematic indicators, a qualitative analysis was conducted. Following the list of thematic indicators mentioned by Habermas & de Silveira (2008),

a detailed subtype analysis was performed. The next section will present the results of this qualitative analysis.

Specific Local Indicators of Global Coherence (Theme) in Positive Narratives of TD and Autistic Children

To further elucidate the type of thematic indicators produced under the local indicators of global coherence, particularly in the positive valenced stories a qualitative examination of the narrative samples was conducted. As previously discussed, statistical analyses indicated that autistic children scored significantly lower in thematic coherence in their positive stories for both global ratings of coherence and local indicators contributing to global coherence compared to their TD peers, despite showing thematic capacity in their negative narratives. This intriguing finding prompted a thematic subtype analysis, leveraging Habermas & de Silveria (2008) list of thematic indicators to identify which specific types of themes were produced by autistic children versus their TD counterparts.

The thematic subtype analysis revealed a significant qualitative difference: in positive stories, TD children frequently used thematic indicators categorized under "complex cognitive processes," specifically "understanding" and "opinion." For instance, 13 out of 30 TD stories featured examples of understanding-based subtypes, and 18 out of 30 included opinion-based subtypes. Table 3.1 provides illustrative examples of opinion-based indicators (subtype of thematic indicator), while Table 3.2 presents examples of understanding-based indicators (subtype of thematic indicator), all drawn from the positive valence stories of TD children.

Table 3.1 Examples of the Opinion-based (thematic indicators) Local Indicators of Global Coherence in the Positive Stories of TD Children

Thematic Indicators	Examples from TD Children's Narratives
Complex Cognitive Processes: Opinion	"Diwali was the <i>best</i> festival this year! The fireworks were <i>so beautiful</i>, and I <i>liked</i> all the sweets." "I am happy about my new school bag which is <i>super cool</i>, it has a picture of a superhero, and I <i>think</i> it makes me run faster." "I <i>really enjoyed</i> visiting my grandparents' village; playing with the handpump was <i>very funny</i>." "Shama gifted a new set of crayons was which is very oily in texture and is <i>amazing</i>, now I can draw <i>much better</i> pictures." "I <i>think</i> the sweets that my mother makes are the <i>tastiest</i> in the whole neighborhood." "Playing cricket with my friends after school is <i>the most enjoyable thing</i> to do every day." "I <i>loved</i> going to the temple for the festival; because I feel that the decorations were <i>so bright and pretty</i>." During my cousin's wedding, which was the first wedding of the house, everyone looked so excited.. wedding was <i>so exciting</i>; everyone looked <i>very happy</i>." "I <i>believe</i> watching TV and movies is <i>much more interesting</i> than reading books." "Going to the beach last summer was the best vacation we ever had, I just loved everything about it – the sand, the waves, the ice cream, it was all just so perfect." "My mom's special aloo paratha is <i>definitely my favorite</i> breakfast." "I <i>think</i> my new bicycle is <i>the fastest</i> one on our street." "Our school picnic was <i>fantastic</i>, the park had <i>lots of swings</i>." "I <i>felt so good</i> when I shared my snacks; it's <i>nice to be kind</i>." "The new cartoon movie was <i>brilliant</i>, I <i>want to watch it again</i>." "My grandmother's stories are <i>the famous ones</i> because she makes funny voices." "I <i>like</i> helping my father water the plants; as my mother says they look <i>so fresh</i> afterwards and I tried it and I felt the same" "I was so proud of myself." "I feel that I had a great day"

Table 3.2 Examples of the Understanding-based (thematic indicators) Local Indicators of Global Coherence in the Positive Stories of TD Children

Thematic Indicators	Examples from TD Children's Narratives
Complex Cognitive Processes: Understanding	"When my older brother helped me build the tall Lego tower, I <i>understood</i> that working together makes things easier." "After my teacher showed me how to make the clay pot, I <i>realized</i> that being patient helps you learn new things." "My mom explained why we light lamps for Diwali, and then I <i>understood</i> that it's about light overcoming darkness." "When my grandmother told me stories about our family, I <i>learned</i> how important it is to respect elders." "After I helped my neighbor carry her groceries, I <i>realized</i> that even small acts of kindness can make someone happy." "When my parents took me to the science museum, I <i>understood</i> how many amazing things can be done with simple machines." "I <i>figured out</i> that if I finish my homework quickly, I have more time to play." "After my friend taught me a new game, I <i>realized</i> that it's fun to try different things." "When the power went out and we used candles, I <i>understood</i> how lucky we are to have electricity every day." "I <i>learned</i> that practicing my music makes me better, just like practicing anything." "When the gardener showed me how the plant grows from a seed, I <i>understood</i> that everything needs care to grow." "My dad explained why we should save water, and then I <i>understood</i> that it's important for everyone." "After helping my aunt distribute food to those in need, I <i>realized</i> that sharing makes a big difference."

The analyses of thematic indicators of coherence further revealed that while these thematic indicators were consistently present in the positive narratives of TD children, they were entirely absent from the samples of autistic children's positive narratives. Even more notably, these specific thematic indicators of local indicators of thematic coherence were not present in the autistic children's negative stories either.

This absence is particularly noteworthy because, as established in the within-group comparison, autistic children scored significantly higher in thematic coherence in their negative stories, indicating their capacity to produce thematic indicators within negative polarity narratives. The consistent absence of "understanding" and "opinion" markers from *both* their positive and negative

stories, despite scoring significantly higher in thematic coherence in their negative stories, therefore necessitated further investigation into the specific thematic indicators produced by these autistic children. Particularly this focused analysis was performed to identify which thematic contributions autistic children made in their narratives, given the complete absence of interpretive "understanding" and "opinion" markers.

The results revealed that autistic children's thematic contributions in their stories were primarily limited to providing exemplifications and illustrations, a subtype categorized within Habermas & de Silveria (2008) list. These illustrative factual thematic indicators were present in both their positive and negative narratives, though they were used significantly more frequently in the latter, contributing to their higher scores in theme for the local indicators of global coherence. Specifically, in their positive narratives, these children used illustrations 5 out of 30 times, while in their negative stories, illustrations were produced in 12 out of 30 instances. Table 3.3 presents examples of the illustrations used in the autistic children's positive and negative stories. This pattern suggests that autistic children tend to produce more factual but less interpretive self-narratives compared to their TD peers.

Table 3.3 Examples of the Illustration and Exemplification (thematic indicators) Local Indicators of Global Coherence in the Positive and Negative Stories of Autistic Children

Thematic Indicators	Examples from Autistic Children's narratives
Positive emotional polarity prompt (Happy/excited stories) (n=5)	My train carriages are arranged, the engine moves along the track, such that the carriages follow in a line. I use my drawing materials, I draw a large square, then a smaller square inside it, and repeat this pattern, like a square inside square. The song was played and the song 'Chanda Mama Door Ke' came on, and I moved my lips with the words like this.... My toys were all in one cupboard like a stack. All of them side by side My mother takes me to a park..she gets me on the swing. which is like an elephant in shape
Negative emotional polarity prompt (Worried stories) (n=12)	Loud noises can happen suddenly. For instance, the thunder clapped very loudly, My schedule can change. For example, when my swimming class was cancelled, The doctor asked me five questions about my food, like an exam, and I only answered two. For example, my robot toy did not move when I pressed the button. Just like yesterday, my toy car batteries were meaning its batteries were gone. We waited for the bus for 30 minutes, like a very long cartoon. When we went to the big new shop, I did not know where the toys were, meaning I had to follow my father very close. Someone bumped into me in the carpark and I had to run like Doremon (cartoon character) For example, when someone messed up my crayon box and all the colors were mixed, and I couldn't use them For example, when my shirt tag was scratching my neck all day at school When the teacher asked me why I was upset, my mouth wouldn't make the words, and I just stood there shaking. I banged my head on the wall the same way my brother did.

The observed distinction in the use of specific thematic indicators is not merely stylistic; it has significant developmental implications. Specifically, the autistic children's no mention of their own understanding and opinions of events—points to several important considerations regarding their development and quality of life: first, potential difficulties in their intrapersonal Theory of Mind (ToM; Westby & Robinson (2014)); second, anticipated challenges in navigating collectivist cultural contexts (such as India; Chaddha & Deb, 2013) during adolescence; third, difficulties in developing a strong sense of self-identity (Westby 2021a); and finally, potential impacts on their sense of agency (Westby, 2021b). These considerations are further explained in the paragraphs below.

The absence of “understanding” and “opinion” markers in autistic children's narratives suggests specific challenges with intrapersonal ToM (Westby 2021a). While TD children's stories often include reflections such as “After I helped my neighbor carry her groceries, I *realized* that even small acts of kindness can make someone happy”, autistic children's stories remain at the level of what happened, without elaboration on how it made them feel or what they thought about it. This aligns with existing research indicating that autistic individuals may have difficulties with self-knowledge, clarity of self-concept, and making sense of their emotional experiences (Fasulo, 2019). The current findings reinforce this by showing that, even when autistic children can produce thematically coherent narratives, particularly in negative contexts, their thematic contributions are limited to factual illustrations rather than interpretive or evaluative content.

The implications of these narrative differences are particularly salient in collectivist cultural contexts such as India, where social integration and community relationships are highly

valued (Chadda & Deb, 2013; Hofstede, 2011). In such settings, the ability to express one's understanding and opinions is crucial for negotiating social roles and developing a sense of belonging. TD children's narratives, rich in personal interpretation, help them position themselves within their families and communities. For example, a TD child might say, "My mom explained why we light lamps for Diwali, and then I understood that it's about light overcoming darkness," thereby connecting a personal insight to a broader cultural practice. In contrast, autistic children, whose stories rarely include such reflections, may find it more challenging to articulate their place in group contexts or to express their contributions to collective activities. This difficulty could hinder their ability to navigate the complex social structures of collectivist societies and to develop a robust sense of personal identity.

The process of identity formation i.e., developing a clear sense of self that includes likes, dislikes, values, and opinions—is deeply intertwined with the ability to create meaningful narratives about one's life experiences (Hallford et al., 2021). When individuals express their understanding and opinions within their stories, they connect past events to their evolving sense of self. For TD children, this is evident in statements like, "I learned that practicing my music makes me better, just like practicing anything." These narrative markers not only enrich the coherence of their self-stories but also support the social process of identity development, which is shaped by interactions and discussions with others (Higgins & Sandhu, 2014). For autistic children, the absence of such interpretive content in their narratives may limit the richness and coherence of their self-stories, making it more difficult to develop a strong personal identity and to find their place within social groups (Dean et al., 2013).

Furthermore, the capacity to narrate one's own understanding of events and to articulate personal opinions is foundational for developing a sense of agency—the feeling of being the author of one's actions and capable of influencing outcomes in one's life (Adler, 2011). In the data, TD children's stories are replete with agency markers, such as "I believe watching TV and movies is much more interesting than reading books," or "I was so proud of myself." These expressions signal a sense of self-authorship and causal influence. In contrast, autistic children's narratives, which remain descriptive and lack interpretive statements, suggest a weaker sense of themselves as causal agents. For example, while a TD child said, "I felt so good when I shared my snacks; it's nice to be kind," while an autistic child recounted, "My mother takes me to a park...she gets me on the swing, which is like an elephant in shape," without any indication of how the event was experienced or interpreted. This pattern may lead their narratives to become more about what happened rather than about how they influenced or were influenced by events. In collectivist cultures, where collective agency—recognizing one's role within group action and shared goals—is also important, the lack of metacognitive language skills for expressing understanding and opinion may further impede autistic children's ability to fully engage in shared endeavors and to express their position within collective efforts (Wang & Stokhof, 2022).

In summary, the findings from this study highlight a fundamental difference in the narrative expression of autistic and TD children. While autistic children are capable of producing thematically coherent narratives, especially in response to negative prompts, their stories are distinguished by an absence of interpretive content. They describe what happened, but rarely why it mattered to them or what they thought about it. This difference has important implications for their self-understanding, sense of agency, and ability to navigate complex social worlds, particularly in collectivist cultures. By identifying these specific narrative patterns, the study

underscores the need for targeted support that fosters not just storytelling, but also self-reflection and personal meaning-making in autistic children.

3.6.1 Implications for Clinical Practice and Future Research

The findings carry significant implications for both clinical practice and future research in supporting autistic children's narrative development. Building on these findings, intervention approaches should place a strong emphasis on fostering metacognitive language within narrative construction. Narrative interventions should not only encourage children to recount events but also explicitly model and scaffold the use of interpretive language—such as expressing personal understanding (“I realized that...”) and opinion (“I think that...”). Using culturally relevant and developmentally appropriate examples, clinicians can demonstrate how to move from factual descriptions to more reflective and evaluative storytelling. Structured practice activities might include guided questions like, “What did you learn from this?” or “How did this event make you feel or what did you think about it?” to prompt children to articulate their internal responses and interpretations, rather than simply describing what happened.

Additionally, agency-focused narrative interventions should be integrated into clinical practice. These interventions can help children develop the linguistic tools necessary to express their sense of agency within their stories, using scripts and prompts that encourage statements of realization, belief, or influence. For example, clinicians might work with children to construct narratives that include phrases such as “I was proud of myself when...,” “I believe that...,” or “I understood that...,” thereby supporting the development of a stronger sense of self-authorship and personal meaning. By systematically targeting these thematic subtypes—understanding, opinion, and agency—within narrative interventions, clinicians can help autistic children build richer, more

coherent, and personally meaningful narratives, which are foundational for self-understanding, identity development, and successful social participation.

For clinical assessment, refining strategies is crucial. Specifically, SLPs and evaluators should incorporate targeted assessment of metacognitive language, particularly markers of "understanding" and "opinion," when evaluating narrative skills in autistic children. Assessments should include both positive and negative narrative prompts to comprehensively capture the nuances of coherence across emotional valences. In terms of intervention, metacognitive language-focused narrative intervention should use modeling with culturally appropriate examples of expressing understanding and opinions, and incorporate structured practice in interpreting events (e.g., "What do you think this means?"). Additionally, agency-focused narrative intervention should explicitly teach the language of agency in narrative construction, developing scripts that incorporate understanding and opinion markers.

Future research should investigate whether the pattern of findings in this current study replicates across a broader range of positive versus negative emotional expressions in personal narratives and across different cultures, and explore more complex emotional prompts, such as prompts like pride, envy, or empathy. For clinical practice, refining assessment and intervention strategies is crucial. The development and evaluation of metacognitive language-focused narrative interventions, using modeling with culturally appropriate examples and structured practice, are also needed.

3.6.2 Strengths and Limitations

Before closing, some novelties and limitations of the current study. To the best of my knowledge, it is the first study to compare the effect of emotional polarity on coherence of personal

narratives in autistic and TD children. Additionally, it is the first study to analyse coherence for both the global ratings of coherence and the local indicators contributing to global coherence in child language literature, providing a more detailed understanding of narrative abilities of TD and autistic children. A significant novelty stems from its in-depth analysis of thematic indicators of coherence. The analysis identified specific interpretive gaps, such as the consistent absence of "understanding" and "opinion" markers in the narratives of autistic children. This finding provides SLPs and caregivers working with autistic children with more targeted and actionable intervention goals compared to general coherence ratings often found in existing literature, which may not offer sufficiently clear guidance for evidence-based practice. Additionally, future research can further explore other subtypes of local indicators of global coherence that contribute to narrative coherence. Despite these advancements, the study is subject to certain limitations, including a relatively small sample size that may impact the generalizability of its findings, and the exclusive analysis of basic positive and negative emotional prompts, suggesting a need for future research to investigate more complex emotional prompts such as social emotions like pride, envy or empathy.

3.7 Conclusion

To conclude, this study represents a significant advancement in analysing the coherence of personal narratives of autistic children and their TD peers, particularly when recounting experiences with positive and negative emotional polarity. The findings revealed that autistic children scored almost comparably to their TD peers when sharing negative experiences, or sometimes even significantly higher, while distinct differences emerged when sharing positive experiences. This study provides a comprehensive examination of coherence for both global

ratings of coherence and local indicators of global coherence, demonstrating that emotional valence can affect the coherence of personal narratives.

A key finding from the thematic indicators subtype analysis revealed the consistent absence of "understanding" and "opinion" markers in the personal narratives (both positive and negative) of autistic children, unlike their TD peers. These markers, coded using the list from Habermas & de Silveria (2008), are classified within the "complex cognitive processes" subtype under "local indicators of thematic global coherence". This suggests that autistic children produced more factual but less interpretive self-narratives. Consequently, speech pathology interventions should consider emotional valence when targeting narrative coherence, and practitioners working with autistic children should prioritize supporting high-functioning autistic children to share coherent personal experiences that are of emotional and personal significance.

References

- Adler, J. M. (2012). Living into the story: agency and coherence in a longitudinal study of narrative identity development and mental health over the course of psychotherapy. *Journal of personality and social psychology*, 102(2), 367.
- Agresti, A. (2015). *Foundations of linear and generalized linear models*. John Wiley & Sons.
- Allé, M. C., Schneider, P., Rigoulot, L., Gandolphe, M. C., Danion, J. M., Coutelle, R., & Bena, F. (2025). Narrative identity differences in autism. *Scientific Reports*, 15(1), 1-10.
- Almeida, T. S., Yang, F., Zhang, H., & Lamb, M. E. (2024). The Narrative Coherence of Autistic Children's Accounts of an Experienced Event in Response to Different Interviewer Prompts: A Longitudinal Study. *Journal of Autism and Developmental Disorders*, 1-16.
- Baerger, D. R., & McAdams, D. P. (1999). Life story coherence and its relation to psychological well-being. *Narrative inquiry*, 9(1), 69-96.
- Baixauli, I., Colomer, C., Roselló, B., & Miranda, A. (2016). Narratives of children with high-functioning autism spectrum disorder: A meta-analysis. *Research in Developmental Disabilities*, 59, 234-254.
- Bestgen, Y. (1994). Can emotional valence in stories be determined from words?. *Cognition & Emotion*, 8(1), 21-36.
- Bliss, L. S., & Pierre, K. S. (1997). Personal narrative structures of children with specific-language impairment. *Journal of Children's Communication Development*, 18(2), 11-18.
- Bliss, L. S., McCabe, A., & Miranda, A. E. (1998). Narrative assessment profile: Discourse analysis for school-age children. *Journal of communication disorders*, 31(4), 347-363.
- Bohanek, J. G., & Fivush, R. (2010). Personal narratives, well-being, and gender in adolescence. *Cognitive Development*, 25(4), 368-379.
- Brown, B. T. (2007). The content and structure of autobiographical memories in children with and without Asperger Syndrome.
- Bylemans, T., Heleven, E., Baetens, K., Deroost, N., Baeken, C., & Van Overwalle, F. (2023). Mentalizing and narrative coherence in autistic adults: Cerebellar sequencing and prediction. *Neuroscience & Biobehavioral Reviews*, 146, 105045.
- Cameron, A. C., & Trivedi, P. K. (2013). *Regression analysis of count data* (No. 53). Cambridge university press.
- Carlsson, E., Åsberg Johnels, J., Gillberg, C., & Miniscalco, C. (2020). Narrative skills in primary school children with autism in relation to language and nonverbal temporal sequencing. *Journal of Psycholinguistic Research*, 49, 475-489.
- Chadda, R. K., & Deb, K. S. (2013). Indian family systems, collectivistic society and psychotherapy. *Indian journal of psychiatry*, 55(Suppl 2), S299-S309.
- Chang, H. C. (2001). Harmony as performance: The turbulence under Chinese interpersonal communication. *Discourse studies*, 3(2), 155-179.

- Christensen, R. H. B. (2015). Analysis of ordinal data with cumulative link models—estimation with the R-package ordinal. *R-package version*, 28, 406.
- Cooper, K., Russell, A., Calley, S., Chen, H., Kramer, J., & Verplanken, B. (2022). Cognitive processes in autism: Repetitive thinking in autistic versus non-autistic adults. *Autism*, 26(4), 849-858.
- Cox, K. S., & McAdams, D. P. (2019). Mean level differences in the vividness, meaning, and coherence of life story high and low points: How valenced life stories do and do not differ. *Identity*, 19(2), 128-143.
- Coxe, S., West, S. G., & Aiken, L. S. (2009). The analysis of count data: A gentle introduction to Poisson regression and its alternatives. *Journal of personality assessment*, 91(2), 121-136.
- Coxe, S., West, S. G., & Aiken, L. S. (2013). Generalized linear models. *The Oxford handbook of quantitative methods*, 2, 26-51.
- Cresswell, L., & Cage, E. (2019). ‘Who am I?’: an exploratory study of the relationships between identity, acculturation and mental health in autistic adolescents. *Journal of Autism and Developmental Disorders*, 49(7), 2901-2912.
- Davidson, A. J., & Welliver, M. E. (2021). Internal state language and resolution strategies in preschoolers’ narratives about sad experiences. *Early Child Development and Care*, 191(6), 876-890.
- Dean, M., Adams, G. F., & Kasari, C. (2013). How narrative difficulties build peer rejection: A discourse analysis of a girl with autism and her female peers. *Discourse Studies*, 15(2), 147-166.
- Ebesutani, C., Okamura, K., Higa-McMillan, C., & Chorpita, B. F. (2011). A psychometric analysis of the Positive and Negative Affect Schedule for Children–Parent Version in a school sample. *Psychological assessment*, 23(2), 406.
- Fasulo, A. (2019). A different conversation: Psychological research and the problem of self in autism. *Integrative Psychological and Behavioral Science*, 53(4), 611-631.
- Favot, K., Carter, M., & Stephenson, J. (2018). The effects of an oral narrative intervention on the fictional narrative retells of children with ASD and severe language impairment: A pilot study. *Journal of Developmental and Physical Disabilities*, 30, 615-637.
- Ferretti, F., Adornetti, I., Chiera, A., Nicchiarelli, S., Valeri, G., Magni, R., ... & Marini, A. (2018). Time and narrative: an investigation of storytelling abilities in children with autism spectrum disorder. *Frontiers in psychology*, 9, 944.
- Fivush, R. (2008). Remembering and reminiscing: How individual lives are constructed in family narratives. *Memory studies*, 1(1), 49-58.
- Fivush, R. (2021). The Development of an Emotional Self-concept through Narrative Reminiscing. *Emotion Researcher*, 30-36.
- Fivush, R., Berlin, L., McDermott Sales, J., Mennuti-Washburn, J., & Cassidy, J. (2003). Functions of parent-child reminiscing about emotionally negative events. *Memory*, 11(2), 179-192.

- Fivush, R., Bohanek, J. G., & Duke, M. (2010). The intergenerational self: Subjective perspective and family history. In *Self continuity* (pp. 131-143). Psychology Press.
- Fivush, R., Habermas, T., & Reese, E. (2019). Retelling lives: Narrative style and stability of highly emotional events over time. *Qualitative Psychology*, 6(2), 156.
- Frattaroli, J. (2006). Experimental disclosure and its moderators: a meta-analysis. *Psychological bulletin*, 132(6), 823.
- Frith, C., & Frith, U. (2005). Theory of mind. *Current biology*, 15(17), R644-R645.
- Gabaj, M., Kuvač Kraljević, J., & Westerveld, M. F. (2025). Linguistic organisation and coherence in personal narratives of 10-year-old children with developmental language disorder. *First Language*, 45(2), 128-151.
- Gaigg, S. B., & Bowler, D. M. (2008). Illusory memories of emotionally charged words in autism spectrum disorder: Further evidence for atypical emotion processing outside the social domain. *Journal of Autism and Developmental Disorders*, 39(7), 1031-1038.
- Gillam, S. L., Hartzheim, D., Studenka, B., Simonsmeier, V., & Gillam, R. (2015). Narrative intervention for children with autism spectrum disorder (ASD). *Journal of Speech, Language, and Hearing Research*, 58(3), 920-933.
- Goddard, L., O'Dowda, H., & Pring, L. (2017). Knowing me, knowing you: Self defining memories in adolescents with and without an autism spectrum disorder. *Research in Autism Spectrum Disorders*, 37, 31-40.
- Goffredi, R., & Sheldon, K. M. (2024). The autobiographical critic within: Perceiving oneself as a major character in one's life story predicts well-being. *Journal of Research in Personality*, 111, 104510.
- Goldman, S. (2008). Brief report: Narratives of personal events in children with autism and developmental language disorders: Unshared memories. *Journal of Autism and developmental disorders*, 38, 1982-1988.
- Gollan, T. H., Weissberger, G. H., Runnqvist, E., Montoya, R. I., & Cera, C. M. (2012). Self-ratings of spoken language dominance: A Multilingual Naming Test (MINT) and preliminary norms for young and aging Spanish-English bilinguals. *Bilingualism: language and cognition*, 15(3), 594-615.
- Habermas, T., & de Silveira, C. (2008). The development of global coherence in life narratives across adolescence: temporal, causal, and thematic aspects. *Developmental psychology*, 44(3), 707.
- Habermas, T., Ehler-Lerche, S., & De Silveira, C. (2009). The development of the temporal macrostructure of life narratives across adolescence: Beginnings, linear narrative form, and endings. *Journal of personality*, 77(2), 527-560.
- Hallford, D. J., Ricarte, J. J., & Hermans, D. (2021). Perceived autobiographical coherence predicts depressive symptoms over time through positive self-concept. *Frontiers in psychology*, 12, 625429.

- Hart, B., Risley, T. R., & Kirby, J. R. (1997). Meaningful differences in the everyday experience of young American children. *Canadian Journal of Education*, 22(3), 323.
- Harvey, A., Spicer-Cain, H., Botting, N., Ryan, G., & Henry, L. (2023). Assessing ‘coherence’ in the spoken narrative accounts of autistic people: A systematic scoping review. *Research in Autism Spectrum Disorders*, 102, 102108.
- Heilmann, J., Miller, J. F., Nockerts, A., & Dunaway, C. (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children.
- Henry, L. A., Crane, L., Fesser, E., Harvey, A., Palmer, L., & Wilcock, R. (2020). The narrative coherence of witness transcripts in children on the autism spectrum. *Research in Developmental disabilities*, 96, 103518.
- Herman, D. (2008). Narrative theory and the intentional stance. *Partial Answers: Journal of Literature and the History of Ideas*, 6(2), 233-260.
- Higgins, C., & Sandhu, P. (2014). Researching identity through narrative approaches. In *The Routledge handbook of educational linguistics* (pp. 50-62). Routledge.
- Hilbe, J. M. (2014). *Modeling count data*. Cambridge University Press.
- Hill, E. L., & Frith, U. (2003). Understanding autism: insights from mind and brain. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 358(1430), 281-289.
- Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online readings in psychology and culture*, 2(1), 8.
- Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression*. John Wiley & Sons.
- Huang, A. X., Hughes, T. L., Sutton, L. R., Lawrence, M., Chen, X., Ji, Z., & Zeleke, W. (2017). Understanding the self in individuals with autism spectrum disorders (ASD): A review of literature. *Frontiers in psychology*, 8, 1422.
- Hudson, J. A., Gebelt, J., Haviland, J., & Bentivegna, C. (1992). Emotion and narrative structure in young children's personal accounts. *Journal of Narrative and Life History*, 2(2), 129-150.
- ISAA. Report on assessment tool for autism: Indian Scale for Assessment of Autism. New Delhi: Ministry of Social Justice & Empowerment: Government of India; 2009
- Ivanova, I., Salmon, D. P., & Gollan, T. H. (2013). The multilingual naming test in Alzheimer's disease: clues to the origin of naming impairments. *Journal of the International neuropsychological Society*, 19(3), 272-283.
- Justice, L. M. (2006). Evidence-based practice, response to intervention, and the prevention of reading difficulties.
- Kathuria, T., & Friedlmeier, W. (2023). Emotion socialization in the Indian cultural context. *Online Readings in Psychology and Culture*, 6(1), 10.

- Keenan, E. G., Gotham, K., & Lerner, M. D. (2018). Hooked on a feeling: Repetitive cognition and internalizing symptomatology in relation to autism spectrum symptomatology. *Autism*, 22(7), 814-824.
- Kerns, C. M., Newschaffer, C. J., & Berkowitz, S. J. (2015). Traumatic childhood events and autism spectrum disorder. *Journal of autism and developmental disorders*, 45, 3475-3486.
- Kuvač Kraljević, J., Matić Škorić, A., & Gabaj, M. (2023). Personal narratives of school-age children: A cross-sectional developmental study. *Folia phoniatrica et logopaedica*, 75(6), 412-430.
- Labov, W. (1972). *Language in the inner city*. Philadelphia: University of Pennsylvania Press.
- Labov, W. & Waletzky, J. (1997) Narrative Analysis: Oral Version of Personal Experience, in: *Journal of Narrative and Life History*, 7 (1-4), (New Jersey: Lawrence Erlbaum Associates), 3-38.
- Lee, M., Martin, G. E., Hogan, A., Hano, D., Gordon, P. C., & Losh, M. (2018). What's the story? A computational analysis of narrative competence in autism. *Autism*, 22(3), 335-344.
- Lenth R (2023). emmeans: Estimated Marginal Means, aka Least-Squares Means. R package version 1.8.4-1, <<https://CRAN.R-project.org/package=emmeans>
- Losh, M., & Capps, L. (2003). Narrative ability in high-functioning children with autism or Asperger's syndrome. *Journal of autism and developmental disorders*, 33, 239-251.
- Lucariello, J., Le Donne, M., Durand, T., & Yarnell, L. (2006). Social and intrapersonal theories of mind: "I interact therefore I am" In A. Antonietti, O. Sempio-Liverta, & A. Marchetti (Eds.), *Theory of mind and language in developmental contexts* (pp. 149–171). Springer Science + Business Media. https://doi.org/10.1007/0-387-24997-4_8
- Lugnegård, T., Hallerbäck, M. U., & Gillberg, C. (2011). Psychiatric comorbidity in young adults with a clinical diagnosis of Asperger syndrome. *Research in developmental disabilities*, 32(5), 1910-1917.
- Lysaker, P. H., & Lysaker, J. T. (2002). Narrative structure in psychosis: Schizophrenia and disruptions in the dialogical self. *Theory & Psychology*, 12(2), 207-220.
- Marini, A., Ozbič, M., Magni, R., & Valeri, G. (2020). Toward a definition of the linguistic profile of children with autism spectrum disorder. *Frontiers in psychology*, 11, 808.
- Mazefsky, C. A., Collier, A., Golt, J., & Siegle, G. J. (2020). Neural features of sustained emotional information processing in autism spectrum disorder. *Autism*, 24(4), 941-953. <https://doi.org/10.1177/1362361320903137>
- Mazurek, M. O. (2014). Loneliness, friendship, and well-being in adults with autism spectrum disorders. *Autism*, 18(3), 223-232.
- McCullagh, P. (1980). Regression models for ordinal data. *Journal of the Royal Statistical Society: Series B (Methodological)*, 42(2), 109-127.
- Miller, J. G. (1984). Culture and the development of everyday social explanation. *Journal of personality and social psychology*, 46(5), 961.

- Miniscalco, C., Hagberg, B., Kadesjö, B., Westerlund, M., & Gillberg, C. (2007). Narrative skills, cognitive profiles and neuropsychiatric disorders in 7–8-year-old children with late developing language. *International journal of language & communication disorders*, 42(6), 665-681.
- Miranda, A. E., McCabe, A., & Bliss, L. S. (1998). Jumping around and leaving things out: A profile of the narrative abilities of children with specific language impairment. *Applied Psycholinguistics*, 19(4), 647-667.
- Mitchell, C., Reese, E., Salmon, K., & Jose, P. (2020). Narrative coherence, psychopathology, and wellbeing: Concurrent and longitudinal findings in a mid-adolescent sample. *Journal of Adolescence*, 79, 16-25.
- Ng-Cordell, E., Rai, A., Peracha, H., Garfield, T., Lankenau, S. E., Robins, D. L., ... & Kerns, C. M. (2022). A qualitative study of self and caregiver perspectives on how autistic individuals cope with trauma. *Frontiers in Psychiatry*, 13, 825008.
- Nicolopoulou, A., & Richner, E. S. (2007). From actors to agents to persons: The development of character representation in young children's narratives. *Child development*, 78(2), 412-429.
- Patel, S., Day, T. N., Jones, N., & Mazefsky, C. A. (2017). Association between anger rumination and autism symptom severity, depression symptoms, aggression, and general dysregulation in adolescents with autism spectrum disorder. *Autism*, 21(2), 181-189.
- Pennebaker, J. W., & Chung, C. K. (2007). Expressive writing, emotional upheavals, and health. *Foundations of health psychology*, 263-284.
- Peterson, C., & Biggs, M. (2001). "I was really, really, really mad!" Children's use of evaluative devices in narratives about emotional events. *Sex Roles*, 45, 801-825.
- Peterson, C., & McCabe, A. (1983). *Developmental psycholinguistics: Three ways of looking at a child's narrative*. Springer Science & Business Media.
- Raffard, S., D'Argembeau, A., Lardi, C., Bayard, S., Boulenger, J. P., & Van der Linden, M. (2010). Narrative identity in schizophrenia. *Consciousness and cognition*, 19(1), 328-340.
- Raven, J. (2003). Raven progressive matrices. In *Handbook of nonverbal assessment* (pp. 223-237). Boston, MA: Springer US.
- Reese, E., Fivush, R., Merrill, N., Wang, Q., & McAnally, H. (2017). Adolescents' intergenerational narratives across cultures. *Developmental Psychology*, 53(6), 1142.
- Reese, E., Haden, C. A., Baker-Ward, L., Bauer, P., Fivush, R., & Ornstein, P. A. (2011). Coherence of personal narratives across the lifespan: A multidimensional model and coding method. *Journal of cognition and development*, 12(4), 424-462.
- Singelis, T. M., & Brown, W. J. (1995). Culture, self, and collectivist communication: Linking culture to individual behavior. *Human communication research*, 21(3), 354-389.
- Thümmeler, R., Engel, E. M., & Bartz, J. (2022). Strengthening emotional development and emotion regulation in childhood—As a key task in early childhood education. *International journal of environmental research and public health*, 19(7), 3978.

- Tompkins, V., & Farrar, M. J. (2011). Mothers' autobiographical memory and book narratives with children with specific language impairment. *Journal of communication disorders*, 44(1), 1-22.
- Vanaken, L., Bijttebier, P., Fivush, R., & Hermans, D. (2021). Narrative coherence predicts emotional well-being during the COVID-19 pandemic: A two-year longitudinal study. *Cognition and Emotion*, 36(1), 70-81.
- Vanderveren, E., Bijttebier, P., & Hermans, D. (2019). Autobiographical memory coherence and specificity: Examining their reciprocal relation and their associations with internalizing symptoms and rumination. *Behaviour Research and Therapy*, 116, 30-35.
- Wang, Q. (2001). "Did you have fun?": American and Chinese mother-child conversations about shared emotional experiences. *Cognitive Development*, 16(2), 693-715.
- Wang, Y., & Stokhof, M. (2022). A relational perspective on collective agency. *Philosophies*, 7(3), 63.
- Westby, C. (2021a). Developing autobiographical reasoning/self-identity. *Word of Mouth*, 32(3), 13-16.
- Westby, C. (2021b). Building Agency Through Story Telling. *Word of Mouth*, 33(1), 5-6.
- Westby, C. E., Chen, K. M., Lee, J. P., & Wong, A. M. Y. (2023). Topic and content of personal narratives of children from three East Asian cultures and three English-speaking cultures: a collaborative qualitative analysis. *Folia Phoniatrica Et Logopaedica*, 75(6), 431-446.
- Westby, C., & Culatta, B. (2016). Telling tales: Personal event narratives and life stories. *Language, Speech, and Hearing Services in Schools*, 47(4), 260-282.
- Westby, C., & Robinson, L. (2014). A developmental perspective for promoting theory of mind. *Topics in language disorders*, 34(4), 362-382.
- Westerveld, M. F., Lyons, R., Nelson, N. W., Chen, K. M., Claessen, M., Ferman, S., ... & Global TALES Consortium. (2022). Global TALES feasibility study: personal narratives in 10-year-old children around the world. *PLoS One*, 17(8), e0273114.
- Williams, S. E., Ford, J. H., & Kensinger, E. A. (2022). The power of negative and positive episodic memories. *Cognitive, affective & behavioral neuroscience*, 22(5), 869-903. <https://doi.org/10.3758/s13415-022-01013-z>
- Williams, Z. J., McKenney, E. E., & Gotham, K. O. (2021). Investigating the structure of trait rumination in autistic adults: A network analysis. *Autism*, 25(7), 2048-2063.
- Yang, Z. (2024). How East Asian culture influences the personality traits of its residents: An exploration of cultural characteristics and the emphasis on interdependence. *Communications in Humanities Research*, 31(1), 44-50.
- Zalla, T., Labruyère, N., & Georgieff, N. (2013). Perceiving goals and actions in individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 43, 2353-2365.

Zilberstein, S., Ayala-Hurtado, E., Sanchez, M., & Robey, D. (2024). The Self in Action: Narrating Agentic Moments. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 10(5), 118-140.

Chapter 4- Examining the Oral Inferential Comprehension Skills of Hindi-speaking Children with and without Autism

4.1 Introduction

Effective discourse comprehension in oral communication relies on two skills: literal and inferential comprehension (Dawes et al., 2019). Literal comprehension involves understanding information that is explicitly stated, while inferential comprehension requires making connections between pieces of information to gain a deeper understanding. By combining these skills, listeners can gain a more comprehensive understanding of the information presented and accurately interpret the speaker's intended meaning (Cain et al., 2001). Inferential comprehension plays a vital role in everyday communication, as it enables individuals to engage meaningfully with others. Inference making can help listeners fill in gaps in the conversation, identify underlying assumptions, and connect new information to their existing knowledge, ultimately facilitating more effective and meaningful interactions with others (Bishop, 2014; Dawes, 2018).

Beyond daily communication, inferential comprehension is fundamental for children's academic and social development. Academically, it is essential for learning and classroom participation, allowing children to grasp complex ideas, identify conceptual relationships, and connect new knowledge to their existing understanding. Socially, inferential skills are integral to social communication, supporting engagement in peer conversations, interpretation of nonverbal cues, and participation in group activities (Wilson et al., 2024).

Inferencing can be a challenging task, particularly for children with various impairments. Children with language difficulties, reading comprehension difficulties, or social communication disorders may struggle to make inferences due to difficulties in integrating background knowledge,

synthesizing information, or interpreting nonverbal cues (Westby 2019, Oakhill & Yuill, 1996). Specifically, children with DLD, Pragmatic Language Impairment (PLI), or Autism may face significant challenges in inferencing, which can impact their academic progress and social interactions. Additionally, children with hearing loss may miss out on everyday conversations or social cues, making it harder to build the background knowledge needed for inferencing (Deacon et al., 2018). Autistic children, particularly those with social communication differences, may find it difficult to interpret nonverbal cues or understand others' perspectives, which are critical for making accurate guesses about unspoken meanings (Norbury, 2005).

Children with social communication and language disorders often face gaps in inference, affecting both learning and social interactions. In school, they may struggle to grasp lessons that rely on connecting ideas, while in conversations, they may misinterpret jokes or sarcasm (Adams et al., 2001; Wilson et al., 2024). This chapter (Chapter 4) compares the oral inferential comprehension abilities of autistic and TD children, and is innovative in conceptually incorporating the Blank's levels of language abstraction (an approach developed by Marion Blank in 1978 and is still commonly used in the field of speech pathology that analyses language comprehension into four levels of increasing complexity/abstraction) and methodologically proposing/incorporating a refined scoring scheme to analyse the inferential skills of these children's responses to the comprehension questions in the LITMUS-MAIN fictional stories.

4.1.1 Models/Frameworks of Oral Inferential Comprehension

Inferential comprehension develops over time, especially in young children, who gradually improve their ability to make inferences along a continuum of difficulty, progressing from simple to more complex inferencing tasks (Filiatrault-Veilleux et al., 2015). Researchers have proposed different models of inferential comprehension, with two notable models being the "Book Sharing

Model" by Van Kleeck (2008) and the perceptual-language distance scale of comprehension demands by Blank et al., (1978a).

The "Book Sharing Model" proposed by Van Kleeck (2008) identifies three primary types of inferences made by young children during book sharing: *causal, evaluative, and informational*. Causal inferences involve predicting outcomes, linking information within or across texts, and inferring emotions, attitudes, and motivations (Van Kleeck, 2008). Evaluative inferences require making moral or conventional judgments. Informational inferences, on the other hand, involve defining unfamiliar words, elaborating on information using prior knowledge, or providing context about characters, time, and setting (Van Kleeck, 2008; Van Kleeck et al., 2006). These types of inferences play a crucial role in bridging information gaps and enriching comprehension by integrating general knowledge (Cain et al., 2004; Van Kleeck, 2008). Children with poor inferential comprehension skills may struggle to grasp the main idea of a discourse, leading to challenges in language comprehension and overall communicative competence.

Another framework of oral inferential comprehension is the perceptual-language distance scale of comprehension demands proposed by Blank et al., (1978a). This model provides a framework for evaluating children's oral language comprehension based on the concept that language spans a "continuum of perceptual-language distance" and includes four progressive levels:

Level I (Matching Perception to Language): At this foundational stage, children match sounds and sights, responding to immediate demands. They connect what they see directly with highly noticeable elements. Tasks focus on objects in their immediate environment, requiring basic skills like matching, identifying, and naming objects. Assessors ask simple questions that prompt short responses or non-verbal cues like pointing, for example, "What is this".

Level II (Selective Analysis of Perception): Progressing to the next level, in Level II, children are expected to respond to selective aspects of situations. Here, they are expected to control their perceptions and provide responses. For instance, they may need to answer questions about shapes or sizes rather than just naming objects. For example, pointing towards some actions and asking “What are they doing”.

Level III (Reordering Perception for Language): At Level III, a notable shift occurs in the relationship between language and perception. Children are required to adjust their perceptions to meet verbal task requirements. Here, language is applied to perceptions rather than simply matching or identifying.

For example, they might be asked to explain how objects like scissors and knives are similar even though they are not the same, or to explain the emotions, for example, “How does he feel”.

Level IV (Reasoning about Perception): The final stage encourages children to reason based on their perceptions. Critical thinking and analysis become crucial. Children are tasked with understanding relationships between objects and events and explaining the underlying reasons behind these relationships. For example, “What will happen if”.

In terms of the nature of inferential questions, Levels I and II primarily focus on description, while Levels III and IV increasingly involve inferencing. Level III entails inferring feelings or potential statements, while Level IV necessitates reasoning behind these inferences.

Blank’s levels of language abstraction also provide valuable insights into why oral inferential comprehension can be more challenging than factual comprehension for both TD children and those with language and communication difficulties. This approach considers the gap between language comprehension and perception, and how it affects the level of abstraction

required for understanding. Unlike other models, such as Van Kleeck's (2008) book sharing model, Blank's levels of language abstraction provide more comprehensive understanding of the levels involved in oral inferential comprehension. By knowing and examining the perceptual-language distance, one can gain a better understanding of the specific challenges that TD children and children with language and disorders or atypical development face at different levels of comprehension. Figure 4.1 represents the perceptual distance between the four levels of abstraction.

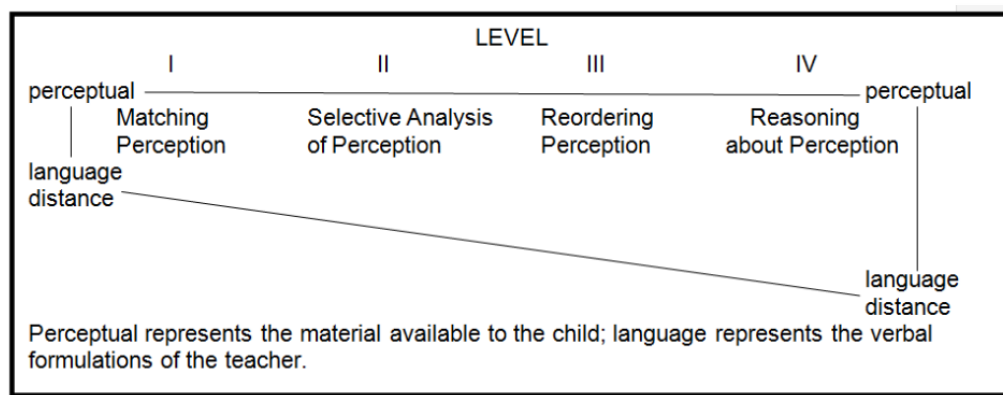


Figure 4.1 The Perceptual-Language Distances Underlying the Scale of Abstraction Blank et al., (1978a, p.17).

The merits of this approach lies in its ability to provide a conceptual understanding of why inferencing is difficult and identify the levels of inferencing that are more challenging, as noted by Norbury & Bishop (2002) and Nuske & Bavin (2011). Blank's levels of language abstraction has practical applications, as it can be used with children of all ages (Westby, 2019; Hay & Fielding-Barnsley, 2012), and is applicable in school settings, where teachers can apply it across all academic fields to support students' inferencing skills (Westby, 2019). It can also serve diagnostic tool to differentiate between TD children and those with language disorders, informing targeted interventions.

4.2 Blank's Levels of Abstraction as a Framework for Understanding Inferencing

Blank's levels of language abstraction are explicitly hierarchical and developmental, mapping the natural progression of children's comprehension skills from concrete (Level I: matching perception) to abstract (Level IV: reasoning beyond perception). This mirrors typical language-cognitive development, making it ideal for identifying developmental delays in children with language disorders (Westby, 2017; Rooha et al., 2023; Wilson et al., 2024). Its hierarchical structure allows for a clear understanding of how children's comprehension skills develop over time, and how they can be supported and targeted through intervention. For example, children who struggle with Level I tasks may require additional support and practice to develop their basic comprehension skills, while children who struggle with Level IV tasks may require more advanced and abstract thinking skills. The use of Blank's levels of language abstraction can help clinicians and educators to accurately identify specific areas of strength and weakness in children's comprehension. This diagnostic capability allows for the development of tailored interventions, informs assessment and treatment strategies, and enables the monitoring of progress over time.

4.3 Inferencing Difficulties for Children with Different Language and Behavioural Disorders

Children with different language and behavioural disorders often face distinct challenges in drawing inferences, though the nature of these difficulties varies across diagnostic profiles. Those with DLD struggle to integrate contextual and linguistic cues, frequently relying on literal interpretations of information even when situational or textual context suggests alternative meanings (Bishop & Adams, 1992; Norbury, 2005).

In children with autism, inferencing challenges are linked to "context blindness" – a reduced ability to use situational or social-emotional context to interpret non-literal language, mental states, or motivations, particularly in social interactions (Vermeulen, 2015; Westby, 2017;

Norbury & Bishop, 2002; Westerveld et al., 2021). For children with Attention Deficit/Hyperactivity Disorder (ADHD), working memory limitations and attentional deficits often lead to fragmented inferential processing, where key details required to form coherent interpretations are missed or inconsistently connected (Lorch et al., 2004). Similarly, children with Language Impairment (LI) and behavioural disorders may demonstrate poor pragmatic inference skills due to overlapping Theory of Mind (ToM) deficits and difficulties integrating social-contextual information, complicating their ability to navigate implied meanings in communication (Botting & Adams, 2005; Benner et al., 2002). These patterns highlight how different neurodevelopmental pathways disrupt inferencing – from basic linguistic integration in DLD to social-cognitive processing in autism and resource allocation challenges in ADHD. The examples from some studies have been stated below:

Research has extensively explored inferential narrative comprehension development and difficulties in preschool children with language impairment (Kendeou et al., 2008; Rapp & van den Broek, 2005; Reuterskiöld Wagner et al., 1999) as well as school-age children with identified language difficulties (Adams et al., 2009; Botting & Adams, 2005; Bowyer-Crane & Snowling, 2005; Dawes et al., 2018; Dodwell & Bavin, 2008; Ryder et al., 2008). Studies show that children with language disorders have difficulties in completing inferential comprehension tasks. For example, Dodwell & Bavin (2008) found significant differences between 6-year-old children with DLD and their age-matched peers on inferential questions of the comprehension task from the Expressive Receptive Recall of Narrative Instrument (Bishop, 2004), but not on the factual questions, indicating that language disorder puts children at particular risk of inferential comprehension difficulties. Dawes et al., (2018) identified that language and cognitive skills, such as narrative macrostructure, vocabulary, syntax, literal comprehension, vocabulary knowledge,

and ToM, contribute to narrative inferential comprehension in children with DLD. The importance of both oral language proficiency and cognitive skills for answering inferential comprehension questions has been highlighted, which may help explain why children on the autism spectrum, who show delays and deviance in ToM development (Peterson et al., 2005) and language delays, demonstrate inferential narrative comprehension difficulties, regardless of their oral language proficiency at word- and sentence level (Norbury & Bishop, 2003). These studies highlight how different neurodevelopmental pathways disrupt inferencing – from basic linguistic integration in DLD to social-cognitive processing in autism and resource allocation challenges in ADHD. In light of these findings, the present study seeks to further explore the nature of inferential comprehension challenges in children with social-communication difficulties such as children with autism.

4.4 Present Study

To further understand the inferential abilities of children with difficulties in social-communication, the overarching aim of the present study is to understand how inferential abilities of children can be better understood through the lens of Blank's levels of language abstraction. To achieve this, the study involves a group of autistic children, representing the atypical group, as an example of how these children's inferential abilities can be viewed and compared to their TD peers in the light of Blank's approach. Specifically, the study investigates inferencing difficulties in autistic children with low support needs and their TD peers. The Multilingual Assessment Instrument for Narratives (MAIN; Gagarina et al., 2019) comprehension questions have been used and examined through the lens of Blank's levels of language abstraction, to identify which levels or questions are more challenging for autistic children and their TD peers. Building on the understanding of Blank's levels and its application to children with social-communication

difficulties, the present study aims to investigate inferential comprehension in children with autism, a population that has been shown to struggle with inferencing (Westerveld et al., 2021). Difficulty in oral inferential comprehension is one of the outcomes of autism and autistic children struggle with inferencing particularly related to emotional understanding (Bodner et al., 2016). Given below are some studies that compare the inferencing abilities of autistic children and their TD peers.

4.5 Inferential Comprehension in Children with Autism

Building upon the general understanding of inferencing difficulties in language and behavioural disorders, this section reviews specific studies comparing the inferencing abilities of autistic children and their TD peers.

One such study conducted by Westerveld et al., (2021) explored the narrative comprehension scores of 14 autistic children with low support needs, 21 autistic children with high support needs, and 32 TD children. The age of the participants was between 5;7 to 6;11 years. The children were presented with a story "Ana gets Lost" and were a series of questions, including both factual and inferential questions. Notably, three of the inferential questions focused on the participants' abilities to make inferences about internal responses. The study employed a quality of response continuum to score the participants' answers, considering the completeness and evidence-based nature of their responses. A high-quality response was considered ideal, involving evidence-based and complete responses related to the story script. Near-to-higher level responses were potential justifications but were incomplete in some way. At the lowest end of the continuum were responses that were completely off-topic or inadequate, and at the low contingency end, there were responses related to the story script but not to the asked question. The findings of the study revealed significant group differences between the TD group and the autistic group for both factual

and inferential questions. The authors of the study also highlighted the importance of answers/inferences that provide a claim based on evidence and reason about the relationship between the claim and the evidence present.

Nuske & Bavin (2011) conducted another study that examined the inferential comprehension skills of 14 autistic children with low-support needs compared to their 14 TD peers. The children were between 4-7 years of age. They were read six short stories of five to seven sentences each and they were asked three different categories of inferential questions from these stories, one factual, one script and one propositional. The factual question asked children a piece of information given in the story and was used to make sure they had listened to the story. The researchers aimed to analyse how autistic children's responses differed concerning aligning with the main idea or the script of the story compared to TD peers. The findings indicated that autistic children's responses did not consistently align with the main idea or the script of the story in the same manner as those of the TD peers. This finding also suggested that autistic children encounter challenges in making relevant inferences in all types of inferential questions.

Norbury & Bishop (2002) investigated narrative comprehension in 10 autistic children with low support needs and their 18 TD peers aged between 6-10 years. The study included three categories of questions: literal comprehension questions, text-connecting questions, and questions related to gap-filling inferences. The researchers aimed to examine the differences between the two groups in terms of their ability to comprehend narratives and make inferences. The findings revealed significant group differences between the two groups, particularly regarding inferencing-related questions. Autistic children often made inferences that were not consistently relevant to the story context, indicating challenges in connecting evidence to claims.

These above existing studies highlight the difficulties autistic children with low support needs face in making relevant inferences during narrative comprehension. The current research status also reveals that in the above studies there are limited number of inferential questions, typically ranging from 0 to 5 questions in number. Moreover, the nature of inferential questions featured in these studies often focus on characters' internal states, such as "Why did Ana get bored?" or "Why was Susie happy when they left the store?" as used in Westerveld et al., (2021). Across all the above studies, a consistent finding emerged: i.e., autistic children, even those with low support needs, encountered significant challenges when asked about inferring characters' internal states. Studies have highlighted that this might be because of one of the outcomes of autism, i.e., difficulty in understanding the underlying reasons behind characters' emotional responses. It is also notable that, to date, only one study (Westerveld et al., 2021) has concentrated on refining the scoring scale instead of following the binary scoring approach to assess the comprehension skills of these children.

The existing research suggests that autistic children's inferential comprehension abilities can be understood in relation to Blank's levels of language abstraction, with varying degrees of success across different levels of abstraction. For instance, studies have shown that autistic children tend to struggle with inferential tasks that require understanding characters' internal states and emotional responses, such as those examined by Westerveld et al. (2021) and Nuske and Bavin (2011). These tasks, which may correspond to Blank Level III, require the ability to think abstractly and make connections between different pieces of information. While the literature does not provide a clear picture of autistic children's performance on tasks corresponding to Blank's Level IV, it is evident that they face challenges with tasks that require higher levels of abstraction, such as making inferences about characters' motivations and intentions. In contrast, tasks that require

more concrete thinking, such as identifying literal information and making factual inferences, may be more accessible for autistic children, suggesting that they may perform relatively well on tasks corresponding to Blank Levels I and II. However, further research is needed to fully understand the relationship between Blank's levels of language abstraction and autistic children's inferential comprehension abilities, particularly with regard to the higher levels of abstraction.

4.6 LITMUS MAIN for Assessing Oral Inferential Comprehension

The present study used the Hindi version of the MAIN, a widely used narrative assessment tool that has been translated into 92 languages worldwide (Gagarina et al., 2015, 2019; Madappa et al., 2020, revised unpublished version; Srivastava 2022). MAIN assesses both the production and comprehension of narratives, and its Hindi version was employed in this study to evaluate the narrative comprehension of children. The MAIN assessment consists of four parallel, cross-culturally balanced picture stories (Cat Story, Dog Story, Baby Birds, Baby Goats), each comprising six pictures and three episodes. Each episode follows a Goal-Attempt-Outcome (GAO) sequence, where a character's goal, attempt to attain it, and the outcome are depicted.

The MAIN comprehension assessment features ten inferential questions that evaluate children's understanding of the narrative. Unlike previous studies, these questions not only examine children's understanding of characters' internal states but also assess their grasp of goals, reasoning behind character states, theory of mind abilities, and overall plotline understanding. The ten inferential questions cover multiple aspects of story comprehension, making MAIN a comprehensive tool for assessing narrative understanding.

The MAIN comprehension questions for the "Dog Story" and the "Cat Story" are presented in Appendix 5 and 6. An analysis of these questions reveals that six questions (D2, D3, D5, D6, D7, and D8) probe internal states that either initiate an event or are a reaction to an outcome of an

event. Questions D2 and D5 query the internal states of characters in Episodes 1 and 2 of the MAIN story respectively. Questions D3, D6, and D9 are follow-up questions that ask why a character feels a certain way and are only asked if the child does not answer it in the preceding question. Question D8 queries a character's internal state in Episode 3 of the corresponding MAIN story, using a theory of mind question that tests the child's understanding through a 'what if' scenario not depicted in the picture series. The final question, D10, assesses the child's ability to infer meaning about the overall plotline.

The MAIN protocol involves administering these sets of questions for each story, providing a comprehensive evaluation of children's narrative comprehension skills.

4.6.1 Mapping the Levels of Blank's Language abstraction to MAIN Comprehension Questions

The ten inferential questions in MAIN as discussed before are inferential in nature. Marion Blank's levels of language abstraction also list the nature of questions that can be grouped under different levels, for example which questions can be grouped as Level I, II, III or IV. Level I questions can be like that can be used in all kinds of activities from discussing stories to participating in classroom activities are: What is this? What did you see? What is this called? Show me what you got? etc. Level II can be questions like: What is he or she doing? How are these two different? What is happening? etc. Level III can be questions like: How does he or she feel? What could he or she say? And Level IV can be questions like: What will happen if...? What could you do if...? What will you do if the ball goes? (examples cited from Table 1, Westby 2017).

Table 4.1 below shows the list of questions that can be associated with Blank's levels, the table also enlists the reason to assign a particular level to a MAIN question.

Upon examining the MAIN inferential questions, I categorized them into defined levels according to Blank's levels of language abstraction. All the questions in MAIN, either belong to Level III or Level IV. I found that there were initially five questions that belonged to Level III and six questions that belonged to Level IV. However, the total number of questions did not add up to ten, as one question, D4 from the MAIN protocol, was assigned to both Level III and Level IV. This dual classification of question D4 is justified in Table 4.1, which explains why D4 meets the criteria for both levels.

Due to its unique status, question D4 was considered separately in the analysis, as it falls under both Level III and Level IV. If question D4 is excluded from the overall level III and Level IV question analysis, the distribution of questions becomes more straightforward, with four questions belonging to Level III and five questions belonging to Level IV. This revised distribution provides a clearer understanding of the composition of the MAIN inferential questions according to Blank's levels of language abstraction.

Table 4.1 Assigning Blank's Levels of Language Abstraction to MAIN Questions

Questions	Examples from Dog Story	Answers stated in the story script	Level according to Blank's Levels of Language Abstraction	Reason for assigning Level III/IV
D1	Why does the dog leap forward/jump?	Yes, he leaped forward because he wanted to catch it	Level III	Although a 'why' question but the information is stated in the story so it can be Level 3 as recall is involved
D2	How does the dog feel?	Yes, He hurt himself and was very angry	Level III	Stating how a character might feel+ Recall
D3	Why do you think that the dog is feeling	Not directly, there could be	Level IV	Justifying the prediction

angry/ disappointed/
hurt etc.? possibly two
reasons

D4	Why does the boy jump/ leap upwards?	No	Level IV (The MAIN story does not clearly specify why does the boy jumps or leap forward, so if the child completely relies at the auditory support i.e., listening to the story, then the question is level IV) The question can be considered as Level III question if the child also looks at the picture presented to the child, in which the answer is specified that the child leaps forward to catch the ball.	Justifying the action
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D5	How does the boy feel?	Yes, he was sad and wanted his balloon back	Level III	Stating how a character might feel
D6	Why do you think that the boy is feeling good/ happy etc.?	Yes stated, the boy was happy to have his balloon back	Level III	Justifying the prediction+ Recall
D7	Why does the dog grab the sausages?	No	Level IV *(world knowledge is involved)	Justifying the prediction/Inferencing
D8	Imagine that the boy sees the dog. How does the boy feel?	No	Level IV	Predicting and explaining

D9	Why do you think that the boy feels bad/ angry/ mad etc.?	No	Level IV	Justifying the prediction
D10	Will the boy be friends with the dog? Why?	No	Level IV	Predicting and explaining/Inferencing

4.6.2 MAIN Scoring Scheme

The current scoring scheme of MAIN is based on a binary coding system, where accurate responses are awarded 1 point and inaccurate responses receive 0 point. The system is lenient, allowing for a range of responses to be considered correct. For instance, consider a story about a character named Emma who is shown to be sad because she lost her favorite toy. If a child is asked the question "Why is Emma feeling sad?", the expected answer could be "Because she lost her favorite toy". If a child responds with "She's sad because she likes that toy a lot", this answer would also be considered correct and would receive a score of 1. The leniency of the scoring system means that children's responses are assessed in a way that acknowledges their understanding of the story, even if their answers are not always precise or detailed.

In the MAIN protocol, for the question, "Why does the boy hold the fishing rod in the water?", the expected answer is "Because the boy wants to get back his ball". This answer or anything similar would score '1' mark. However, if a child responds with "It's the boy's favourite ball", this answer may not fully address the question but could still be awarded a score of 1. This leniency in the scoring system allows for a more flexible assessment of a child's inferential comprehension abilities, acknowledging that children may express their understanding in different ways.

These examples highlight the need for a more refined scoring system that can assess the child's responses better. A more refined scoring approach would allow for the evaluation of responses that do not exactly match the expected answers but still demonstrate some understanding of the narrative. This approach would also enable the assessment of pragmatic aspects of language, such as the child's ability to use context and inference to generate responses.

Bohnacker & Lindgren (2020) also agrees that a more refined scoring approach is necessary and suggests that a system that evaluates both the correctness and pragmatics of responses would be more effective.

This study aimed to assess the MAIN questions using a refined scoring scheme, using the Pre-Language Assessment Instrument, Second Edition (PLAI-2) developed by Blank et al., (2007). The PLAI-2 scoring scheme is designed to identify children who are significantly below their peers in preschool discourse, tracing their language development while also providing an assessment of their strengths and weaknesses in responding to different levels of language abstraction. This aligns with the primary objective of this study, which seeks to investigate the language abilities of preschool children with and without autism. A detailed explanation of the refined scoring scale is provided in the following section, which outlines the specific criteria and procedures used to evaluate the children's responses.

4.6.3 Refined Scoring Scheme according to Pre-Language Assessment Instrument-2 (PLAI-2)

Following Blank's guidelines, the adequacy of expressive responses can be rated at a continuum with four levels. The highest level (3) is when “fully adequate response”, i.e., when the response meets the demands of the task, directly answers the question, and is contextually grounded to the given context. The second highest level (2) is “an acceptable response”, when the response is poorly formulated but still correct, often including extraneous information that is not directly related to the context. In contrast, the lower-level response quality (1) is “an ambiguous response” which is vague, making it unclear whether the answer is correct or incorrect. At the lowest level (0) of the continuum is the inadequate response, which is incomplete or fails to meet the demands of the task, including instances where no response is provided. Table 4.2 below depicts the four-point response scale in PLAI-2.

Table 4.2 Four-point Response Scale in the PLAI-2

Scores	Responses	Descriptors
3	Fully Adequate	Responses fully meet the demands of the task
2	Acceptable	Response is correct but poorly formulated, imprecise or includes extraneous information
1	Ambiguous	Response is formulated in a way that makes it unclear whether it is correct or incorrect
0	Inadequate	Response does not meet the demands of the task, or no response is offered.

The following examples serve to illustrate how different responses align with the continuum of adequacy.

Inadequate (Score 0): This level is exemplified by the response "The grass is green." In this case, the answer is completely unrelated to the question, "Why does the boy hold the fishing rod in the water?" This response fails to meet the demands of the task, as it does not address the question at all, demonstrating a lack of understanding or engagement with the prompt.

Ambiguous (Score 1): An example of an ambiguous response is "The boy is trying to achieve something." While this statement hints at an intention, it is vague and does not clearly connect to the specific action of holding the fishing rod in the water. The lack of specificity leaves it uncertain whether the response is correct or incorrect, as it does not directly answer the question.

Acceptable (Score 2): The response "It is the boy's favourite ball" illustrates an acceptable level of response. Although this answer is correct in that it relates to the boy's motivation for using the fishing rod, it is poorly formulated and includes extraneous information that does not directly address the question. The response could be improved by providing a clearer connection to the action of retrieving the ball from the water.

Fully Adequate (Score 3): A fully adequate response is exemplified by "The boy wants his ball back." This answer directly addresses the question with clarity and specificity, demonstrating a complete understanding of the context. It effectively explains why the boy is holding the fishing rod in the water, linking the action to the goal of retrieving the ball.

So in this study, the responses to the question were scored in the following way, for example, for the question, "Will the boy be friends with the dog? Why?" can be categorized into four types. An inadequate response is one that is unrelated to the story, such as "The sun is shining brightly today" or simply "No" without explanation. In contrast, an ambiguous response is related to the story but lacks clear reasoning, like "they can be either friends or enemy". An acceptable response is logically related to the story details and correct, but may be poorly formulated or include extraneous information, such as "No, they will not be friends because the dog was bad". A fully adequate response, on the other hand, shows a clear understanding of the story and provides a logical explanation, like "No, they will not be friends

because the dog took the boy's food". These categories help to assess the child's ability to interpret the story and provide a coherent answer.

The merits of the PLAI-2 system are that this four-point continuum, which ranges from fully adequate to inadequate, effectively captures the gradations in response quality that binary scoring, such as correct or incorrect, often misses. This is particularly crucial for children with language disorders, as they may produce responses that do not derive evidence from the text. Furthermore, the scale's granularity allows for the tracking of subtle improvements in response quality, such as when a child moves from providing "inadequate" to "ambiguous" responses after an intervention, enabling more precise progress monitoring and informed intervention planning.

4.7 Research Questions

The objective of this study was to understand whether a specific question level (Level III or Level IV) is a significant predictor of scores. Specifically, the study sought to examine whether level IV questions are more difficult than level III questions for children of both groups. With this objective the study asks the following questions:

- Is there a significant main effect of question level on the difficulty of inferential questions, such that level IV questions are more challenging than level III questions in light of the Blank's levels of language abstraction?
- Is there a significant main effect of clinical status on the difficulty of inferential questions, such that children with autism score lower than typically developing children?
- Is there a significant interaction between question level and clinical status such that the difficulty of level IV questions is more pronounced in children with autism compared to the TD children?

4.7.1 Hypotheses

For the first research question it was predicted that level IV questions will be more difficult than level III questions. This prediction is grounded in previous research, which suggests that inferential comprehension questions are particularly demanding for young children specially for children between 6–9-year-old (Filiatrault-Veilleux et al., 2016). This current study also involves specifically children between 6-9 years of age and the level IV questions in this study represent the highest level of difficulty according to Blank's level of language abstraction. Therefore, it was expected that the level IV questions would pose a greater challenge to children's inferential comprehension skills compared to the level III questions.

For the second research question, it was hypothesized that autistic children would experience greater difficulty with inferential questions compared to TD children, as reflected in their scores on these questions, regardless of the Level III or Level IV questions. This prediction was again based on the findings of previous studies, which have consistently shown that autistic children struggle with inferential comprehension, particularly when compared to their performance on literal comprehension questions (Westerveld et al., 2017). The existing literature suggests that autistic children tend to have difficulty making inferences, drawing conclusions, and understanding implicit meanings, which are all critical skills required for successful inferential comprehension. Therefore, it was expected that autistic children would perform more poorly on inferential questions compared to TD children, and that this difference would be evident across both Level III and Level IV questions.

For the third research question, it was hypothesized that there will be significant interaction between question level and clinical status, such that difficulty with level IV questions is more pronounced in children with autism compared to TD children. This interaction is expected to arise because autistic children may already struggle with level III

questions, which require inferential thinking and understanding of implicit information. The increased complexity of level IV questions may exacerbate these existing difficulties, leading to a greater difference in performance between autistic and TD children. As a result, the gap in performance between the two groups is predicted to widen at level IV, with autistic children experiencing greater challenges in responding accurately to these more complex questions compared to their TD peers.

For question D4 in MAIN, the analysis was performed separately, I only examined whether there were significant group differences in scoring between autistic and TD children. This was because, given the unique characteristics of question D4, which can be answered correctly by relying on either auditory information from the story or visual information from the picture, it can be classified as either Level III or Level IV, depending on the cues used by the child to respond.

4.8 Methods

Thirty Hindi-speaking autistic children with low support needs and their thirty TD peers participated in this study. The autistic children were recruited from a non-governmental organization; the TD children had no developmental concerns and were recruited from a local school. They were classified as “autistic children with low support needs” as they were diagnosed of having mild autism on the Indian Scale for Assessment of Autism (ISAA, 2009). Both groups were matched on age, socioeconomic status and non-verbal IQ. These autistic children also had comparable scores on their morphosyntactic competence and expressive vocabulary. The scores for these measures are stated in Table 4.3.

All children were assessed individually either in school or at a venue that was convenient for the family. The experimenter ensured that the child was assessed in a quiet room. All the sessions were audio-recorded for further analyses.

Table 4.3 Participant Characteristics

Participant Characteristics	Autistic children; n=30 Mean (SD)	TD; n=30 Mean (SD)
Age in Months	88.06 (0.34)	88.67 (0.58)
Range	(72-108)	(72-108)
Score in Multilingual Naming Test (MINT)	54.93 (1.23)	55.40 (2.43)
Score in Sentence Repetition (SRep) Task	89.90 (2.43)	90.5 (2.40)
Score in Raven's Matrix	103 (2.45)	106 (1.98)

4.8.1 Administering MAIN

In this study, the Cat and the Dog story from MAIN, was used in retelling mode. Each child engaged with only one story in retelling mode, and the stories were counterbalanced. First, children listened to the MAIN stories while viewing corresponding pictures on a computer screen. Subsequently, they were told to retell the story while looking at the MAIN pictures. After they retold the story, they were asked the MAIN comprehension questions corresponding to the story. Throughout the questioning, the children could still view all the story pictures.

4.8.1.1 Scoring of MAIN

Although not the primary objective of the research question, I initially employed the MAIN scoring approach to explore potential group differences in responses to each individual

question, as well as the total scores across all ten questions. To pursue this, following the guidelines in the MAIN protocol, responses to the comprehension questions were scored as either 1 (correct) or 0 (incorrect). The responses to these questions were transcribed verbatim. A total of 600 (60 participants * 10 questions) questions were asked, with each child answering 10 questions from either the Cat or Dog story. To ensure accurate coding, I reviewed the participant recordings to verify the initial coding accuracy.

For interrater reliability, the score sheet and recordings were shared with two other Hindi-speaking linguists to confirm the accuracy of the scores for each comprehension question. The other two linguists were provided with the original MAIN scoring sheet and were first trained by the first author on scoring comprehension questions. When they assigned scores to the comprehension questions, of the 600 questions, 96% (576 questions) had matching scores meaning that 96% scoring matched with the scoring of the first author, while 24 questions did not align due to human error. These discrepancies were reviewed in a scheduled zoom meeting, referencing the audio recordings for clarification, leading to corrections in the scoring. Ultimately, a consensus of 100% was achieved in the scoring process. For the data analysis, a binary regression model was fitted as the data was in terms of correct (1) and incorrect (0) responses. Separate models were run with different response variables: Total scores on MAIN comprehension questions and individual scores on the questions: D1, D2, D3, D4, D5, D5, D6, D7, D8, D9 and D10. For each of the models, the scores on the MAIN questions were included as the fixed effect. Participants and Story Items (Cat vs Dog Story) as random effects. I also checked for the interaction of Group (Autistic vs TD). Participants and Story Items were random factors. A top-down model building strategy was adopted by starting with a full model and stepwise removing predictors that did not significantly contribute to the model fit. For significant group differences effect sizes are reported as Cohen's 'd' and interpreted as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) (Cohen, 1988).

The results obtained through the MAIN scoring approach revealed that there were no significant group differences between the total comprehension scores or any of the Level III questions. However, a significant group difference was found for one Level IV question (D10), which is related to the overall plotline of the story. Specifically, the TD group performed significantly better than the autistic group on this question. Furthermore, a significant group difference was also found for the total scores on comprehension questions, with the TD group again outperforming the autistic children. The detailed results obtained after using binary scoring according to the MAIN protocol are presented in Appendix 7.

Given that the MAIN binary scoring scheme was not sensitive enough to capture robust group differences (significant group difference only for question D10 and total comprehension scores with small effect size) in comprehension abilities of TD and autistic, I proceeded to use the second scoring approach based on the PLAI-2, as part of the research objective. This approach aimed to provide a more refined assessment of the children's comprehension skills, particularly in relation to their ability to make inferences and engage with the story's context. By using the scoring system based on the PLAI-2, I sought to uncover more detailed insights into the inferential comprehension abilities of children with and without autism as the four-point continuum allows for a more precise evaluation of response quality, capturing subtle differences that may not be apparent through binary scoring methods.

4.8.1.2 Refined Scoring Approach

As defined in Table 4.2, the responses to comprehension questions were rated on a scale of 0 to 3. The first author transcribed each child's responses and assigned scores ranging from 0 to 3 based on their relevance to the story. These scores were then reviewed by the same two Hindi-speaking linguists who assessed inter-rater reliability earlier for the MAIN binary scoring approach. There was a 90% (540 out of 600 questions) agreement with the remaining

10% disagreements. All the disagreements revolved around the scoring of '1' or '2'. To resolve these discrepancies, discussions were conducted over video calls.

4.8.2 Data Analyses

The data was analysed in R (version 4.2.0; R Core Team, 2022) using the ordinal package (version 2023.12-4, Christensen, 2023) for ordinal regression analysis.

An ordinal regression model was fitted using the CLM to examine the relationship between question levels (Level III vs. Level IV) and clinical status (Autistic vs. TD) on inferential comprehension scores. The score was in terms of 0, 1, 2, and 3, representing the ordinal nature of the scores. Separate models were run to examine the main effects of question level and clinical status, as well as their interaction.

For the main effect of question level, an ordinal regression model was fitted with question level (Level III vs. Level IV) as the predictor variable and inferential comprehension scores as the response variable. The model was run across both autistic and TD groups.

For the main effect of clinical status, an ordinal regression model was fitted with clinical status (Autistic vs. TD) as the predictor variable and inferential comprehension scores as the response variable. The model was run across both Level III and Level IV questions.

To examine the interaction between question level and clinical status, an ordinal regression model was fitted with question level (Level III vs. Level IV) and clinical status (Autistic vs. TD) as predictor variables, and their interaction term, on inferential comprehension scores.

Effect sizes for the ordinal regression models were reported as odds ratios (ORs), which represent the change in the odds of achieving a higher score category for a one-unit change in the predictor variable, holding other variables constant (Agresti, 2015; Christensen, 2019).

Note: All R codes and statistical analysis outputs are deposited on the Open Science Framework and can be found at [link](#) under the 'Files' tab, in the 'Chapter 4' folder.

4.9 Results

This section presents the results according to the research questions

4.9.1 Effect of Question Level on Responses

The CLM revealed a statistically significant main effect of Question Level on the difficulty of inferential questions ($\chi^2(1) = 103.4$, $p < 0.001$). Specifically, Level IV questions were found to be significantly more challenging than Level III questions, as indicated by a negative coefficient ($\beta = -3.65$, $SE = 0.36$, $z = -10.17$, $p < 0.001$). This negative coefficient signifies that as the question level progresses from III to IV, the likelihood of scoring in a higher category decreases substantially.

The mean scores further underscore this difference: Level III questions yielded a mean of 2.90 ($SD = 0.51$) and Level IV questions had a mean of 1.64 ($SD = 1.22$), highlighting a significant difference in difficulty between the two levels. The odds ratio for Level IV was 0.0259, indicating that the odds of scoring in a higher category were approximately 97.4% lower for Level IV questions compared to Level III questions. This represents a large effect size, as odds ratios far from 1 indicate substantial differences.

The threshold coefficients, which represent the cut-points between the different levels of the outcome variable (Scores), were all significant and ranged from -4.71 to -3.23, further supporting the model's ability to distinguish between the different levels of difficulty. These thresholds indicate the boundaries between adjacent score categories.

Figure 4.2 illustrates the mean scores of children on each question level, clearly showing the increased difficulty of Level IV questions compared to Level III.

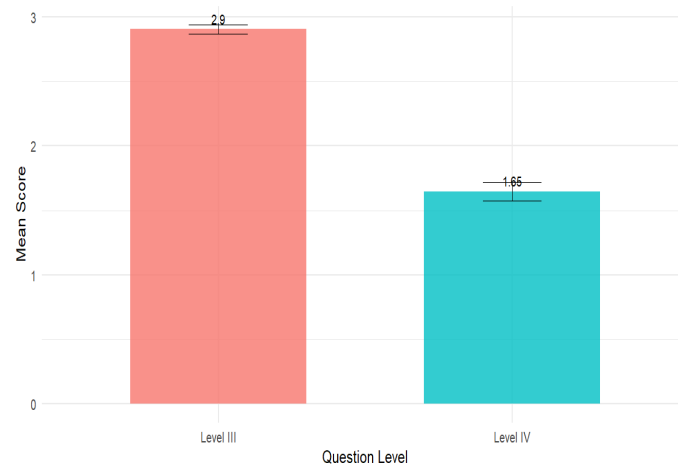


Figure 4.2 Mean Scores on Level III and Level IV Questions

4.9.2 Effect of Clinical Status on the Scores

The CLM revealed a statistically significant main effect of Clinical Status on the difficulty of inferential questions ($\chi^2(1) = 79.8$, $p < 0.001$). Results indicated that autistic children scored significantly lower than their TD peers, evidenced by a positive coefficient ($\beta = 1.83$, $SE = 0.20$, $z = 8.94$, $p < 0.001$). This positive coefficient reflects that TD children were substantially more likely to achieve higher scores compared to autistic children.

The associated odds ratio of 6.21 signifies that the odds of scoring in a higher category were approximately 6.21 times greater for TD children compared to autistic children. This represents a large effect size, reinforcing the substantial performance difference between the groups.

The threshold coefficients, which represent the cut-points between the different levels of the outcome variable (Scores), were all significant and ranged from -1.15 to 0.17. These thresholds indicate the boundaries between adjacent score categories and further support the model's ability to distinguish between the different levels of difficulty for both autistic and TD children.

These findings provide strong evidence for the hypothesis that autistic children experience greater difficulty with inferential questions compared to their TD peers. The results highlight a substantial difference in performance between the two groups, with TD children demonstrating a significantly higher likelihood of achieving better scores on the inferential comprehension task.

Figure 4.3 illustrates the mean of inferential comprehension scores by clinical status on all inferential questions.

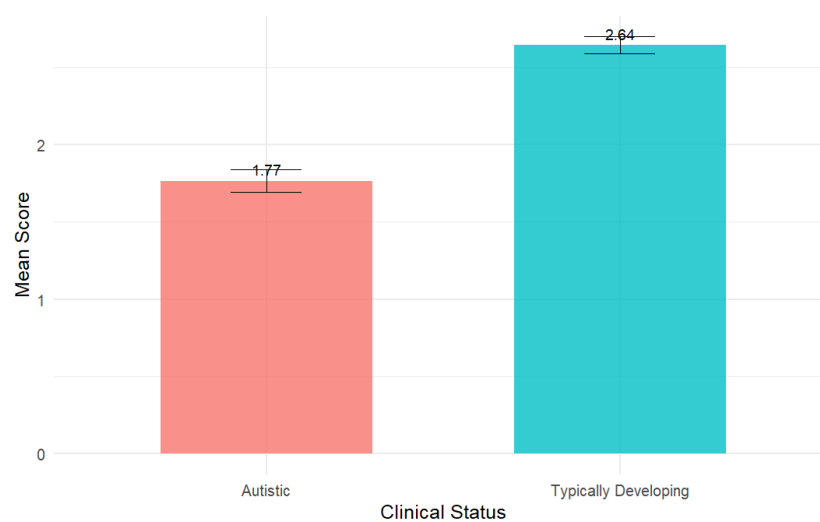


Figure 4.3 Mean of Scores by Clinical Status on all Inferential Questions

4.9.3 Interaction between Clinical Status and Scores

The ordered logistic regression analysis revealed a significant interaction effect between Clinical Status and Question Level on the difficulty of inferential questions ($\beta=2.06$, $SE=0.77$, $z=2.68$, $p=0.007$) This interaction indicates that the difference in difficulty between Level III and Level IV questions was more pronounced for autistic children compared to TD children.

The estimated marginal means (EMMs) further illustrate this interaction. Autistic children scored significantly lower on Level IV questions (EMM = -0.85, SE = 0.14) compared

to Level III questions ($EMM = 3.91$, $SE = 0.43$). In contrast, TD children scored higher on Level IV questions ($EMM = 1.92$, $SE = 0.20$) compared to Level III questions ($EMM = 4.63$, $SE = 0.59$). These results suggest that while both groups found Level IV questions more challenging than Level III questions, the increased difficulty was considerably more significant for autistic children.

The odds ratio for the interaction term (QuestionLevel4: ClinicalStatusTD) was 7.83, indicating that the odds of scoring in a higher category for Level IV questions were approximately 7.83 times greater for TD children compared to autistic children. This represents a very large effect size, highlighting the substantial difference in performance between the two groups at Level IV.

The threshold coefficients, which represent the cut-points between the different levels of the outcome variable (Scores), were all significant and ranged from further supporting the model's ability to distinguish between the different levels of difficulty.

Figure 4.4 illustrates the estimated marginal means for autistic and TD children at each question level. The figure shows that autistic children had lower estimated marginal means than TD children at both Level III and Level IV. However, the difference in estimated marginal means between autistic and TD children was more pronounced at Level IV, suggesting that autistic children found Level IV questions significantly more challenging than TD children.

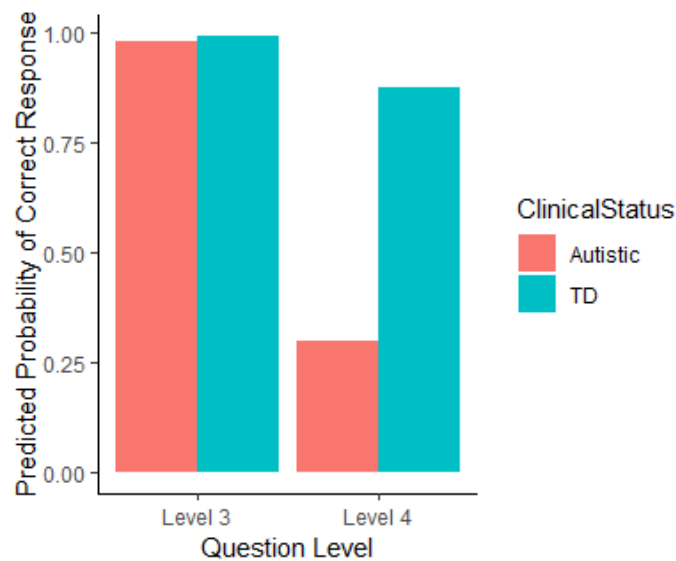


Figure 4.4 Estimated Marginal Means for Autistic and TD Group at Each Question Level

For D4 an ordinal regression model was run as follows: `D4 <- clm (D4 Scores ~ Clinical Status, data = dataset)`. The results of the ordinal regression analysis revealed a significant effect of clinical status on the scores of D4 ($p < 0.001$). The analysis showed that TD children were more likely to have higher scores compared to autistic children, as indicated by a coefficient of 4.22. The effect size, as measured by Cohen's d , was -0.52, indicating a medium effect size.

4.10 Discussion

This study examined the inferential abilities of TD children and those with autism, specifically autistic children with low support needs. The aim of the study was to understand how Blank's levels of language abstraction applies to these groups. The goal was to identify which levels of questioning were more challenging for autistic children and their TD peers, and to gain a better understanding of their inferential abilities.

The study used LITMUS MAIN comprehension questions to examine the comprehension scores of children with and without autism. With the aim of investigating how

children with and without autism answer inferential questions and which inferential questions are more challenging for them, the study looked at MAIN questions through the lens of Blank's levels of language abstraction which assesses children's oral language comprehension across four levels. At Level I, children are required to demonstrate a basic understanding of spoken language by identifying and recalling specific information. They must be able to follow simple instructions, identify objects or pictures, and answer questions that require a literal interpretation of the text. This level assesses children's ability to process and understand straightforward language. Level II requires children to use contextual clues to understand the meaning of spoken language. They must be able to make inferences based on the situation, use prior knowledge to inform their understanding, and demonstrate an awareness of the relationships between objects, events, or ideas. This level evaluates children's ability to think critically and make connections between different pieces of information.

Levels III and IV are particularly challenging. Level III requires children to adjust their perceptions to meet verbal task requirements, involving inference. Level IV demands reasoning based on perceptions, necessitating critical thinking and analysis.

To score the MAIN questions, the MAIN protocol for scoring was initially followed, which involves a binary scoring system. However, no significant group differences were observed using this approach except on only one individual question (see Appendix 7 for the results of the MAIN binary scoring approach). A refined scoring system, based on the Blank's PLAI-2, was used which assigned scores ranging from 0 to 3. This revised scoring system was used to score MAIN questions. The results revealed that this scoring approach better captured the group difference (see Appendix 8 for a comparative analysis of the percentage of correct answers in the TD and Autistic groups, using both the initial binary scoring approach and the refined scoring approach based on the PLAI-2). The primary goal of this comparison was to

assess which scoring method provided better understanding of group differences, particularly concerning the relevance of responses.

The results of this study revealed a significant main effect of question level on the difficulty of inferential questions, with Level IV questions being more challenging than Level III questions for all children. This suggests that questions requiring reasoning, critical thinking, and analysis are more difficult for children to answer than those requiring adjustments to verbal task requirements. Notably, children with autism scored significantly lower than their TD peers on both Level III and Level IV questions, indicating difficulties with integrating local details into a broader context. This finding is consistent with the theory of weak central coherence (Happé 2005; Westby, 2018), which proposes that autistic individuals excel at processing local details but struggle with global integration. Furthermore, the significant interaction between question level and clinical status suggests that the difficulty of Level IV questions was more pronounced in the autistic group. The struggles of autistic children with Level III questions may be rooted in their challenges with organizing and sequencing story details, a challenge that has been previously documented (Westerveld et al., 2021). However, their even greater difficulty with Level IV questions could be due to struggles with understanding social cues, such as character motives, goals, and intentions (Vermeulen et al., 2017), which are essential for making inferences. The study also demonstrates that there were more group differences using the refined scoring scale compared to when using the scoring scheme in the MAIN protocol which is more lenient.

Building on these findings, this study demonstrates that Blank's levels of language abstraction can be used for examining the inferential skills in children with and without autism. The framework employed shows promise for investigating inferential abilities in children with autism and may have potential applications for other group of children with difficulties in social communication and inferencing, such as DLD, ADHD, Down syndrome, PLI, etc. However,

further research is needed to confirm its applicability to diverse populations and to address the heterogeneity of language and cognitive abilities within and across these populations. The study also demonstrates how the refined scoring scheme was able to capture more group differences and better capture the cognitive-linguistic vulnerabilities of the autistic children than the original scoring scheme.

The Table 4.4 shows the responses of the autistic children that scored lower than expected and the reasons why these answers scored lower.

Given that autistic children scored lower than their TD peers in answering inferential questions, particularly with Level 4 questions, I conducted a more in-depth analysis of the autistic children's responses. By examining the answers provided by autistic children, I aimed to identify patterns and trends that could explain why their responses deviated from the expected answers.

Table 4.4 Autistic Children's Responses that did not Score Full Marks

Questions	Responses	Reasons for categorizing these responses as partially relevant
Level IV D3 (Why do you think that the dog/cat was angry?)	Response 1: Getting hurt is always very painful, and that is what the cat felt.	This response was coded as Acceptable (score 2) because it does directly reference the details in the story, like the cat got hurt and it could have been painful for the cat. However, this is imprecise and poorly formulated and also contains some extraneous information.

	Response 2: The Dog/Cat got angry they don't get food.	This answer is Acceptable (score 2) because it is related to the story details and offers a logical explanation for why a dog might become angry, based on general knowledge about their motivations and typical responses.
Level III/Level IV D4: Why does the boy jump/leap forward?	The boy jumps forward because it is his favourite ball	This answer is Acceptable (score 2) because while the child's response demonstrates some logical thinking and an attempt to infer the boy's motivation, it is only partially relevant because it relies on information that is not actually present in the story. It shows the child is making an educated guess, but not one that is fully grounded in the narrative details
Level IV D7: Why does the dog grab the chicken leg pieces? Why does the cat grab the fish?	Response 1: They (chicken leg pieces/fishes) are very tasty and maybe the dog/cat wanted it	This answer was coded as Acceptable (Score 2) because again here the child draws from the details of the story, including extraneous information but it is poorly formed/imprecise.
Level IV D8: Imagine that the	Response 1: The boy would feel okay	The response again is coded as Acceptable (score 2) because the answer is connected to the story

boy sees the dog. How does the boy feel? D9: Why do you think that the boy would feel okay?	Response to D9: The boy would feel okay because it was just one chicken leg piece only.	details and also explains the logic which is correctly linked to the story but however the answer is imprecise.
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Children's responses to Level IV questions, such as D3, D4, D7, D8, and D9, were coded as Acceptable (score 2) because, although they demonstrated some understanding of the story, they were poorly formulated and imprecise. For example, in response to questions like "Why do you think that the cat is feeling angry/disappointed/hurt etc?", "Why does the boy hold the fishing rod in the water?", and "Why does the cat grab the fish?", children provided answers such as "Getting hurt is always very painful and the cat might have felt the same", "The boy jumps forward because it is his favourite/nice ball", and "The fish looks very tasty and that might have made the dog hungry". These responses were scored as acceptable in terms of relevance, because they were linked to the story details, were logical but somehow imprecise or poorly formulated.

To address the challenges in inferential comprehension skills observed in the study, particularly in Level IV questions, teachers, Speech Language Pathologists (SLPs), and professionals can employ a range of evidence-based strategies. The study's findings showed that both autistic and TD children scored lower in Level IV questions, which require reasoning about perceptions, emotions, and abstract cause-effect relationships (e.g., "Why does the cat feel angry?"). To improve inferential comprehension skills, teaching question types, such as "Why do you think...?" or "What do you think will happen next?", can encourage children to think critically and make inferences about the context, while also promoting metacognitive

awareness and self-regulation (Oczkus, 2010). Teaching these question types can help children move beyond literal details (Level III) to analyse motivations and emotions (Level IV). Using structured question types, such as "What clues tell you the cat is angry?", can reduce ambiguity and scaffold children's ability to focus on story-specific evidence, rather than defaulting to generic scripts (e.g., "Getting hurt is painful") (Kispaal, 2008). The study's findings also highlighted the importance of making implicit reasoning explicit, which can be achieved through think-aloud strategies, where children verbalize their thought processes when answering questions (Oczkus, 2010). For example, a teacher might say: "I think the cat grabs the fish because earlier, the story said it hadn't eaten all day. Let me check page 2...", modeling how to connect story events to inferences and addressing the "partial relevance" issue observed in the study. By incorporating these evidence-based strategies and interventions, educators and therapists can support children with autism in developing their inferential comprehension skills, which are crucial for enhancing their reading comprehension, critical thinking, and problem-solving abilities. Improving inferential comprehension skills can lead to improved academic performance, increased independence, and enhanced social interactions, and can also help individuals with autism to better navigate social situations, reduce anxiety and stress, and develop more effective communication skills (Oczkus, 2010). Therefore, it is essential to incorporate these strategies into educational and therapeutic settings to support individuals with autism in achieving their full potential.

4.11 Conclusion

This study compared the oral inferential comprehension abilities of Hindi-speaking children with and without autism. It is particularly innovative in its conceptual integration of Blank's level of language abstraction and its methodological proposal and application of a refined scoring scheme for analysing children's responses to comprehension questions within the LITMUS-MAIN fictional stories.

The findings unequivocally indicated that Level IV questions, which demand reasoning based on perceptions, critical thinking, and advanced analysis, were particularly challenging for autistic children relative to their TD peers. Crucially, the refined scoring scheme proved to be more sensitive, effectively capturing group differences and providing a more granular insight into the cognitive-linguistic vulnerabilities of autistic children compared to the original, more lenient, binary scoring scheme.

This study makes several significant contributions to the existing literature. First, it is one of the few studies to employ a refined, graduated scoring scale to assess children's responses to comprehension questions, moving beyond traditional binary approaches. Notably, it also stands as the first study to examine inferential comprehension skills across multiple facets of a story, encompassing critical elements such as character goals, intentionality, theory of mind, and overall plotline. Furthermore, by rigorously applying Blank's approach—a well-established framework widely used by speech-language pathologists for assessing children with and without social-communication difficulties—this study significantly enriches the clinical utility of LITMUS-MAIN as a comprehensive narrative assessment tool. This elevates its potential to offer a more profound understanding of children's language abilities.

While this study offers robust insights, it acknowledges certain limitations, including a relatively small sample size. Additionally, the study's specific focus on autistic children with low support needs may not fully capture the complete spectrum and complexity of inferential comprehension skills across the broader autism spectrum. Future research can build upon these foundational findings by incorporating more diverse groups of autistic children across the spectrum to further elucidate the developmental trajectory of inferential comprehension in autism and other language disorders. The findings of this study carry broader implications for understanding the inferential abilities of children with various social communication

difficulties, underscoring the pressing need for continued research and the development of targeted interventions and refined assessments to effectively support these children.

References

- Adams, C. (2001). Clinical diagnostic and intervention studies of children with semantic-pragmatic language disorder. *International Journal of Language & Communication Disorders*, 36(3), 289-305.
- Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing words to life: Robust vocabulary instruction*. Guilford Press.
- Adams, C., Clarke, E., & Haynes, R. (2009). Inference and sentence comprehension in children with specific or pragmatic language impairments. *International Journal of Language & Communication Disorders*, 44(3), 301-318.
- Agresti, A. (2015). *Foundations of Linear and Generalized Linear Models*. Wiley.
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of child psychology and psychiatry, and allied disciplines*, 42(2), 241-251.
- Benner, G. J., Nelson, J. R., & Epstein, M. H. (2002). Language skills of children with EBD: A literature review. *Journal of Emotional and Behavioral Disorders*, 10(1), 43-56.
- Bishop, D. V., & Adams, C. (1992). Comprehension problems in children with specific language impairment: Literal and inferential meaning. *Journal of Speech, Language, and Hearing Research*, 35(1), 119-129.
- Bishop, D. V. (2014). *Uncommon Understanding (Classic Edition): Development and disorders of language comprehension in children*. Psychology Press.
- Bishop, D. V., & Snowling, M. J. (2004). Developmental dyslexia and specific language impairment: Same or different?. *Psychological bulletin*, 130(6), 858.
- Blank, M., Rose, S. A., & Berlin, L. J. (1978). *Preschool Language Assessment Instrument: The language of learning in practice*.
- Blank, M., Rose, S. A., & Berlin, L. J. (1978). *Test Review: Preschool Language Assessment Instrument-2 (PLAI-2)*.
- Bodner, K. E., Engelhardt, C. R., Minshew, N. J., & Williams, D. L. (2015). Making inferences: Comprehension of physical causality, intentionality, and emotions in discourse by high-functioning older children, adolescents, and adults with autism. *Journal of autism and developmental disorders*, 45, 2721-2733.
- Bohnacker, U., & Lindgren, J. (2020). MAIN story comprehension. *Language Impairment in Multilingual Settings: LITMUS in action across Europe*, 29, 13.
- Botting, N., & Adams, C. (2005). Semantic and inferencing abilities in children with communication disorders. *International Journal of Language & Communication Disorders*, 40(1), 49-66.
- Bowyer-Crane, C., & Snowling, M. J. (2005). Assessing children's inference generation: What do tests of reading comprehension measure?. *British journal of educational psychology*, 75(2), 189-201.
- Cain, K., Oakhill, J. V., Barnes, M. A., & Bryant, P. E. (2001). Comprehension skill, inference-making ability, and their relation to knowledge. *Memory & cognition*, 29(6), 850-859.

- Cain, K., Oakhill, J., & Bryant, P. (2004). Children's reading comprehension ability: Concurrent prediction by working memory, verbal ability, and component skills. *Journal of educational psychology*, 96(1), 31.
- Christensen, R. H. B. (2023). Analysis of ordinal data with cumulative link models—estimation with the R-package ordinal. *R-package version*, 28, 406.
- Christensen, R. H. B. (2019). *Ordinal—Regression Models for Ordinal Data*. R package version 2019.12-10. <https://CRAN.R-project.org/package=ordinal>
- Deacon, S. H., Holliman, A. J., Dobson, G. J., & Harrison, E. C. J. (2018). Assessing direct contributions of morphological awareness and prosodic sensitivity to children's word reading and reading comprehension. *Scientific Studies of Reading*, 22(6), 527-534.
- Dawes, E., Leitão, S., Claessen, M., & Kane, R. (2018). A profile of the language and cognitive skills contributing to oral inferential comprehension in young children with developmental language disorder. *International journal of language & communication disorders*, 53(6), 1139-1149.
- Dawes, E., Leitão, S., Claessen, M., & Lingoh, C. (2019). Oral literal and inferential narrative comprehension in young typically developing children and children with developmental language disorder. *International journal of speech-language pathology*, 21(3), 275-285.
- Dodwell, K., & Bavin, E. L. (2008). Children with specific language impairment: An investigation of their narratives and memory. *International Journal of Language & Communication Disorders*, 43(2), 201-218.
- Frith, U. (2003). *Autism: Explaining the enigma*. Blackwell publishing.
- Filiatrault-Veilleux, P., Bouchard, C., Trudeau, N., & Desmarais, C. (2016). Comprehension of inferences in a narrative in 3-to 6-year-old children. *Journal of Speech, Language, and Hearing Research*, 59(5), 1099-1110.
- Filiatrault-Veilleux, P., Bouchard, C., Trudeau, N., & Desmarais, C. (2015). Inferential comprehension of 3–6 year olds within the context of story grammar: A scoping review. *International journal of language & communication disorders*, 50(6), 737-749.
- Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A. (2018). *Learning disabilities: From identification to intervention*. Guilford Publications.
- Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balčiūnienė, I., ... & Walters, J. (2015). Assessment of narrative abilities in bilingual children. *Assessing multilingual children: Disentangling bilingualism from language impairment*, 241, 274.
- Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Bohnacker, U., & Walters, J. (2019). MAIN: Multilingual assessment instrument for narratives—Revised. *ZAS Papers in Linguistics*, 63, 20-20.
- Grossmann, I. & Santos, H. C. (2016). Individualistic cultures. In V. Zeigler-Hill & T.K. Shackelford, *Encyclopedia of Personality and Individual Differences*. New York: Springer. doi: 10.1007/978-3-319-28099-8_2024-1
- Happé, F. G. (1996). Studying weak central coherence at low levels: children with autism do not succumb to visual illusions. A research note. *Journal of child psychology and psychiatry*, 37(7), 873-877.

- Happé, F. (2005). The weak central coherence account of autism. *Handbook of autism and pervasive developmental disorders, 1*, 640-649.
- Happé, F., & Frith, U. (2006). The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *Journal of autism and developmental disorders, 36*, 5-25.
- Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Paul H Brookes Publishing.
- Hay, I., & Fielding-Barnsley, R. (2012). Social learning, language and literacy. *Australasian Journal of Early Childhood, 37*(1), 24-29.
- ISAA. Report on assessment tool for autism: Indian Scale for Assessment of Autism. New Delhi: Ministry of Social Justice & Empowerment: Government of India; 2009
- Kendou, P., Bohn-Getter, C., White, M. J., & Van den Broek, P. (2008). Children's inference generation across media. *Journal of Research in Reading, 31*(3), 259-272.
- Kispaal, A. (2008). *Effective Teaching of Inference Skills for Reading. Literature Review. Research Report DCSF-RR031*. National Foundation for Educational Research. The Mere, Upton Park, Slough, Berkshire, SL1 2DQ, UK.
- Kjelgaard, M. M., & Tager-Flusberg, H. (2001). An Investigation of Language Impairment in Autism: Implications for Genetic Subgroups. *Language and cognitive processes, 16*(2-3), 287-308. <https://doi.org/10.1080/01690960042000058>
- Lorch, E. P., O'Neil, K., Berthiaume, K. S., Milich, R., Eastham, D., & Brooks, T. (2004). Story comprehension and the impact of studying on recall in children with attention deficit hyperactivity disorder. *Journal of Clinical Child and Adolescent Psychology, 33*(3), 506-515.
- Madappa, M., Gurung, Y., & Raman, M. G. (2020). Spinning a yarn across languages: Adapting MAIN for India. *ZAS Papers in Linguistics, 64*, 107-116.
- National Reading Panel (US), National Institute of Child Health, & Human Development (US). (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction: Reports of the subgroups*. National Institute of Child Health and Human Development, National Institutes of Health.
- Norbury, C. F., & Bishop, D. V. (2003). Inferential processing and story recall in children with communication problems: a comparison of specific language impairment, pragmatic language impairment and high-functioning autism. *International journal of language & communication disorders, 37*(3), 227-251.
- Norbury, C. F. (2005). Barking up the wrong tree? Lexical ambiguity resolution in children with language impairments and autistic spectrum disorders. *Journal of experimental child psychology, 90*(2), 142-171.
- Nuske, H. J., & Bavin, E. L. (2011). Narrative comprehension in 4-7-year-old children with autism: Testing the weak central coherence account. *International Journal of Language & Communication Disorders, 46*(1), 108-119. <https://doi.org/10.3109/13682822.2010.484847>

- Oakhill, J. & Yuill, N. (1996). Higher order factors in comprehension disability: Processes and remediation. In C. Cornoldi & J. Oakhill (Eds.), *Reading comprehension difficulties: Processes and intervention*. (pp. 69-92). Mahwah, NJ: Erlbaum
- Oczkus, L. (2010). Literacy Survival Tips.
- Peterson, C. C., Wellman, H. M., & Liu, D. (2005). Steps in theory-of-mind development for children with deafness or autism. *Child development*, 76(2), 502-517.
- R Core Team (2022). R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.
- Rapp, D. N., & Van Den Broek, P. (2005). Dynamic text comprehension: An integrative view of reading. *Current directions in psychological science*, 14(5), 276-279.
- Reuterskiöld Wagner, C., Sehlen, B., & Nettelbladt, U. (1999). What's the story? Narration and comprehension in Swedish preschool children with language impairment. *Child Language Teaching & Therapy*, 15(2).
- Roberts, C. (2012). Information structure: Towards an integrated formal theory of pragmatics. *Semantics and pragmatics*, 5, 6-1.
- Rooha, A., Anil, M. A., Bhat, J. S., Bajaj, G., & Deshpande, A. (2023). Assessing Inferencing Skills in Children Through the Lens of Dynamic Visual Narratives. *Communication Disorders Quarterly*, 44(3), 173-184.
- Ryder, N., Leinonen, E., & Schulz, J. (2008). Cognitive approach to assessing pragmatic language comprehension in children with specific language impairment. *International journal of language & communication disorders*, 43(4), 427-447.
- Snowling, M. J., & Hulme, C. (2012). Interventions for children's language and literacy difficulties. *International Journal of Language & Communication Disorders*, 47(1), 27-34.
- Van Kleeck, A., & Norlander, E. (2008). Fostering form and meaning in emerging literacy using evidence-based practice.
- Van Kleeck, A., Vander Woude, J., & Hammett, L. (2006). Fostering literal and inferential language skills in Head Start preschoolers with language impairment using scripted book-sharing discussions.
- Vermeulen, P. (2015). Context blindness in autism spectrum disorder: Not using the forest to see the trees as trees. *Focus on autism and other developmental disabilities*, 30(3), 182-192.
- Vermeulen, K., Egger, J. I., Janzing, J. G., van Dongen, L. C. M., van Bokhoven, J. H. L. M., Kleefstra, T., & Staal, W. G. (2017). The context of symptom measures: interpretation and clinical diagnosis of autism spectrum disorders in intellectual disabilities.
- Westby, C. (2017). Weak Central Coherence: An Explanation for Comprehension Difficulties. *Word of Mouth*, 29(1), 5-8.
- Westby, C. (2017). Autism as a Problem of Context Blindness. *Word of Mouth*, 28(5), 8-12.
- Westby, C. (2017). Marion Blank's levels of language abstraction. *Word of Mouth*, 29(1), 12-15.

- Westby, C. (2019). Beyond the Words: Making Inferences. *Word of Mouth*, 30(3), 14-16.
- Westby, C. (2019). The myth of learning styles. *Word of Mouth*, 31(2), 4-7.
- Westerveld, M. F., Filiatrault-Veilleux, P., & Paynter, J. (2021). Inferential narrative comprehension ability of young school-age children on the autism spectrum. *Autism & developmental language impairments*, 6, 23969415211035666.
- Westerveld, M. F., Paynter, J., Trembath, D., Webster, A. A., Hodge, A. M., & Roberts, J. (2017). The emergent literacy skills of preschool children with autism spectrum disorder. *Journal of autism and developmental disorders*, 47, 424-438.
- Wilson, E., Cain, K., Davies, C., Gibson, J., Joseph, H., Serratrice, L., & Vogelzang, M. (2024). Children's development of conversational and reading inference skills: a call for a collaborative approach. *Language Development Research*, 4(1), 42-79.
- Yeari, M., Elentok, S., & Schiff, R. (2017). Online and offline inferential and textual processing of poor comprehenders: Evidence from a probing method. *Journal of Experimental Child Psychology*, 155, 12-31.

Chapter 5 General Discussion and Conclusion

5.1 Introduction

This thesis examines the topics of personal narratives, the effect of emotional polarity (positive versus negative stories) on personal narratives and the inferential comprehension skills in fictional narrative context of Hindi-speaking children with and without autism. This chapter will synthesize the major findings from the three empirical studies conducted, discuss their significance, propose avenues for future research, and conclude the thesis.

5.2 Summary of the Major Findings

Study one (Chapter 2) examined the topics and contents of personal stories shared by autistic children and their TD peers. Using the Global TALES protocol, personal narratives were elicited from 21 autistic children with low support needs and 30 TD children, aged 6-9 years, in response to four (happy, worried, angry and proud) emotion-based prompts and two situation-based prompts (problem solving and something important). The topics of the children's personal stories were analysed and compared. It was found that autistic children's narratives primarily featured immediate family members and self-oriented experiences, whereas TD children's stories included a broader range of family relationships, conflict management, and contributing to others. The Assessment of Life Habits (Life-H), a parental questionnaire that evaluates an individual's participation in daily life activities, to assess the children's social activities and participation levels was used. The Life-H scores revealed that TD children had more experiences in communication, interpersonal relationships, and taking up responsibilities as contributors, such as helping others and participating in community activities, whereas autistic children had more experiences in receiving help and support from others.

The story topics/contents of autistic children demonstrated their restricted social involvement, which was characterized by a focus on immediate family members and personal experiences. Their Life-H scores supplemented this finding, indicating that their social involvement was limited to receiving support from others, rather than participating in social activities or contributing to their community.

Study 2 (Chapter 3) examined the effect of emotional polarity (positive and negative) on the coherence of personal narratives in children with autism and TD children. This study compared the coherence of personal stories about positive versus negative emotional experiences shared by children with and without autism. Participants included thirty Hindi-speaking autistic children with low support needs (aged 6-9 years) and 30 neurotypical Hindi-speaking peers matched on age, expressive vocabulary, expressive morphosyntactic competence, non-verbal IQ, and socio-economic status. Children shared personal narratives in response to "*Excited*" and "*Worried*" prompts from the Global TALEs protocol (Westerveld et al., 2023) adapted to Hindi (Srivastava et al., 2023), representing positive and negative emotional experiences, respectively. Responses were transcribed and analysed for global ratings of coherence (rating narratives on context, chronology and theme dimensions using the Narrative Coding Coherence Scheme (NaCCS, Reese et al., 2011) and local coherence (quantifying the use of causal, temporal and thematic indicators, Habermas & de Silveria 2008). Results demonstrated that TD children exhibited comparable scores in global ratings of coherence in both positive and negative personal stories. However, when narrating negative experiences, they employed more causal reasoning, while positive experiences correlated with increased use of temporal indicators, possibly reflecting cultural values emphasizing social harmony. Conversely, autistic children with low support needs told more coherent stories about negative experiences than positive ones. This may suggest a stronger motivation to process and make sense of distressing negative emotions. For the local indicators of global coherence,

autistic children scored significantly higher in negative stories, using more causal and temporal indicators. A between-group comparison revealed that TD children produced more coherent stories about positive experiences, whereas autistic children's narratives were more coherent when discussing negative experiences. Notably, autistic children even scored significantly higher than TD children on some coherence measures during negative narratives, potentially indicating a bias towards or enhanced recall of negative events. To further elucidate these findings, a thematic subtype analysis was conducted, particularly in light of autistic children's lower thematic coherence in positive stories compared to TD peers, despite demonstrating thematic capacity in negative narratives. This qualitative examination, using the exhaustive list of thematic indicators by Habermas & de Silveria (2008), aimed to identify specific thematic subtypes. The analysis revealed that in positive stories, TD children frequently employed thematic subtypes related to "complex cognitive processes," such as "understanding" (13/30 stories) and "opinion" (18/30 stories). Crucially, these specific thematic subtypes ("understanding" and "opinion") were consistently absent in the positive narratives of autistic children, and notably, also in their negative stories. Autistic children primarily used other thematic subtypes, such as explanations or exemplifications, in both positive and negative narratives, though more frequently in the latter, contributing to their higher thematic scores in this context. This finding suggests that autistic children tend to produce more factual but less interpretive self-narratives compared to their TD peers.

Study 3 (Chapter 4) examined the inferential comprehension skills of Hindi-speaking children with and without autism using LITMUS MAIN comprehension questions. The study aimed to investigate how children with and without autism answer inferential questions and which questions are more challenging for them. The study used Blank's levels of language abstraction, which assesses children's oral language comprehension across four levels. Level I requires children to demonstrate a basic understanding of spoken language, while Level II

requires them to use contextual clues to understand the meaning of spoken language. Levels III and IV are particularly challenging, with Level III requiring children to adjust their perceptions to meet verbal task requirements and Level IV demanding reasoning based on perceptions. The study found that Level IV questions were more challenging than Level III questions for children with and without autism. Additionally, autistic children scored lower than TD children on inferential questions, indicating that they found these questions more difficult. The increased challenge posed by Level IV questions was notably more pronounced in autistic children, suggesting that they particularly struggle with inferential questions, especially at higher levels of language abstraction.

In summary, the major findings of the three studies examined the differences in the topics of personal narratives, coherence, and inferential comprehension skills in fictional narrative context between autistic children and their TD peers. Study 1 found that autistic children's personal stories primarily featured immediate family members and self-oriented experiences, whereas TD children's stories included a broader range of relationships, instances where the children were involved in conflict management, and contributing to others. Study 2 results revealed that TD children exhibited comparable scores in global ratings of coherence across positive and negative narratives, while autistic children's narratives were more coherent when sharing stories of negative emotional experiences than positive ones; a specific finding from the thematic subtype analysis further indicated that interpretive thematic markers related to "understanding" and "opinion" were consistently absent in autistic children's narratives. Study 3 analysed the inferential comprehension skills of children through the lens of Blank's levels of language abstraction. The inferential questions were mapped as Level III (questions that require applying language to perceptions to make connections and explanations) and Level IV inferential questions (which requires reasoning and analysing perceptions to understand relationships and underlying reasons). It was found that children with and without autism and

found inferential questions challenging, particularly at higher levels of language abstraction, and that Level IV questions were more challenging than Level III questions for both groups, with this difficulty being more pronounced for autistic children.

5.3 Empirical and Clinical Significance of this Thesis

This thesis explores language and communication in children, with a focus on autism, contributing to empirical and clinical understanding. The research undertaken across three studies collectively addresses several important areas:

(i) Focusing on the importance of considering functional aspects of narratives

Primarily, the work underscores the importance of considering the functional aspects of narratives in children, an area often underexplored in child language literature. Moving beyond traditional structural narrative analyses, the research systematically examined:

- The content and topics of personal narratives, revealing how these reflect children's social involvement and experiences.
- Narrative coherence for both global ratings of coherence and local indicators contributing to global coherence, particularly the impact of emotional polarity and the specific types of indicators used.
- Oral inferential comprehension in detail, assessing abilities across varying levels of language abstraction.

By providing a comprehensive analysis of *how* children use language in narrative contexts, *what* they choose to talk about, and *how* they structure their discourse to convey meaning and coherence, the thesis highlights the vital role of functional aspects in understanding children's language development, social communication, and broader cognitive abilities.

(ii) In-depth Exploration of Two Key Narrative Genres

The thesis provides an in-depth focus on two key narrative genres—personal and fictional narratives—both extensively researched in child language. While previous work often concentrated on structural elements, the thesis innovatively explored their functional dimensions:

- **Personal Narratives:** Using the adapted Global TALEs protocol (Studies 1 and 2), the research analysed the topics children chose to discuss, offering insights into their lived experiences and social engagement. Study 1 demonstrated the protocol's utility in discerning the *range* of topics children narrate, providing guidance for clinicians in intervention planning. Study 2 further showcased the protocol's ability to elicit context-specific personal narratives across diverse emotional experiences (e.g., "Excited" and "Worried"), allowing for detailed examination of how emotional polarity influences coherence and narrative content.
- **Fictional Narratives:** Through the analysis of inferential comprehension, the thesis explored how children process and interpret information from fictional contexts, specifically examining their ability to engage with abstract linguistic demands.

The functional approach across both genres offers a deeper understanding of narrative use, shedding light on how children deploy narrative to convey meaning, express emotions, and engage in social interaction, thereby offering concrete guidance for clinical assessment and intervention.

(iii) Featuring autistic children with low support needs

The thesis focuses on autistic children with low support needs. These children, despite having comparable structural language skills as their TD peers, face specific challenges in social communication, as well as difficulties inferencing. By comparing this group to a matched

group of TD children, the thesis provides an understanding of the language and narrative comprehension abilities of autistic children with low support needs, shedding light on the specific challenges they face and the ways in which they differ from their TD peers.

(iv) Focusing on functioning based on ICF

The three studies uniquely investigate the functional aspects of language and communication abilities of autistic children within the internationally recognized ICF framework. Promoted for children with language and communication disorders, the ICF provides a holistic lens, encompassing body functions and structures, activities, participation, and environmental factors. By examining:

- Activities and Participation: (e.g., the types of experiences and social involvement reflected in narrative topics from Study 1; the participation in specific narrative tasks in Studies 2 and 3).
- Mental Functions: (e.g., the cognitive processes underlying inferential comprehension in Study 3; the metacognitive processes involved in articulating "understanding" and "opinion" in Study 2).
- Environmental Factors: (e.g., the potential influence of cultural values on narrative strategies in Study 2).

The research offers a comprehensive understanding of the language and communication abilities of autistic children in the context of their daily lives. The ICF framework's application provides a valuable blueprint for clinical practice, enabling a more thorough understanding of the complex needs of children with language and communication disorders. It effectively translates empirical findings into actionable insights, contributing significantly to the advancement of both research and clinical practice aimed at supporting autistic children's functional communication and participation.

Study 1

Study one examined the contents of personal narratives, providing a window into the social lives of children. By analysing the topics of the personal narratives that children share one can gain insight into their surroundings, relationships, and emotional experiences. The Global TALEs protocol, which consists of six prompts, was used to elicit narratives from children about times when they felt happy, worried, annoyed, faced a problem situation, felt proud of themselves, and wanted to share something important. By examining the content of these narratives, one can understand how children interact with others, respond to different emotional contexts, and navigate social situations.

For autistic children, who face socio-communication challenges, understanding the content of their narratives can be particularly valuable. By analysing the content of their stories, researchers can identify areas where they may need additional support or opportunities for social participation. For example, autistic children may benefit from activities that encourage social interaction with non-immediate family members, conflict resolution, and helping others. Enriching their life experiences in this way can provide them with a richer foundation for sharing personal stories and developing social relationships.

Study 2

This study explored how emotional polarity influences narrative coherence in autistic and TD children. It found autistic children's narratives were less coherent for positive emotions, but more coherent for negative ones in certain measures. Specifically, a key finding from the thematic subtype analysis in this study was the consistent absence of "understanding" and "opinion" markers in the personal narratives (both positive and negative) of autistic children, unlike their TD peers. These markers, linked to "complex cognitive processes," indicate that autistic children tend to produce more factual accounts

rather than interpretive self-narratives. This has significant implications for intrapersonal theory of mind. No mention of expression of "understanding" and "opinion" markers can suggest a different internal processing or articulation of one's own thoughts, feelings, and beliefs (Arnaud, 2020). These findings bear on identity development. The process of developing a coherent sense of self, or identity, is significantly shaped by an individual's ability to construct meaningful narratives about their life experiences. Expressing understanding and opinions within these narratives helps connect past events to a developing self-concept (Allé et al., 2025). Identity formation is a highly social process, influenced by discourses and interactions (Bagatell, 2007). For autistic individuals, navigating this can involve unique considerations, including how their autism integrates into their overall identity (Cresswell & Cage, 2019; Lamash et al., 2024). The way personal experiences are narrated contributes to the evolving subjective representation of one's life (Allé et al., 2025), and differences in this narrative style can influence the richness and coherence of one's self-story.

The implications also extend to social and cultural integration. Narrative abilities are fundamental for effective social communication and for building and maintaining relationships (Lee et al., 2017; Nayar et al., 2024). The observed differences in narrative expression can influence how autistic individuals engage in social interactions and integrate within cultural contexts. In adolescence, and particularly in collectivist cultures like China, the ability to articulate one's understanding and express personal opinions on social situations is often valued and expected for successful social navigation and participation, with challenges potentially hindering integration (Atherton et al., 2023; Li & Qi, 2023). When these thematic indicators are less prominent, it could influence the ease with which autistic individuals negotiate social structures and contribute to group discussions.

Finally, this impacts individual agency. The linguistic expression of "understanding" and "opinion" often serves as a marker of perceiving oneself as an active agent in one's life—

someone who makes choices, influences outcomes, and learns from experiences. The less frequent use of these markers might suggest a distinct articulation of personal agency, leading to narratives that describe events without explicitly detailing personal impact, decisions, or influence. This can relate to variations in the "sense of self," specifically the feeling of being an individual across time and in relation to others. While narratives describe events, the explicit inclusion of one's interpretive stance (understanding, opinion) demonstrates a self-reflexive engagement with those events, shaping a more dynamic and agentic self-representation (Sirota, 2010).

Study 3

This study investigated the oral inferential skills of Hindi-speaking children with and without autism, using the LITMUS MAIN assessment (Gagarina et al., 2019). LITMUS MAIN, a narrative assessment tool translated into 92 languages globally, was employed to examine inferential comprehension. Unlike previous research that primarily focused on inferring internal states or used binary scoring, this study adopted a novel approach by applying Blank's levels of language abstraction and a refined scoring scheme to evaluate children's understanding of various narrative aspects, including characters' internal states, goals, motivations, theory of mind abilities, and overall plotline. The ten inferential questions within the MAIN assessment cover multiple dimensions of story comprehension, making it a comprehensive tool for assessing narrative understanding.

The study found that Level IV questions, which require reasoning based on perceptions and necessitate critical thinking and analysis, were significantly more challenging than Level III questions, which involve adjusting perceptions to meet verbal task requirements involving inference. Children with autism scored lower than TD children on inferential questions, indicating distinct patterns in their ability to make inferences and draw conclusions from text.

Furthermore, the observed differences in performance on Level IV questions were more pronounced in children with autism, suggesting variations in their higher-level thinking and critical thinking skills.

This study is, to the best of my knowledge, the first to examine inferential questions through the lens of Blank's level of language abstraction, offering a unique perspective on the complexities of narrative comprehension. The findings have significant implications for the assessment and intervention of inferential comprehension skills in children with autism. Specifically, the results suggest that children with autism may exhibit distinct patterns in context-dependent reasoning, particularly when faced with complex texts that require higher levels of language abstraction. These observed patterns may be attributed to variations in integrating prior knowledge, making inferences, and understanding implicit meanings. The novel application of Blank's levels of language abstraction and the refined scoring system add significant clinical value to LITMUS MAIN as an instrument for comprehensively assessing inferential comprehension.

5.4 Suggestions for Future Research

These studies provide a foundation for understanding the functional aspects of personal narratives, emotional polarity, and oral inferential skills in children with and without autism, opening several critical avenues for future research. Expanding upon the methodologies and populations explored, subsequent studies could further investigate the functional aspects of narratives by examining specific themes within personal narratives of autistic children and how these may differ from those of TD children, building on insights from Study 1. Furthermore, refining the scoring schemes used to assess emotional polarity in narratives, moving beyond current frameworks to capture more nuanced aspects of emotional expression and coherence, would be beneficial, as highlighted by Study 2. This includes exploring microstructural

(local/propositional) indicators of coherence to provide a more detailed understanding of how autistic children construct and convey meaning in their narratives, complementing macrostructural analyses. Also, the findings of Study 2 provide preliminary insights into the linguistic features of autistic children's utterances, but they also highlight the need for further research to fully understand the implications of these results. Specifically, the observation that autistic children's utterances contain fewer instances of mental state verbs and constructions with 'think' and 'realise' may suggest difficulties with Theory of Mind (ToM), identity, agency, and navigating collectivist cultures. However, these hypotheses require further investigation and cannot be confirmed without direct measurement of these constructs. To address these limitations, future research should prioritize longitudinal designs that track the development of linguistic features and cognitive constructs in autistic children over time. Additionally, studies should strive to recruit larger and more diverse samples, including children of different ages, socioeconomic backgrounds, and linguistic profiles (e.g., multilingual and monolingual children).

Future research should also focus on refining assessment and intervention strategies based on the findings across all three studies. For instance, given the insights from Study 3, assessments of narrative skills should incorporate specific evaluations of metacognitive language and higher-level inferential abilities, considering varying levels of language abstraction. Building on Study 2's findings regarding emotional polarity, assessments should include both positive and negative narrative prompts to provide a comprehensive view of narrative coherence across different emotional valences. In terms of interventions, research is needed to develop and evaluate metacognitive language-focused narrative interventions, which could involve explicit teaching and modeling of ways to express understanding and opinions within narratives, using culturally appropriate examples. Agency-focused narrative interventions, explicitly teaching the linguistic expression of personal agency within narrative

construction, including developing scripts that incorporate "understanding" and "opinion" markers, are also promising.

Finally, to gain a more complete understanding of developmental trajectories, studies can extend the age range of participants to include older individuals with autism, providing insight into how these language and communication skills develop and evolve over time. Longitudinal studies are also crucial to track the development of these skills in autistic children, allowing researchers to identify potential predictors of long-term language, communication, and social outcomes.

5.5 Conclusion

To conclude, this PhD project attempts to contribute to the field of child language narrative research by shifting the focus from the structural aspects of narratives to some functional and meaning-related dimensions. By examining the topics, coherence of personal narratives, and inferential comprehension in fictional narrative context in the narratives of Hindi-speaking children with and without autism, this research has attempted to provide a more comprehensive understanding of the social communication and understanding of inferences of children with autism.

The findings of this research have implications for speech therapists working with children from culturally and linguistically diverse backgrounds. Understanding what contents are functional and meaningful for autistic children and their families enables therapists to develop more targeted and effective interventions that focus on the psycho-social development of these children.

This PhD project has contributed to a deeper understanding of the functional aspects of the narrative abilities of children with autism and has provided a foundation for future research in this area. The findings of this research have the potential to inform the development of more

effective interventions and therapies for children with autism, specifically autistic children with lower support needs.

References

- Allé, M. C., Schneider, P., Rigoulot, L., Gandolphe, M. C., Danion, J. M., Coutelle, R., & Berna, F. (2025). Narrative identity differences in autism. *Scientific Reports*, 15(1), 16990.
- Arnaud, S. (2020). Emotional consciousness in autism. *Journal of Consciousness Studies*, 27(9-10), 34-59.
- Atherton, G., Morimoto, Y., Nakashima, S., & Cross, L. (2023). Does the study of culture enrich our understanding of autism? A cross-cultural exploration of life on the spectrum in Japan and the West. *Journal of Cross-Cultural Psychology*, 54(5), 610-634.
- Bagatell, N. (2007). Orchestrating voices: Autism, identity and the power of discourse. *Disability & Society*, 22(4), 413-426.
- Capps, B. (2022). One health requires a theory of agency. *Cambridge Quarterly of Healthcare Ethics*, 31(4), 518-529.
- Cresswell, L., & Cage, E. (2019). 'Who am I?': an exploratory study of the relationships between identity, acculturation and mental health in autistic adolescents. *Journal of Autism and Developmental Disorders*, 49(7), 2901-2912.
- Fasulo, A. (2019). A different conversation: Psychological research and the problem of self in autism. *Integrative Psychological and Behavioral Science*, 53(4), 611-631.
- Gagarina, N., Klop, D., Kunnar, S., Tantele, K., Välimaa, T., Bohnacker, U., & Walters, J. (2019). MAIN: multilingual assessment instrument for narratives-revised.
- Gainer Sirota, K. (2010). Narratives of transformation: Family discourse, autism and trajectories of hope. *Discourse & Society*, 21(5), 544-564.
- Habermas, T., & de Silveira, C. (2008). The development of global coherence in life narratives across adolescence: temporal, causal, and thematic aspects. *Developmental psychology*, 44(3), 707.
- Lamash, L., Gutman, Y., Meyer, S., & Gal, E. (2025). Aligning Perspectives: Autism Identity, Independence, Participation, and Quality of Life in Autistic Adolescents Through Self and Parental Reports. *Journal of Autism and Developmental Disorders*, 1-12.
- Lee, M., Martin, G. E., Hogan, A., Hano, D., Gordon, P. C., & Losh, M. (2018). What's the story? A computational analysis of narrative competence in autism. *Autism*, 22(3), 335-344.
- Li, Z., & Qi, C. (2023). Why can't children with autism integrate into society in China? Study based on the perspective of NGO classification. *Frontiers in Public Health*, 11, 1041815.
- Nayar, K., Landau, E., Martin, G. E., Stevens, C. J., Xing, J., Sophia, P., ... & Losh, M. (2024). Narrative ability in autism and first-degree relatives. *Journal of Autism and Developmental Disorders*, 1-16.
- Reese, E., Haden, C. A., Baker-Ward, L., Bauer, P., Fivush, R., & Ornstein, P. A. (2011). Coherence of personal narratives across the lifespan: A multidimensional model and coding method. *Journal of cognition and development*, 12(4), 424-462.
- Srivastava, V., Chan, A., & Westerveld, M. F. (2023). What do children in India talk about? Personal narratives of typically developing Hindi-speaking children. *Folia Phoniatrica et Logopaedica*, 75(6), 447-455.

Tawankanjanachot, N., Melville, C., Habib, A., Truesdale, M., & Kidd, L. (2023). Systematic review of the effectiveness and cultural adaptation of social skills interventions for adolescents with autism spectrum disorders in Asia. *Research in Autism Spectrum Disorders*, 104, 102163.

Westerveld, M. F., Filiatrault-Veilleux, P., & Paynter, J. (2021). Inferential narrative comprehension ability of young school-age children on the autism spectrum. *Autism & developmental language impairments*, 6, 23969415211035666.

Appendices

Appendix 1. Hindi version of the Global TALES protocol

Word-to-Word translation, where some words and phrases are replaced by meaning-wise translations

मैं आपको छे सवाल दि खाने जा रही हूँ। (सवाल लैमिनेटेड कार्ड पर टाइप किये जाते हैं या आईपैड/टैबलेट पर एक निर्धारित क्रम में प्रस्तुत किये जाते हैं।) मैं हर सवाल को ज़ोर से पढ़ूंगी। हर सवाल आपको किसी ऐसी कहानी के बारे में बताने के लिए कहता है जिसमें आप हैं। मैं चाहती हूँ की आप मुझे इसके बारे में जितना हो सके उतना बताएं, ताकि मुझे यह ठीक तरह से पता चल सके की क्या हो रहा था, लेकिन ज़रूरी नहीं की कहानी बहुत लम्बी या बहुत खास हो। हर सवाल को सुने और उस समय के बारे में सोचें जिसके बारे में आप मुझे बता सकते हैं। जब आप शुरू करने के लिए तैयार हों, तो मुझे बताएं और मैं रिकॉर्डर ऑन कर दूंगी।

आप जितना चाहे उतना समय ले सकते हैं।

शुरू में दिए गए सवाल पढ़ें; फिर लगभग ५ सेकंड तक रुके। बहुत लम्बा न रुके -10 सेकंड से अधिक नहीं।

यदि बच्चा कुछ सोचने के लिए संघर्ष कर रहा है (यानी, ५ सेकंड से अधिक का विराम है, या बच्चा कहता है, "मुझे नहीं पता", तो हर कहानी संकेत के लिए दिए गए लिखित सहायक संकेतों को बच्चे के सामने पढ़ें।

यदि बच्चा किसी विषय के साथ शुरू के सवाल का जवाब देता है (उदाहरण के लिए, "हाँ, मैंने एक पुरस्कार जीता, "

या "मेरा भाई कभी-कभी परेशान करता है," तो सामान्य संकेत बोलते हुए आगे बढ़ें। मुझे इस बारे में एक कहानी बताओ !

इस सामान्य संकेत का उपयोग करने के बाद, केवल दिलचस्पी दिखाने वाला और उत्साह जनक चेहरा दिखाने का प्रयास करें। यदि बच्चा कुछ भी नहीं बोल रहा तो सामान्य संकेत दोहराएं, यदि बच्चा केवल एक या दो वाक्य बोलता है तो निम्नलिखित अतिरिक्त संकेतों के साथ आगे बढ़ें ।

क्या आप इस बारे में और बता सकते हैं ?

मैं आपकी कहानी के बारे में और जानना चाहती हूँ। क्या आप मुझे कुछ और बता सकते हैं।

क्या आप समझा सकते हैं की आपका उससे क्या मतलब है ?

आप बच्चे की बात जारी रखने के लिए और उसे प्रोत्साहित करने के लिए उसे शाबाशी दे सकते हैं। इस बात का ध्यान रहे की संकेत निष्पक्ष हो (अग्रणी नहीं)। उदाहरण के लिए, आप इस तरह की बातें कह सकते हैं :

बहुत खूब

यह तो दिलचस्प है !

अहां आप बच्चे द्वारा अभी- अभी बतायी गयी कोई बात दोहरा सकते हैं (बिना नयी जानकारी जोड़े)।
उदाहरण के लिए

"आपका परीक्षण वास्तव में कठिन था।"

"आप एक दौड़ की तैयारी कर रहे थे।"

प्रमुख प्रश्न पूछें और सहायक संकेत देने से बचें जैसे "आपकी कहानी कैसे समाप्त होती है ?"

सुनिश्चित करें की आप सेट आर्डर (१ से ६) का उपयोग करके सभी छह प्रोटोकॉल सवाल पूछते हैं।

प्रोटोकॉल संकेत और लिखित अनुवर्ती संकेत:

1. मुझे उस समय के बारे में कहानी बताएं जब आप सच में बहुत खुश थे।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) - और बच्चे मुझे एक खास पार्टी के बारे में बताते हैं, जैसे कि कोई घर की पार्टी , या कभी-कभी वे मुझे एक खास छुट्टी के बारे में बताते हैं जहाँ वो अपने परिवार के साथ गए थे।

2. मुझे उस समय के बारे में कहानी बताएं जब आप परेशान या घबराये हुए थे। शायद एक समय जब बहुत सारी चीजें हो रही थीं और आपको नहीं पता था कि क्या करना है।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) - और बच्चे मुझे उस समय के बारे में बताते हैं जब उनके पास स्कूल के लिए प्रोजेक्ट होता है, या कभी-कभी वे मुझे बताते हैं वह दूसरे घर गए तो क्या समस्याएं आयी।

3. मुझे उस समय की कहानी बताओ जब तुम सच में नाराज़ या गुस्से में थे।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) -और बच्चे मुझे किसी मित्र या भाई या बहन के बारे में कहानी सुनाते हैं। या कभी-कभी वे मुझे क्लास के किसी ऐसे बच्चे के बारे में बताते हैं जिसने उन्हें नाराज़ किया या उन्हें गुस्सा दिलाया ।

4. मुझे एक ऐसे समय के बारे में एक कहानी बताएं जब आपको खुद पर गर्व हुआ।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) - कुछ बच्चे मुझे उस समय के बारे में बताते हैं जब वे किसी और के लिए दयालु थे, या एक समय के बारे में जब उन्होंने कड़ी मेहनत की और पुरस्कार जीता।

5. मुझे एक ऐसे समय के बारे में एक कहानी सुनाएं जब आपको कोई दिक्कत थी और आपको इसे ठीक करना था। मुझे सब कुछ बताएं कि क्या हुआ और इसे ठीक करने के लिए आपको क्या करना पड़ा।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) - और बच्चे मुझे उस समय के बारे में बताते हैं जब उन्होंने किसी ऐसे आदमी की मदद की, जिसे कोई परेशानी थी, या जब उन्हें किसी परेशानी का सामना करना पड़ा और उन्हें यह पता लगाना पड़ा कि परेशानी को दूर करने के लिए क्या करना चाहिए।

6. मुझे कुछ ऐसी कहानी बताएं जो आपके साथ हुई हो जो आपके लिए बहुत खास थी।

लिखित अनुवर्ती संकेत (यदि आवश्यक हो) - कुछ बच्चे मुझे कुछ जीतने के बारे में बताते हैं या शायद ऐसे समय के बारे में जब उन्होंने स्कूल में बहुत अच्छा काम किया था।

Appendix 2. Narrative Coding Coherence Scheme by Reese et al., (2011)

Criteria	Context: Orienting the narrative in time and space	Chronology: Relating components along timeline	Theme: Maintaining and elaborating on topic
<i>Level 0</i>	No information about time or location is provided.	Narrative consists of a list of actions with minimal or no information about temporal order.	The narrative is substantially off topic and/or characterized by multiple digressions that make the topic difficult to identify. No attempt to repair digressions.
<i>Level 1</i>	Partial information is provided; there is mention of time <i>or</i> location at any level of specificity.	Naïve listener can place some but not most of the events on a timeline. Fewer than half of the temporally relevant actions can be ordered on a timeline with confidence.	A topic is identifiable and most of the statements relate to it. The narrative may include minimal development of the topic through causal linkages, or personal evaluations and reactions, or elaborations of actions.
<i>Level 2</i>	Both time and place are mentioned but no more than one dimension is specific.	Naïve listener can place between 50–75% of the relevant actions on a timeline but cannot reliably order the entire story from start to finish with confidence.	The narrative substantially develops the topic. Several instances of causal linkages, and/or interpretations, and/or elaborations of previously reported actions are included.
<i>Level 3</i>	Both time and place are mentioned and both are specific.	Naïve listener can order almost all (> 75%) of the temporally relevant actions. This includes cases in which the speaker marks deviations from temporal order or repairs a violated timeline.	Narrative includes all the above and a resolution to the story, or links to other autobiographical experiences including future occurrences, or self-concept or identity. Resolution brings closure and provides new information.

Appendix 3. Local Indicators of Global Coherence Identified at the Level of Propositions (Habermas & de Silveria's, 2008 list)

Type of global coherence	Code for local indicator	Example
Temporal ^a	Temporal indicators	
	Life phase	"I got to know her in fourth grade"; "When I was a baby"
Causal ^b	Age	"When I was 9"
	Calendar date	"In 2002"; "On May 6, 2006"
Causal ^b	Distance from present	"That was last year"; "2 years ago"
	Causally related states of long duration	
Causal ^b	Extended event	"I would really like to have a real change in my life because everything's gotten so confused."
	Personality	"I was a very shy person then. Therefore, I never dared to ask her"
Causal ^b	Causal links between personal states and events	
	Personality explains action	"We did a lot of boating, because my father likes rowing."
Causal ^b	Event explains personality	"I actually had problems with the teachers throughout school, because I am someone who doesn't like to adapt himself."
	Event explains personality	"If I hadn't joined the sports club then, I wouldn't have friends now, and I would still be a shy person."
Causal ^b	Biographical arguments	
	Developmental status	"After age 10, I became a shy person because the separation of my parents made me distrust others"
Causal ^b	Biographical background	"My parents' divorce didn't affect me much. I wasn't really aware of what was happening. I was still too little."
	Lessons learned	"When a car suddenly raced towards us, he panicked. He had been run over by a car when he was small."
Causal ^b	Life maxim, generalization	"All throughout childhood, my parents helped me with everything; they took care of all the paperwork, everything. And now I am 18, and I am still unable to organize my life."
	Formative experience	"That's why I told myself, next time I fall in love, school work should not suffer from it."
Thematic ^c	Illustration	"I swallowed a coin. Then I learned that I better not swallow small objects."
	Hedges	"I had received a bad mark, and I thought that she had given marks in a mean way. That's what you usually think when you get a bad mark"
Thematic ^c	Regarding explanations	"I was really emotionally hooked up with him for a long time. Probably that's what always happens when it's the first kiss."
	Regarding descriptions or interpretations	"My first relationship has influenced me extremely."
Thematic ^c	Complex cognitive processes	"I haven't learned to do things on my own [general statement], although I am able to use the subway on my own and stuff like that, but, for example, I do not have the faintest idea how to go about anything bureaucratic [exemplification]."
	Understanding	"Anna is a very complicated person, just like me. Maybe [hedge] that's why we make such a good fit."
Thematic ^c	Opinion	"Maybe [hedge] that's why I am so lazy"
	Opinion	"I'm not sure [hedge] whether I'm going to do well at the exam."
Thematic ^c	Opinion	"Now I am better able to control myself, I believe [hedge]."
	Opinion	"Even then I had already understood that my mother was mentally ill."
Thematic ^c	Opinion	"Then I realized how little I meant to him."
	Opinion	"I was always convinced that he didn't care for me."
Thematic ^c	Opinion	"I was of the opinion that I didn't need it."
	Opinion	

Note. Global rating scale values ranged from 1 to 7 points.

^a Temporal coherence (temporal orientation) = the degree to which the rater was able to follow the temporal sequence or/and the absolute timing of events in life, ranging from 0% to 100% of events. ^b Causal coherence (developmental consequentiality) = the degree to which the rater understood how past experiences explained how the personality, life, or outlook of the participant had changed and what the turning points and motives for these developments were, ranging from *no change in personality is described to the development of the personality is presented with its turning points and motives*. ^c Thematic coherence (plausible transitions) = the degree to which events followed each other in an unrelated way versus the degree to which implicit or explicit plausible links between events were provided. Raters had to decide on the relative amount of events or themes that had good transitions to the following event or theme, ranging from 0% to 100%.

Appendix 4. LITMUS Multilingual Assessment Instrument for Narratives (MAIN; Gagarina et al., 2019), The Cat and The Dog Story



The Cat Story



The Dog Story

Appendix 5 MAIN Comprehension Questions for the Dog Story

		Examples of correct responses	Examples of wrong responses	Score
0	Did you like the story?	Warm-up question, not scored		
D1.	Why does the dog jump/ leap forward? (point to pictures 1-2) (Episode 1: Goal)	Wants to get/ catch/ chase the mouse/ to play with the mouse Wants the mouse (In order) to + VERB (get, take) the mouse	Is leaving/ running/ wanted to jump Dogs are always jumpy	0 1
D2.	How does the dog feel? (point to picture 3) (IST as reaction)	Angry/ bad/ disappointed/ hurt/ in pain/ not good/ not comfortable	Good/ happy	0 1
D3.	(Only ask D3 if the child gives a correct response without explanation/ rationale in D2. If a correct explanation is provided in D2, then give a point in D3 and proceed to D4.) Why do you think that the dog is feeling angry/ disappointed/ hurt etc.? ⁸	Couldn't catch the mouse/ he bumped his head/ bumped into the tree It hurts when you bump into a/the tree The mouse escaped/ got away	Inappropriate/ irrelevant answer	0 1
D4.	Why does the boy jump/ leap upwards? (point to picture 5) (Episode 2: Goal)	Wants to get/ take his balloon (back) Wants his balloon (back) (In order) to + VERB (get, take) his balloon (back)	To climb the tree/ climb trees	0 1
D5.	How does the boy feel? (point to picture 6) (IST as reaction)	Good/ fine/ happy/ satisfied/ pleased	Bad/ angry/ mad/ sad	0 1
D6.	(Only ask D6 if the child gives a correct response without explanation/ rationale in D5. If a correct explanation is provided in D5, then give a point in D6 and proceed to D7.) Why do you think that the boy is feeling good/ happy etc.? ⁹	Has/ got the balloon back Could/ was able to + VERB (get, take) the balloon	He is smiling/ he looks like that/ he is standing or other inappropriate answer	0 1
D7.	Why does the dog grab the sausages? (point to picture 5) (Episode 3: Goal)	Decided/ wants to eat/ have/ steal the sausages/ Takes the chance/ opportunity when the boy is not looking	Wants to play with the bag	0 1
		Didn't get the mouse/ couldn't get/ take the mouse Dogs like sausages/ meat (generic meaning) Sausages are tasty/yummy		
D8.	Imagine that the boy sees the dog. How does the boy feel? (point to picture 6) (IST as reaction)	Bad/ angry/ sad/ mad not good	Good/ fine/ happy/ satisfied/ pleased	0 1
D9.	(Only ask D9 if the child gives a correct response without explanation/ rationale in D8. If a correct explanation is provided in D8, then give a point in D9 and proceed to D10.) Why do you think that the boy feels bad/ angry/ mad etc.? ¹⁰	Dog ate/ is eating/ took/ has taken his sausages Boy wanted to eat/ have the sausages (himself) They were the boy's sausages	Inappropriate answer	0 1
D10.	Will the boy be friends with the dog? Why?	No - give at least one reason (dog ate/ stole the sausages) or any other appropriate answer	Yes/ I don't know/ other irrelevant answer	0 1
D11.	Total score out of 10:			

Appendix 6 MAIN Comprehension Questions for the Cat Story

		Examples of correct responses	Examples of wrong responses	Score
0	Did you like the story?	Warm-up question, not scored		
D1.	Why does the cat jump/ leap forward? (point to pictures 1-2) (Episode 1: Goal)	Wants to get/ catch/ chase the butterfly/ to play with the butterfly Wants the butterfly (In order) to + VERB (get, take) the butterfly	Is leaving/ running/ wanted to jump Cats are always jumpy/ running	0 1
D2.	How does the cat feel? (point to picture 3) (IST as reaction)	Angry/ bad/ disappointed/ hurt/ in pain/ not good/ not comfortable	Good/ happy	0 1
D3.	(Only ask D3 if the child gives a correct response without explanation/ rationale in D2. If a correct explanation is provided in D2, then give a point in D3 and proceed to D4.) Why do you think that the cat is feeling angry/ disappointed/ hurt etc.? ³	Couldn't catch the butterfly/ fell into the bush It hurts to fall into a prickly bush Butterfly escapes/ got away	Inappropriate/ irrelevant answer	0 1
D4.	Why does the boy hold the fishing rod in the water? (point to picture 5) (Episode 2: Goal)	Wants to get/ take his ball (back) Wants his ball (back) (In order) to + VERB (get, take) his ball (back/ out)	To play in the water	0 1
D5.	How does the boy feel? (point to picture 6) (IST as reaction)	Good/ fine/ happy/ satisfied/ pleased	Bad/ angry/ mad/ sad	0 1
D6.	(Only ask D6 if the child gives a correct response without explanation/ rationale in D5. If a correct explanation is provided in D5, then give a point in D6 and proceed to D7.) Why do you think that the boy is feeling good/ fine/ happy/ satisfied etc.? ⁴	Has/ got the ball back Could/ was able to + VERB (get, take)	He is smiling/ he looks like that/ other inappropriate answer	0 1
D7.	Why does the cat grab the fish? (point to picture 5) (Episode 3: Goal)	Decided/ wants to eat/ have/ steal the fish Takes the chance/ opportunity when the boy is not looking	Wants to play with the fish	0 1
		Didn't get the butterfly/ Couldn't get/take the butterfly Cats like fish (generic meaning) Fish are tasty/ yummy		
D8.	Imagine that the boy sees the cat. How does the boy feel? (point to picture 6) (IST as reaction)	Bad/ angry/ sad/ mad/ not good	Fine/ good/ happy/ satisfied/ pleased	0 1
D9.	(Only ask D9 if the child gives a correct response without explanation/ rationale in D8. If a correct explanation is provided in D8, then give a point in D9 and proceed to D10.) Why do you think that the boy feels bad/ angry/ mad etc.? ⁵	Cat ate/ is eating/ took/ has taken his fish Boy wanted to eat/ have the fish (himself) It was the boy's fish	Fishing rod is on the ground or other inappropriate answer	0 1
D10.	Will the boy be friends with the cat? Why?	No - give at least one reason (cat ate/ stole the fish) or any other appropriate answer	Yes/ I don't know/ other irrelevant answer	0 1
D11.	Total score out of 10:			

Appendix 7. Statistical Results for Scoring MAIN Questions of LITMUS MAIN USING Binary Scoring

Total Comprehension Questions				
Fixed Effect	β	SE	z	p
(Intercept)	2.04	0.22	8.94	<0.001
Group (TD)	0.54	0.31	1.17	0.08
Random Effect	Variance	SD		
Participant	.25	0.50		
Story (Dog or Cat)	0.00	0.00		
Scores on D2				
Fixed Effect	β	SE	z	p
(Intercept)	1.87	0.53	3.48	<0.001
Group (TD)	1.49	1.15	1.30	0.19
Random Effect	Variance	SD		
Participant	2.573e-16	1.604e-08		
Story (Dog or Cat)	0.000e+00	0.000e+00		
Scores on D3				
Fixed Effect	β	SE	z	p
(Intercept)	2.1972	.60	3.61	0.00
Group (TD)	0.44	0.95	0.46	0.64
Random Effect	Variance	SD		
Participant	6.746e-14	2.597e-07		
Story (Dog or Cat)	9.045e-46	3.008e-23		
Scores on D4				
Fixed Effect	β	SE	z	p
(Intercept)	1.38	0.45	3.03	<0.001
Group (TD)	19.18	5337.62	0.00	0.99
Random Effect	Variance	SD		
Participant	0	0		
Story (Dog or Cat)	0	0		
Scores on D5				
Fixed Effect	β	SE	z	p
(Intercept)	1.38	0.45	3.03	<0.001
Group (TD)	1.98	1.11	1.77	0.07
Random Effect	Variance	SD		
Participant	0	0		
Story (Dog or Cat)	0	0		
Scores on D6				
Fixed Effect	β	SE	z	p

(Intercept)	1.87	0.53	3.48	<0.001
Group (TD)	1.49	1.15	1.30	0.19
Random Effect	Variance	SD		
Participant	4e-14	2e-07		
Story (Dog or Cat)	0e+00	0e+00		
Scores on D7				
Fixed Effect	β	SE	<i>z</i>	<i>p</i>
(Intercept)	1.60	0.48	3.28	<0.001
Group (TD)	1.75	1.12	1.55	0.11
Random Effect	Variance	SD		
Participant	4.854e-14	2.203e-07		
Story (Dog or Cat)	0.000e+00	0.000e+00		
Scores on D8				
Fixed Effect	β	SE	<i>z</i>	<i>p</i>
(Intercept)	1.87	0.53	3.48	<0.001
Group (TD)	1.49	1.15	1.30	0.19
Random Effect	Variance	SD		
Participant	1e-14	1e-07		
Story (Dog or Cat)	0e+00	0e+00		
Scores on D9				
Fixed Effect	β	SE	<i>z</i>	<i>p</i>
(Intercept)	1.81	0.80	2.26	<0.02
Group (TD)	0.66	0.79	0.83	0.40
Random Effect	Variance	SD		
Participant	5.493e-09	7.411e-05		
Story (Dog or Cat)	6.403e-01	8.002e-01		
Scores on D10				
Fixed Effect	β	SE	<i>z</i>	<i>p</i>
(Intercept)	1.87	0.54	3.45	<0.001
Group (TD)	-1.60	0.66	-2.42	p<0.01
Random Effect	Variance	SD		
Participant	0	0		
Story (Dog or Cat)	0	0		

Appendix 8. A Comparison of the Percentage of Correct Answers Using MAIN Protocol Scoring and the Refined Scoring Based on the PLAI-2

Questions	% of Correct Answers using Scoring Approach 1		% of children scoring 3 in relevance using the new scoring approach	
	TD Group	Autistic Group	TD Group	Autistic Group
D1	100%	100%	100%	100%
D2	96.6%	86.6%	96.6%	73.3%
D3	93%	90%	86.6%	43.3%
D4	100%	80%	96.6%	30%
D5	96.6%	80%	96.6%	80%
D6	96.6%	86.6%	96.6%	70%
D7	96.6%	83.3%	93%	40%
D8	96.6%	86.6%	76.6%	23.3%
D9	93%	83.3%	83.3%	10%
D10	86.6%	56.6%	50%	36.6%