Investigating the narrative expression of Mandarin-speaking monolingual and bilingual children: a corpus-based approach

Yucheng Liu

MSc in Education (Child development and Education),

2024

DECLARATION BY THE CANDIDATE AS AUTHOR OF THE DISSERTATION

1. I understand that I am the owner of this dissertation and that the copyright rests with me unless I specifically transfer it to another person.

2. I allow the Department to deposit on my behalf a copy of this dissertation in the Oxford University Research Archive ('ORA') where it shall be freely available online for use in accordance with ORA's Terms and Conditions of Use [https://ora.ox.ac.uk/terms_of_use].

3. I understand that this dissertation should not contain material that can be used to personally identify individuals or specific groups of individuals (unless permission has been obtained from the individuals) and that such material should be removed before this dissertation is deposited in ORA.

4. I agree to be bound by the terms of the ORA Grant of Non-exclusive Licence [https://ora.ox.ac.uk/deposit_agreements] and I warrant that to the best of my knowledge, making my thesis available on the internet will not infringe copyright or any other rights of any other person or party, nor contain defamatory material.

5. I agree that my dissertation shall be available for download in ORA in accordance with paragraphs 2, 3 and 4 above.

Signed [an electronic signature is sufficient]:	Yucheng Liu
Date:	22/12/2024

Abstract

Narrative expression plays a significant role in children's development and academic success. The two-structural framework is one of the most common tools to assess children's narrative expression, which includes macrostructural analysis and microstructural analysis. Previous studies have suggested that children's narrative abilities develop with age and that narrative expression might differ between monolingual and bilingual children (e.g., Bonifacci et al., 2018; Lindgren & Bohnacker, 2022; Justice et al., 2006). However, most previous studies have focused on narratives for Western languages (e.g., Bohnacker et al., 2022; Lindgren et al., 2023) Therefore, the present study aims to explore the narrative expression of Mandarin-speaking monolingual children and bilingual children whose second language is Mandarin across age groups (i.e., 3 to 9).

The two research questions with one sub-question are:

RQ1 Do monolingual and bilingual children differ in macrostructure and microstructure narrative expression within the same age group?

RQ2: Are there age differences in children's narrative expression within monolingual and bilingual groups?

RQ2a: Does the age effect on the development of narrative expression differ for bilingual and monolingual children?

The present study employed a corpora-based analysis using three open-access corpora: Zhou Narrative Corpus (2008), the Xinjiang Corpus (2012), and the "Left-behind" Ethnic Minority Children Corpus (2022). In this study, children's narratives were measured by two macrostructural metrics (i.e., story structure components and internal state terms) and five microstructural metrics (i.e., TNW, TNC, MLUw, MATTR, and VocD). For RQ1, data were organised into three age groups (i.e., 4, 5, 6). Within each age group, the independent variable (IV) was the language group (i.e., monolingual or bilingual), and the dependent variables (DVs) were the macrostructural and microstructural metrics. For RQ2, data were organised by language groups. Within each language group, the IV was age, and the DVs were the macrostructural and microstructural metrics. MANOVAs were used as the analytical approach.

There were significant differences in microstructural narratives between monolingual and bilingual children for the age 4, 5, and 6. However, no significant difference was found in macrostructural narratives between two language groups at ages 4 and 5, while significant differences were found at age 6 for story structure components. Furthermore, significant age effects were observed in monolingual children's microstructural and macrostructural

narratives. For bilingual children, a significant age effect was only found in microstructural narratives, while their macrostructural narratives did not differ across ages.

The current findings are generally consistent with previous studies, which show that monolingual and bilingual children differ in microstructural narratives while producing more similar performances in macrostructural narratives. Furthermore, the significant age effects found in this study are supported by previous research. The contribution of the current study is to provide an understanding of how Mandarin monolingual and bilingual children's narrative development varies across ages. Additionally, this study adds to understanding of the development of narrative structures for non-Western monolingual and bilingual children. However, the limitations of this study, including unbalanced sample sizes, highlight the need for further research.

Keywords：Narrative expression, Bilingual, Monolingual, Macrostructure, Microstructure

Acknowledge

I would like to express my heartfelt gratitude to all those who supported me throughout the process of completing this dissertation.

First and foremost, my deepest thanks go to my supervisor, Dr. Ernesto Roque-Gutierrez, for his invaluable guidance and constant encouragement during my research. His insightful feedback was instrumental in shaping this dissertation.

I am also deeply thankful to my peers, particularly everyone in the CDE cohort, for their helpful discussions, constructive critiques, and support throughout the research process.

My sincere appreciation goes to my family and friends, especially my parents, Nunu Zheng, and all my friends from OBSS, for their unwavering support and encouragement. Their understanding, patience, and belief in me kept me motivated during the most challenging times.

Without the assistance and support of all these individuals, this dissertation would not have been possible. I am truly grateful to each and every one of them.

Table of Content

Lists of Tables

List of Figures

Chapter 1: Introduction

1.1 Overview

Narratives are language tools that convey ideas, feelings, and history (Curenton & Lucas, 2007). The description of fictional events or storytelling is one common type of children's oral narrative expression and is identified as one ecologically valid measurement that contains rich language information (Curenton & Lucas, 2007; Gagarina et al., 2016). In specific, narrative expression is a suitable language assessment tool for both monolingual and bilingual children (Gagarina et al., 2016). Numerous studies have shown that children's narrative skills are essential predictors of their school readiness (e.g., Fiorentino & Howe, 2004; Oakhill & Cain, 2007; Piasta et al., 2018), closely linked to both cognitive development (e.g., socio-emotional abilities and communication knowledge; Beaudoin et al., 2016; Fiorentino & Howe, 2004) and academic development (e.g., early literacy and reading comprehension; Piasta et al., 2018; Wellman et al., 2011).

Among various frameworks that evaluate children's narratives, macrostructural-microstructural analysis is one of the most widely used frameworks across various languages (Gagarina et al., 2016). The macrostructural analysis focuses on the organization and story grammar of narratives, while microstructural analysis evaluates narratives from linguistic perspectives, such as vocabulary and grammatical features (Curenton & Lucas, 2007; Gagarina et al., 2015).

Rather than being born with, narrative abilities are acquired through over-time learning via interactions with families, peers, teachers, books, and other possible materials (Curenton, 2010). Therefore, children's narrative skills develop with age (e.g., Lindgren & Bohnacker, 2022). The age effect has been found in children's both macrostructural and microstructural abilities and is evident in both monolingual and bilingual children (e.g., Justice et al., 2006; Lindgren et al., 2023; Munoz et al., 2003). For instance, Berman and Slobin's (2013) study revealed that older children produced more complicated story structures. This pattern was found across monolingual children who speak Turkish, Spanish, German, English, or Hebrew. Regarding bilingual children, Lindgren et al.'s (2023) systematic review involving 43 studies also found a significant age effect on bilingual children's macrostructural narrative development.

Some researchers are concerned that bilingual children may not be able to receive adequate language exposure as their monolingual peers (e.g., August & Shanahan, 2006), which may lead to limited language competence (Lindsey et al., 2003). Therefore, comparing the narrative development of bilingual children with their monolingual peers seems necessary.

The majority of studies suggested that bilingual children showed weaker microstructural narrative abilities, which are heavily linguistically dependent (e.g., Bonifacci et al., 2018). In contrast to microstructural narratives, bilingual children are more likely to show more resemble performance in macrostructural abilities compared with their monolingual peers (e.g., Zhou, 2022). However, mixed results have been found when comparing bilingual and monolingual children's narrative skills. For instance, Hipfner-Boucher et al.'s (2014) study found that bilingual children produced narratives with less syntactic complexity compared to monolingual peers, while Bonifacci et al. (2018) refutes that there was no significant difference in syntactic complexity between bilingual children and monolingual children's narratives. Furthermore, most studies agree that bilingual children could have similar macrostructural abilities as monolinguals (e.g., Bonifacci et al., 2018; Hipfner-Boucher et al., 2014), while some studies found different results. For example, Vettori et al.'s (2022) study found that monolingual children excel bilingual children in story structures, while Chen and Yan (2011) suggested that Mandarin-English bilingual children tend to use more evaluative expressions, such as internal state terms, compared to English-speaking children. In sum, findings across studies that explore the narrative expression of monolingual children and bilingual children remain mixed.

1.2 Rationale for the Research

The rationale for the current research is that there are limitations and gaps in the field of bilingual and monolingual children's narratives, making further studies necessary. Firstly, one of the research gaps is the presence of controversial results in previous studies, highlighting the necessity for further investigation. For example, Bonifacci et al. (2018) found that bilingual and monolingual children could produce narratives with similar levels of syntactic complexity. In contrast, Hipfner-Boucher et al.'s (2014) study found monolingual children exceeded bilingual children in grammatical complexity. Secondly, most of these studies focus on children who speak Western languages, resulting in a biased sample representation in this field (Lindgren et al., 2023). In particular, Mandarin, as one of the most widely used languages in the world, has not been paid much attention in this research field. For instance, in Lindgren et al.'s (2023) systematic review including 42 studies exploring narrative expression using MAIN, only two of these studies focused on participants whose language is Mandarin. Thirdly, many studies did not include age as a variable in their studies, especially for studies that compared monolingual and bilingual children's narrative expression (Lindgren et al., 2023). As a result, the differences in narrative developmental trajectories for bilingual and monolingual children were under-researched.

1.3 Aim of the Study

The present study aims to fill the research gaps by investigating the narrative expression of children aged from 3 to 9 who are either Mandarin-speaking monolinguals or bilinguals whose second language is Mandarin, and comparisons between monolinguals and bilinguals will be conducted. In particular, the study focuses on bilingual children whose first language is a minority language in China. Further, the development pattern of monolingual and bilingual Mandarin-speaking children will be explored. Two research questions with one sub-research question are RQ1: Do monolingual and bilingual children differ in macrostructure and microstructure narrative expression within the same age group? RQ2: Are there age differences (3 to 9 years old) in children's narrative expression within monolingual and bilingual groups? RQ2a: Does the age effect on the development of narrative expression differ for bilingual and monolingual children?

1.4 Significance of the Study

The significance of this research lies in its potential to offer a general understanding of the narrative expression and developmental patterns of Mandarin-speaking monolingual and bilingual children. Specifically, the present study might be the first to compare monolingual Mandarin-speaking children with bilingual children whose first language is a minority language in China and whose second language is Mandarin. This study utilizes three high-quality corpora, enhancing the reliability and validity of the research.

1.5 Structure of the Dissertation

The present dissertation is comprised of five chapters.

Chapter 1 is the introduction, which offers a broad picture of the background information, the rationale, and the significance of conducting this study.

Chapter 2 is the literature review. This chapter discusses the importance of narrative expression and its evaluation methods based on empirical studies. Moreover, it critically evaluates studies on the narrative development of monolingual and bilingual children, identifies research gaps in this field, and raises research questions with corresponding hypotheses.

Chapter 3 is the methodology chapter. It details the research design, the corpora used in the present study, the rationales for macrostructural and microstructural analyses, coding and reliability, and ethical considerations.

Chapter 4 presents the results. It offers descriptive statistics and inferential statistics with appropriate assumptions checks, both of which answer the research questions.

Chapter 5 is the discussion chapter. This chapter restates the aim and research questions of the present study, discusses the analytical findings in relation to previous literature, evaluates limitations to inform future research, and discusses the contribution and implications of this study.

Chapter 2: Literature Review

2.1 Overview of the Chapter

This chapter provides the theoretical and empirical foundation for this research. Section 2.2 elaborates on the definition and importance of narrative expression. Section 2.3 introduces the two-structural framework as the evaluation method for narrative expression, including macrostructural and microstructural analyses. Section 2.4 discusses empirical studies on the narrative development of monolingual and bilingual children. Section 2.5 identifies the research gaps in this field and outlines the aim of this study. Finally, research questions and hypotheses are presented in Section 2.6.

2.2 Narrative expression

2.2.1 What is a narrative?

Narratives are language tools that convey ideas, feelings, and history (Curenton & Lucas, 2007). Based on the classic definition provided by Labov (1972), a narrative must be composed of at least two sequential clauses that describe the same experience or event. Therefore, narratives are identified as the description of events or experiences in a logical manner (i.e., same theme, space, or time; Curenton & Lucas, 2007). In general, children's oral narratives are the descriptions of fictional events or personal experiences in the present or the past (Curenton & Lucas, 2007). For this study, children's narratives are examined via their storytelling.

2.2.2 Why assess children's narratives?

Narrative abilities are important skills that children acquire from preschool years. Much evidence suggests that children's narrative skills could predict children's development in various ways, all of which could prepare children for formal schooling in both cognitive and academic domains (e.g., Fiorentino & Howe, 2004; Oakhill & Cain, 2007; Piasta et al., 2018). Besides playing an important role in children's development, narrative expression contains rich information, which is crucial for research. The importance of children's narratives in both children's development and research will be discussed in the following section.

Better narrative abilities enable children to succeed in school by facilitating cognitive development (Curenton, 2010). Fiorentino and Howe (2004) investigated the relationship between preschool children's narrative abilities and their school readiness via 25 English-speaking children (Mage = 4.8) from low SES backgrounds. By employing MacArthur Story-Stem Battery (MSSB; Bretherton et al., 1990) as the narrative elicit material, it was found that participants' narrative abilities were positively related to school readiness (e.g., social

knowledge, emotional maturity, and cognitive development). Therefore, Fiorentino and Howe (2004) argued that narrative skills were crucial clues that dynamically reflected children's cognitive development in the classroom environment. The validity of measurement for children's school readiness and narrative abilities was examined in this study. However, the limited sample size of this study may hinder its generalizability. Nevertheless, similar results have been found in Beaudoin et al.'s (2016) longitudinal study with a larger sample (N = 353). It was found that by facilitating children's narrative expression, children's socio-emotional skills and problem-solving skills in class increased correspondingly. Overall, children's narrative skills are related to their cognitive development, which plays an essential role in school readiness.

In addition to cognitive development, children's narrative abilities are also important for children's academic development, because narrative expression could serve as the foundation for academic information dissemination and acquisition (Gagarina et al., 2016). Specifically, narrative, as one component of emergent literacy, is closely associated with other emergent literacy factors and could predict reading development.

Under the theoretical framework of emergent literacy, narrative expression is one important skill alongside other skills, such as phonological awareness and vocabulary (National Early Literacy Panel, 2008; Whitehurst & Lonigan, 1998). For instance, narrative expression enables children to verbally interact and communicate with adults, a process that facilitates language development and early understanding of texts (Dickinson, 2011; Justice et al., 2008). Furthermore, shared book reading, a key approach to eliciting children's narrative expression, provides children with excellent opportunities to learn vocabulary, letter knowledge, and letter-sound correspondences (Justice et al., 2010).

As a consequence, narrative ability has been seen as a crucial factor in supporting children to learn reading, because much evidence indicates that narrative skills could bridge the printed text and oral language by enriching the opportunities for children to interact with printed text and stories (LeFevre, 2001; Sénéchal & LeFevre, 2002). In specific, the association between children's narrative skills and early word reading skills was found, and this association was believed as the reason why narrative expression could promote reading development (Sénéchal & Lever, 2014; Piasta et al., 2018). According to much empirical research, narrative expression could predict children's ability in word identification and decoding, both of which are key elements in supporting early word reading development. (National Early Literacy Panel, 2008). More specifically, Wellman et al. (2011) found that children's abilities in reading comprehension and word identification could be predicted by

children's macrostructural narrative skills while decoding could be predicted by microstructural narrative skills. This finding is further supported by Piasta et al.'s (2018) longitudinal study which involved a larger number of participants from more diverse backgrounds. The results showed that children's narrative abilities significantly predicted children's ability of word identification and decoding in two years. However, the effect size of children's narrative abilities in children's reading development was weaker than other emergent literacy skills, such as vocabulary and phonological awareness. Nevertheless, narrative expression could predict children's reading development and other emergent literacy skills to some extent.

Oral narratives possess ecological validity and contain rich resources of data (Gagarina et al., 2016). Generally, children's narratives are collected in relatively natural contexts that capture their linguistic and cognitive abilities. Concerning linguistic abilities, narratives can be used to assess various linguistic features, including macrostructure and microstructure (Gagarina et al., 2016). Additionally, Paradis et al. (2010) suggested that cognitive capacities can be captured by narratives, making them potentially less biased and more suitable for measuring language ability in bilingual children than other language assessment tools. Narrative expression is not only appropriate for monolingual children but also for bilingualism (Gagarina et al., 2016). Compared with previous language assessments, the advantage of narrative expression lies in its coverage of rich linguistic resources that can be compared across languages (Gagarina et al., 2016).

2.3 Evaluating children's narratives

Various methods and frameworks have been developed to evaluate children's narratives, such as the Narrative Assessment Protocol built by Justice and colleagues (2010) and the Story Pyramid Framework suggested by Curenton and Lucas (2007). Among these methods and frameworks, narratives are typically evaluated within a two-structural framework, where children's narrative expression is assessed through macrostructure and microstructure analysis (Gagarina et al., 2016). The macrostructural analysis focuses on the organisation and story grammar of narratives, while microstructural analysis evaluates narratives from linguistic perspectives, such as vocabulary and grammatical features (Curenton & Lucas, 2007; Gagarina et al., 2015). Even though Curenton and Lucas's (2007) Story Pyramid Framework evaluates children's narratives through broader features and is more culturally sensitive, the present study selects the two-structural framework to evaluate children's narratives for two reasons. Firstly, macrostructure and microstructure analysis can effectively assess the development of children's narratives, which is the key focus of the

present study (Ding et al., 2024). Secondly, macrostructural and microstructural analysis are the most frequently used frameworks to evaluate children's narratives, so adopting this analysis enables a richer understanding of this field and allows for comparison with a larger amount of previous literature (Curenton & Lucas, 2007). In the following two subsections, macrostructural and microstructural analyses will be introduced.

2.3.1 Evaluating children's narrative at the macrostructural level

The macrostructure of narrative expression focused on the overall organisation of the story. In specific, two frameworks, including high-point analysis and the story grammar approach, are used for analysing different types of narrative expression (Košutar et al., 2022). High-point analysis is often used in researching personal narratives (e.g., recalling personal stories), while the story grammar approach is usually applied in evaluating fictional narratives (e.g., telling or retelling a fictional story; Košutar et al., 2022). The present study specifically focused on researching children's narrative abilities in storytelling, so the story grammar approach was chosen as the key framework for macrostructural analysis.

The story grammar framework is based on the assumption that all stories follow a universal organisational structure of a setting and episode structure (Trabasso & Nickels, 1992). Based on this theoretical framework, Gagarina and colleagues developed the Multilingual Assessment Instrument for Narratives (MAIN) to analyse macrostructure (Gagarina et al., 2015). Based on the MAIN, the production of the macrostructure features is evaluated in three sub-sections, including the story structure components, structural complexity, and internal state terms (Gagarina et al., 2015).

2.3.1.a Story structure components

The story structure components are composed of six categories, involving 1) settings, 2) initiating event, 3) characters' goals, 4) character's attempts to achieve the goals (i.e., procedure), 5) outcomes of character's attempts, and 6) character's internal states that embark the goals and convey reaction (Gagarina et al., 2015). The scripts for children's narratives are coded based on the story structure components. An extract from 'Baby Bird' in the MAIN was used as an example to illustrate each component of the story structure:

One day [*Setting*], there was a mother bird who saw that her baby birds were hungry [*Initiating event*]. She wanted to find food for them [*Goal*], so she flew away to get food [*Attempt*]. The mother bird came back with a big worm for her children [*Outcome*]. Mother birds and baby birds were happy [*Internal states as reactions*].

2.3.1.b Structural complexity

The evaluation of structural complexity depends on the coding of story structure components, but further analysis carries on. It was argued that analysing structural complexity enables researchers to know the level of children's narrative development which could be used in cross-language comparison. The theoretical foundations of structural complexity in MAIN are Westby's binary decision tree (Westby, 2005) and clinical assessment. In MAIN, Gagarina and her teams (2015) established a more concise three-level model to evaluate structural complexity: 1) sequences, where children did not clearly state a goal; 2) incomplete episodes, where children clearly state a goal but omitted attempt or/and outcome; 3) complete episodes, where a complete structure of episodes (GOAL-ATTEMPT-OUTCOME) is achieved. Children who achieved complete episodes indicated that they acquired good narrative abilities, such as perspective-taking, causality, and meta-awareness in planning the goals and actions within the story (Trabasso & Nickels, 1992).

2.3.1.c Internal state terms (ISTs)

Awareness of characters' states of mind is the presupposition of cohesive narratives. This awareness enables children to interpret characters' intentions, goals, and emotions. Furthermore, sharing the internal states of characters provides information to listeners to follow and understand a narrative. The underpinning factor that supports this awareness is the theory of mind (ToM; Lorusso et al., 2007). Using internal state terms (ISTs) in narratives indicates children's ToM abilities as well as metacognitive and metalinguistic knowledge. The ability to use ISTs in narratives is important not only for narrative development but also for more advanced language and literacy development. This is because it was found that using ISTs in narratives is closely related to a literate style that is frequently used in school-based discourse and the development of complicated syntax (Grazzani & Ornaghi, 2012; Nippold et al., 2005). Mental state verbs are the primary focus for investigating ISTs, including belief verbs, motivational verbs, verbs of saying and telling, experiential expression, and emotion terms (Grazzani & Ornaghi, 2012). In MAIN, children's usage of ISTs is assessed to understand their awareness of characters' goal-directed behaviour and intentionality. To compare cross languages, parallel lexical items of ISTs from various languages were selected and categorised into six groups. These groups are metal verbs (e.g., think, want, decide), verbs of saying and telling (i.e., call, say), emotion terms (e.g., happy, sad), consciousness terms (e.g., awake, alive), physiological state (e.g., hungry, thirsty), and perceptual state (e.g., hear, see).

2.3.2 Evaluating children's narrative at the microstructural level

Microstructure analysis focuses on linguistic aspects of narrative expression, and it is considered language-dependent. The microstructure of narratives involves various dimensions, including productivity, lexical diversity, and syntactic complexity. Numerous measures for assessing the quality of the microstructure of narratives have been proposed during the past few decades. Each dimension of the microstructure of narratives with corresponding measures will be introduced and discussed in the following section.

2.3.2.a Productivity

The productivity for narratives is defined as the quantity of language (i.e., words and utterances) generated within a narrative sample. The productivity could reflect the length of narratives (Hao et al., 2018). Common measures of productivity are the total number of words (TNW; Hunt, 1970), the total number of terminable units (T-units; Hunt, 1966), and the total number of communication units (C-units; Loban, 1976).

2.3.2.b Lexical Diversity

In terms of lexical diversity, this dimension emphasises the number of different words used in a sample narrative. The greater lexical diversity indicates that a more varied vocabulary has been produced in a narrative. The number of different words (NDW) and type-token ratio (TTR; i.e., the ratio of the total count of different words to the total count of all words) are two commonly used measures for lexical diversity (Justice et al., 2006; Yu, 2009). However, it needs to be noticed that NDW is not a pure measure of lexical diversity, since NDW could be treated as a measure of productivity as well (Heilmann et al., 2010; Košutar et al., 2022). Furthermore, the reliability of using NDW and TTR for measuring lexical diversity in narratives has been challenged by some research (Malvern et al., 2004). The core challenge is that the results of both NDW and TTR are easily influenced by the length of the narratives. In this case, more sophisticated measures that take consideration of the narrative length have been developed, including the moving-average type-token ratio (MATTR; Covington & McFall, 2010), measure D (Malvern & Richards, 1997), and VocD (Zhou & Zhang, 2020).

2.3.2.c Syntactic complexity

Syntactic complexity is another crucial dimension for microstructures of narrative. Syntactic complexity pertains to the variety and sophistication of syntactic structures used in language production (Ortega, 2003). Overall syntactic complexity could be measured by using global metrics of language complexity, such as the mean length of C-unit (MLCU; Loban, 1976) and the mean length of utterance measured in words (MLUw; Bishop & Donlan, 2005).

Furthermore, the clausal density (CD) is another way to measure syntactic complexity (Ortega, 2003).

2.4 Development of Narrative Expression

Rather than being born with, narrative abilities were acquired through over-time learning via interactions with families, peers, teachers, books, and other possible materials (Curenton, 2010). With a higher quality of interaction, children are more likely to produce more advanced narratives, such as increasing the number of total words and more lexical diversity (Boyce et al., 2010). In general, the development trajectory of children's narrative expression universally followed the age increasing regardless of culture (Curenton, 2010). However, cross-cultural differences in narrative expression development might also be found (Curenton, 2010). In the following sections, monolingual children's narrative development and bilingual children's narrative development will be discussed.

2.4.1 Monolingual children's narrative development

Numerous studies revealed that age plays a significant role in children's narrative abilities development (e.g., Lindgren & Bohnacker, 2022). With age increases, children can produce stories with better cohesion, more complex structure, and more sophisticated language (Lindgren & Bohnacker, 2022; Roch et al., 2016). In general, children's ability to comprehend and produce complicated texts gradually increases, which facilitates their narrative development (Florit et al., 2014; Lever & Sénéchal, 2011).

The developmental period of children's narratives has been tracked by many researchers. For instance, Karmiloff and Karmiloff-Smith (2001) suggested that children's narrative development starts around age 3 and matures by age 9, while Justice et al. (2006) found that children's narrative development continues until age 10. Despite slight disagreements in the developmental periods, most researchers agree that the preschool period and the early years of primary school are significant for the development of children's narrative abilities (Roth, 2009). Karmiloff and Karmiloff-Smith (2001) argue that the development process could be divided into three stages. The first stage is for children aged between 3 to 5. In the first stage, children begin to use pronouns to refer to characters, but they show relatively poor cohesion (i.e., lexical or grammatical connectivity) in their narratives which is to due limited language proficiency. In the second stage (i.e., children aged between 6 to 7), children could clearly state the main characters as the subjects during their storytelling process and significant improvements in cohesion could be observed, while limited coherence (i.e., structural connectivity of stories) is still a problem. In the third stage (i.e., children between ages 8 to 9), the balance of cohesion and coherence in narratives could

be reached. However, the key limitation of this study is that the sample is restricted to English-speaking and French-speaking children, so limited generalizability might be a concern. Nevertheless, similar development patterns have been observed across languages. For instance, Zhu and Li (1987) found similar three-stage narrative development in Mandarin-speaking children.

The studies around the development of monolingual children's narratives will be evaluated on both macrostructural and microstructural levels in the following subsections.

2.4.1.a Monolingual children's development in macrostructural aspects

Various empirical studies have revealed that children's macrostructural abilities increase with age. Specifically, children's narrative abilities in all three macrostructural features, story structure components, structural complexity, and internal state terms, develop over time, although the development of each feature may occur at different ages. For example, Castilla-Earls et al.'s (2015) cross-sectional study investigated the narrative development of 109 monolingual Spanish-speaking children aged from 3 to 5. They found that older children could produce stories with more complicated structures. At age three, children only include the most basic components of the story, including actors and actions, and children at age 4 start to introduce the internal states of characters in their narratives. At age five, narratives with more complex structures were produced, including the first occurrence of setting and initiating events. The increased complexity of macrostructural features of narrative with age has been found across language. In Berman and Slobin's (2013) study, the narrative abilities of preschool children and school-aged children speaking Turkish, Spanish, German, English, or Hebrew have been examined. The results indicated that younger children tend to produce fewer story components (i.e., macrostructure) during the storytelling process. Specifically, they found that at age three, only 3% of the children could cover all initiating events, attempt, and outcome that were composed of a complete episode, while the number increased to 34% by the age of five. Despite this universal pattern, cross-language differences in narrative development have been found. For instance, only one-fourth of the Hebrew-speaking children at age 4 could include an initiating event, while 83% of the English-speaking children could do so. Cross-language differences could be supported by Carmiol and Sparks's study (2014), and they explained the differences as follows the diverse cultural contexts which emphasised different elements in the story.

Even though cultural and linguistic differences might influence children's narrative expression, and most literature on children's narrative development explores children who speak English or Latin languages, some studies focusing on Mandarin-speaking children also

found that children's macrostructural narrative abilities increase with age (Wu et al., 1984). Studies on Mandarin-speaking children's narrative expression could date back to the 1980s. Wu and colleagues (1984) focused on the development of fictional narratives among Mandarin-speaking children and found a significant age effect on children's macrostructural narratives. However, this early research was critiqued for limitations in study design, including the use of the same materials for both story-telling and retelling tasks, which might weaken the reliability. Nonetheless, in later decades, studies with more sophisticated designs have been conducted and similar results were found. For instance, Wang (2017) and Zhang (2007), who used Frog, Where Are You? as the key material for their studies, found evidence of a significant age effect on children's macrostructural abilities. Further, Sah (2011) found that children at the age of nine used more and higher quality internal state terms (i.e., emotions) compared to children at the age of five, based on both quantitative and qualitative methods. Sah (2011) argued that using internal state terms in the narratives is an important part of offering evaluation, which builds on children's understanding of the story elements, and linguistic and cognitive abilities.

2.4.1.b Monolingual children's development in microstructural aspects

Similar to macrostructural narratives, children's microstructural narratives rapidly develop through preschool age to late childhood. In specific, all three subgroups of microstructural narratives, productivity, lexical diversity, and syntactic complexity, increased along with children's age increases (e.g., Justice et al., 2006). When children get older, they can produce longer narratives with more diverse words (Roth, 2009). Similarly, more complex syntax could be observed in children's narratives, such as an increasing number of more complex clauses (Dasinger & Toupin, 2013; Kallay & Redford, 2021). For instance, Justice et al.'s (2006) study investigated the development of children's narrative microstructure based on 250 English-speaking children in the USA aged between 5 and 12. They found that children's productivity (i.e., TNW), lexical diversity (i.e., NDW), and syntactic complexity (e.g., MLT-W, MLT-M) developed with their age increase. Specifically, the developmental increase of microstructural narrative is more evident for younger children (i.e., 5-10), while the development for children in older age groups was not significant.

However, it should be noted that while the trend towards more sophisticated microstructural narratives is evident, there are some disagreements regarding the specific development for concessive age groups. Consistent with Justice et al.'s (2006) study, Mäkinen and colleagues (2014) found that there are significant differences in productivity (i.e., C-units & TNW), lexical diversity (i.e., NDW), and syntactic complexity (i.e., MLCU, CD) between

children aged 4 and those aged seven to eight by investigating 178 Finnish-speaking typical developing children. However, no significant differences were detected for syntactic complexity for consecutive age groups, while significant increases in productivity (i.e., C-units) and lexical diversity (i.e., NDW) were observed. The lack of significant increase in syntactic complexity across concessive age groups is supported by Westerveld et al.'s (2004) study of 268 children aged between 4;5 and 7;6 from New Zealand. Unlike Mäkinen et al.'s (2014) study, no significant increase in children's productivity was found between children aged 4 and 5 in Westerveld et al.'s (2004) study. Based on these studies, it can be inferred that children's microstructural narrative abilities develop over time, but these developments may not be significant between consecutive age groups.

Similar to monolingual children speaking English-related or Latin-related languages, significant age effects on monolingual Mandarin-speaking children's microstructural narratives have been found (Ding et al., 2024). Liu et al.'s (2017) study investigated the narrative development of 81 Mandarin-speaking children aged between 3 to 5. It was found that children could produce longer narratives with more complex syntax and more diverse vocabulary. Specifically, children could gradually produce more complex sentences in their narratives by using more between-sentence connections and more diverse structures, such as compound sentences and quoted sentences. However, Sah's study (2011) found that the length of the story did not increase followed by the trend of age increases and children at age five use more clauses compared to children at age 9, both findings which were inconsistent with the previous study. One possible explanation for this is that at age 9, children could produce clauses with complicated structures that conveyed more information, so they might be able to use fewer clauses to deliver a similar amount of information as children at age 5. Even though similar patterns of microstructural narrative development have been found in Mandarin-speaking children, the number of studies in this area is still limited, and existing research has produced some controversial findings.

2.4.2 Research studies on bilingual children's narrative development

Similar to monolingual children, bilingual children's both microstructural and macrostructural narrative skills in both languages improved with age (Lindgren et al., 2023).

Regarding the macrostructural narratives, Lindgren et al.'s (2023) systematic review indicates that the development could be typically observed between ages 3-4 and 6-7 bilingual children. In a more recent longitudinal study conducted by MacLeod and Pesco (2023), the development of bilingual children's narratives with age was also found. The participants were 60 preschool children whose first language is a minority language, while their second

language is French, the instructional language at school. The Edmonton Narrative Norms Instrument (ENNI) was used as the narrative measurement. It was found that with increasing exposure to French at school, the participants' narrative abilities in French developed, including the use of richer story components and greater structural complexity. However, the age effect for bilingual children's macrostructural narratives might be less evident for older age groups. For instance, no significant differences in macrostructural narratives have been found in Yang et al.'s (2023) study involving Kam-Mandarin bilingual children aged between 5 to 9 and Fiani et al.'s (2022) study for Arabic-French bilingual children aged between 6 to 9.

Regarding microstructural narratives, Munoz et al.'s (2003) study found a significant age effect on children's syntactic complexity but not on productivity. In this study, 24 bilingual preschool Latino children from minority communities were recruited, and English, their second language, was chosen as the target language for investigation. Half of the participants were younger than 5 years old, and the rest of the children were in the older group their mean age was 63.5 months. It was found that older children not necessarily produce longer stories, but they tend to use longer sentences with more complex grammar compared to children in the younger age group.

However, cross-language differences and transfer in bilingual children's narrative abilities might exist between two languages. Lindgren & Bohnacker (2022) used MAIN to elicit and assess participants' narratives, and their participants were 45 German-Swedish bilinguals 4- to 6-year-olds who lived in Sweden. The macrostructural narrative skills (i.e., story structural components and structural complexity) and microstructural narrative skills (i.e., productivity measured by TNW) increased with age in both languages. However, the scores of structural complexities in Swedish are higher than in German. Furthermore, the developmental patterns with age for these two languages were different. For instance, age is a stronger predictor for macrostructural narrative skills in Swedish than in German. One possible reason to explain this difference is that Swedish is the majority language, so with age increase, children attended full-time Swedish-instructed schools, which have more language exposure opportunities in Swedish than in German. In contrast to Lindgren & Bohnacker's (2022) study, most studies were more likely to observe cross-language differences in microstructural narratives than macrostructural abilities. For instance, Hao et al (2019) compared the narrative abilities of Mandarin-English bilingual children, and they found that the cross-language differences in macrostructural abilities are less evident compared to microstructural abilities. Various possible reasons were suggested by scholars to explain the differences in cross-language differences in microstructural narratives. One possible reason is

that microstructural narratives, compared with macrostructural narratives, are more sensitive to language proficiency and language exposure (Hao et al., 2019; Karlsen et al., 2016). In contrast to microstructural narrative abilities, macrostructural narrative abilities might be more likely to transfer across languages (Gagarina et al., 2012). In Bohnacker et al.'s (2022) study, 100 Turkish-Swedish bilingual children aged from 4 to 7 years old growing up in Sweden were recruited. The Multilingual Assessment Instrument for Narratives (MAIN) was chosen as the material for eliciting and assessing children's narratives. It was found that the macrostructural narratives (i.e., story structure components and structural complexity in Turkish and Swedish increased similarly in children aged from 4 to 7. In this case, Bohnacker et al. (2022) argued that the positive cross-language relationship indicates bilingual children's macrostructural skills in narratives could transfer between the two languages. Similarly, macrostructural narrative abilities have been found transferable in Tribushinini et al.'s (2022) study that investigated 32 Indonesian-Dutch bilinguals aged between 5 to 11.

2.4.3 Comparing the narrative developments for bilingual and monolinguals

The language and literacy development of bilingual children is a key concern for many researchers and educators. Concerns about language development delays arise because many bilingual children tend to have imbalanced language exposure for their two languages. For instance, some bilingual children are exposed to one language at school but use a completely different language at home. In this case, August and Shanahan (2006) revealed that these bilingual children face delays in their second language (i.e., the instructional language at school) development compared to their monolingual peers, who usually receive more and higher-quality language exposure. Specifically, poor linguistic competence and limited vocabulary knowledge are common issues that bilingual children might face (Lindsey et al., 2003). Various studies have suggested that there is a positive relationship between linguistic competence and narrative abilities. Therefore, concerns about bilingual children's narrative abilities compared to their monolingual peers have been raised.

Regarding to narrative development of bilingual children and their monolingual peers, most studies suggested that bilingual children show weaker microstructural narrative abilities, which are heavily linguistic dependent (e.g., Bonifacci et al., 2018). For instance, Uccelli and Páez (2007) conducted a longitudinal study that followed 24 Spanish-English children from preschool to primary school. The home language is Spanish, and the instructional language at school is English. Even though participants' productivity (i.e., TDW) and lexical diversity in English narrative skills significantly improved from preschool to grade 1 in primary school, their performance is under the average of their monolingual peers. However, it should be

noted that researchers did not directly assess monolingual children's microstructural narrative abilities, but rather they used the national average value for monolingual children's narrative abilities to conduct the comparison with their bilingual participants. In this case, the reliability of this comparison was weakened. Nevertheless, similar findings were detected by Bonifacci and colleagues (2018). By comparing 64 Italian monolinguals (Mean age: 4;8) and 64 bilingual children with Italian as their second language (Mean age: 4;8), they found that bilingual children showed lower productivity (measured by NTW) and less lexical diversity (measured by TTR) in their narratives compared with monolingual children, after controlling for age. However, similar levels of MLU and clauses were found for both monolingual and bilingual children, indicating that bilingual children do not differ in syntactic complexity from their monolingual peers. This finding is partially supported by Hipfner-Boucher et al.'s (2014) study, which found significant differences between monolingual English-speaking children and bilingual children in productivity and lexical diversity. However, Hipfner-Boucher et al. (2014) also found that monolingual children outperformed bilingual children in grammatical aspects. The differences between these two studies might be explained by differences in study design, as the task in Hipfner-Boucher et al.'s (2014) study was story retelling rather than direct storytelling. Overall, there is agreement on bilingual children's lower lexical diversity and productivity, while mixed results were found regarding syntactic complexity.

In contrast to microstructural narratives, bilingual children are more likely to show more resemble performance in macrostructural abilities compared with their monolingual peers (e.g., Zhou, 2022). Bonifacci et al.'s (2018) study found that the narratives of monolingual and bilingual children did not significantly differ in story components, structural complexity, and internal state terms. However, bilingual children tended to produce fewer settings and attempts compared to their monolingual peers, but these disparities were not significant. Similar findings were found in Hipfner-Boucher et al.'s (2014) study, where bilingual children produce narratives with similar levels of story grammar compared to their monolingual peers. However, the results of these studies were challenged by Vettori et al.'s (2022) study. They found that bilingual children lag significantly behind their monolingual peers in story structures. The possible explanation might be that the age group in Vettori et al.'s study consisted of primary school children, whereas participants in previous studies were preschool children. As children grow up, macrostructural narratives might become more language-dependent. In addition to differences in story grammar, differences in internal state terms were also detected. Chen and Yan's (2011) study found that Mandarin-English bilingual children tend to use more evaluative expressions, such as internal state terms, compared to

English-speaking children. One explanation proposed by Chen and Yan is that Chinese culture is more sensitive to feelings and emotions. Influenced by this culture, Mandarin-English bilingual children may more easily detect and express characters' feelings in a story.

2.5 Research gap and the present study

Based on the previous literature review, the importance of narrative abilities in children's lives is highlighted, including predicting future reading development and literacy skills. Among all types of children's narrative expressions, storytelling or fictional narratives can be used by researchers as opportunities to analyse children's use of narratives with high ecological validity. Various frameworks and methods have been used to evaluate children's narrative expression, with the two-structural framework (i.e., macrostructure and microstructure analysis) being the most commonly used (Ding et al., 2024; Gagarina et al., 2016). Research on monolingual children's narrative development has found that both macrostructural and microstructural narrative abilities improve with age (e.g., Lindgren et al., 2023;). Similarly, significant age effects have been observed in the development of bilingual children's narrative expression (Lindgren et al., 2023).

Although these previous insights are valuable, there remain research gaps and controversies in the existing research for children's narrative development that require additional investigation. One of the research gaps in the current field is the presence of controversial results in previous studies. For instance, Bonifacci et al. (2018) found that bilingual and monolingual children could produce narratives with similar levels of syntactic complexity, while Hipfner-Boucher et al.'s (2014) study found monolingual children exceeded bilingual children in grammatical complexity. These disputes make it necessary to conduct further study. Furthermore, most of these studies focus on children who speak Western languages, resulting in a biased sample representation in this field (Lindgren et al., 2023). Among the studies focusing on Mandarin-speaking children, a popular research area in recent years is the comparison between typical children and children with developmental language disorders (e.g., Hao et al., 2018; Sheng et al., 2020), while the comparison of monolingual and bilingual Mandarin-speaking children has received limited attention. Even though a few studies choose to compare monolingual and bilingual Mandarin-speaking children, most of them explore the narrative differences between monolingual English-speaking children and bilingual Mandarin-English children (i.e., Mandarin as their first language, English as their second language). Additionally, Lindgren and colleagues' (2023) systematic review covering 42 studies revealed that one limitation in this field is that many studies did not include age as a variable in their studies, especially for studies comparing monolingual and bilingual

children's narrative expression. As a result, the differences in narrative developmental trajectories for bilingual and monolingual children were under-researched. Therefore, the present study aims to focus on the development patterns of narratives for monolingual Mandarin-speaking children and bilingual children whose second language is Mandarin. In particular, the study focuses on bilingual children whose first language is a minority language in China. The importance of this research lies in analyzing the trajectory of Mandarin as a second language for bilingual children, (Bonifacci et al., 2018).

2.6 Research questions and hypotheses:

The current study aims to explore two research questions, along with one sub-question, to investigate the Mandarin narrative expression of Mandarin-speaking monolingual children and bilingual children whose second language is Mandarin:

- RQ1: Do monolingual and bilingual children differ in macrostructure and microstructure narrative expression within the same age group?
- RQ2: Are there age differences (3 to 9 years old) in children's narrative expression within monolingual and bilingual groups?
    - RQ2a: Does the age effect on the development of narrative expression differ for bilingual and monolingual children?

Based on previous studies, the following hypotheses are made: For RQ1, it is hypothesized that within the same age group, monolingual children produce narratives with a higher level of microstructure, while monolingual and bilingual children do not differ in macrostructural narratives. For RQ2, it is hypothesized that there are significant age effects in narrative expression for both bilingual and monolingual children. Additionally, for the sub-question of RQ2, the hypothesis is that the development pattern of macrostructural narratives is similar for both bilingual and monolingual children, while bilingual children might show a slower growth rate in microstructural narratives compared to monolingual children.

Chapter 3: Methods

3.1 Overview of Chapter

This chapter introduces the methodological framework of the present study. The research design is explained in Section 3.2. In Section 3.3, the three corpora used in this study are described, including demographic information of participants, elicitation materials for narratives, data collection procedures, and coding and analysis standards. The rationale for macrostructural analysis is discussed in Section 3.4, covering subsampling, selection of stories, standardization of marking schemes, and comparison plans. The rationale for microstructural analysis is introduced in Section 3.5. Section 3.6 presents the coding plan for both microstructural and macrostructural analyses, along with an evaluation of coding reliability. In Section 3.7, the analytical approach used to answer the research questions is introduced. Finally, the ethical considerations of this study are presented in Section 3.8.

3.2 Research Design

The study design of the present study is a secondary cross-corpus analysis. The key rationale for employing secondary cross-corpus analysis is to access rich narratives from broader and larger samples. Further, cross-corpus analysis is suggested as one valid approach to compare children's linguistic and narrative abilities (Granger, 2010). Three open-access corpora shared on CHILDES and Endangered Languages Archive were used as the key materials to answer the research questions. These three corpora are the Zhou Narrative Corpus (2008), the Xinjiang Corpus (2012), and the "Left-behind" Ethnic Minority Children Corpus (2022). Children's narratives were investigated based on these three corpora via microstructural and microstructural analysis. The procedure of coding and data analysis were introduced in the section on procedure. Before that, the key information of three corpora, including participation, was introduced in the following section.

3.3 Corpora

3.3.1 Zhou Narrative Corpus (2011)

The Zhou Narrative Corpus contains the narratives of 116 monolingual Mandarin-speaking children aged from 3 to 6. These narratives were collected from 5 high-quality kindergartens in Shanghai, China, in 2008 for Li's doctoral dissertation (2011). Stratified sampling was used to recruit participants. Participants were recruited based on their age group and four age groups (i.e., ages 3, 4, 5, and 6) were included in this study. Within each age group, the gender ratio is around 50%. All participants were typically developing children who did not have language impairment or hearing loss. Besides, all participants were

identified as from highly educated families, because at least one of the participants' parents have a college degree.

The Chinese version of *The Very Hungry Caterpillar* by Eric Carle was used to elicit children's narrative expressions. This picture book was chosen because its illustrations provide information as rich as the text, allowing children to understand the story directly through the pictures. This approach helps control the influence of children's diverse literacy abilities on their narratives (Gao, 2009). *The Very Hungry Caterpillar* is a story about a caterpillar that grows from an egg, eats lots of food, builds a cocoon, and finally becomes a butterfly. The story starts with a setting where a little egg lies on a leaf in the light of the moon. After the sun rises, a caterpillar comes out of the egg and looks for food. On the following pages, the food that the caterpillar eats each day is depicted, and finally, the caterpillar builds a cocoon, then emerges from the cocoon and becomes a butterfly. Figure 1 shows two sample pages of this picture book. The full transcript and all pictures of this story can be found in Appendix 1.

Figure 1. Sample Pages of *The Very Hungry Caterpillar*

Data collection took place in the corners of classrooms. The book was first offered to the children to look through, and then researchers asked the participants to tell the story. Children were given enough time to read the book, and they were asked to tell the story while flipping through the book. During the children's storytelling process, if any child faced difficulties in continuing, researchers would repeat children's words or ask, 'What happened next?' rather than offering any hints about the following content of the story. If children read the text in the book, researchers would instruct them to tell the story based on the pictures and use their own words rather than read the text directly. Participants' narrative expressions were recorded via video.

Children's narratives were coded by researchers according to the rules and standards in CHILDES. To evaluate participants' narratives, the researchers developed a scoring scheme (Appendix 2) based on the keywords for each page in *The Very Hungry Caterpillar*. The keywords were divided into three categories: nouns related to the characters or key elements, verbs related to the actions of events, and adjectives related to the states of characters. GEM and GEMFREQ commands were used to organize the vocabulary that children produced for each page. Then, researchers evaluated whether this vocabulary matched the scoring table they had developed. If a word fully matched the scoring table, the child received 1 point. If the meaning was similar but not identical, the child received 0.5 points. If the keywords were missing or completely incorrect, the child did not receive any points.

3.3.2 "Left-behind" Ethnic Minority Children Corpus (2022*)*

This corpus recorded one segment of results from Yang et al.'s (2022) project on exploring the narratives of left-behind Kam-Mandarin bilingual children in South China. The original project collected narratives from 55 children, while this corpus contains the narratives of 20 of those children. The participants in this corpus were 5 to 9-year-old bilingual children whose home language was Kam and whose second language was Mandarin, which they began to acquire upon entering school (i.e., around age 3). All participants grew up with Kam as the family and primary community language. These participants were from rural areas in the Guangxi Zhuang Autonomous Region in South China, and at least one of their parents worked in cities, leaving them to be taken care of by other caretakers (usually grandparents or other relatives). All participants attended either kindergarten (5-7 hours per weekday) or primary school (7-8 hours per weekday), where formal instruction was in Mandarin. According to their caretakers, all participants were typically developing children without learning disabilities or other disorders that might affect language development.

Participants' narratives were elicited using the Kam and Mandarin versions of the Multilingual Assessment Instrument for Narratives (MAIN), a widely used assessment tool for comparing cross-linguistic narrative abilities. MAIN includes four picture-based stories: Cat, Dog, Baby Birds, and Baby Goat. Each story consists of six pictures depicting three episodes, and texts were not contained in this instrument. The materials for eliciting children's narratives are included in Appendix 3. Sample materials are shown in Figure 2. The stories and pictures in MAIN are built on rigorous theoretical foundations and empirical evidence. Each story in MAIN is in a fictional style, incorporating all important elements of fiction, such as setting, goals, attempts, and outcomes. It is suggested that MAIN is suitable for diverse cultures and languages.

Figure 2. Sample materials of MAIN (Baby Goat)

In this study, the Cat and Dog stories were used as materials for the story-retelling tasks, where children listened to the model story before retelling it. On the other hand, the Baby Birds and Baby Goat stories were used as materials for the independent story-telling process without model stories. Participants' narratives in both Kam and Mandarin were assessed. The 'Left-behind' Ethnic Minority Children Corpus contains 40 transcriptions of stories, including 20 stories for children's retelling narratives (10 in Kam and 10 in Mandarin) and 20 stories for children's independent storytelling narratives (10 in Kam and 10 in Mandarin).

Participants' narratives were evaluated only through macrostructural analysis. Three key components of macrostructural narratives in MAIN were used: story structure, story complexity, and internal state terms. The maximum score for story structure is 17 points. For each episode, five elements of story grammar (i.e., IST as initiating event, goal, attempt, outcome, IST as a reaction) account for 5 points. Therefore, the story grammar for three episodes totals 15 points, and an additional two points are given for the settings. A maximum of 9 points is given for story complexity (i.e., a maximum of 3 for each episode). For each episode, if none of the elements of goal, attempts, and outcome were depicted, a score of 0 would be given. If only the goal is missing, a score of 1 would be given. If the episode is missing either the attempt or outcome, a score of 2 would be given. Three marks would be given if a complete episode with GAO was expressed. The score for internal state terms was counted by the total number of IST tokens. The scripts of the original MAIN Stories and scoring sheets can be found in Appendix 4.

3.3.4 Xinjiang Corpus (2012)

In the Xinjiang Corpus, the narratives of 184 Uighur-Mandarin bilingual preschool children were collected. All participants were recruited from 12 public kindergartens in both rural and urban areas in Xinjiang Province, China. All the children's first and home language was Uighur, and their second language was Mandarin, which is also their instructional language at preschool. In preschool, all participants were mixed with other Mandarin monolingual peers. Participants were recruited based on their age group, with three age groups selected for this study: 4, 5, and 6 years old. An equal gender ratio was considered during sampling. Furthermore, all participants were identified as typically developing children whose language proficiency was representative of Uighur-Mandarin bilingual preschool children.

The Edmonton Narrative Norms Instrument (ENNI) was used to elicit children's narrative expressions. This assessment is suitable for evaluating the narratives of children aged 4 to 9. The ENNI is composed of three sets of pictures, each set representing a complete story. Since the ENNI does not involve any text, it is suggested to be suitable for measuring children who speak any language. The difficulty level of these three stories increases by increasing the number of characters and the number of pictures in each story. The first story, named A1 Ball, involves two characters and is composed of 5 pictures. The second story, named A2 Diving Board, involves three characters and is composed of 8 pictures. The third story, named A3 Airplane, involves four characters and is composed of 13 pictures. The sample pictures are shown in Figure 3. The pictures of each story could be found in Appendix 5. Children were given 5 minutes to read all three sets of pictures to familiarize themselves with the stories, and then tell the stories to the researchers. All participants were asked to use Mandarin to tell the story, and the children's narratives were recorded.

Figure 3. Sample Pictures of ENNI

According to the ENNI official website, children's narratives elicited by ENNI can be evaluated through both macrostructural and microstructural analysis. However, in Zhou et al.'s study (2014), only macrostructural analysis was used. Zhou et al.'s (2014) study focused

on investigating children's story grammar. Instead of entirely following the original ENNI scoring schema, Zhou et al.'s study (2014) analysed only six core components of story grammar: setting, initiating events, internal response, attempt, outcome, and the reaction of characters. Based on the story grammar scoring sheet provided by ENNI, additional components, such as characters and internal plans, can also be evaluated. The scoring sheet for story grammar offered by ENNI can be found in Appendix 6.

3.3.5 Corpora selection in the current study

The Zhou Narrative Corpus (2008), the Xinjiang Corpus (2012), and the 'Left-behind' Ethnic Minority Children Corpus (2022) are three corpora selected for use in the present study. The summary of these three corpora is shown in Table 1.

Corpus	Participants	Ages	Modes/Stories	Language(s)	Macrostructural analysis	Microstructural analysis
Zhou Narratives	Monolingual Mandarin-speaking chidlren (N=116)	3-6	*Very Hungry Caterpillar* (A picture book)	Mandarin	The researchers developed a scoring table based on the keywords in the story(i.e., three categories: Nouns related to characters or key elements; Verbs related to the actions of events; Adjectives related to the states of characters) Evaluation process: Full match with scoring table: 1 point Similar meaning but not identical: 0.5 points Missing or completely incorrect keywords: 0 points	None
Left-behind' Ethnic Minority Children	Bilingual Kam-Mandarin Children (N=20)	5-9	MAIN stories; T: Baby birds & Baby goats; RT: Cat & Dog	Kam; Mandarin	**Story structure Components**: setting (2 points) + elements within episodes (IST as initiating event, goal, attempt, outcome, IST as a reaction; each element is 1 point) * 3= 17 scores **Story Complexity** - The completeness of episodes based on Story Structure Components AO=1point, GA/GO=2points, GAO=3points **Internal state terms IST** the total number of IST tokens	None
Xinjiang	Bilingual Uighur-Mandarin Children (N=384)	4-6	ENNI A1-Ball; A2-Diving Board; A3-Airplane	Mandarin	Children's narratives were assessed based on setting, initiating events, internal response, attempt, outcome, and reaction of characters	None

Table 1. Summary of Zhou Narrative Corpus (2008), the Xinjiang Corpus (2012), and the "Left-behind" Ethnic Minority Children Corpus (2022)

*Note: T = telling; RT = retelling; IST = internal state term; G = goal; A = attempt; O = outcome

The Zhou Narrative Corpus (2008) and Xinjiang Corpus (2012) collected children's storytelling in Mandarin, while the 'Left-behind' Ethnic Minority Children Corpus (2022) contains children's storytelling and retelling in both Kam and Mandarin. To maintain consistency with the other two corpora and address the current research question focusing on children's storytelling in Mandarin, only participants (n = 10) who used Mandarin to directly

tell stories in the 'Left-behind' Ethnic Minority Children Corpus (2022) were involved in the present study. On the other hand, all narrative expressions of participants from the Zhou Narrative Corpus (2008) and the Xinjiang Corpus (2012) were used in this study.

3.4 Rationale for macrostructural analysis

The present study aims to use macrostructural analysis to gain a general understanding of children's organization of stories. Specifically, children's narrative expressions will be evaluated based on their accomplishment of story structure components (SSC) and usage of internal state terms (ISTs). Although all original studies of the three corpora used a macrostructural lens to explore their data, the present study will take a step further by considering age groups and language groups (i.e., monolingual and bilingual) when investigating macrostructural narrative expression. Therefore, the macrostructural analysis of children's narrative expressions will be conducted for each corpus to explore age effects (RQ2), and a comparison of the macrostructural analyses across the three corpora will be made to explore the differences between monolingual and bilingual groups (RQ1 + RQ2a).

3.4.1 Subsampling for macrostructural analysis

Due to the time-consuming nature of manual coding required for macrostructure analysis, selecting subsamples from each corpus is necessary to make this task feasible. The creation of a subsample for each corpus used stratified sampling based on age. In the Zhou Narratives Corpus (2008), 5 students were randomly selected from each age group (i.e., ages 3, 4, 5, 6), resulting in a total of 20 participants. Similarly, 5 participants from each age group (i.e., ages 4, 5, 6) in the Xinjiang Corpus (2011) were randomly selected to create the subsample, resulting in a total of 15 participants. Regarding the Left-behind Corpus (2022), it only includes the narratives of 10 participants for storytelling, which is a small number, so the narrative expressions of all participants of this corpus were examined via macrostructural analysis. In sum, the narrative expressions of 45 participants were analysed via a macrostructural lens.

3.4.2 Stories selection for macrostructural analysis

In total, six stories were used to elicit children's narrative expressions across the three corpora. The Zhou Narrative Corpus (2008) used *The Very Hungry Caterpillar*. The Xinjiang Corpus (2012) used three ENNI stories of increasing difficulty levels: A1 Ball, A2 Diving Board, and A3 Airplane. For the Left-behind Corpus (2022), 'Baby Bird' and 'Baby Goat,' two MAIN stories with parallel designs and similar difficulty levels, were used.

By using multiple stories as elicitations, the task effects on children's narrative expression should be considered. To make comparisons among corpora feasible and reduce

the task effects on children's narrative expression, selecting a subset of stories is necessary. Since only one story was used in the Zhou Narrative Corpus (2008), there is no need for selection. For the Xinjiang Corpus (2012), selecting one specific story from the three is essential because the different difficulty levels could extensively increase the task effect. Compared to the stories in the other two corpora, A1 Ball in the Xinjiang Corpus (2012) is relatively too simple, leaving A2 Diving Board and A3 Airplane as potential choices with more appropriate difficulty levels. However, according to Zhou et al.'s (2014) study, it was found that their participants' narrative expression dropped significantly when using the A2 Diving Board compared to the A3 Airplane, despite this story involving more pictures and characters. It was suggested that participants were less familiar with diving, as it is not a common activity for children living in Xinjiang. Therefore, A3 Airplane was selected as the elicitation for the Xinjiang Corpus since it has a comparable difficulty level to the stories in the other corpora and reduces the bias resulting from cultural unfamiliarity. For the Left-behind Corpus (2022), narratives elicited by both 'Baby Bird' and 'Baby Goat' were decided to be kept in the present study. The main reason is that these two stories were designed to be parallel to each other, allowing the same number and type of macrostructural components to be inferred from the pictures. Furthermore, no significant differences were found in children's performance between these two stories according to multiple empirical studies, indicating no task effect (Lindgren et al., 2023). Additionally, the sample size of the Left-behind Corpus is limited, so retaining both stories and thus keeping more children's narratives is important for generalizability.

3.4.3 Standardization of macrostructural analysis schemes for three corpora

Two core macrostructural features for analysing children's narrative development are story structure components and internal state terms, both of which are primarily based on the MAIN framework. The MAIN framework was chosen as the reference for macrostructural analysis because the validity and reliability of the MAIN framework have been tested via various studies (Lindgren et al., 2023). However, stories other than MAIN stories were used in Zhou Narrative Corpus (2008) and Xinjiang (2011), so tailoring the macrostructural scoring schemes according to the specific stories of these two corpora is necessary.

The original scoring scheme in the Zhou Narrative Corpus (2008) emphasized whether participants could speak keywords in the story (Appendix 2), leaving participants' overall story organization under-researched. Additionally, the story used in the Zhou Narrative Corpus (i.e., *The Very Hungry Caterpillar*) is relatively linear and lacks clear initiating events and goals for the main characters to work towards in some episodes, which differs from the

stories in the other two corpora that follow a more fictional structure. Due to the lack of exploration of story grammar in the original scoring scheme and the differences in story structure, developing a more standardized scoring sheet for evaluating the story grammar of *The Very Hungry Caterpillar* is necessary. By referencing the MAIN scoring schema for story structure components, a new macrostructural analysis coding scheme was developed for *The Very Hungry Caterpillar* (Appendix 7). Participants could earn a total of 17 points for story structure components, which include setting, initiating events, goals, attempts, outcomes, and characters' internal mental states as six key factors. Participants would receive one point for producing each story structure component. However, unlike the stories in other corpora, which have balanced story structure components in each episode, the character's attempts in this story occupy a significant portion of the story structure, while initiating events and goals might be absent in some episodes. Specifically, there are 8 attempts in this story, but only one initiating event and one goal. Nevertheless, differences in the scoring scheme are unavoidable due to the differences in story structure. Furthermore, the internal state terms usage was calculated as the total number of IST tokens, which reference to the MAIN coding scheme.

Unlike the Zhou Narratives Corpus (2008), the story (A3 Airplane) in the Xinjiang Corpus shares a very similar story structure to MAIN stories. Additionally, the ENNI scoring schema used in the Xinjiang Corpus (2012) is similar to the MAIN story structure components scoring scheme. Therefore, the ENNI scoring scheme can be easily adapted to follow the MAIN schema for consistency purposes in the current study (Appendix 8). A total of 17 points are included, following the same scoring structure as MAIN. For the Left-behind Corpus (2022), the original MAIN scoring scheme was applied (Appendix 4).

3.4.4 Macrostructure metrics for comparison

In terms of comparisons between monolingual and bilingual Mandarin-speaking children or between age groups, the total score of story structure components and internal state terms were selected as the focuses for comparisons. The reason for selecting story structure components and internal state terms as macrostructural metrics for cross-corpora comparison is that these two factors remain relatively stable despite differences in the stories. In addition to the features of corpora, theoretical reasons are also taken into account when selecting specific metrics for macrostructural analysis. Regarding the story structure components, many studies suggest that older children tend to produce more story structure components (e.g., Castilla-Earls et al., 2015; Lindgren et al., 2023). Therefore, the total score of story structure components is chosen as one macrostructure measure in the present study to compare language and age groups. Regarding the internal state terms, it was found in Chen

and Yan's (2011) study that Mandarin-English bilingual children tended to use more internal state terms in their narratives than English-speaking monolingual children, which indicates that children's narrative state terms usage might be more sensitive to certain culture which underpinning the language children acquired. Therefore, the present study aims to compare monolingual and bilingual children's internal state terms usage for bilingual children whose first language is minority language in China and monolingual Mandarin-speaking children.

3.5 Rationale for microstructural analysis

The microstructural analysis focuses on more linguistic aspects of children's narrative development. In specific, participants' narratives would be evaluated through the lens of productivity, lexical diversity, and syntactic complexity. Analysing microstructural narratives is particularly important in the present study because none of the three original studies of these corpora used microstructural analysis. Therefore, this aspect has been left as an unresearched area.

The total number of words (TNW) and the total number of C-units (TNC) are selected as two core metrics to measure the productivity of children's narratives. TNW was selected because it was one of the most prevalent measurements for productivity in numerous studies across various languages in this field, which indicates high validity and reliability (e.g., Yang et al., 2022). Further, the validity of TNW in evaluating productivity was supported by Justice et al.'s (2006) factor analysis. In addition to TNW, the total number of C-units was selected as another measurement for evaluating productivity. C-unit is known as the communication unit and its basic structure is 'an independent clause with its modifier' (Loban, 1976). In addition to other segmentation units, such as T-units, C-unit was considered a more suitable segmenting approach in assessing oral Mandarin narratives, which has been tested in previous studies (e.g., Hao et al., 2018; Yang et al., 2022).

Regarding the measurement of lexical diversity, the Vocabulary Diversity (VocD) and the Moving-Average (MATTR) were selected as predictors. VocD is one crucial indicator of lexical diversity in a narrative and could be calculated by CLAN. Compared with the total number of different words (TNW), VocD was suggested to be more robust and more appropriate for Mandarin-speaking children (Fan & Xu, 2024; McCarthy & Jarvis, 2007). Moreover, MATTR was selected to measure children's narrative expression because it was found that MATTR could yield stable values that reflect children's lexical diversity regardless of the length of the narratives (Zenker & Kyle, 2021).

In terms of syntactic complexity, the mean length of utterance in words (MLUw) was selected. The MLUw is calculated by the TNW divided by TNU. The reason is that MLUw

has been extensively researched and used in investigating the complexity of children's narratives in various languages, including Mandarin-speaking children (e.g., Hao et al., 2018, Ranti, 2015). Furthermore, MLUw is regarded as one of the most robust indicators for the syntactic complexity of children's narrative development.

Three key components of microstructural narratives will be compared within each corpus to investigate developmental trajectories for both bilingual and monolingual participants. However, only lexical diversity and syntactic complexity will be compared between bilingual and monolingual participants because the length of the stories in each corpus differs, making comparisons of productivity between corpora meaningless.

3.6 Coding and Reliability

All three corpora provided transcriptions in Chinese characters of all narrative samples following the Codes for Human Analysis of Transcripts (CHAT) format. These transcriptions served as the foundation of the coding process, while media (i.e., voice recordings) of the Zhou Narrative Corpus (2008) and Xinjiang Corpus (2012) served as potential supplements for coding when necessary.

Regarding the macrostructural analysis, I, as a native Mandarin speaker, served as the primary coder. The coding followed the standardized scoring schemes developed for the present study. These scoring schemes were tailored to each specific story, and standardization was applied to make comparisons between corpora feasible. The logic underpinning these adjustments for the scoring schemes was discussed in the previous section. By using standardized scoring schemes, two macrostructural scores were generated for each story: the total score of story structure components (i.e., maximum of 17 points) and the internal state terms score.

To ensure the reliability of the coding, a second coder independently scored the macrostructure of the narratives for all participants. The second coder is also a native Mandarin speaker and was blinded to the coding results of the first coder to avoid possible biases. The two coders discussed the inconsistencies between their coding, and some minor changes were made. The inconsistencies are often related to the identification of goals in children's narratives. The two coders discussed why these inconsistencies occurred and reached a more consensus-based agreement on how to identify goals in children's narratives. After all adjustments, inter-rater reliability was calculated for the total score of story structure components and internal state terms between the two coders. Cohen's kappa (κ) was applied. The Cohen's κ values for the total score of story structure components (SSC) and internal

state terms (IST) in all four stories are shown in Table 2. All Cohen's κ values are higher than 0.7, indicating good inter-rater reliability (Field, 2016).

	Zhou Narrative		Xinjiang		Kam	
	SSC	IST	SSC	IST	SSC	IST
Cohen's K	0.824	0.744	0.846	0.844	0.773	0.756

Table 2. Cohen's κ Values for Inter-rater Reliability

TNW (Total Number of Words), TNC (Total Number of C-unit), MLUw (Mean Length of Utterance in Words), MATTR (Moving-Average Type-Token Ratio), and VocD were selected as microstructural metrics to analyse participants' narratives. Their narrative expressions were coded into these five metrics via the Computerized Language Analysis (CLAN) program. The selection of these metrics was based on their effectiveness and the features of Mandarin narratives, ensuring the reliability of microstructural analysis in the present study.

3.7 Analytical approaches

The macrostructural data was obtained by manual coding followed by standardized scoring schemes, while the microstructural data was directly extracted from three corpora using CLAN. After data preparation, SPSS and R were utilized as the primary software for data analysis in this study.

Descriptive statistics were initially performed to provide a general overview of the data. For instance, the number of participants within each age group for each corpus was counted. Additionally, the mean and standard deviation of children's macrostructural and microstructural narratives were calculated. Visualizations of descriptive data were also created, such as boxplots of macrostructural metrics and microstructural metrics by language group and age group.

Beyond the descriptive statistics, inferential statistics were conducted to explore the research questions. Before running any inferential statistics tests, the assumptions of these tests were checked. After checking all assumptions of tests and made corresponding adjustment, inferential tests were conducted.

Regarding RQ1, six MANOVA were conducted to explore the difference between monolingual and bilingual Mandarin-speaking children in macrostructural narrative and microstructural narrative within the same age group (i.e., ages 4, 5, & 6). Comparisons were made within the same age group to investigate the influence of language status on narratives at similar developmental stages, thus minimizing the effect of age differences. Specifically, three MANOVAs focused on macrostructural metrics within the same age groups, and the

other three MANOVAs focused on microstructural metrics within the same age groups. For each MANCOVA, the independent variable was language (i.e., monolingual or bilingual). The dependent variables included either macrostructural metrics (i.e., the total score of story structure components and internal state terms) or microstructural metrics (i.e., MLUw, MATTR, and VocD). Regarding RQ2, four MANOVA analyses were performed. Two of the MANOVAs explored whether monolingual children's macrostructural and microstructural narratives improved with age. Similarly, the other two MANOVAs were used to examine whether bilingual children's narrative expression develops with age. In these MANOVAs, the independent variable was age, and the dependent variables were either macrostructural or microstructural metrics. Post-hoc tests were taken out if the MANOVA analyses revealed significant differences. Bonferroni and Scheffe tests were used for multiple comparisons to investigate whether narrative differences existed between specific age groups.

3.8 Ethic considerations

The ethics approval for the current study was granted by the Education Departmental Research Ethics Committee (DREC) at the University of Oxford (Appendix 9). The research ethics reference is EDUC_C1A_24_093. The data for the current research comprise three open-access corpora from CHILDES and the Endangered Languages Archive, all of which received ethical approval in their original studies and have open-access agreements with CHILDES and the Endangered Languages Archive. All participant information was kept confidential and none of it is identifiable. Furthermore, these data were used solely for research purposes and will be stored on a password-protected device (i.e., my laptop) and a OneDrive account (i.e., my University of Oxford account) for no longer than the research period.

Chapter 4: Results

4.1 Overview of Chapter

The present chapter presents the descriptive statistics and inferential statistics used to answer the research questions. Assumption checks for inferential tests are conducted, and appropriate adjustments are made.

4.2 Descriptive Statistics

There are two groups of data used in the current study. The first group is used for microstructural analysis, combining participants from both the Zhou Narrative Corpus and the Xinjiang Corpus. The Zhou Narrative Corpus consists of monolingual Mandarin-speaking children, while the Xinjiang Corpus includes bilingual children whose second language is Mandarin. Several missing values were present in age, MATTR, and VocD. The missing age values are due to the original authors not providing age information for some participants. The missing values for MATTR and VocD are due to the language samples not being dense enough for some participants, making it impossible to extract these metrics using CLAN. After excluding these missing values, the description of this data group, including the number of participants by age and language, is shown in Table 3.

	Age 3	Age 4	Age 5	Age 6	Total
Monolingual	16	26	26	30	98
Bilingual	NA	16	67	82	165
Total	16	42	93	112	263

Table 3. Number of participants by age and language group for microstructural analysis

The second group of data is used for macrostructural analysis. This group consists of a subsample from the Zhou Narrative Corpus (n = 20), the Xinjiang Corpus (n = 15), and the 'Left-behind' Corpus (n = 10), all with macrostructural coding. The combination of participants from the Xinjiang Corpus and the Left behind Corpus constitutes the bilingual group in this data set. The description of this data group is shown in Table 4

	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Total
Monolingual	5	5	5	5	NA	NA	NA	20
Bilingual	NA	5	6	6	4	1	3	25
Total	5	10	11	11	4	1	3	45

Table 4. Number of participants by age and language group for macrostructural analysis

	TNW		TNC		MLUw		MATTR		VocD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Monolingual (n = 98)	133.93	55.46	25.70	9.03	5.30	1.56	0.87	0.06	32.28	13.55
Bilingual (n = 165)	235.93	109.45	44.37	19.54	5.14	1.10	0.86	0.06	23.12	8.66

Table 5. Mean and Standard Deviation of microstructural metrics across language group

Table 5 provides a general overview of microstructural narrative expressions of monolingual and bilingual children. For TNW and TNC, Table 3 indicated that bilingual children produce longer narratives compared with monolingual children. This difference is likely due to the elicitation materials for bilingual children being much longer than those used for monolingual children. For MLUw, MATTR, and VocD, monolingual children generally have higher mean scores than bilingual children. However, the difference in MATTR between the two groups is very small.

	SSC		IST	
	Mean	SD	Mean	SD
Monolingual (n = 20)	6.10	5.21	3.15	3.20
Bilingual (n = 25)	5.08	3.39	2.96	2.47

Table 6. Mean and Standard Deviation of macrostructural metrics across language group

Table 6 reveals an overview of the macrostructural narrative expressions of monolingual and bilingual children. According to this table, the mean scores of story structure components and internal state terms are higher for monolingual children compared to bilingual children.

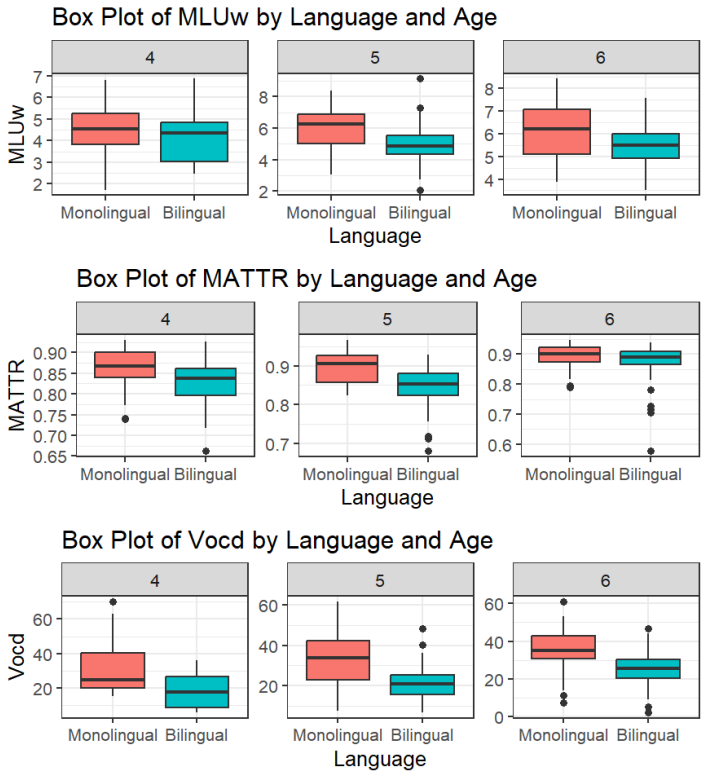


Figure 4. Boxplot comparison of microstructural metrics by language group and age

Figure 4 shows that monolingual children generally have higher median scores in MLUw, MATTR, and VocD compared to bilingual children at ages 4, 5, and 6. Across age groups, both monolingual and bilingual children show developmental progress in MLUw,

MATTR, and VocD. In general, monolingual children tend to show more consistent increases with less variability compared to bilingual children.

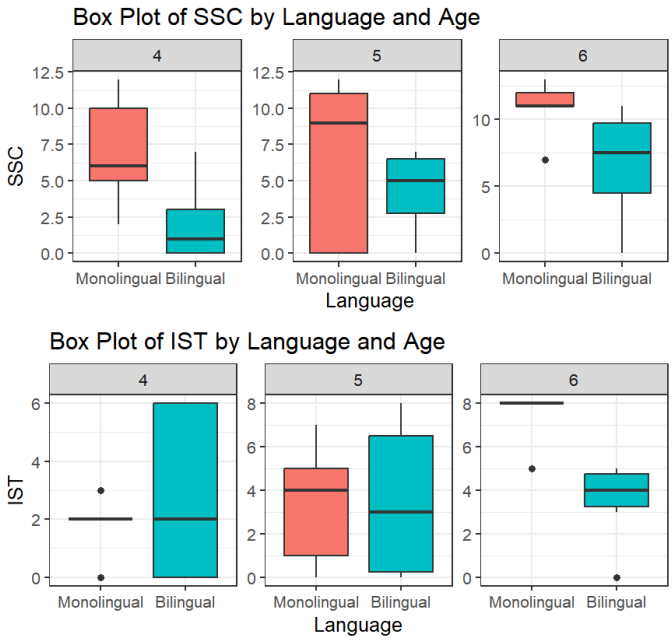


Figure 5. Box Plots of macrostructural metrics by Language and Age

Figure 5 indicates that monolingual children generally have higher median SSC (Story Structure Components) and IST (Internal State Terms) scores compared to bilingual children. The exception is at age 4, where monolingual and bilingual children have similar median IST scores. Furthermore, both groups show consistent improvement in SSC and IST across ages. Monolingual children's improvement in IST is more pronounced and less variable compared to bilingual children.

This section represents a preliminary approach to investigating children's microstructural and macrostructural narratives, with visualising comparisons based on age and language groups. In Section 4.4, these comparisons will be explored in greater depth using inferential tests.

4.3 Assumption Check

4.3.1 Assumption Check for Research Question 1

The first research question aimed to explore whether monolingual and bilingual Mandarin-speaking children differ in macrostructural and microstructural Mandarin narrative expression. To answer this research question, six one-way multivariate analyses of variance (MANOVAs) were selected as potential tests. Before running the assumptions of MANCOVA were examined using R. The assumptions of one-way MANCOVA are listed below (Filed, 2016).

- One independent variable needs to be measured at the categorical level and include at least two categorical groups
- Two or more dependent variables should be continuous variables
- Independence of observations is required
- A linear relationship between each dependent variable and each group of the independent variable should be assumed
- Multivariate normality should be present
- Homogeneity of variance is needed
- There should be no multicollinearity

The level of measurement of MANCOVA analysis was met for RQ1 because the independent variable is language, which contains two categorical groups (i.e., monolingual and bilingual), Further, the dependent variables are either three microstructural metrics or two macrostructural metrics, all of which are continuous variables.

The current study met the assumption of the independence of observation. There are different participants in the two language groups, and the observation of each participant is independent within the same language group.

To assess the remaining four assumptions, a summary of whether or not they are met is presented in Table 7. The following methods were used for each assumption check. Linearity was checked by drawing scatterplot matrices with LOESS lines. Multivariate normality was verified through multivariate Shapiro-Wilk tests. The homogeneity of variance was examined using Box's M-test. Lastly, multicollinearity was assessed by running Pearson correlations. Detailed outputs for these assumption checks can be found in Appendix 10.

Age group	DV	Linearity	Multivariate Normality	Homogeneity of variance	Multicollinearity	Test selected
Age 4	Microstructure metrics	No	p <.001	p = .002	No	Pillai's trace
	Macrostructure metrics	No	p = 0.259	p = 0.326	No	Wilks' Lambda
Age 5	Microstructure metrics	Yes	p <.001	p <.001	No	Pillai's trace
	Macrostructure metrics	No	p = 0.204	p = 0.310	No	Wilks' Lambda
Age 6	Microstructure metrics	No	p <.001	p <.001	No	Pillai's trace
	Macrostructure metrics	No	p = 0.288	p = 0.223	No	Wilks' Lambda

Table 7. Assumption Check for RQ1

In Table 7, it was shown that linearity was often violated, which reduced the power of the MANOVA. Regarding multivariate normality, the p-value was found to be less than .001 when the dependent variable was microstructural metrics across all age groups, indicating a violation of the assumption of multivariate normality. However, the decision was made to proceed with the MANOVA, as it is relatively robust to violations of multivariate normality (Field, 2016). Conversely, the assumption of multivariate normality was satisfied when the dependent variable was macrostructural narratives across the three age groups. When the dependent variables were the microstructural metrics, the p-value was found to be less than .05, indicating that the assumption of homogeneity of variance and covariance was not met. In this case, Pillai's trace was selected as the appropriate test, because it is the most robust to violations of homogeneity of variance and covariance among the four popular MANOVA tests (Field, 2016). For the macrostructural metrics, Box's M-test revealed that the assumption of homogeneity of variance and covariance was met. Consequently, Wilks' Lambda was selected for this analysis. Finally, the table suggests that no multicollinearity was found.

4.3.2 Assumption Check for Research Question 2

The second research question aimed to explore whether there are age differences in children's narrative expression within monolingual and bilingual groups. To address this question, four MANOVAs were selected as the potential statistical tests. Before conducting these MANOVAs, the assumptions of MANOVA were examined using R. The criteria for these assumptions were presented in the previous section. To assess the linearity, multivariate normality, homogeneity of variance, and multicollinearity, a summary of whether or not they are met is presented in Table 8. Detailed outputs for these assumption checks can be found in Appendix 11.

Language group	DV	Linearity	Multivariate Normality	Homogeneity of variance	Multicollinearity	Test selected
Monolingual	Microstructure metrics	No	p <.001	p <.001	No	Pillai's trace
	Macrostructure metrics	No	p <.001	p <.001	No	Pillai's trace
Bilingual	Microstructure metrics	No	p <.001	p <.001	No	Pillai's trace
	Macrostructure metrics	No	p = .158	NA*	No	Pillai's trace

Table 8. Assumption Check for RQ2

*Note: there are one or more levels with fewer observations than variables

The assumption of the level of measurement was met in RQ2. The independent variable for RQ2 is age, which is measured at the ordinal level. In the monolingual group, the independent variable includes four categories: age 3, age 4, age 5, and age 6. In the bilingual group, the independent variable includes six categories, ranging from age 4 to age 9. As in RQ1, all dependent variables are continuous variables. Further, the independence of observation was met as well.

According to Table 8, linearity was violated in all cases, indicating that the power of MANOVA was reduced. The assumption of multivariate normality was met only for the bilingual group with macrostructural metrics as dependent variables. In other cases, MANOVA was still conducted because this test is relatively robust to violations of multivariate normality. Additionally, homogeneity of variance was violated in all cases, so Pillai's trace was selected as the appropriate test. Finally, the assumption of no multicollinearity was satisfied.

4.4 Inferential Statistics

4.4.1 Inferential Statistics for Research Question 1

To explore the differences in microstructural narratives between monolingual and bilingual children in each age group, three MANOVAs were conducted for ages 4, 5, and 6.

Microstructural metrics	Monolingual (n = 26)		Bilingual (n = 16)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
MLUw	4.51	1.24	4.18	1.22	0.71	0.40	0.02
MATTR	0.86	0.05	0.82	0.07	4.09	0.05	0.09
VocD	31.01	14.73	18.73	10.03	8.61	0.01	0.18
MANOVA F (3, 38) = 2.91, p < .05; Pillai's Trace = .19, partial η2 = .187							

Table 9. Microstructural Metrics of Monolingual and Bilingual Children Aged 4

Based on Table 9, a significant difference between monolingual and bilingual children aged 4 in microstructural narrative expression was found, $F (3, 38) = 2.91$, $p < .05$; Pillai's Trace = .19, partial $\eta 2 = .187$. However, the between-subjects effect tests revealed that monolingual and bilingual children only significantly differed in VocD at age 4, $F (1, 40) = 8.61$, $p < .01$, partial $\eta 2 = .18$, while no significant differences were found in MLUw and MATTR.

Microstructural metrics	Monolingual (n = 26)		Bilingual (n = 67)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
MLUw	5.97	1.37	4.96	1.11	13.57	< .001	0.13
MATTR	0.90	0.04	0.85	0.05	18.11	< .001	0.17
VocD	33.92	13.54	21.01	7.60	33.84	< .001	0.27
MANOVA F (3, 89) = 12.80, p < .001; Pillai's Trace = .30, partial η2 = .30							

Table 10. Microstructural Metrics of Monolingual and Bilingual Children Aged 5

Table 10 revealed that there was a significant difference between monolingual and bilingual children's microstructural narratives at age 5, F (3, 89) = 12.80, p < .001; Pillai's Trace = .30, partial η2 = .30. In specific, statistical significances were found in all three microstructural metrics between monolingual and bilingual children at age 5, including MLUw (F (1, 91) = 13.57, p < .001, partial η2 = .13), MATTR (F (1, 91) = 18.11, p < .001, partial η2 =.17), VocD (F (1, 91) = 33.84, p < .001, partial η2 =.27)

Microstructural metrics	Monolingual (n = 30)		Bilingual (n = 82)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
MLUw	6.18	1.33	5.47	0.91	10.27	< .001	0.09
MATTR	0.89	0.04	0.88	0.06	1.39	0.24	0.01
VocD	35.94	12.98	25.71	8.48	23.60	< .001	0.18
MANOVA F (3, 108) = 18.01, p < .001; Pillai's Trace = .33, partial η2 = .33							

Table 11. Microstructural Metrics of Monolingual and Bilingual Children Aged 6

Regarding age 6, Table 11 shows that a significant difference between monolingual and bilingual children in microstructural narrative expression was found, F (3, 108) = 18.01, p < .001; Pillai's Trace = .33, partial η2 = .33. Specifically, the between-language-group differences were found in MLUw (F (1, 110) = 10.27, p < .01, partial η2 = .09) and VocD (F (1, 110) = 1.39, p < .001, partial η2 = .18), while no significant difference was found in MATTR (F (1, 110) = 1.39, p = .24, partial η2 = .012).

Macrostructural metrics	Monolingual (n = 5)		Bilingual (n = 5)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
Story Structure Components	7.00	4.00	2.20	2.95	4.66	0.06	0.37
Internal State Terms	1.80	1.10	2.80	3.03	0.48	0.51	0.06
MANOVA	F (2, 7) = 3.51, p = .09; Wilks' Lambda = .50, partial η2 =.50						

Table 12. Macrostructural Metrics of Monolingual and Bilingual Children Aged 4

Macrostructural metrics	Monolingual (n = 5)		Bilingual (n = 6)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
Story Structure Components	6.40	5.94	4.33	2.80	0.58	0.47	0.06
Internal State Terms	3.40	2.88	3.50	3.62	0.00	0.96	0.00
MANOVA	F (2, 8) = .69, p = .63; Wilks' Lambda = .89, partial η2 =.11						

Table 13 Macrostructural Metrics of Monolingual and Bilingual Children Aged 5

Macrostructural metrics	Monolingual (n = 5)		Bilingual (n = 6)		Between-subjects Effects		
	Mean	SD	Mean	SD	F	P	Partial η2
Story Structure Components	10.80	2.28	6.67	4.18	3.88	0.08	0.30
Internal State Terms	7.40	1.34	3.50	1.87	15.11	0.00	0.63
MANOVA	F (2, 8) = 7.77, p = .01; Wilks' Lambda = .34, partial η2 =.66						

Table 14. Macrostructural Metrics of Monolingual and Bilingual Children Aged 6

Based on Tables 12 to 14, when comparing group differences in macrostructural narratives within the same age group, a significant difference was found only at age 6 between monolingual and bilingual children, F (2, 8) = 7.77, p = .01; Wilks' Lambda = .34, partial η^2 = .66. No statistically significant differences between language groups were found at ages 4 and 5. For children aged 6, monolingual children used significantly more internal state terms than bilingual children, F (2, 8) = 15.11, p < .001, partial η^2 = .63, while there was no significant difference in the production of story structure components between monolingual and bilingual children.

4.4.2 Inferential Statistics for Research Question 2

	3 (n = 16)		4 (n = 26)		5 (n = 26)		6 (n = 30)		Between-subjects Effects		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P	Partial η2
TNW	87.00	40.11	116.69	54.08	159.73	48.21	151.53	50.33	9.53	< .001	0.23
TNC	23.44	9.65	26.19	10.40	27.81	9.81	24.67	6.35	0.96	0.41	0.03
MLUw	3.83	1.00	4.51	1.24	5.97	1.37	6.18	1.33	17.78	< .001	0.36
MATTR	0.83	0.08	0.86	0.05	0.90	0.04	0.89	0.04	6.54	< .001	0.17
VocD	24.82	10.05	31.01	14.73	33.92	13.54	35.94	12.98	2.68	0.05	0.08
MANOVA F (15, 248.85) = 4.18, p < .001; Pillai's Trace = .50, partial η2 =.187											

Table 15. Microstructural Metrics of Monolingual Children across Age Groups

Table 15 revealed that there was a significant increase in microstructural narrative expression for monolingual children with age increased, F (15, 248.85) = 4.18, p < .001; Pillai's Trace = .50, partial η2 =.187. Specifically, significant age effects were found on TNW (F (3, 94) = 9.53, p < .001, partial η2 = .23), MLUw (F (3, 94) = 17.78, p < .001, partial η2 = .36), and MATTR (F (3, 94) = 6.55, p < .001, partial η2 = .17). However, no significant age

effect was found in TNC (F (3, 94) = .96, p < .001, partial η2 = .03) and VocD (F (3, 94) = 2.68, p = .051, partial η2 = .08).

	3 (n = 5)		4 (n = 5)		5 (n = 5)		6 (n = 5)		Between-subjects Effects		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P	Partial η2
SSC	0.20	0.45	7.00	4.00	6.40	5.94	10.80	2.28	6.80	< .001	0.56
IST	0.00	0.00	1.80	1.10	3.40	2.88	7.40	1.34	17.62	< .001	0.77
MANOVA F (6, 32) = 6.64, p < .001; Pillai's Trace = 1.109, partial η2 = .55											

Table 16. Macrostructural Metrics of Monolingual Children across Age Groups

Similar to microstructural narrative expression, monolingual children's macrostructural narrative expression significantly differed across ages, MANOVA F (6, 32) = 6.64, p < .001; Pillai's Trace = 1.109, partial η2 = .55 (Table 16). Specifically, significant age effects were found on both story structure components (F (3, 16) = 6.80, p < .01, partial η2 = .56) and internal state term usage (F (3, 16) = 17.62, p < .001, partial η2 = .77).

	4 (n = 16)		5 (n = 67)		6 (n = 82)		Between-subjects Effects		
	Mean	SD	Mean	SD	Mean	SD	F	P	Partial η2
TNW	185.94	87.42	228.97	103.84	251.37	115.23	2.67	0.07	0.03
TNC	41.69	18.79	44.63	18.94	44.68	20.35	0.17	0.85	0.00
MLUw	4.18	1.22	4.96	1.11	5.47	0.91	12.26	< .001	0.13
MATTR	0.82	0.07	0.85	0.05	0.88	0.06	8.57	< .001	0.10
VocD	18.73	10.03	21.01	7.60	25.71	8.48	8.38	< .001	0.09
F (10, 318) = 3.34, p < .001; Pillai's Trace = .19, partial η2 =.095									

Table 17. Microstructural Metrics of Bilingual Children across Age Groups

According to table 17, a significant age effect on bilingual children's microstructural narrative expression was found, F (10, 318) = 3.34, p < .001; Pillai's Trace = .19, partial η2 =.095. Specifically, significant age effects were found on MLUw (F (2, 162) = 12.26, p < .001, partial η2 = .131), MATTR (F (2, 162) = 8.57, p < .001, partial η2 = .096), and VocD (F (2, 162) = 8.38, p < .001, partial η2 = .094). However, no significant age effect were on bilingual children's TNW (F (2, 162) = 2.67, p < .001, partial η2 = ..032) and TNC (F (2, 162) = .17, p < .001, partial η2 = .002).

	4 (n = 5)		5 (n = 6)		6 (n = 6)		7 (n = 4)		8 (n = 1)		9 (n = 3)		Between-subjects Effects		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P	Partial η2
SSC	2.20	2.95	4.33	2.80	6.67	4.18	5.25	1.71	11.00	NA	6.00	2.00	2.08	0.11	0.35
IST	2.80	3.03	3.50	3.62	3.50	1.87	2.75	1.71	4.00	NA	1.00	1.00	0.48	0.79	0.11
MANOVA F (10, 38) = 1.56, p = .18; Pillai's Trace = .48, partial η2 = .28															

Table 18. Macrostructural Metrics of Bilingual Children across Age Group

According to Table 18, no significant differences were found in bilingual children's macrostructural narratives across age group, MANOVA F (10, 38) = 1.56, p = .18; Pillai's

Trace = .48, partial η2 = .28. According to the tests of between-subjects effects, bilingual children's story structure components and internal state terms did not increase with age.

4.4.3 Comparison of age effects on macrostructural and microstructural narratives between language groups

Post hoc multiple comparisons were used to examine age effects on the microstructural and macrostructural narratives of monolingual and bilingual children. Bonferroni tests were employed when the sample sizes in each age group were relatively similar, while Scheffe tests were used for unequal sample sizes among age groups. Additionally, line charts depicting the mean scores of narrative metrics across different age groups were combined with the results of the post hoc multiple comparisons to illustrate children's narrative development. Furthermore, comparisons were made between the narrative developmental processes of monolingual and bilingual children.

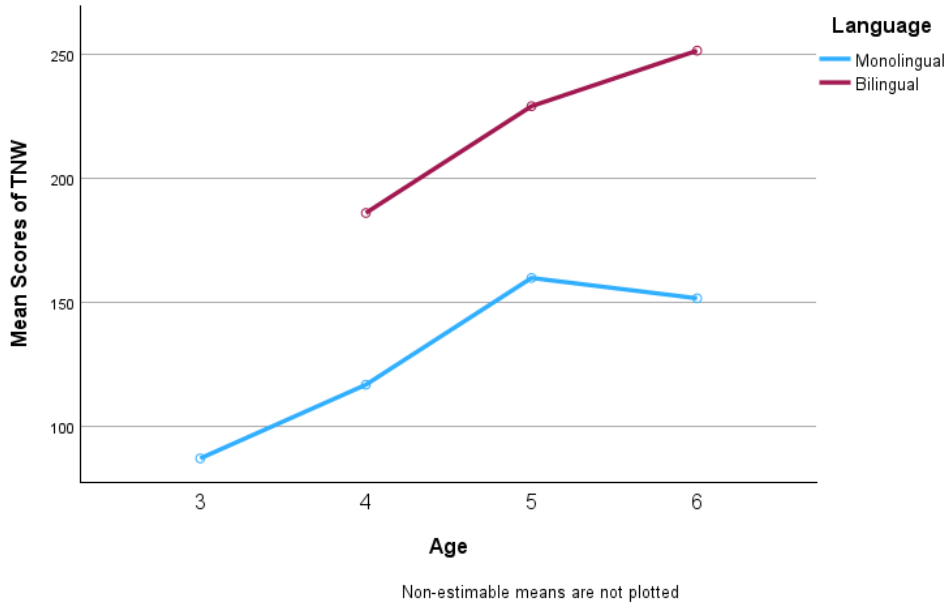


Figure 6. Mean scores of TNW across age groups for monolingual and bilingual children

Figure 6 indicates that the mean scores of TNW generally increase for both monolingual and bilingual children. Further, this figure shows that bilingual children produced more words than monolingual children. This is because the story (i.e., elicitation material) for bilingual children is longer than monolingual children. The Bonferroni tests indicated significant differences in TNW between monolingual children aged 3 and those aged 5 and 6. For contiguous age groups, significant differences in TNW for monolingual children were found between ages 4 and 5, but not between ages 3 and 4 or ages 5 and 6. For

bilingual children, however, no significant difference across ages was found in the Scheffe test.

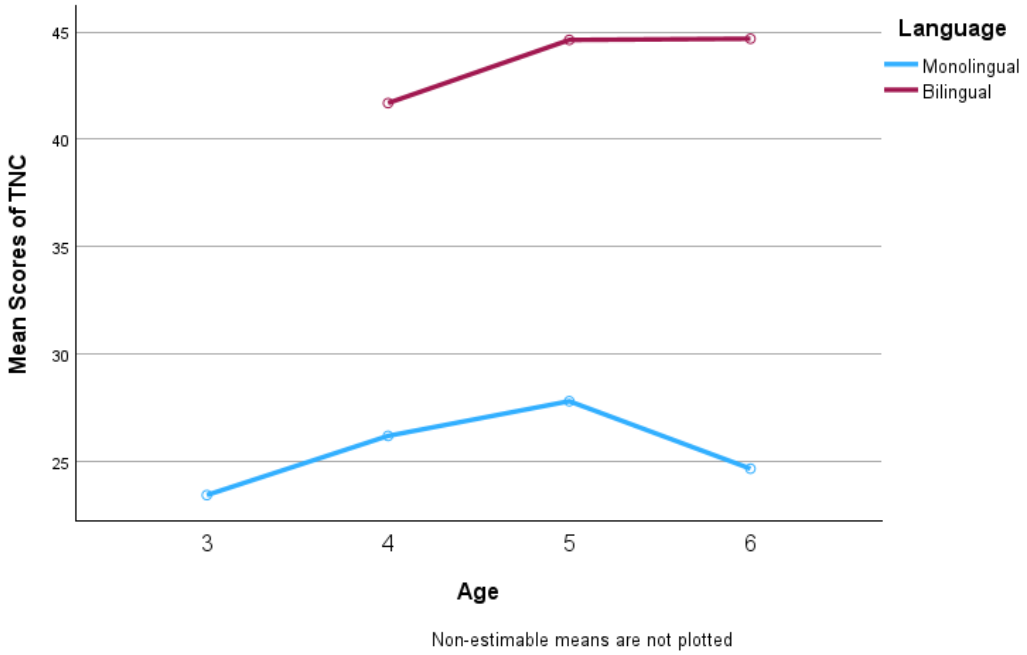


Figure 7. Mean scores of TNC across age groups for monolingual and bilingual children

Figure 7 shows some fluctuations in the mean scores of TNC across ages for monolingual and bilingual children. However, the post-hoc test did not find significant differences in TNC across ages for children from both language groups.

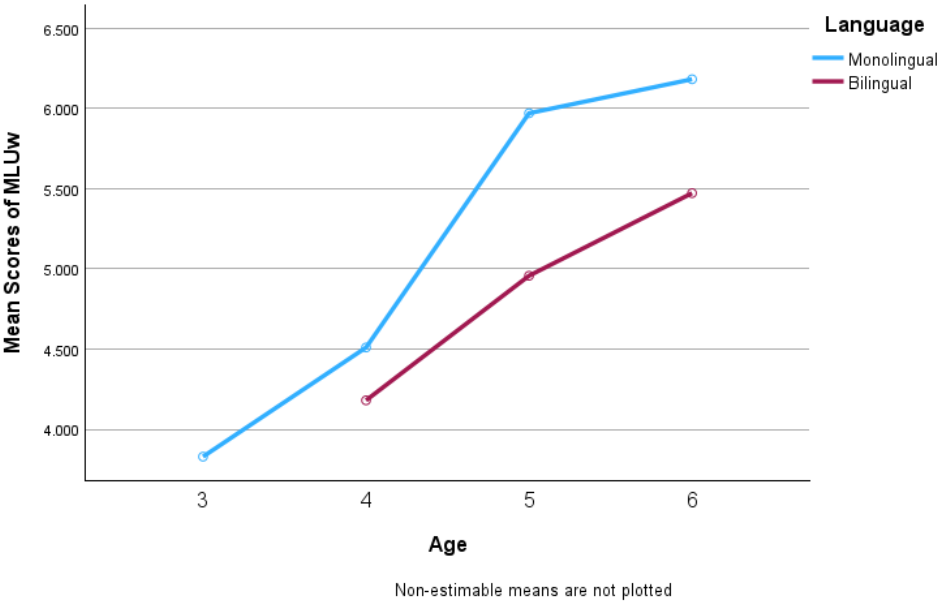


Figure 8. Mean scores of MLUw across age groups for monolingual and bilingual children

Based on Figure 8, monolingual and bilingual children's MLUw developed with age. The differences in MLUw between these two groups are relatively small at age 4, while the differences between groups increased when children at age 5 and 6. This is because

monolingual children's MLUw increases dramatically from 4 to 5, while bilingual children had a slower growth rate in MLUw in this age period. For the MLUw of monolingual children, significant age effects were observed between children aged 3 and those aged 5 and 6. However, no significant differences were found between two contiguous age groups, age 3 and 4 & age 5 and 6, while the MLUw of monolingual children aged 4 and 5 significantly differed from each other. For bilingual children, significant age effects in MLUw were found between all age groups.

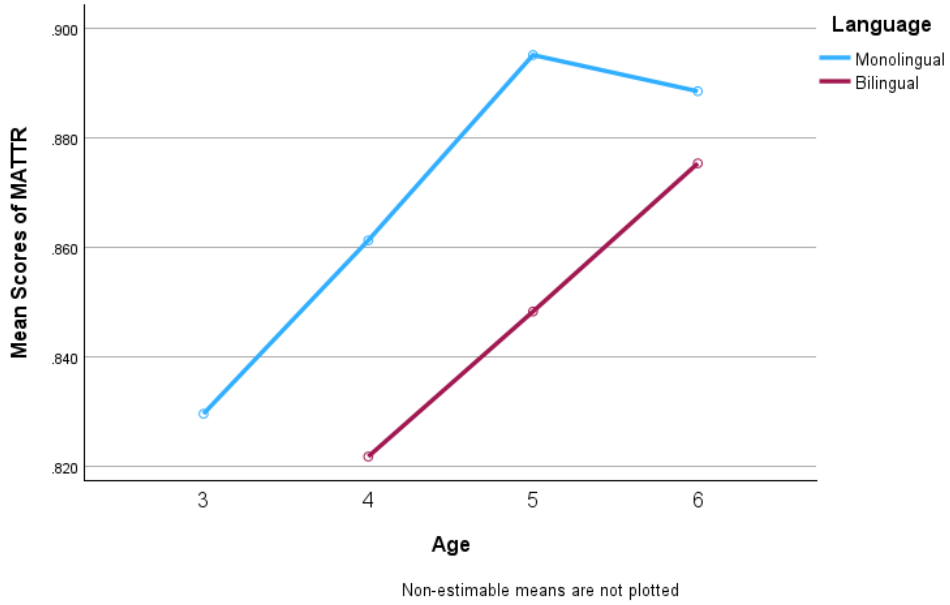


Figure 9. Mean scores of MATTR across age groups for monolingual and bilingual children

Figure 9 illustrates that the monolingual children's MATTR increased from age 3 to 5, but it dropped slightly from 5 to 6. For bilingual children, their MATTR increases consistently. The differences between the two groups are consistent as ages 4 and 5, and the difference has shortened by age 6. For monolingual children, significant age effects in MATTR were found only between age 3 and age 5 or 6. For bilingual children, the Scheffe test indicated that there were significant age differences between those aged 6 and aged 4 or 5. However, no significant age differences were found between ages 4 and 5.

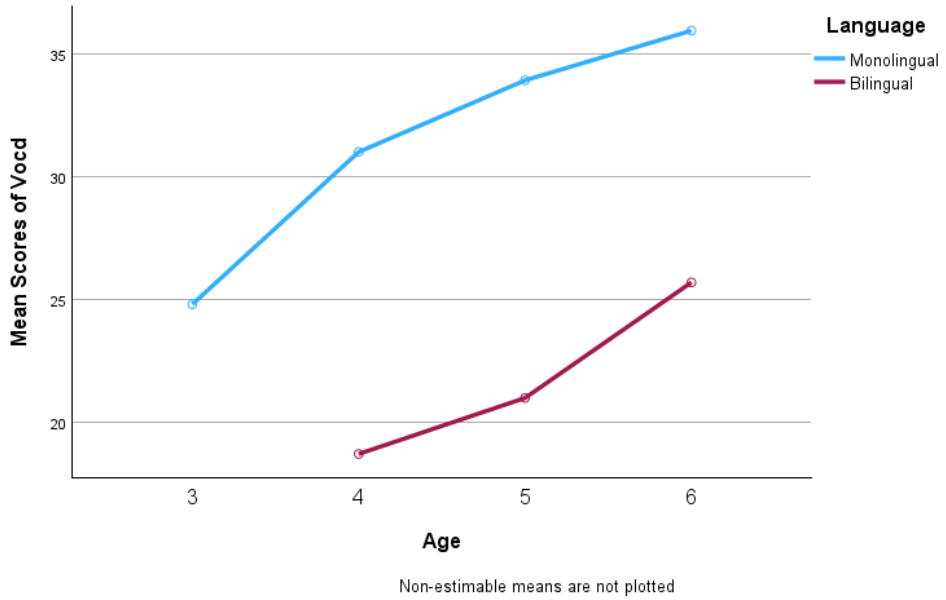


Figure 10. Mean scores of MATTR across age groups for monolingual and bilingual children

Figure 10 indicates that the VocD for monolingual children rises steadily, while the development rate for bilingual children is steeper. The post hoc test indicated that a significant age effect in monolingual children's VocD could only be found between age 3 and 6. The post hoc test revealed that significant age differences in VocD were found between bilingual children aged 6 and those aged 4 or 5. However, no significant age differences were found between ages 4 and 5.

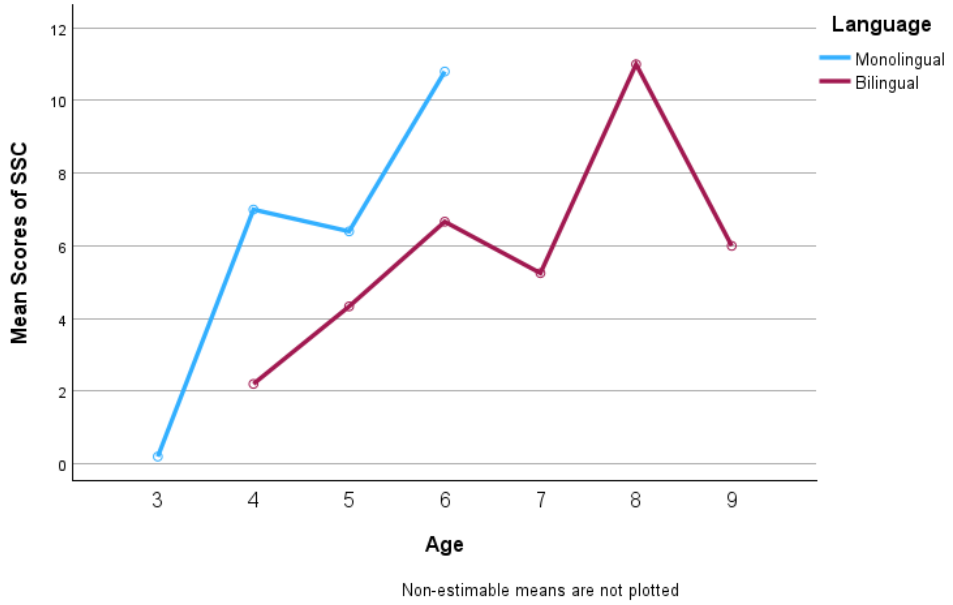


Figure 11. Mean scores of SSC across age groups for monolingual and bilingual children

Figure 11 illustrated that monolingual children's and bilingual children's ability to produce story structure components increased with age with fluctuations. Regarding the development of monolingual children's story structure components, a significant age effect

was found only between ages 3 and 6. For bilingual children, a significant age effect could be found between age 4 and those aged 6 or 8.

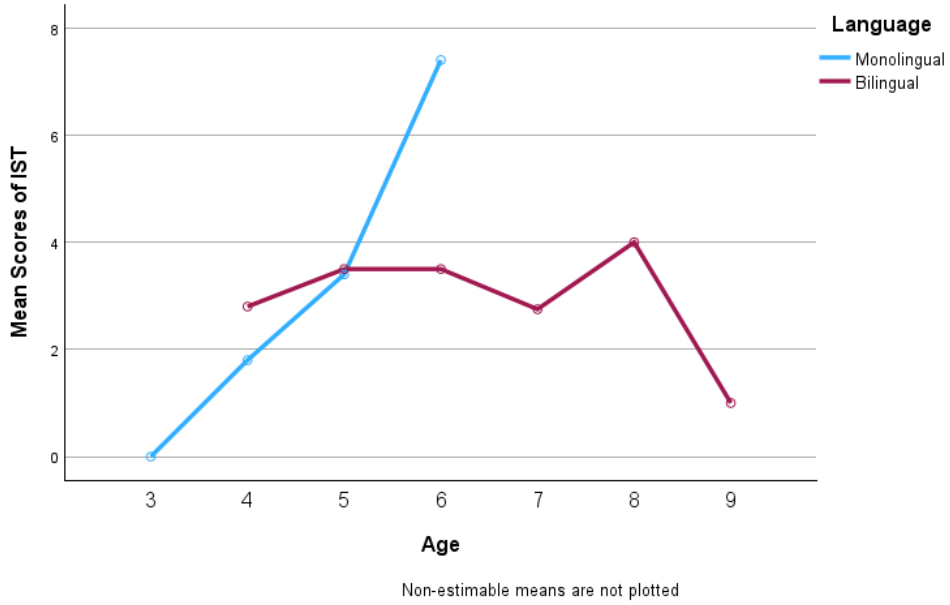


Figure 12. Mean scores of IST across age groups for monolingual and bilingual children

Figure 12 indicated dramatic increase in monolingual children's ability in produce internal state terms with age, while it also showed that bilingual children's ability. For internal state term usage, significant age differences were found between ages 3 and 5 or 6, and between ages 4 and 6. For contiguous age groups, significant age effects on ISTs were found only between ages 5 and 6. For bilingual children, no significant differences in IST between age groups was found.

Chapter 5: Discussion

5.1 Overview of the Chapter

The present chapter aims to discuss and interpret the results to answer two research questions. The discussion will be carried out based on the previous studies in this field, which to investigate any connections between the present results to other studies. Following this, the limitations of the present study will be discussed, and future research suggestions will be given based on these limitations. Then, the implications of this study will be discussed, followed by a short conclusion to the whole study.

5.2 Interpretation of Findings

The purpose of this study was to investigate the Mandarin narrative expression of monolingual Mandarin-speaking children and bilingual children whose second language is Mandarin. The first research question aimed to examine whether monolingual and bilingual Mandarin-speaking children differ in macrostructural and microstructural Mandarin narrative expression within the same age group. The second research question aimed to explore whether the microstructural and macrostructural narratives of monolingual and bilingual children increased with age. Following the second research question, a sub-research question aimed to explore whether the developmental process of narrative expression differs between monolingual and bilingual children.

For RQ1, it was found that monolingual Mandarin-speaking children significantly exhibited more advanced microstructural narrative abilities in Mandarin than their bilingual peers at ages 4, 5, and 6. However, a significant difference in macrostructural performance was only found at age 6.

The microstructural narrative differences found in the present study are consistent with Bonifacci et al.'s (2018) study on monolingual and bilingual children who speak Italian and Hipfner-Boucher et al.'s (2014) study on English-speaking children. A similar pattern was observed in both the current study of Mandarin-speaking children and previous studies of monolingual and bilingual children speaking dominant languages, indicating that differences in microstructural narratives between monolingual and bilingual children are not limited to Latin-related languages but extend to Mandarin as well.

When examining each age group in detail, significant language group differences in syntactic complexity (measured by MLUw) were observed at ages 5 and 6, but not at age 4. This finding contrasts with Bonifacci et al.'s (2018) study, which found no significant difference in MLU between monolingual and bilingual children (mean age: 4;8). One potential explanation for this discrepancy is that age might influence differences in syntactic

complexity between monolingual and bilingual children. The mean age of participants in Bonifacci et al.'s (2014) study is younger than that of participants in the current study, and the current study also found no significant difference in MLU between bilingual and monolingual children at age 4. Future research might need to explore whether MLU differences between bilingual and monolingual children vary with age.

In addition to syntactic complexity, monolingual children produced Mandarin narratives with more diverse vocabulary compared to bilingual children. This finding aligns with Bonifacci et al.'s (2018) and Hipfner-Boucher et al.'s (2014) studies, both of which found that monolingual children tend to show better lexical diversity than their bilingual peers. However, the results of the two measures of lexical diversity used in the present study were not always consistent with each other. At ages 4 and 6, VocD showed significant differences while MATTR did not. Therefore, the consistency of MATTR and VocD may need further investigation in future studies. Nevertheless, Fan and Xu's (2024) study has pointed out that VocD is more robust and appropriate for Mandarin-speaking children due to its sensitivity when comparing Mandarin-speaking children's narrative development. Therefore, the present study concluded that there were significant differences in Mandarin microstructural narratives between monolingual and bilingual children when VocD indicated significant differences.

For macrostructural narrative expression between Mandarin-speaking monolingual and bilingual children, significant differences were only found at age 6. In other same-age group comparisons, monolingual and bilingual children showed similar performance in story structure components and internal state terms. This finding is relatively consistent with many previous studies (Bonifacci et al., 2018; Hipfner-Boucher et al., 2014) that found bilingual children tend to show similar macrostructural narrative abilities, which refutes the results of Vettori et al.'s (2022) study that found bilingual children significantly lag behind their monolingual peers. The current study observed significant differences in macrostructural narrative expression only at age 6. This pattern of no differences at younger ages but significant differences at older ages might be a potential research focus for the future.

For specific macrostructural narrative metrics, story structure components at age 6 were the only metrics where bilingual and monolingual children differed. This finding is inconsistent with Chen and Yang's (2011) research, which found that English-Mandarin-speaking children excelled over monolingual English-speaking children in internal state term use when additional language and culture had an effect. One possible reason is that the cultural differences between Chinese and English are more pronounced, thus creating an

additional effect in macrostructural narratives. However, in the current study, bilingual children's two languages are used within China and might share more cultural similarities with each other than Mandarin-English, so cultural differences might not have played a significant role in the current study.

For RQ2, it was found that monolingual Mandarin-speaking children's microstructural and macrostructural narrative abilities increased with age, while bilingual children's microstructural Mandarin narrative abilities increased with age while no significant age effect was found for their Macrostructural abilities.

For monolingual children, in specific, significant age effects were found in three key dimensions of microstructural narratives, including productivity (i.e., measured by TNC), lexical diversity (i.e., measured by MATTR & VocD), and syntactic complexity (i.e., measured by MLUw). This finding is supported by many studies that found age plays an essential in monolingual children's microstructural narrative abilities development in all dimensions (e.g., Liu et al., 2017; Justice et al., 2006; Roth, 2009). In addition to microstructural narratives, a significant age effect was also found in monolingual Mandarin-speaking children's macrostructural narratives, including story structure components and internal state terms as two key dimensions. This finding is consistent with many previous research that focused on monolingual Mandarin-speaking children, such as Wang's (2017) and Zhang's (2007) study. Further, this finding is in line with Berman and Slobin's (2013) study that found significant age effects on macrostructural narratives across children speaking Turkish, Spanish, German, English, or Hebrew. Thus, the present study adds further evidence of Mandarin-speaking monolingual children in Berman and Slobin's (2013) finding.

For bilingual children, in specific, significant age effects were found in two dimensions of microstructural narrative abilities, which are lexical diversity (i.e., measured by MATTR & VocD) and syntactic complexity (i.e., measured by MLUw), while no significant age differences were found in the productivity (i.e. measured by TNC & TNW) of bilingual children's Mandarin narrative expression. This finding is supported by Munoz et al.'s (2003) study that found Latin-English bilingual children did not produce longer stories with age but may use more complex grammar and vocabulary in their narratives. In contrast to microstructural narratives, bilingual children's macrostructural narratives are not significantly different across age groups. This finding contradicts MacLeod and Pesco's (2023) longitudinal study which found that bilingual children whose second language is French increased their macrostructural narrative abilities in French with age. However, Yang et al.'s (2023) study with participants aged from 5 to 9 and Fiani et al.'s (2022) study with participants aged from 6

to 9 suggested that age effect on bilingual children's macrostructural narrative is less evidence for the older age group. Therefore, one possible reason for no significant age effect was not observed in the current study is that older age groups were involved (i.e., from 4 to 9).

The development trajectory of narrative expression for both monolingual and bilingual children is analysed and compared. For microstructural narrative developmental trajectory, bilingual children showed a more consistent and stable increase compared to monolingual children. This is because monolingual children might show more dramatic increase than bilingual children, which is observed in the developmental trajectory for syntactic complexity from ages 4 and 5. Moreover, monolingual children might show a slight decrease from age 5 to 6, which was observed in productivity and lexical diversity measured by MATTR. Nevertheless, these decreases were not significant. In addition to differences, there are some similarities between monolingual and bilingual children's microstructural narrative development trajectory. For instance, it was found that concessive development might not be necessary between every consecutive age group, but rather significant differences are more likely to be found between two age groups with larger distances. This lack of significant difference between consecutive groups is similar to Mäkinen and colleagues' (2014) study which did not find significant age effect on syntactic complexity across concessive age groups for Finnish-speaking children and Westerveld et al.'s (2004) which did not find a significant difference in productivity for children aged between 4 and 5. Regarding the differences between monolingual and bilingual children with age across age groups, it was found that the differences in lexical diversity are not stable across age, where monolingual and bilingual children showed resemble performance at age 4, while the differences dramatically strengthened at ages 5 and 6. Regarding the macrostructural narrative development trajectory, monolingual and bilingual children showed different patterns. Even though both monolingual children's and bilingual children's narrative abilities around story structure components increase in fluctuation, monolingual children could produce more story structure components than their bilingual peers. Furthermore, monolingual children's usage of internal state terms consistently developed over time, while no significant age effect was found on bilingual children's internal state term usage.

5.3 Limitations of the present study

One limitation of the present study is that age, as one of the most important factors, is treated as an ordinal variable rather than a continuous variable due to the constrained information provided by the corpus. As a result, a substantial amount of information related to age is lost, which may reduce the power of the statistical analysis.

Another limitation is that this study is based on secondary research analysis, meaning that the research design is limited to the available corpora. Consequently, some factors that might influence the relationship between children's language group and their narrative expression cannot be controlled. For instance, socioeconomic status (SES), a core factor influencing children's language development, cannot be controlled in this study because the original corpora did not provide or measure SES. However, it should be acknowledged that SES differences between the three corpora might exist. The Zhou Narrative Corpus involves participants whose parents received higher education and live in Shanghai, one of the most developed cities in China, while the Left-behind Corpus recruited participants from a village with limited economic development. The Xinjiang Corpus balanced SES by recruiting participants from both rural and urban areas in Xinjiang Province. These SES differences among participants might influence the study results. In addition to limited control over some confounding variables, another constraint of using the three corpora is the limited sample size within groups, most apparent in the Left-behind Corpus (2022). There are only 10 participants in total, with one age group (age 8) having only one participant. The limited sample size and small number of participants in specific age groups reduce both the generalizability to a wider group of the same age and the power of the statistical tests.

Furthermore, the limited capacity constrained the data that could be processed. For macrostructural coding, due to limitations of time and capacity, only subsamples of the corpora could be processed. Even though the subsamples were randomly selected, the limited sample size within each age group constrains the generalizability of the results.

5.4 Future Research

The future research suggestions are based on the current limitations and findings of this study. One suggestion is to increase the capacity for coding macrostructural narratives to better understand the narratives of monolingual and bilingual children. More researchers or additional help from others might be needed in this project to code more narratives from a larger sample size. The current research is limited by time and individual capacity, so the macrostructural narrative analysis might not be representative enough. This limitation could be easily mitigated by increasing capacity.

Another recommendation is to collect more relevant data. One benefit of collecting more detailed data is the ability to control for other possible factors that influence the relationship between language groups (i.e., monolingual and bilingual) and narrative expression, such as children's gender and family SES. Additionally, using more precise levels of measurement could include more information, thereby increasing the power of data

analysis. This is particularly applicable to age, which is treated as an ordinal variable in this study. If age could be measured in both years and months in future research, as a continuous variable, the development of monolingual and bilingual children could be explored in more detail with more appropriate statistical analysis methods.

In addition, the macrostructural metrics could be reevaluated and tested in future studies. In the current study, inconsistencies between microstructural metrics existed, increasing the difficulty of interpreting results. Future research should test which metrics are more reliable for Mandarin-speaking children. Furthermore, using factor analysis and latent variable analysis to explore the relationships between variables is also important to enhance the validity of the research.

5.5 Contribution & Implications

Despite the limitations and constraints, the current study contributes to the research field in exploring monolingual and bilingual children's narratives. The current research uses three reliable corpora to analyse the macrostructural and macrostructural narrative of Mandarin-speaking monolingual children and bilingual children whose second language is Mandarin. Three important contributions of this study are the involvement of age, usage of a large sample size, and focus on Mandarin narratives. One limitation of the previous research in this field is that age as a factor always is treated as a control factor and not many studies compare same-age group differences and developmental trajectory when comparing monolingual and bilingual children's narratives. Therefore, the current study contributes to this field by treating age as one important variable, which tries to explore the developmental trajectory differences in the narrative between monolingual and bilingual children. In addition, compared to many previous studies that involved no more than 100 participants, the current study embraces a larger sample size via secondary data analysis to increase reliability. Further, most studies that compared the narrative differences between bilingual and monolingual children focused on English or Latin-related languages as the research focus. The importance of this study is it chose Mandarin narrative as the research focus which further contributes to the field of bilingual and monolingual children narrative development.

The findings of this study could give an overall picture of differences in Mandarin narratives of Mandarin-speaking monolingual children and bilingual children whose second language is Mandarin. Therefore, paves the way for future studies which also interested in this field. In addition to implicating the theoretical contribution and research implication, the current study might be able to be used to inform in-class practices to offer more support to

bilingual children who might not show similar performance as their monolingual peers. Offering more resources and support is needed and important.

References

August, D. & Shanahan, T. (2006). Developing literacy in second-language learners. *Report of the National Literacy Panel on Language-Minority Children and Youth*. Mahwah, NJ: Lawrence Erlbaum.

Beaudoin, M. N., Moersch, M., & Evare, B. S. (2016). The effectiveness of narrative therapy with children's social and emotional skill development: an empirical study of 813 problem-solving stories. *Journal of Systemic Therapies, 35*(3), 42-59. https://doi.org/10.1521/jsyt.2016.35.3.42

Berman, R. A., & Slobin, D. I. (Eds.). (2013). *Relating events in narrative: A c rosslinguistic developmental study*. Psychology Press.

Bishop, D., & Donlan, C. (2005). The role of syntax in encoding and recall of pictorial narratives: Evidence from specific language impairment. *British Journal of Developmental Psychology*, *23*(1), 25-46. https://doi.org/10.1348/026151004X20685

Bohnacker, U., Lindgren, J., & Öztekin, B. (2022). Storytelling in bilingual Turkish-Swedish children: Effects of language, age and exposure on narrative macrostructure. *Linguistic Approaches to Bilingualism*, *12*(4), 413–445. https://doi.org/10.1075/lab.20057.boh

Bonifacci, P., Barbieri, M., Tomassini, M., & Roch, M. (2018). In few words: Linguistic gap but adequate narrative structure in preschool bilingual children. *Journal of Child Language*, *45*(1), 120–147. https://doi.org/10.1017/S0305000917000149

Boyce, L. K., Innocenti, M. S., Roggman, L. A., Norman, V. K. J., & Ortiz, E. (2010). Telling Stories and Making Books: Evidence for an Intervention to Help Parents in Migrant Head Start Families Support Their Children's Language and Literacy. *Early Education and Development*, *21*(3), 343–371. https://doi.org/10.1080/10409281003631142

Bretherton, I., Oppenheim, D., Buchsbaum, H., & Emde, R. N. (1990). The MacArthur story stem battery. *Unpublished manuscript*.

Carmiol, A. M., & Sparks, A. (2014). Narrative development across cultural contexts. *Pragmatic development in first language acquisition*, *10*, 279-296.

Castilla-Earls, A., Petersen, D., Spencer, T., & Hammer, K. (2015). Narrative Development in Monolingual Spanish-Speaking Preschool Children. *Early Education and Development*, *26*(8), 1166–1186. https://doi.org/10.1080/10409289.2015.1027623

Chen, L., & Yan, R. (2011). Development and use of English evaluative expressions in narratives of Chinese–English bilinguals. *Bilingualism: Language and Cognition, 14*(4), 570–578. doi:10.1017/S1366728910000362

Covington, M. A., & McFall, J. E. (2010). Cutting the gordian knot: The movingaverage type–token ratio (MATTR). *Journal of Quantitative Linguistics, 17*(2), 94–100. https://doi.org/10.1080/09296171003643098

Curenton, S. M. (2010). Narratives as Learning Tools to Promote School Readiness. *Early Education and Development*, *21*(3), 287–292. https://doi.org/10.1080/10409289.2010.485532

Curenton, S. M., & Lucas, T. D. (2007). Assessing young children's oral narrative skills. *Assessment in emergent literacy. San Diego: Plural Publishing Inc*, 377-432.

Dasinger, L., & Toupin, C. (2013). The development of relative clause functions in narrative. In *Relating events in narrative* (pp. 457-514). Psychology Press.

Dickinson, D. K. (2011). Teachers' language practices and academic outcomes of preschool children. *Science, 333*, 964–967. https://doi.org/10.1126/science.1204526.

Ding, W., Wu, M., Ye, Z., & He, W. (2024). Narrative Development of Mandarin-Speaking Children in Grades 2–5 at a Mainland Chinese Primary School. *Reading & Writing Quarterly*, *40*(1), 54–68. https://doi.org/10.1080/10573569.2023.2165204

Fan, Z., & Xu, J. (2024). Assessing Narrative Microstructure in Mandarin-Speaking School-Age Children. *Language, Speech, and Hearing Services in Schools*, *55*(1), 199-216. https://doi.org/10.1044/2023_LSHSS-23-00021

Fiani, R., Henry, G., & Prévost, P. (2020). Narrative comprehension in Lebanese Arabic-French bilingual children. In U. Bohnacker & N. Gagarina (Eds.), *Developing Narrative Comprehension: Multilingual Assessment Instrument for Narratives* (pp. 32–60). John Benjamins. https://doi.org/10.1075/sibil.61.02fia

Field, A. (2016). *Discovering statistics using IBM SPSS statistics*. Sage publications limited.

Fiorentino, L., & Howe, N. (2004). Language Competence, Narrative Ability, and School Readiness in Low-Income Preschool Children. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, *36*(4), 280-294. https://doi.org/10.1037/h0087237

Florit, E., Roch, M., & Levorato, M. C. (2014). Listening text comprehension in preschoolers: A longitudinal study on the role of semantic components. *Reading and Writing*, *27*, 793-817. https://link.springimer.com/article/10.1007/s11145-013-9464-1

Gagarina, N., Klop, D., Kunnari, S., Tantele, K., Välimaa, T., Balčiūnienė, I., Bohnacker, U., & Walters, J. (2015). 9 .Assessment of Narrative Abilities in Bilingual Children. In S. Armon-Lotem, J. de Jong, & N. Meir (Eds.), *Assessing Multilingual Children* (pp. 243–276). Multilingual Matters. https://doi.org/10.21832/9781783093137-011

Gagarina, N., Klop, D., Tsimpli, I. M., & Walters, J. (2016). Narrative abilities in bilingual children. *Applied Psycholinguistics*, *37*(1), 11–17. https://doi.org/10.1017/S0142716415000399

Granger, S. (2010). Comparable and translation corpora in cross-linguistic research. Design, analysis and applications. *Journal of Shanghai Jiaotong University*, *2*(1), 14-21. https://sites.uclouvain.be/cecl/archives/Granger_Crosslinguistic_research.pdf

Grazzani, I. and Ornaghi, V. (2012) How do use and comprehension of mental-state language relate to theory of mind in middle childhood? *Cognitive Development 27*, 99–11. https://doi.org/10.1016/j.cogdev.2012.03.002

Hao, Y., Sheng, L., Zhang, Y., Jiang, F., De Villiers, J., Lee, W., & Liu, X. L. (2018). A narrative evaluation of Mandarin-speaking children with language impairment. *Journal of Speech, Language, and Hearing Research*, *61*(2), 345-359. https://doi.org/10.1044/2017_JSLHR-L-16-0367

Heilmann, J., Miller, J. F., Nockerts, A., & Dunaway, C. (2010). Properties of the narrative scoring scheme using narrative retells in young school-age children. *American Journal of Speech-Language Pathology, 19*(2), 154–166. https://doi.org/10.1044/1058-0360(2009/08-0024)

Hipfner-Boucher, K., Milburn, T., Weitzman, E., Greenberg, J., Pelletier, J., & Girolametto, L. (2015). Narrative abilities in subgroups of English language learners and monolingual peers. *International Journal of Bilingualism*, *19*(6), 677-692. https://doi.org/10.1177/136700691453433

Hunt, K. W. (1966). Recent measures in syntactic development. *Elementary English, 43*(7), 732–739. https://www.jstor.org/stable/41386067

Hunt, K. W. (1970). Syntactic maturity in school children and adults. *Monographs of the Society for Research in Child Development, 35*(1), 1–67. https://doi.Org/10.2307/1165818

Justice, L. M., Bowles, R. P., Kaderavek, J. N., Ukrainetz, T. A., & al, et. (2006). The Index of Narrative Microstructure: A Clinical Tool for Analyzing School-Age Children's Narrative Performances. *American Journal of Speech - Language Pathology*, *15*(2), 177–191. https://doi.org/10.1044/1058-0360(2006/017)

Justice, L. M., Bowles, R., Pence, K., & Gosse, C. (2010). A scalable tool for assessing children's language abilities within a narrative context: The NAP (Narrative Assessment Protocol). *Early Childhood Research Quarterly*, *25*(2), 218-234. https://doi.org/10.1016/j.ecresq.2009.11.002

Justice, L. M., Pullen, P. C., & Pence, K. (2008). Influence of verbal and nonverbal references to print on preschoolers' visual attention to print during storybook reading. *Developmental Psychology*, *44*(3), 855-866. https://doi.org/10.1037/0012-1649.44.3.855.

Kallay, J. E., & Redford, M. A. (2021). Clause-initial AND usage in a cross-sectional and longitudinal corpus of school-age children's narratives. *Journal of Child Language*, *48*(1), 88-109. doi:10.1017/S0305000920000197

Karlsen, J., Geva, E., & Lyster, S. A. (2016). Cognitive, linguistic, and contextual factors in Norwegian second language learner's narrative production. *Applied Psycholinguistics*, *37*(5), 1117-1145. doi:10.1017/S014271641500051X

Karmiloff, K., & Karmiloff–Smith, A. (2001). *Pathways to language from fetus to adolescent.* Harvard University Press.

Košutar, S., Kramarić, M., & Hržica, G. (2022). The relationship between narrative microstructure and macrostructure: Differences between six- and eight-year-olds. *Psychology of Language and Communication*, *26*(1), 126–153. https://doi.org/10.2478/plc-2022-0007

Labov, W. (1972). *Sociolinguistic patterns*. Oxford: Blackwell.

LeFevre, J. A. (2001). Storybook reading and parent teaching: links to language and literacy development. *New Directions for Child & Adolescent Development*, *2001*(92), 39-52.

Lever, R., & Sénéchal, M. (2011). Discussing stories: On how a dialogic reading intervention improves kindergartners' oral narrative construction. *Journal of experimental child psychology*, *108*(1), 1-24. https://doi.org/10.1016/j.jecp.2010.07.002

Li, L. & Zhou, J. (2011). Preschool Children's Development of Reading Comprehension of Picture Storybook: from a perspective of multimodel meaning making. Doctor's Dissertation. East China Normal University. Shanghai, China.

Lindgren, J., and Bohnacker, U. (2022). How do age, language, narrative task, language proficiency and exposure affect narrative macrostructure in German-Swedish bilingual children aged 4 to 6? *Linguist. Approaches Biling.* 12, 479–508. doi: 10.1075/lab.20020.lin

Lindgren, J., Tselekidou, F., & Gagarina, N. (2023). Acquisition of narrative macrostructure: A comprehensive overview of results from the Multilingual Assessment Instrument for Narratives. *ZAS Papers in Linguistics*, *65*, 111–132. https://doi.org/10.21248/zaspil.65.2023.623

Lindsey, K. A., Manis, F. R., & Bailey, C. E. (2003). Prediction of first-grade reading in Spanish-speaking English-language learners. *Journal of educational psychology*, *95*(3), 482. https://doi.org/10.1037/0022-0663.95.3.482

Liu, Y., Skibbe, L. E., & Bowles, R. P. (2017). 3–5 sui er han yu er tong xu shi neng li fa zhan de shi yan yan jiu. [An Experimental Study of the Narrative Ability of 3–5-Year-Old Chinese Children.] *Chinese Journal of Special Education*, 11, 92– 96.

Loban, W. (1976). *Language development: Kindergarten through grade twelve (Research Report No. 18)*. National Council of Teachers of English. https:// files.eric.ed.gov/fulltext/ED128818.pdf

Lorusso, M.L., Galli, R., Libera, L., Gagliardi, C., Borgatti, R. and Hollebrandse, B. (2007) Indicators of theory of mind in narrative production: A comparison between individuals with genetic syndromes and typically developing children. *Clinical Linguistics and Phonetics 21* (1), 37–53. https://doi.org/10.1080/02699200600565871

MacLeod, A. A., & Pesco, D. (2023). Narratives by bilingual children: a tale of strengths and growth during kindergarten. *International Journal of Bilingual Education and Bilingualism*, *26*(7), 891-903. https://doi.org/10.1080/13670050.2022.2132107

Mäkinen, L., Loukusa, S., Nieminen, L., Leinonen, E., & Kunnari, S. (2014). The development of narrative productivity, syntactic complexity, referential cohesion and event content in four- to eight-year-old Finnish children. *First Language*, *34*(1), 24–42. https://doi.org/10.1177/0142723713511000

Malvern, D. D., & Richards, B. J. (1997). A new measure of lexical diversity. *British Studies in Applied Linguistics*, *12*, 58-71.

Malvern, D., Richards, B., Chipere, N., & Durán, P. (2004). L*exical diversity and language development: Quantification and assessment.* Palgrave MacMillan. https://doi.org/10.1057/9780230511804

McCarthy, P. M., & Jarvis, S. (2007). VocD: A theoretical and empirical evaluation. *Language Testing*, *24*(4), 459-488. https://doi.org/10.1177/0265532207080767

Munoz, M. L., Gillam, R. B., Pena, E. D., & Gulley-Faehnle, A. (2003). Measures of language development in fictional narratives of Latino children. *Language, Speech & Hearing Services in Schools*, *34*(4), 332–342.

Muñoz, M. L., Gillam, R. B., Peña, E. D., & Gulley-Faehnle, A. (2003). Measures of language development in fictional narratives of Latino children. https://doi.org/10.1044/0161-1461(2003/027)

National Early Literacy Panel. (2008). *Developing early literacy.* Washington, D. C.: National Institute for Literacy.

Nippold, M.A., Ward-Lonergan, J.M. and Fanning, J.L. (2005) Persuasive writing in children, adolescents, and adults: A study of syntactic, semantic, and pragmatic development. *Language, Speech, and Hearing Services in Schools, 36* (2), 125–138. https://doi.org/10.1044/0161-1461(2005/012)

Nippold, M.A., Ward-Lonergan, J.M. and Fanning, J.L. (2005) Persuasive writing in children, adolescents, and adults: A study of syntactic, semantic, and pragmatic development. *Language, Speech, and Hearing Services in Schools, 36* (2), 125–138.https://doi.org/10.1044/0161-1461(2005/012)

Oakhill, J., & Cain, K. (2007). Issues of causality in children's reading comprehension. *Reading comprehension strategies: Theories, interventions, and technologies*, 47-71.

Ortega, L. (2003). Syntactic complexity measures and their relationship to L2 proficiency: A research synthesis of college-level L2 writing. *Applied linguistics*, *24*(4), 492-518. https://doi.org/10.1093/applin/24.4.492

Piasta, S. B., Groom, L. J., Khan, K. S., Skibbe, L. E., & Bowles, R. P. (2018). Young children's narrative skill: concurrent and predictive associations with emergent literacy and early word reading skills. *Reading and Writing*, *31*, 1479-1498. https://doi.org/10.1007/s11145-018-9844-7

Ranti, A. (2015). Mean length utterance of children morphological development. In Proceedings of the 1st National Conference on English Language Teaching, 96-109.

Roch, M., Florit, E., and Levorato, C. (2016). Narrative competence of Italian–English bilingual children between 5 and 7 years. *Appl. Psycholinguist.* 37, 49–67. doi: 10.1017/S0142716415000417

Roth, F. P. (2009). Children's early narratives. *Emergent literacy and language development*, 153-191.

Roth, F. P., Speece, D. L., & Cooper, D. H. (2002). A longitudinal analysis of the connection between oral language and early reading. *The Journal of Educational Research*, *95*(5), 259-272. https://doi.org/10.1080/00220670209596600.

Sah, W. H. (2011). Emotion expressions and knowledge of story structure: A study of mandarin-speaking children's narrative development. *Taiwan Journal of Linguistics*, *9*(2), 67-109. DOI: 10.6519/TJL/2011/9(2).2

Sénéchal, M., & LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child development*, *73*(2), 445-460. https://doi.org/10.1111/1467-8624.00417

Sénéchal, M., & LeFevre, J. A. (2014). Continuity and change in the home literacy environment as predictors of growth in vocabulary and reading. *Child development*, *85*(4), 1552-1568. https://doi.org/10.1111/cdev.12222.

Sheng, L., Shi, H., Wang, D., Hao, Y., & Zheng, L. (2020). Narrative production in Mandarin-speaking children: Effects of language ability and elicitation method. *Journal of Speech, Language, and Hearing Research*, *63*(3), 774-792. DOI:10.1044/2019_JSLHR-19-00087

Trabasso, T., & Nickels, M. (1992). The development of goal plans of action in the narration of a picture story. *Discourse processes*, *15*(3), 249-275. https://doi.org/10.1080/01638539209544812

Uccelli, P., & Páez M. M. (2007). Narrative and Vocabulary Development of Bilingual Children From Kindergarten to First Grade: Developmental Changes and Associations Among English and Spanish Skills. *Language, Speech, and Hearing Services in Schools*, *38*(3), 225–236. https://doi.org/10.1044/0161-1461(2007/024)

Vettori, G., Bigozzi, L., Incognito, O., & Pinto, A. G. (2022). Relationship between oral narrative and vocabulary skills among bilingual language-minority children and their monolingual peers in primary school. *International Journal of Bilingualism*, 13670069221089064. https://doi.org/10.1177/13670069221089064

Wang, H. (2017). 5–6 sui you er xu shi neng li fa zhan te dian ji qi yu yan ying xiang yin su yan jiu. [Features and Influencial Factors of 5–6 year-old Children's narrative development.] (Master), Shanxi Normal University, Shanxi. Available from DNKI Chinese Database

Wellman, R. L., Lewis, B. A., Freebairn, L. A., Avrich, A. A., Hansen, A. J., & Stein, C. M. (2011). Narrative ability of children with speech sound disorders and the prediction of later literacy skills. *Language, Speech, and Hearing Services in Schools, 42,* 561–579. https://doi.org/10.1044/0161-1461(2011/10-0038)

Westby, C. E. (2005). Assessing and remediating text comprehension problems. *Language and reading disabilities*, *3*, 163-224.

Westerveld, M. F., Gillon, G. T., & Miller, J. F. (2004). Spoken language samples of New Zealand children in conversation and narration. *Advances in Speech Language Pathology*, *6*(4), 195–208. https://doi.org/10.1080/14417040400010140

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child development*, *69*(3), 848-872. https://doi.org/10.1111/j.1467-8624.1998.tb06247.x

Wu, J., Ying, H., & Zhu, M. (1984). You er kan tu shuo hua de te dian. [Characteristics of young children talking about pictures.] Psychological Science, 5, 6–12.

Xinjiang Corpus (2012) Doi:10.21415/T5NP64 https://childes.talkbank.org/access/Chinese/Mandarin/Xinjiang.html

Yang W., Chan, A., and Gagarina., N. (2022). *Narratives in left-behind Kam-Mandarin bilingual children*. Endangered Languages Archive. Handle: http://hdl.handle.net/2196/z5909c9o-7p3a-4898-5444-u15z7p41763r.

Yang, J., Kim, J. H., Tuomainen, O., & Xu Rattanasone, N. (2022). Bilingual Mandarin-English preschoolers' spoken narrative skills and contributing factors: A remote online story-retell study. *Frontiers in Psychology*, *13*, 797602.

Yu, G. (2009). Lexical diversity in writing and speaking task performances. *Applied Linguistics, 31*(2), 236–259. https://doi.org/10.1093/applin/amp024

Zenker, F., Kyle, K., 2021. Investigating minimum text lengths for lexical diversity indices. Assessing Writing 47. https://doi.org/10.1016/j.asw.2020.100505.

Zhang, H. (2007) Xue qian er tong kan tu xu shi shun xu neng li yan jiu. [The temporality competence of preschool children in frog story.] (Master), East China Normal University, Shanghai. Available from CNKI Chinese Database

Zhou, J., & Zhang, Y. (2020). The computerized child language analysis: Building a non-standardized child language measuring system based on Chinese language development corpus. *Studies in Preschool Education, 6*, 72–84.https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.13861/j.cnki.sece.2020.06.010

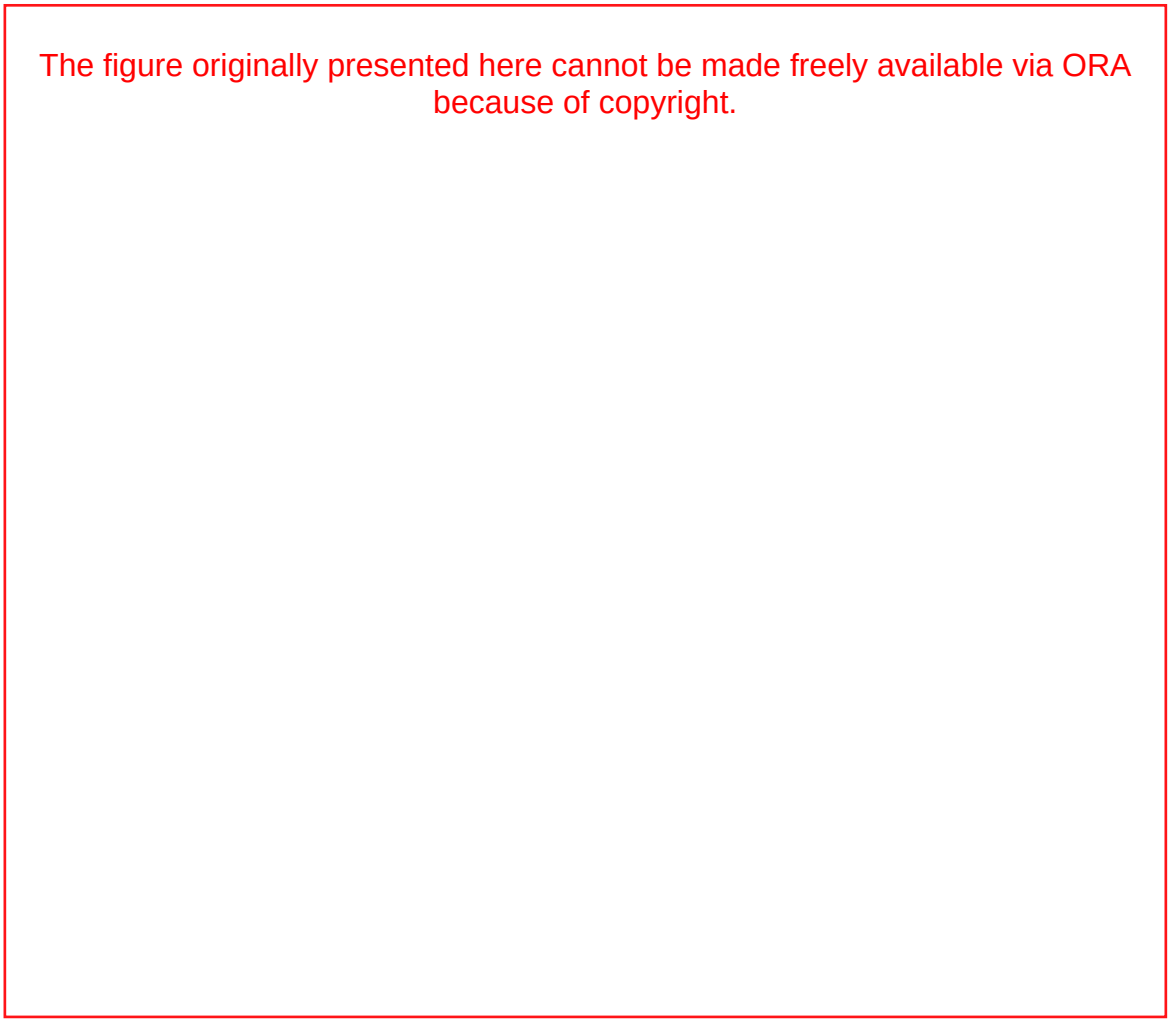
Zhou, J., Li, C., Du, L., Wang, F., Chen, S., & Zhang, L. (2014). The Development of Mandarin Acquisition of Uygur Children in Bilingual Preschools in Xinjiang. *Journal of East China Normal University Education Sciences, 1*, 11-19. DOI:10.16382/j.cnki.1000-5560.2014.01.011

Zhou, M. (2022). *Monolingual and Bilingual Narrative Production and Comprehension across Cultures* (Doctoral dissertation, Doctoral dissertation, Trinity College Dublin. School of Linguistic Speech & Comm Sci. CLCS).

Zhu, Z. R., & Li, Z. Q. (1987). On the structural elements and the development stage of students' writing ability. *Educational Review, 4*,33–37.

Appendix 1

The very hungry caterpillar 好饿的毛毛虫




The figure originally presented here cannot be made freely available via ORA
because of copyright.

The very hungry caterpillar (English Version)

By Eric Carle

In the light of the moon a little egg lay on a leaf.

One Sunday morning the warm sun came up and – pop! - out of the egg came a tiny and very hungry caterpillar.

He started to look from some food.

On Monday, he ate through one apple. But he was still hungry.

He started to look for some food.

On Tuesday, he ate through two pears, but he was still hungry.

He started to look for some food.

On Wednesday, he ate through three plums, but he was still hungry.

He started to look for some food.

On Thursday, he ate through four strawberries, but he was still hungry.

On Friday, he ate through five oranges, but he was still hungry.

On Saturday, he ate through one piece of chocolate cake, one ice-cream cone, one pickle, one slice of Swiss cheese, one slice of salami, one lollipop, one piece of cherry pie, one sausage, one cupcake, and one slice of watermelon.

That night he had a stomachache!

The next day was Sunday again. The caterpillar ate through one nice green leaf, and after that he felt much better.

Now he wasn't hungry anymore – and he wasn't a little caterpillar anymore. He was a big, fat caterpillar.

He built a small house, called a cocoon, around himself. He stayed inside for more than two weeks. Then he nibbled a hole in the cocoon, pushed his way out and ...

He was a beautiful butterfly!

中文译本：

月光下， 一颗小小的蛋躺在叶子上 。

星期天 的早上 ，暖和 的太阳升起来 了。

“啾”一声 ， 一条又小又饿 的毛毛虫 ， 从蛋里爬 了出来 。

它要去找一些东西来吃。

星期一 ，它吃 了一个苹果 。

可是，肚子还是好饿 。

星期二 ，它吃 了两个梨 。

可是，肚子还是好饿 。

星期三 ，它吃了三个李子 。

可是，肚子还是好饿 。

星期四 ，它吃 了四个草毒。

可是，肚子还是好饿 。

星期五 ，它吃了五个桔子 。

可是，肚子还是好饿 。

星期六 ，它吃了一块巧克力蛋糕 一个冰淇淋甜筒 一条腌黄瓜 一块奶酪 一截火腿 一根棒棒糖一块樱桃派 一条香肠 一个纸杯蛋糕和一片西瓜 。

那天晚上，毛毛虫的肚子好痛！

第二天 ，又是星期天了。

毛毛虫吃了一片又嫩又绿 的叶子 ，觉得舒服 多 了。

现在 ，毛毛虫不觉得肚子饿 了。它不再是一条小 毛毛虫 了。

它是一条又肥又大的毛毛虫 。

它造 了一间小房子，叫做“ 茧 ”，把 自己包在 里头。

它在里头住 了两个多星期 ，然后 ，把茧咬破 一个洞 ，钻 了出来 ……

啊 毛毛虫变成 了一只漂亮的蝴蝶。

Appendix 2

页码	图画形象	事件行动	角色状态
P5	蛋 月亮 叶子	躺	小小的
P6	毛毛虫 太阳	爬出来	又小又饿
P7	毛毛虫 苹果 太阳	找 吃	饿
P8	毛毛虫 梨	吃	饿
P9	毛毛虫 李子	吃	饿
P10	毛毛虫 草莓	吃	饿
P11	毛毛虫 桔子	吃	饿
P12	毛毛虫 巧克力蛋糕 冰淇淋 甜筒 腌黄瓜 奶酪 火腿 棒棒糖 樱桃派 香肠 纸杯蛋糕 西瓜	吃	痛
P13	毛毛虫 叶子	吃	舒服
P14	毛毛虫 茧	造 包 住 咬破 钻	又肥又大
P15	蝴蝶	变成	漂亮

Page Number	**Picture Elements**	**Event Actions**	**Character States**
P5	Egg, Moonlight, Leaf	Lay	little
P6	Caterpillar, Sun	Came	Tiny and very hungry
P7	Caterpillar, Apple, Sun	Look for, ate	Hungry
P8	Caterpillar, Pear	Ate	Hungry
P9	Caterpillar, Plum	Ate	Hungry
P10	Caterpillar, Strawberry	Ate	Hungry
P11	Caterpillar, Orange	Ate	Hungry
P12	Caterpillar, Chocolate Cake, Ice Cream, Pickle, Cheese, Sausage, Lollipop, Cherry Pie,	Ate	Stomachache

	Sausage, Cupcake, Watermelon		
P13	Caterpillar, Leaf	Ate	Felt much better
P14	Caterpillar, Cocoon	Built, Stay inside, Nibbled, pushed his way out	Fat and Big
P15	Butterfly	Was	Beautiful

Appendix 3

Cat

Dog

Baby goat

Baby bird

Appendix 4

Cat in English

Pictures 1/ 2: One day there was a playful cat who saw a yellow butterfly sitting on a bush. He leaped forward because he wanted to catch it. Meanwhile, a cheerful boy was coming back from fishing with a bucket and a ball in his hands. He looked at the cat chasing the butterfly.

Pictures 3/ 4: The butterfly flew away quickly and the cat fell into the bush. He hurt himself and was very angry. The boy was so startled that the ball fell out of his hand. When he saw his ball rolling into the water, he cried: ”Oh no, there goes my ball!”. He was sad and wanted to get his ball back. Meanwhile, the cat noticed the boy’s bucket and thought: “I want to grab a fish.”

Pictures 5/ 6: At the same time the boy began pulling his ball out of the water with his fishing rod. He did not notice that the cat was grabbing a fish. In the end, the cat was very pleased to eat such a tasty fish and the boy was happy to have his ball back.

Cat in Mandarin

图 1/2: 有一天，有只贪玩的小猫看到一只黄色的蝴蝶坐在草从上面。它想捉住那只蝴蝶，就向它扑了过去。这个时候，有一个开朗的男孩刚刚钓了鱼回来。他一只手拎着装鱼的桶，另一只手拿着球。他看到小猫正在追蝴蝶。

图 3/4: 蝴蝶很快就飞走了。小猫为了捉蝴蝶，不小心跌进了草从。它觉得很痛，也很生气。男孩吓得松开了手，把手上的球给掉了。他看到球滚进了水里，就大叫:“呜……我的球呀!”他很伤心，很想拿回他的球。这个时候，小猫注意到了男孩的桶，心想:“我想吃鱼!”

图 5/6: 同时，那个男孩开始用鱼竿把球从水里面拉上来。他没注意到小猫已经拿走了一条鱼。最后，小猫很高兴地吃了那条美味的鱼，而男孩就拿回了他的球，觉得很开心。

Dog in English

Pictures 1/ 2: One day there was a playful dog who saw a grey mouse sitting near a tree. He leaped forward because he wanted to catch it. Meanwhile, a cheerful boy was coming back from shopping with a bag and a balloon in his hands. He looked at the dog chasing the mouse.

Pictures 3/ 4: The mouse ran away quickly and the dog bumped into the tree. He hurt himself and was very angry. The boy was so startled that the balloon slipped out of his hand.

When he saw his balloon flying into the tree, he cried: “Oh no, there goes my balloon!” He was sad and wanted to get his balloon back. Meanwhile, the dog noticed the boy’s bag and thought: “I want to grab a sausage.”

Pictures 5/ 6: At the same time, the boy began pulling his balloon out of the tree. He did not notice that the dog was grabbing a sausage. In the end, the dog was very pleased to eat such a tasty sausage and the boy was happy to have his balloon back.

Dog in Mandarin

图 1/2: 有一天，有只贪玩的小狗看到一只灰色的老鼠坐在一棵树的附近。它想捉住那只老鼠，就向它扑了过去。这个时候，有一个开朗的男孩刚刚买了东西回来。他一只手拎着购物袋，另一只手拿着个气球。他看到小狗正在追老鼠。

图 3/4: 老鼠很快就跑掉了。小狗为了捉它，不小心撞到了树上。它觉得很痛，也很生气。男孩吓得松开了手，把手上的气球给飞走了。他看到气球飞到了树上，就大叫:“呜……我的气球呀!”他很伤心，很想拿回他的气球。这个时候，小狗注意到了男孩的袋子，心想:“我想吃香肠!”

图 5/6: 同时，那个男孩爬到树上去把他的气球拉下来。他没注意到小狗已经拿走了一根香肠。最后，小狗很高兴地吃了那根美味的香肠，而男核就拿回了他的气球，觉得很开心。

Baby Birds in English

Pictures 1/ 2: One day there was a mother bird who saw that her baby birds were hungry. She flew away because she wanted to find food for them. A hungry cat saw that the mother bird was flying away and meowed: “Mmm, nice, what do I see here in the nest?”

Pictures 3/ 4: The mother bird came back with a big worm for her children, but she did not see the cat. She was happy about the juicy worm for her babies. Meanwhile the mean cat started climbing up the tree because he wanted to catch a baby bird. He grabbed one of the baby birds. A brave dog that was passing by saw that the birds were in great danger. He decided to stop the cat and save them.

Pictures 5/ 6: He said to the cat: ‘Leave the baby birds alone’. And then he grabbed the cat’s tail and pulled him down. The cat let go of the baby bird and the dog chased him away. The dog was very glad that he could save the birds, and the cat was still hungry.

Baby Birds in Mandarin

图 1/2: 一天，鸟妈妈看见小鸟饿了，于是飞到别处去找食物。饥饿的小猫 看到鸟妈妈飞走以后，说到：“哦，太好了，看我在鸟窝里发现了什么？”

图 3/4: 鸟妈妈叼着一条大虫子回来了，她很高兴。但是她没有看到小猫。 这时，这只讨厌的猫开始爬树，它想抓住小鸟。小猫抓住了其中一只小鸟。一只 247 勇敢的小狗看到了，它决定停下来去救小鸟。

图 5/6: 小狗对小猫说：“放开小鸟”，然后他抓住了小猫的尾巴，把它拽 下了树。小猫放开了小鸟，然后小狗追着赶跑了小猫。小狗救了小鸟，它很高兴。 小猫最后还是很饿。

Baby Goats in English

Pictures 1/ 2: One day there was a mother goat who saw that her baby goat had fallen into the water and that it was scared. She jumped into the water because she wanted to save it. A hungry fox saw that the mother goat was in the water and growled: ‘Mmm, nice, what do I see here on the grass?’

Pictures 3/ 4: The mother goat pushed the baby goat out of the water, but she did not see the fox. She was glad that her baby did not drown. Meanwhile the mean fox jumped forward because he wanted to catch the other baby goat. He grabbed the baby goat. A brave bird that was flying by saw that the baby goat was in great danger. He decided to stop the fox and save the baby goat.

Pictures 5/ 6: The bird said to the fox: “Leave the baby goat alone”. And then he flew down and bit the fox’s tail. The fox let go of the baby goat and the bird chased him away. The bird was very happy that he could save the baby goat, and the fox was still hungry.

Baby Goats in Mandarin

图 1/2: 一天，羊妈妈看见小羊掉到水里了。小羊很害怕，羊妈妈跳到水里 去救它。一只饥饿的狐狸看到了，说到：“哦，看我在草地上发现了什么？”

图 3/4: 羊妈妈把小羊推上了岸，它很高兴。但是它没有看到狐狸。同时， 那只狡猾的狐狸向前扑去，想要抓住在吃草的小羊。狐狸抓住了小羊。一只勇敢 的小鸟看到了，它决定停下来去救小羊。

图 5/6: 小鸟对小羊说：“放开小羊”，然后它飞下来咬了狐狸的尾巴。狐 狸放开了小羊，然后小鸟把它赶跑了。小鸟救了小羊，它很高兴。但是狐狸还是 很饿。

Scoring sheet for Cat in English

A. Story Structure

		Examples of correct responses[1]	**Score**
A1.	Setting	Time and/ or place reference, e.g. once upon a time/ one day/ long ago... by a lake/ at the lake/ at the river bank/ by the water/ by the shore/ in a meadow…	0 1 2[2]
Episode 1: Cat (Episode characters: cat and butterfly)			
A2.	IST as initiating event	**Cat** was playful/ curious **Cat** saw a butterfly	0 1
A3.	Goal	**Cat** wanted to catch/ get/ chase the butterfly/ play with the butterfly (In order) to + VERB (catch, get, play)	0 1
A4.	Attempt	**Cat** jumped forward/ up **Cat** chased/ started to chase **Cat** tried to + VERB (catch, get, grab, take)	0 1
A5.	Outcome	**Cat** fell into the bush/ did not get the butterfly/ was not quick enough **Butterfly** escaped/ flew away/ was too quick	0 1
A6.	IST as reaction	**Cat** was disappointed/ angry/ hurt **Butterfly** was happy/ glad	0 1
Episode 2: Boy (Episode character: boy)			
A7.	IST as initiating event	**Boy** was sad/ unhappy/ worried about his ball **Boy** saw the ball in the water	0 1
A8.	Goal	**Boy** decided/ wanted to get his ball back/ (In order) to + VERB (get)	0 1
A9.	Attempt	**Boy** was/is pulling/ tried to pull the ball out of the water	0 1
A10.	Outcome	**Boy** got/had his ball back/ again **The ball** was saved	0 1
A11.	IST as reaction	**Boy** was glad/ happy/ pleased/ satisfied/ relieved (to get/have his ball back)	0 1
Episode 3: Cat (Episode character: cat)			
A12.	IST as initiating event	**Cat** was hungry/ curious/ keen on the fish **Cat** noticed/ saw the fish	0 1
A13.	Goal	**Cat** wanted/ decided to get/ grab/ eat/ have/ steal the fish (In order) to + VERB (eat, get)	0 1
A14.	Attempt	**Cat** was/is grabbing/pulling/ taking/ stealing the fish **Cat** grabs/ pulls/takes the fish (out of the bucket)/ reached for the fish **Cat** tried to + VERB (get, take)	0 1

B. Structural complexity

Number of AO sequences	Number of single G (without A or O)	Number of GA / GO sequences	Number of GAO sequences
B1.	B2.	B3.	B4.

C. Internal State Terms (IST)

C1.	Total number of IST in tokens. IST include: **Perceptual state terms** e.g. *see, hear, feel, smell;* **Physiological state terms** e.g. *thirsty, hungry, tired, sore, hurt(ing)*; **Consciousness terms** e.g. *alive, awake, asleep*; **Emotion terms** e.g. *sad, happy, glad, angry, worried, disappointed, afraid, scared, proud, brave,* (feel) *safe, pleased, surprised;* **Mental verbs** e.g. *want, think, know, forget, decide, believe, wonder, have/ make a plan*; **Linguistic verbs/ verbs of saying/ telling** e.g. *say, call, shout, warn, ask.*

Score sheet for Cat in Mandarin

A. 故事结构

		正确答案范例[1]	分数
A1.	环境	时间和/或地点，例如：从前/ 有一天 / 很久以前... 在湖边/湖上/河边/水边/岸边/草地上...	0 1 2[2]
第一幕：小猫（角色：小猫、蝴蝶）			
A2.	IST 作为事件开始	小猫 贪玩/ 好奇 小猫 看到一只蝴蝶	0 1
A3.	目标	小猫 想(要) ［捉/ 得到/ 追蝴蝶］/ [和蝴蝶玩］ （为了）去+动词（捉、得到、追）	0 1
A4.	行为	小猫 扑了 过去/ 上去 小猫 追/开始追 小猫 尝试去+动词（捉、得到、抓到、拿到）	0 1
A5.	结果	小猫 跌进了草丛/ 没有捉到那只蝴蝶/ 不够快 蝴蝶 逃走了/ 飞走了/ 太快了	0 1
A6.	IST 作为事后反应	猫 很失望/ 生气/ 受伤 蝴蝶 很开心/ 高兴	0 1
第二幕：男孩（角色：男孩）			
A7.	IST 作为事件开始	男孩 很伤心/ 不开心/ 担心他的球/ 看到球在水上面	0 1
A8.	目标	男孩 决定/ 想(要) ［拿回那个球] /（为了）去+动词（得到）	0 1

A9.	行为	男孩 拉/ 试着 把球从水里拉上来	0 1
A10.	结果	男孩 拿回了那个球/ 失而复得 球被拿回来了	0 1
A11.	IST 作为事后反应	男孩 很高兴/ 开心/ 愉快/满足 /放心 （因为拿回了他的球）	0 1
第三幕：小猫（角色：小猫）			
A12.	IST 作为事件开始	小猫 看到/ 留意到那些鱼 小猫 肚子很饿/ 很好奇 /很想吃鱼	0 1
A13.	目标	小猫 想/决定 ［去 拿/抓/吃/要/偷 鱼］ (为了)去+动词（吃、拿）	0 1
A14.	行为	小猫 抓了/ 揪了/拿了/偷了 鱼 小猫 [把鱼（从桶子里）抓/ 揪/拿了 出来]/ [去够那些鱼] 小猫 尝试去+动词（抓、拿）	0 1
A15.	结果	小猫 吃到了/ 得到了 鱼	0 1
A16.	IST 作为事后反应	小猫 很满足/ 高兴/ 得意/ 开心/肚子(再也)不饿了	0 1
A17.	**总分/满分 17 分:**		

B. 结构复杂性

行为-结果序列的出现次数	单独目标（没有行为或结果）的出现次数	目标-行为/目标-结果序列的出现次数	目标-行为-结果的出现次数
B1.	B2.	B3.	B4.

C. 内在状态词 (IST)

C1.	IST 出现的总次数. IST 包括: **感知状态词** 例如:看、听、觉得、闻; **生理状态词** 例如:口渴、肚子饿、累、酸; **意识词** 例如:活着、醒着、睡着; **感情词** 例如:伤心、开心、生气、担心、失望; **心理动词** 例如:想要、觉得、知道、忘记、决定、相信、惊奇、计划; **语言动词/表达动词** 例如:说、叫、喊、警告、问。

Score sheet for Dog in English

A. Story Structure

		Examples of correct responses[6]	Score
A1.	Setting	Time and/ or place reference, e.g. once upon a time/ one day/ long ago… in a forest/ in a park/ in a meadow/ in a field/ by a tree/ near a tree/ by the road	0 1 2[7]
Episode 1: Dog (Episode characters: dog and mouse)			
A2.	IST as initiating event	**Dog** was playful/ curious **Dog** saw a mouse	0 1
A3.	Goal	**Dog** wanted to catch/ get/ chase the mouse/ play with the mouse (In order) to + VERB (catch, get, play with)	0 1
A4.	Attempt	**Dog** jumped forward/ up **Dog** chased/ started to chase **Dog** tried to + VERB (catch, get, grab, take)	0 1
A5.	Outcome	**Dog** bumped his head/ bumped into the tree/ did not get the mouse/ was not quick enough **Mouse** escaped/ ran behind the tree/ mouse was too quick	0 1
A6.	IST as reaction	**Dog** was disappointed/ angry/ hurt **Mouse** was happy/ glad/ relieved	0 1
Episode 2: Boy (Episode character: boy)			
A7.	IST as initiating event	**Boy** was sad/ unhappy/ worried about his balloon **Boy** saw the balloon in the tree	0 1
A8.	Goal	**Boy** decided/ wanted to get his balloon back (In order) to + VERB (get) back	0 1
A9.	Attempt	**Boy** was/is pulling/ tried to pull the balloon down from the tree **Boy** jumped after the balloon/ reached for (the balloon)/ was/is climbing (the tree)	0 1
A10.	Outcome	**Boy** got his balloon back/ again **Balloon** was saved	0 1
A11.	IST as reaction	**Boy** was glad/ happy/ satisfied/ pleased/ relieved (to get/have his balloon back)	0 1
Episode 3: Dog (Episode character: dog)			
A12.	IST as initiating event	**Dog** saw/ noticed the sausages (in the bag) **Dog** was hungry/ curious/ keen on the sausages	0 1
A13.	Goal	**Dog** wanted/ decided to get/ grab/ eat/ have/ steal the sausages (In order) to + VERB (eat, get)	0 1
A14.	Attempt	**Dog** was/is grabbing/pulling/ taking/ stealing the sausages **Dog** grabs/pulls/takes the sausages (out of the bag)/ reached for the sausages **Dog** tried to + VERB (get, take)	0 1
A15.	Outcome	**Dog** ate/ got the sausages	0 1
A16.	IST as reaction	**Dog** was satisfied/ glad/ pleased/ happy/ not hungry (any more)	0 1
A17.		**Total score out of 17:**	

Score sheet for Dog in Mandarin

A. 故事结构

		正确答案范例[6]	分数
A1.	环境	时间和/或地点，例如：从前/ 有一天/ 很久以前... 在森林/ 公园/ 草地 /树旁/路边	0 1 2[7]
第一幕：小狗（角色：小狗、老鼠）			
A2.	IST 作为事件开始	小狗 贪玩/ 好奇 小狗 看到一只老鼠	0 1
A3.	目标	小狗 想(要) [捉/ 得到/ 追 那只老鼠]/ [跟老鼠玩] （为了）去+动词（抓、得到、跟它玩）	0 1
A4.	行为	小狗 跳 向前/ 上去 小狗 去追/开始追 小狗 尝试+动词（抓、得到、捉、拿）	0 1
A5.	结果	小狗 撞到了头/ 捉不到那只老鼠/ 不够快 老鼠 逃走了/ 跑到树后面去了/ 老鼠太快了	0 1
A6.	IST 作为事后反应	小狗 很失望/ 生气/ 受伤 老鼠 很开心/ 高兴/ 放心	0 1
第二幕：男孩（角色：男孩）			
A7.	IST 作为事件开始	男孩 很伤心/ 不开心/ 担心他的气球 男孩 看到气球挂在树上	0 1

A8.	目标	男孩 决定/ 想(要) [拿回他的气球] （为了）去+动词（得到）	0 1
A9.	行为	男孩 拉/ 尝试从树上把气球拉下来/ 跳上去拿气球 /去够（气球）/爬（树）	0 1
A10.	结果	男孩 拿回了气球/ 失而复得 气球被拿回来了	0 1
A11.	IST 作为事后反应	男孩 很高兴/ 开心/ 满足/愉快/放心（因为他拿回了气球）	0 1
第三幕：小狗（角色：小狗）			
A12.	IST 作为事件开始	小狗 看到/ 留意到（袋子里的）香肠 小狗 很饿/ 好奇 /想吃香肠	0 1
A13.	目标	小狗 决定/ 想(要) [拿/吃/要/偷 香肠] （为了）去+动词（吃、得到）	0 1
A14.	行为	小狗 拿了/ 抓了/偷了 香肠 小狗 （从袋子里）[拿了/抓了 香肠] / [去够香肠] 小狗 尝试去+动词（得到，拿到）	0 1
A15.	结果	小狗 吃了/ 得到了 香肠	0 1
A16.	IST 作为事后反应	小狗 很满足/ 高兴/ 得意/ 开心/肚子（再也）不饿了	0 1
A17.	**总分/满分 17 分:**		

Score sheet for Baby Birds in English

A. Story Structure

		Examples of correct responses[11]	Score
A1.	Setting	Time and/ or place reference, e.g. once upon a time/ one day/ long ago... in a forest/ in a meadow/ in a garden/ in a field/ in a bird's nest/ up a tree	0 1 2[12]
Episode 1: Mother/ Bird (Episode characters: mother bird and baby birds)			
A2.	IST as initiating event	**Baby birds** were hungry/ wanted food/ cried for food/ asked for food **<Mother/ Bird/ Parent, etc.>** saw that baby birds were hungry/ wanted food	0 1
A3.	Goal	**Mother bird** wanted to feed baby birds/ to catch/ bring/ get/ find food/ worms (In order) to + VERB (get food)	0 1
A4.	Attempt	**Mother bird** flew away/ went away/ looked for food/ was fetching food **Mother bird** tried to + VERB (get food)	0 1
A5.	Outcome	**Mother bird** got/ caught/ brought/ came back with food/ a worm/ fed the babies **Baby birds** got food/ a worm	0 1
A6.	IST as reaction	**Mother bird** was happy/ satisfied/ pleased **Baby birds** were happy/ satisfied/ pleased/ not hungry any more	0 1
Episode 2: Cat (Episode characters: cat and baby bird(s))			
A7.	IST as initiating event	**Cat** saw mother flying away/ saw that baby birds were all alone/ saw that there was food **Cat** was hungry/ thought "yummy"	0 1
A8.	Goal	**Cat** wanted to eat/ catch/ kill baby bird/-s (In order) to + VERB (eat, catch, kill, get)	0 1
A9.	Attempt	**Cat** was/ is climbing up the tree **Cat** tried to reach/ get baby bird **Cat** climbed/ jumped up (the tree)	0 1
A10.	Outcome	**Cat** grabbed/ got baby bird **Cat** nearly/almost + VERB (caught, got)	0 1
A11.	IST as reaction	**Cat** was happy **Bird/-s** was/ were scared/ crying/ screaming with pain	0 1
Episode 3: Dog (episode characters: dog, cat and baby bird(s))			
A12.	IST as initiating event	**Dog** saw that the bird was in danger/ saw that cat caught/ got the bird **Bird/-s** was/were in danger	0 1
A13.	Goal	**Dog** decided/ wanted to stop the cat **Dog** decided/ wanted to help/ protect/ save/ rescue the bird(-s) (In order) to + VERB (stop, rescue, help)	0 1
A14.	Attempt	**Dog** was/is pulling/ dragging the cat down/ biting/ attacking the cat/ grabbing the cat's tail **Dog** tried to + VERB (pull, drag, get down) **Dog** pulled/ dragged the cat down/ bit/ attacked the cat/ grabbed the cat's tail	0 1
A15.	Outcome	**Dog** chased the cat (away)/ scared the cat off/ away **Cat** let go of the baby bird/ ran away **Bird/-s** was/ were saved/ rescued	0 1
A16.	IST as reaction	**Dog** was relieved/ happy/ proud (to have saved/ rescued the baby bird) **Cat** was angry/ disappointed/ feeling bad/ mad/ scared/ in pain/ cat's tail hurt **Bird/-s** was/ were relieved/ happy/ safe **Mother bird** was relieved/ happy	0 1
A17.		**Total score out of 17:**	

Score sheet for Baby birds in Mandarin

		正确回答示例	得分
A1.	场景	时间、地点。例如：很久很久以前 / 一天 / 从前... 在森林里 / 在草地上 / 花园里 /	0 1 2
情节 1：鸟妈妈（出场人物：小鸟和鸟妈妈）			
A2.	IST 引发事件	鸟妈妈 看见小鸟饿了 / 想要吃饭 小鸟 饿了 / 想吃饭	0 1
A3.	目标	妈妈 想喂小鸟吃饭；去抓 / 找 / 拿虫子	0 1
A4.	行动	妈妈 飞走了 / 走了 / 去找食物了	0 1
A5.	结果	妈妈 找 / 抓 / 拿到了食物；叼着虫子回来了；喂了小鸟 小鸟 吃到了虫子 / 食物	0 1
A6.	IST 表示回应	鸟妈妈 很高兴 / 满意 小鸟 很高兴 / 满意 / 不饿了	0 1
情节 2：小猫（出场人物：小猫和小鸟）			
A7.	IST 引发事件	小猫 看见鸟妈妈飞走了/ 看见小鸟自己在鸟巢里/看见了食物 小猫 很饿/ 小猫流口水了/ 小猫想“好吃的”	0 1
A8.	目标	小猫 想吃/ 杀了小鸟	0 1
A9.	行动	小猫 爬上了树 / 跳上了树 / 试着去抓小鸟	0 1
A10.	结果	小猫 抓到了 / 叼住了小鸟	0 1
A11.	IST 表示回应	小猫 很高兴 小鸟 很害怕	0 1
情节 3：小鸟（出场人物：小鸟，小猫和鸟妈妈）			
A12.	IST 引发事件	小狗 看见小鸟有危险 / 小猫抓住了小鸟	0 1
A13.	目标	小狗 决定 / 想要阻止小猫：帮 / 帮助 / 保护 / 救小鸟	0 1
A14.	行动	小狗 把小猫拉下 / 拽下树 咬了 / 攻击了小猫/ 抓住了小猫的尾巴	0 1
A15.	结果	小狗 把小猫赶跑了 / 小猫跑了 小猫 放开了小鸟/ 逃跑了 小鸟 被救了	0 1
A16.	IST 表示回应	小狗 松了一口气 / 高兴/骄傲 小猫 很生气/ 失望 小鸟 庆幸/ 高兴被救了	0 1
A17.		总得分（共计 17 分）：	

Score sheet for Baby Goats

A. Story Structure

		Examples of correct responses[16]	Score
A1.	Setting	Time and/ or place reference, e.g. once upon a time/ one day/ long ago... in a forest/ in a meadow/ in a field/ by a lake/ at the lake/ at the pond	0 1 2[17]
Episode 1: Mother/ Goat (episode characters: baby goat and mother/ goat)			
A2.	IST as initiating event	**Baby goat** was scared/ in danger/ needed help/ cried (for help)/ called the mother **<Mother/ Goat/ Parent, etc**.> saw that the baby goat was scared/ in danger/ drowning/ couldn't swim **<Mother/ Goat/ Parent, etc**.> was worried about the baby goat in the water	0 1
A3.	Goal	**Mother goat** wanted to help the baby/ to save/ rescue the baby/ to push the baby out of the water/ to get it out of the water (In order) to + VERB (rescue, help) the baby	0 1
A4.	Attempt	**Mother goat** ran/ went into the water **Mother goat** is pushing/ helping **Mother goat** tried to + VERB (help, push)	0 1
A5.	Outcome	**Mother goat** pushed the baby out of the water/ saved/ rescued/ helped the baby out **Baby goat** was saved/ out of the water	0 1
A6.	IST as reaction	**Mother goat** was happy/ relieved **Baby goat** was relieved/ satisfied/ happy/ glad/ not scared any more	0 1
Episode 2: Fox (episode characters: fox and baby goat)			
A7.	IST as initiating event	**Fox** saw mother looking away/ saw that the baby was alone/ saw that there was food **Fox** was hungry/ thought "yummy"	0 1
A8.	Goal	**Fox** wanted to eat/ catch/ kill the baby goat (In order) to + VERB (eat, catch, get, kill)	0 1
A9.	Attempt	**Fox** jumped up/ out/ jumped towards the baby goat **Fox** tried to reach/ grab/ catch the baby goat	0 1
A10.	Outcome	**Fox** got/ grabbed/ caught the baby goat **Fox** nearly/almost + VERB (got, caught)	0 1
A11.	IST as reaction	**Fox** was happy **Baby** goat was scared/ crying/ screaming with pain	0 1
Episode 3: Bird (episode characters: bird, fox and baby goat)			
A12.	IST as initiating event	**<Bird, Crow, etc.>** saw that the goat was in danger/ saw that the fox caught/ got the goat **Baby goat** was in danger	0 1
A13.	Goal	**Bird** decided/ wanted to stop the fox **Bird** decided/ wanted to help/ protect/ save the baby goat (In order) to + VERB (stop, rescue, help)	0 1
A14.	Attempt	**Bird** was/is biting/ dragging the fox's tail/ the fox **Bird** bit/ dragged/ got the fox's tail/ attacked the fox **Bird** tried to + VERB (get fox off)	0 1
A15.	Outcome	**Bird** chased the fox (away)/ scared the fox off/ away **Fox** let go of the baby goat/ ran away **Baby goat** was saved/ rescued	0 1
A16.	IST as reaction	**Bird** was relieved/ happy/ proud (to have saved/ rescued the baby goat) **Fox** was angry/ disappointed/ feeling bad/ mad/ scared/ in pain/ fox's tail hurt **Baby goat/ -s** was/were relieved/ happy/ safe **Mother goat** was relieved/ happy	0 1
A17.		**Total score out of 17:**	

Score sheet for Baby Goats in Mandarin

A. 故事结构

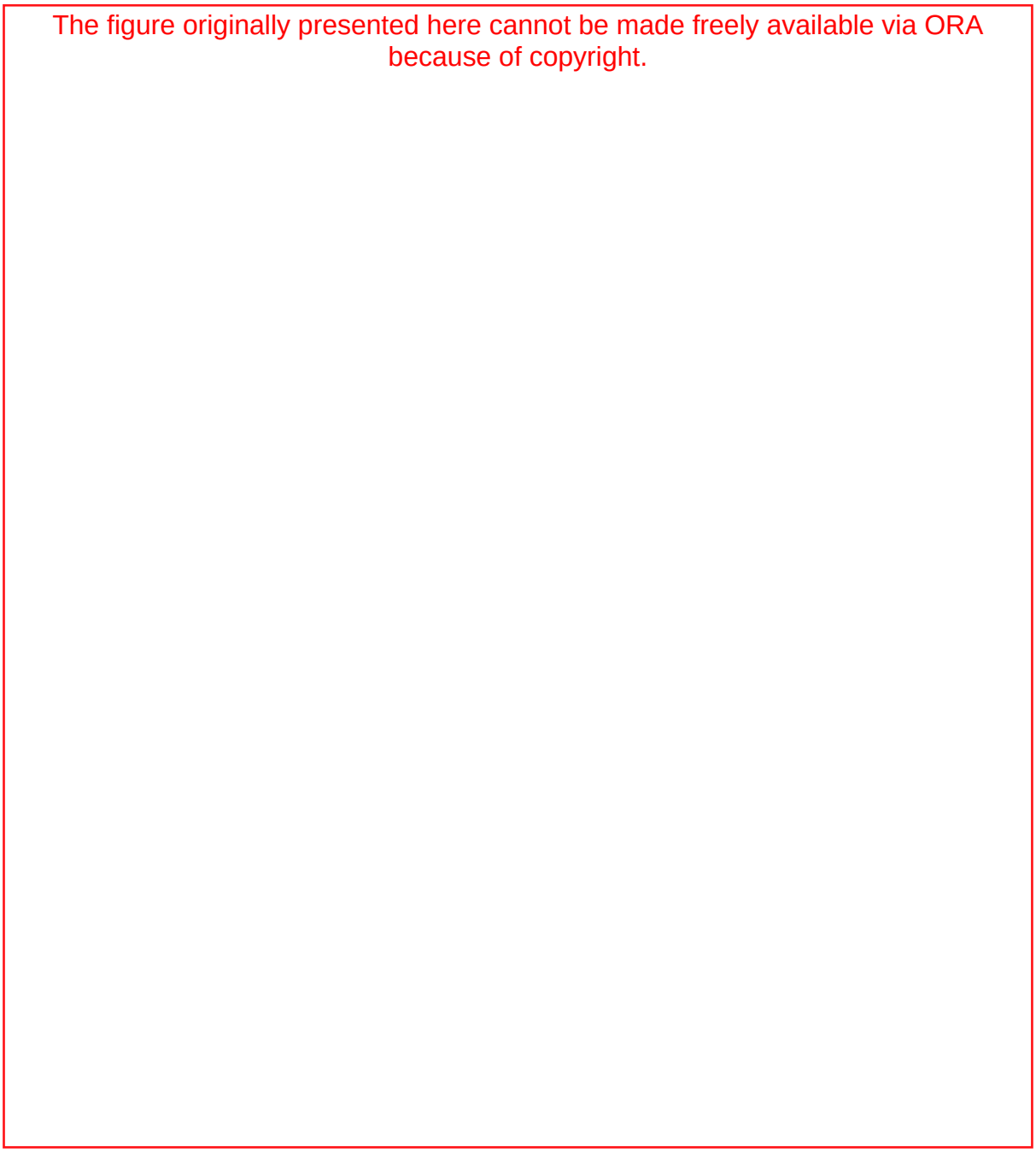
		正确答案范例[16]	分数
A1.	环境	时间和/或地点，例如：从前/ 有一天/ 很久以前...在森林/草地/ 湖边/湖里/池塘...	0 1 2[17]
第一幕：妈妈/羊（角色：小羊和羊妈妈/羊）			
A2.	IST 作为事件开始	小羊 很怕/ 很危险/需要帮助/ 大叫/ 叫羊妈妈 **<妈妈/羊/等等>** 看到小羊 吓坏了/ 很危险/ 不会游泳 **<妈妈/羊/等等>**很担心水里面的小羊	0 1
A3.	目标	羊妈妈 想(要) [帮小羊] / [救/ 把小羊从水里推出来] （为了）去+动词（救，帮助）小羊	0 1
A4.	行为	羊妈妈 跑/进到水里去 羊妈妈 在推 /帮忙 羊妈妈 试着去+动词（帮助，推）	0 1
A5.	结果	羊妈妈 把小羊从水里推了出来/ 救了/帮助小羊出来 小羊 得救了/ 上岸了	0 1
A6.	IST 作为事后反应	羊妈妈 很开心/ 放心 小羊 很放心/ 满足/ 开心/ 高兴/ 不再怕了	0 1
第二幕：狐狸（角色：狐狸和小羊）			
A7.	IST 作为事件开始	狐狸 看到羊妈妈看着其他的地方/ 看到那只小羊孤身一个/ 看到有吃的 狐狸肚子很饿 /想着“嗯，好吃”	0 1
A8.	目标	狐狸 想(要) [吃/ 捉/ 杀 小羊] （为了）去+动词（吃、捉、得到、杀）	0 1
A9.	行为	狐狸 [扑了过去]/ [跳 上前/ 出去] 狐狸 尝试 [接近/ 捉/抓 小羊]	0 1
A10.	结果	狐狸 得到了/ 捉到了/抓到了 小羊 狐狸 几乎/就快+动词（得到、捉到）	0 1
A11.	IST 作为事后反应	狐狸 很开心 小羊 很怕/在哭/痛苦地叫喊	0 1

第三幕：小鸟 （角色： 小鸟、狐狸、小羊/所有羊）			
A12.	IST 作为事件开始	小鸟 看到小羊有危险/看到狐狸抓到/捉到了羊 小羊 有危险	0 1
A13.	目标	小鸟 决定/ 想(要) [阻止狐狸] 小鸟 决定/ 想(要) [帮/ 保护/ 救 小羊] （为了）去+动词（阻止、救、帮助）	0 1
A14.	行为	小鸟 咬(住)/ 拉(住) 狐狸的尾巴 / 狐狸	0 1
A15.	结果	小鸟 把狐狸赶走了/把狐狸吓跑了 狐狸 放开了小羊/ 逃走了 小羊 得救了	0 1
A16.	IST 作为事后反应	小鸟 很放心/ 开心/ 自豪自己能救小羊 狐狸 很生气/ 失望/感觉不好/生气/恐惧/受伤/狐狸尾巴很痛 小羊都很放心/ 安心/ 开心/ 觉得安全了 羊妈妈 觉得很放心/开心	0 1
A17.		**总分/满分 17 分:**	

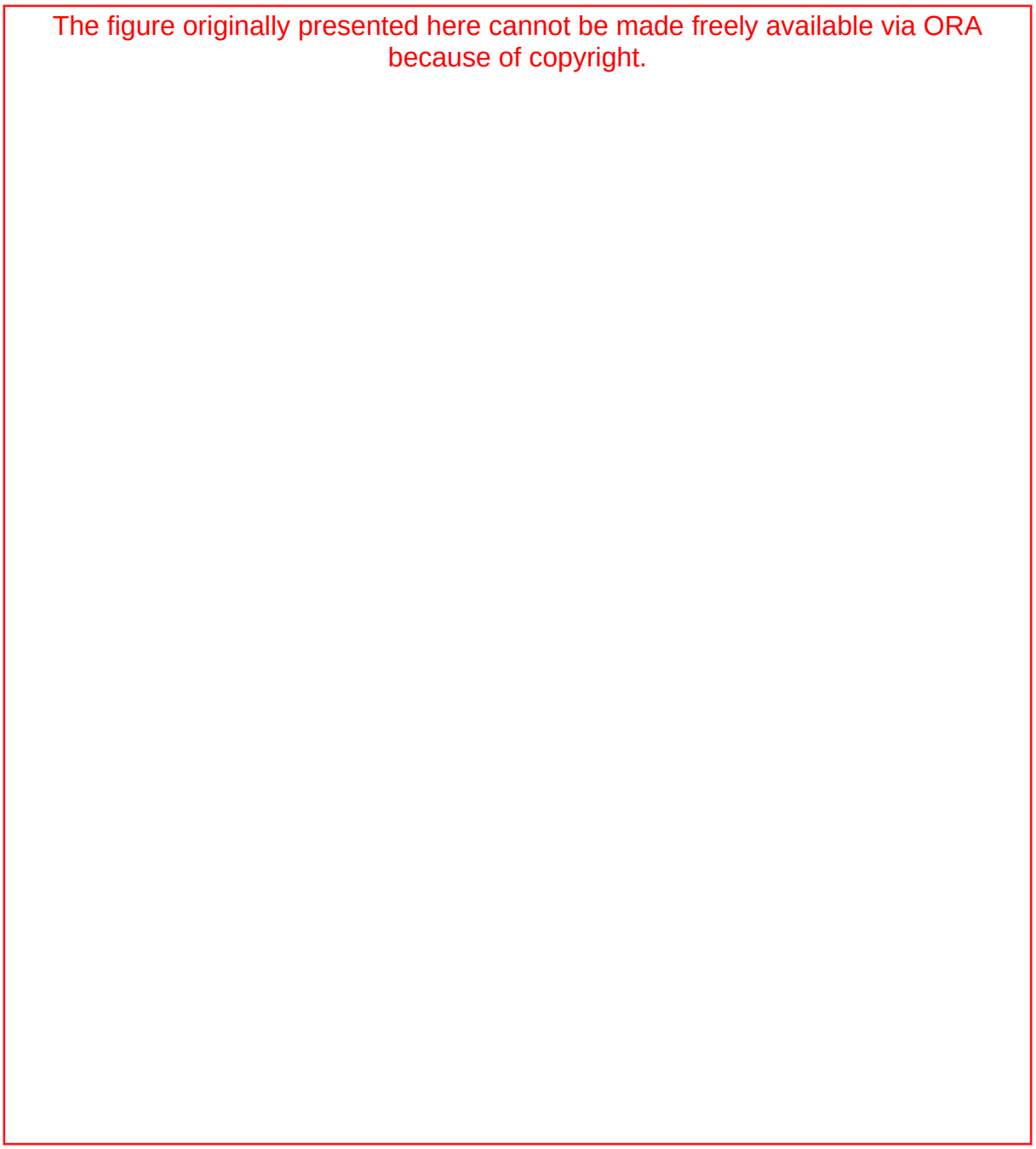
Appendix 5

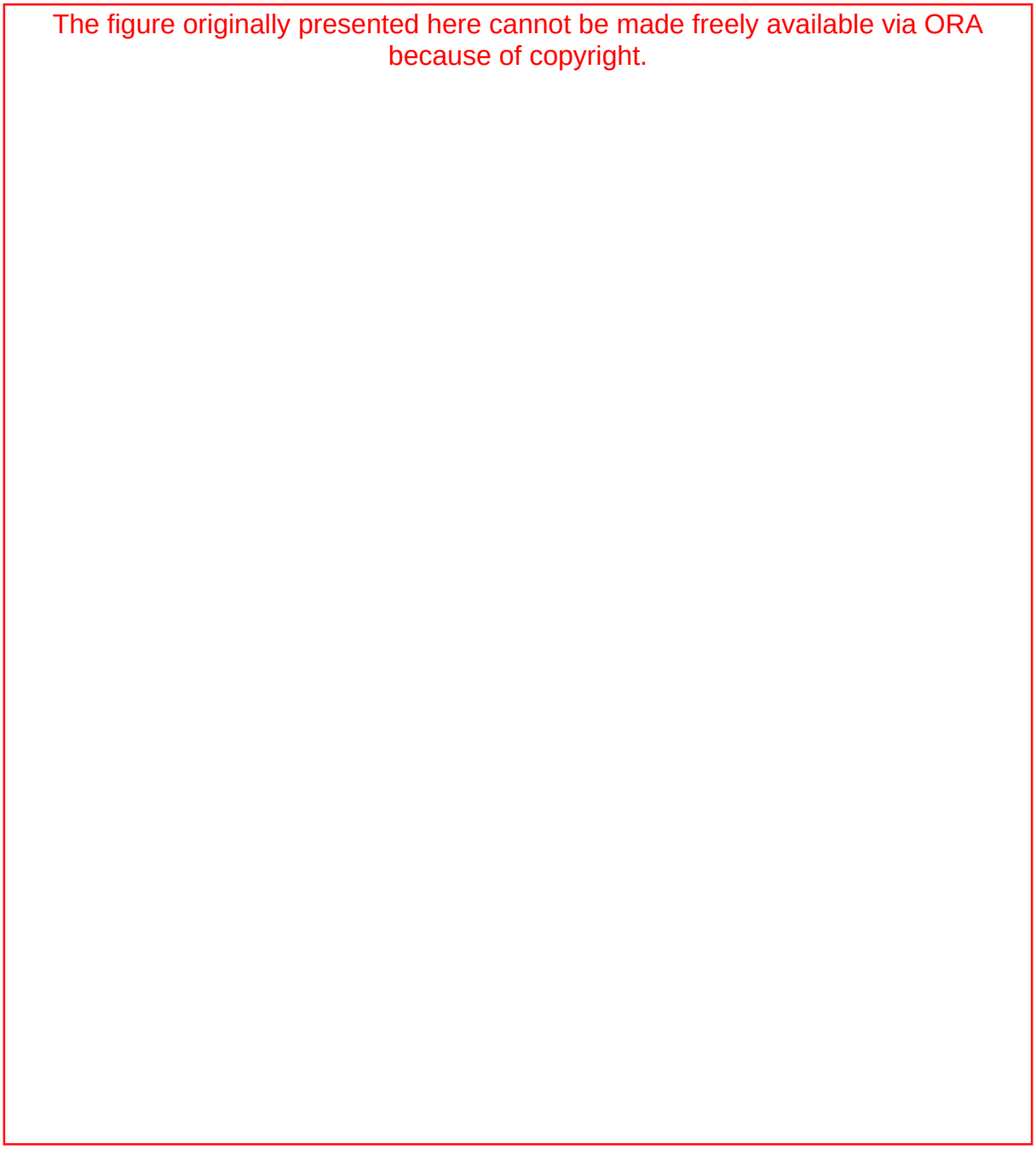
A1: Ball

A2-Diving board



A3-Airplane


The figure originally presented here cannot be made freely available via ORA because of copyright.


The figure originally presented here cannot be made freely available via ORA
because of copyright.

Appendix 6

Score sheet for A1

SG Unit	**Acceptable *[child need only have one alternative per unit to get credit for that unit]***	**Score**
Character 1	giraffe / male / boy (or any type of animal such as horse) [not acceptable: pronoun]	0 1
Character 2	elephant / female / girl (or any type of animal such as cow) [not pronoun]	0 1
Setting	swimming pool had a ball / playing with ball / want to play ball	0 1
Initiating Event	ball goes in water/pool/sand/mud ball is in water they see a ball	0 2
Internal Response	one / both want to get ball elephant says, e.g., "look what happened," "what am I going to do?" Elephant upset / sad [not: he/she/they want to go swimming]	0 1
Internal Plan	giraffe decides to / thinks he will get the ball	0 1
Attempt	giraffe jumps in pool / swims toward ball / tries to get ball [*not*: giraffe swimming (without goal); giraffe falls in water]	0 2
Outcome	giraffe gets ball / gives ball to elephant [not: elephant gives ball to giraffe, unless it is noted as unexpected, e.g., 'but instead, Elephant gets it and gives it to him']	0 2
Reaction of Giraffe	giraffe is happy / proud / smiles giraffe says "You're welcome" giraffe's teeth are chattering / giraffe is cold/wet	0 1
Reaction of Elephant	elephant is happy / is grateful / says thank you elephant hugs the ball [not: holds/has the ball]	0 1
Reaction both or unknown	"they" are happy/in love [code only as replacement for Reaction of Character 1 or 2; there should not be more than 2 reactions total]	0 1
	Total raw score:	
	Standard Score:	

Score sheet for A2

SG Unit	**Acceptable** ***[child need only have one alternative per unit to get credit for that unit]***	**Score**
Character 1	giraffe / male / boy (or any type of animal such as horse) [not acceptable: pronoun]	0 1
Character 2	elephant / female / girl (or any type of animal such as cow) [not acceptable: pronoun]	0 1
Setting	swimming pool no running allowed / going swimming / diving	0 1
Initiating Event	E starts to run towards diving board/ running/ going too fast	0 2
Internal response	E wants to go diving/ wants to dive/ wants to play in the water	0 1
Internal plan	E decides to / thinks she will run / swim	0 1
Attempt	E runs / goes fast	0 2
Outcome	E falls / gets hurt/ bumps knee	0 2
Reaction of Elephant	E sad / cries / upset / holds her knee	0 1
Reaction of Giraffe	G is scared/ worried/ goes to help	0 1
Reaction both/ unknown	"they" are unhappy / sad / upset [code only as a replacement for Reaction of Character 1 or 2; there should not be more than 2 reactions total]	0 1
Character 3 (C3)	lifeguard / other elephant / other male / her father / her brother	0 1
Initiating event	C3 shows up/comes over/ G sees C3/ C3 sees that E is hurt / asks what happened	0 2
Internal response	E/G hopes C3 can help/ C3 wants to help	0 1
Internal plan	Lifeguard decides/wants to help	0 1
Attempt	C3 tries to put Band-Aid on / puts Band-Aid on	0 2
Outcome	E gets help / feels better / has a Band-Aid / sits on bench	0 2
Reaction C1	G is relieved / happy / says "you're all better"/ encourages	0 1
Reaction C2	E feels better / not hurt / not sad / stares at Band-Aid	0 1
Reaction C3	C3 is pleased / happy / proud / takes E to bench/ encourages	0 1
Reaction of both/ unknown	"they" are happy / say "thank you"	0 1
Initiating Event	C3 points to no running sign	0 2
Internal response	C3 wants E to follow rules / doesn't want her to get hurt/ wants to help	0 1
Internal Plan	C3 decides to explain rules	0 1
Attempt	C3 explains rules / tells E "no running"	0 2
Outcome	E understands / listens / knows rules	0 2
Reaction of E	E nervous / worried / sorry / says sorry	0 1
Reaction of C3	C3 is upset / angry / stern	0 1
Reaction of both/ unknown	"they" are worried / upset / angry / sorry	0 1
	Total Score:	

Score Sheet for A3

SG Unit	**Acceptable *[child need only have one alternative per unit to get credit for that unit]***	**Score**
Character 1	giraffe / male / boy (or any type of animal such as horse) (not acceptable: pronoun)	0 1
Character 2	elephant / female / girl (or any type of animal such as cow) [not pronoun]	0 1
Setting	at swimming pool / going swimming / are playing has/is holding airplane / one asks other to play	0 1
Initiating Event	G playing with airplane/making airplane fly G shows/gives E his airplane	0 2
Internal Response	E wants / is interested in airplane	0 1
Internal Plan	E decides to take airplane	0 1
Attempt	E takes airplane / zooms airplane around / makes airplane fly / G gives E a turn	0 2
Outcome	airplane falls in pool / E throws plane in pool	0 2
Reaction of Giraffe	G angry/yells/stares at plane	0 1
Reaction of Elephant	E feels bad/embarrassed/scared / E stares at plane/says oops	0 1
Reaction - both/unknown	“they” are unhappy [code only as replacement for Reaction of Character 1 or 2; there should not be more than 2 reactions total]	0 1
Character 3 (C3)	lifeguard / other elephant /other male / her father / her brother	0 1
Initiating Event	C3 shows up/comes over / E sees C3 / C3 sees plane in water / C3 asks what happened	0 2
Internal Response	E/G hopes C3 can help / C3 wants to help	0 1

Internal Plan	E/G decides to ask for help/explains what happened /asks C3 to get plane / lifeguard decides to try NOT: E talks to C3 (without specifying what about)	0 1
Attempt	C3 tries to get plane / reaches for plane	0 2
Outcome	C3 can't reach plane / plane was too far/sinking	0 2
Reaction C1	G upset / sad / worried / cries / stares at plane	0 1
Reaction C2	E upset / feels bad / feels guilty / looks sheepish / apologizes	0 1
Reaction C3	C3 disappointed / shrugs / says he can't reach it	0 1
Reaction of both/unknown	"they" are disappointed/feels bad [code only as replacement for Reaction of another character; there should not be more than 3 reactions total]	0 1
Character 4 (C4)	other lifeguard / other elephant / other female / her mother / her sister /other person	0 1
Initiating Event	C4 comes over / has net	0 2
Internal Response	C4 wants to help / knows how to get plane / offers to help	0 1
Internal Plan	C4 decides to try / has idea / says she will get it E/G/C3 asks C4 to get it	0 1
Attempt*	C4 reaches for plane / is going to get it / tries to get it C4 gets plane	0 2
Outcome*	C4 gives plane to G / G has plane	0 2
Reaction of Giraffe	G happy / amazed / excited / hugs plane / says thanks	0 1
Reaction of Elephant 1	E happy / relieved / feels better / says thanks	0 1
Reaction C4	female lifeguard relieved / pleased	0 1
Reaction of both/unknown	"they" are happy/excited / say thanks [code only as replacement for Reaction of another character; there should not be more than 3 reactions total]	0 1
	Total score:	
	Standard Score:	

*For this story and this episode, either her attempt to get the plane or her actually getting it qualify as the Attempt, while the Outcome is her giving the plane to the giraffe, because the goal of the episode is to get the plane back to the giraffe.

Appendix 7

Score sheet for The Very Hungry Caterpillor in English

The Very Hungry Caterpillar			
		Examples of correct responses	**Score**
SS1	Setting	Time and/or place reference, e.g. one day/once upon a time/ in the light of the moon/lay on a leaf	0 1 2
SS2	Initiating event	A caterpillar came out of the egg Caterpillar was hungry	0 1
SS3	Goal	Caterpillar wanted to look for some food	0 1
SS4	Attempt	Caterpillar ate through one apple	0 1
SS5	Attempt	Caterpillar ate through two pears	0 1
SS6	Attempt	Caterpillar ate through three plums	0 1
SS7	Attempt	Caterpillar ate through four strawberries	0 1
SS8	Attempt	Caterpillar ate through five oranges	0 1
SS9	Attempt	Caterpillar ate through one piece of chocolate cake, one ice-cream cone, one pickle, one slice of Swiss cheese, one slice of salami， one lollipop, one piece of cherry pie, one sausage, one cupcake, and one slice of watermelon	0 1
SS10	IST as reaction	Caterpillar felt sick	0 1
SS11	Attempt	Caterpillar ate through one nice green leaf	0 1
SS12	Outcome	Caterpillar became a big, fat caterpillar	0 1
SS13	IST as reaction	Caterpillar was not hungry anymore Caterpillar was happy	0 1
SS14	Attempt	Caterpillar built a cocoon around himself	0 1
SS15	Outcome	Caterpillar became a butterfly	0 1
SS16	IST as reaction	Caterpillar (now butterfly) was beautiful and happy	0 1
		Total score out of 17	

Score sheet for The Very Hungry Caterpillor in Mandarin

好饿的毛毛虫			
		正确回答示例	**得分**
SS1	场景	时间、地点。例如：一天 / 从前/ 月光下/ 叶子上	0 1 2
SS2	IST 引发事件	一只毛毛虫 从蛋里爬了出来/感觉很饿	0 1
SS3	目标	毛毛虫 想要找一些东西来吃/寻找食物	0 1
SS4	行动	毛毛虫 吃了一个苹果	0 1
SS5	行动	毛毛虫 吃了两个梨	0 1
SS6	行动	毛毛虫 吃了三个李子	0 1
SS7	行动	毛毛虫 吃了四个草毒	0 1
SS8	行动	毛毛虫 吃了五个桔子	0 1
SS9	行动	毛毛虫 吃了一块巧克力蛋糕 一个冰淇淋甜筒 一条腌黄瓜 一块奶酪 一截火腿 一根棒棒糖一块樱桃派 一条香肠 一个纸杯蛋糕和一片西瓜	0 1
SS10	IST 表示回应	毛毛虫 肚子好痛/ 生病了/ 感觉不舒服	0 1
SS11	行动	毛毛虫 吃了一片叶子	0 1
SS12	结果	毛毛虫 变成了一只又大又肥的毛毛虫/变大了	0 1
SS13	IST 表示回应	毛毛虫 不觉得肚子饿了/感觉饱了 毛毛虫 感觉很开心	0 1
SS14	行动	毛毛虫 造了一个茧/小房子 把自己包在里面	0 1
SS15	结果	毛毛虫 变成了蝴蝶	0 1
SS16	IST 表示回应	蝴蝶 变得很漂亮/感觉开心	0 1
		总分	

Appendix 8

Score sheet for A3-Airplane under standardarization

A3-Airplane			
		Examples of correct responses	Score
SS1	Setting	Time and or place reference: e.g., one day/once upon a time/ swimming pool	0 1 2
SS2	Initiating event	Giraffe is playing with airplane/making airplane fly Giraffes shows Elephant his airplane	0 1
SS3	Goal	Elephant wants/decides to take airplane	0 1
SS4	Attempt	Elephant takes airplane / zooms airplane around / makes airplane fly / Giraffe gives Elephant a turn	0 1
SS5	Outcome	Airplane falls in pool / E throws plane in pool	0 1
SS6	IST as reaction	G angry/yells/stares at plane E feels bad/embarrassed/scared / E stares at plane/says oops"	0 1
SS7	Initiating Event	Lifeguard shows up/comes over / Lifeguard sees plane in water / Lifeguard asks what happened	0 1
SS8	Goal	Elephant and/or giraffe hope lifeguard can help Lifeguard wants to help	0 1
SS9	Attempt	Lifeguard tries to get plane / reaches for plane	0 1
SS10	Outcome	Lifeguard can't reach plane / plane was too far/sinking	0 1
SS11	IST as reaction	Giraffe is upset / sad / worried / cries / stares at plane Elephant upset / feels bad / feels guilty / looks sheepish / apologizes Lifeguard disappointed / shrugs / says he can't reach	0 1
SS12	Initiating Event	other lifeguard/other elephant comes over / has net	0 1
SS13	Goal	Other lifeguard wants to help/ decides to try / has idea	0 1
SS14	Attempt	Other lifeguard reaches for plane / is going to get it / tries to get it	0 1
SS15	Outcome	Other lifeguard gets plane /gives plane to Giraffe /Giraffe has plane	0 1
SS16	IST as reaction	Giraffe happy / amazed / excited / hugs plane / says thanks Elephant happy / relieved / feels better / says thanks	0 1
		Total score out of 17	

Score sheet for A3-Airplane under standardarization in Mandarin

A3-Airplane			
		正确回答示例	得分
SS1	场景	时间、地点：例如，有一天/很久很久以前/在游泳池旁	0 1 2
SS2	IST 引发事件	长颈鹿 正在玩飞机/让飞机飞起来 长颈鹿 向大象展示他的飞机	0 1
SS3	目标	大象 想要/决定要 拿/玩飞机	0 1
SS4	行动	大象 拿到了飞机/玩飞机/让飞机飞起来 长颈鹿 把飞机给了大象	0 1
SS5	结果	飞机 掉进游泳池 大象 （不小心）把飞机扔进游泳池	0 1
SS6	IST 表示回应	长颈鹿 感觉很生气/大喊/盯着飞机看 大象 感觉难受/尴尬/害怕/盯着飞机/说“哎呀”	0 1
SS7	IST 引发事件	救生员出现/走过来/看到水里的飞机/问发生了什么	0 1
SS8	目标	大象和/或长颈鹿 希望救生员能帮忙 救生员 想要帮忙	0 1
SS9	行动	救生员 试图去拿飞机/伸手去拿飞机	0 1
SS10	结果	救生员 够不到飞机 飞机 太远/正在下沉	0 1
SS11	IST 表示回应	长颈鹿 难过/伤心/担心/哭泣/盯着飞机看 大象 难过/感觉不好/感到内疚/看起来不好意思/道歉 救生员 失望/耸耸肩/说他够不到	0 1
SS12	IST 引发事件	另一个救生员/另一只大象 走过来/手中拿着网	0 1
SS13	目标	另一个救生员 想帮忙/决定尝试/有办法	0 1
SS14	行动	另一个救生员 伸手去拿飞机/要去拿/试图拿	0 1
SS15	结果	另一个救生员 拿到飞机/把飞机给长颈鹿 长颈鹿 重新拿到了飞机	0 1
SS16	IST 表示回应	长颈鹿 感觉开心/惊讶/兴奋/抱着飞机/说谢谢 大象 开心/松了一口气/感觉好些了/说谢谢	0 1

Appendix 9

CUREC Approval

Gary Snapper <gary.snapper@education.ox.ac.uk>
周一 2024/3/4 17:31
收件人:Yucheng Liu <yucheng.liu@wolfson.ox.ac.uk>
抄送:Ernesto Roque-Gutierrez <ernesto.roque-gutierrez@education.ox.ac.uk>;Student CUREC <student.curec@education.ox.ac.uk>

1 个附件(130 KB)
Yucheng Liu CUREC Approval.pdf;

Dear Yucheng,

Research ethics approval

Research title: Investigating the narrative and lexical diversity of Mandarin-speaking monolingual and bilingual children: a corpus-based approach

Research ethics reference: EDUC_C1A_24_093

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:

Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely

Dr Gary Snapper

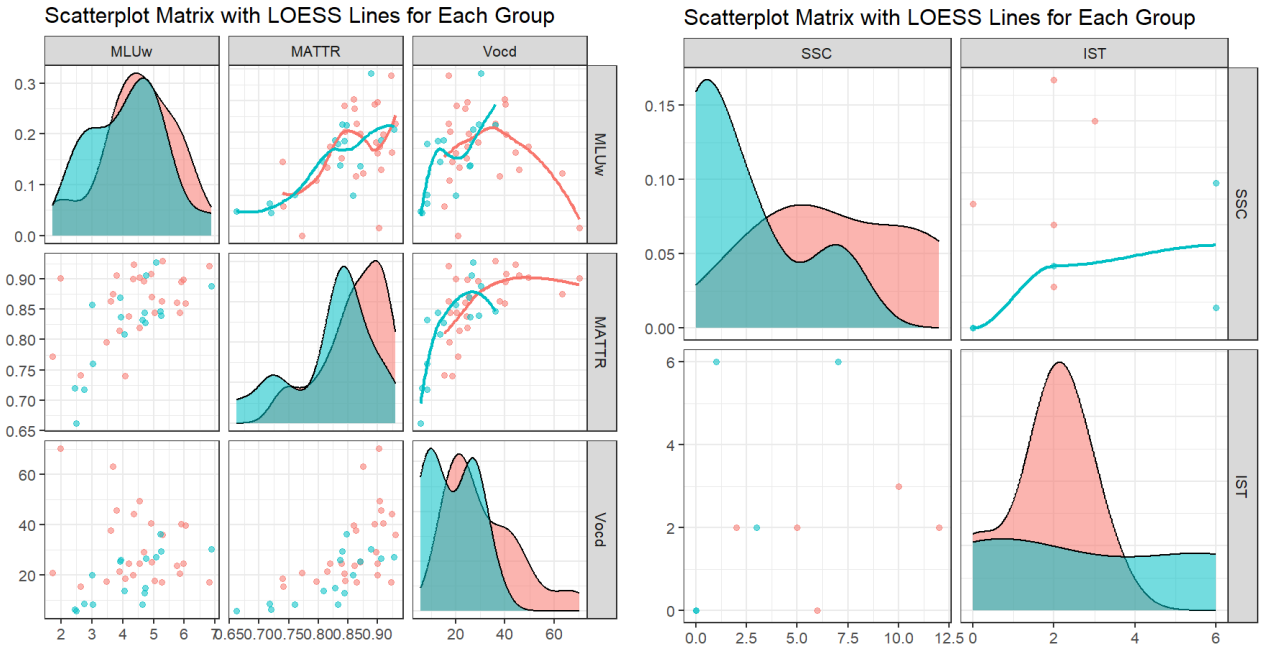
DREC member

Dr Gary Snapper
Departmental Lecturer in English Education

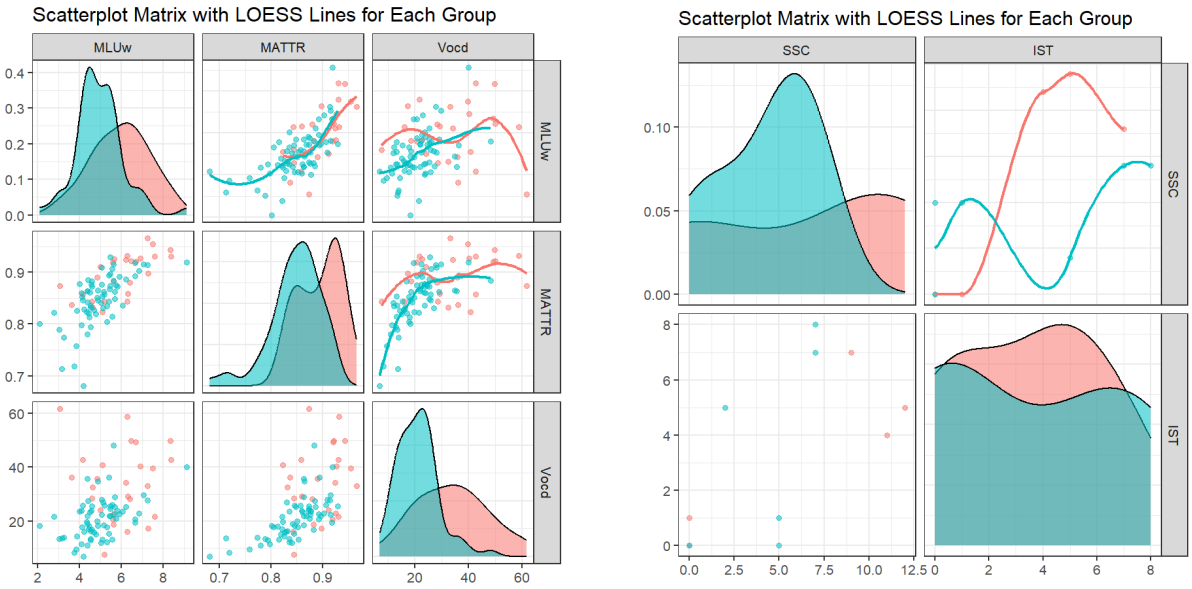
Department of Education, University of Oxford
15 Norham Gardens, Oxford, OX2 6PY
+44 (0)1865 274025

Appendix 10

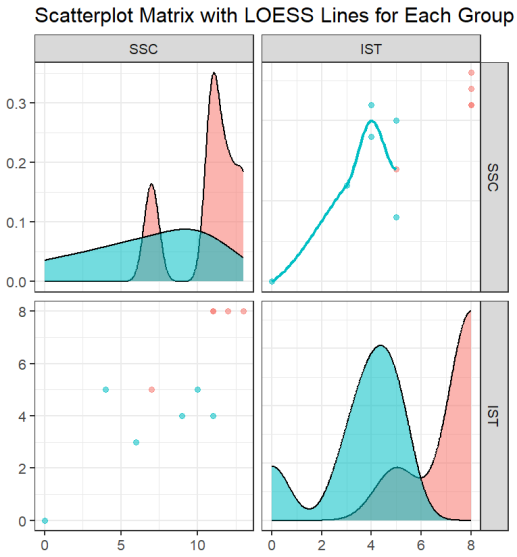
Linearity check for RQ1



RQ1: Age group 4; IV- langauge group; DV: microstructural or macrostructural metrics



RQ1: Age group 5; IV- language group; DV: microstructural or macrostructural metrics



RQ1: Age group 6; IV- langauge group; DV: microstructural or macrostructural metrics

Multicollinearity check

*Multicollinearity was identified when r > .9

Age 4

	MLUw	MATTR	VocD
MLUw	1		
MATTR	0.59	1	
VocD	0.085	0.62	1

	IST
SSC	0.2

Age 5

	MLUw	MATTR	VocD
MLUw	1		
MATTR	0.7	1	
VocD	0.38	0.59	1

	IST
SSC	0.63

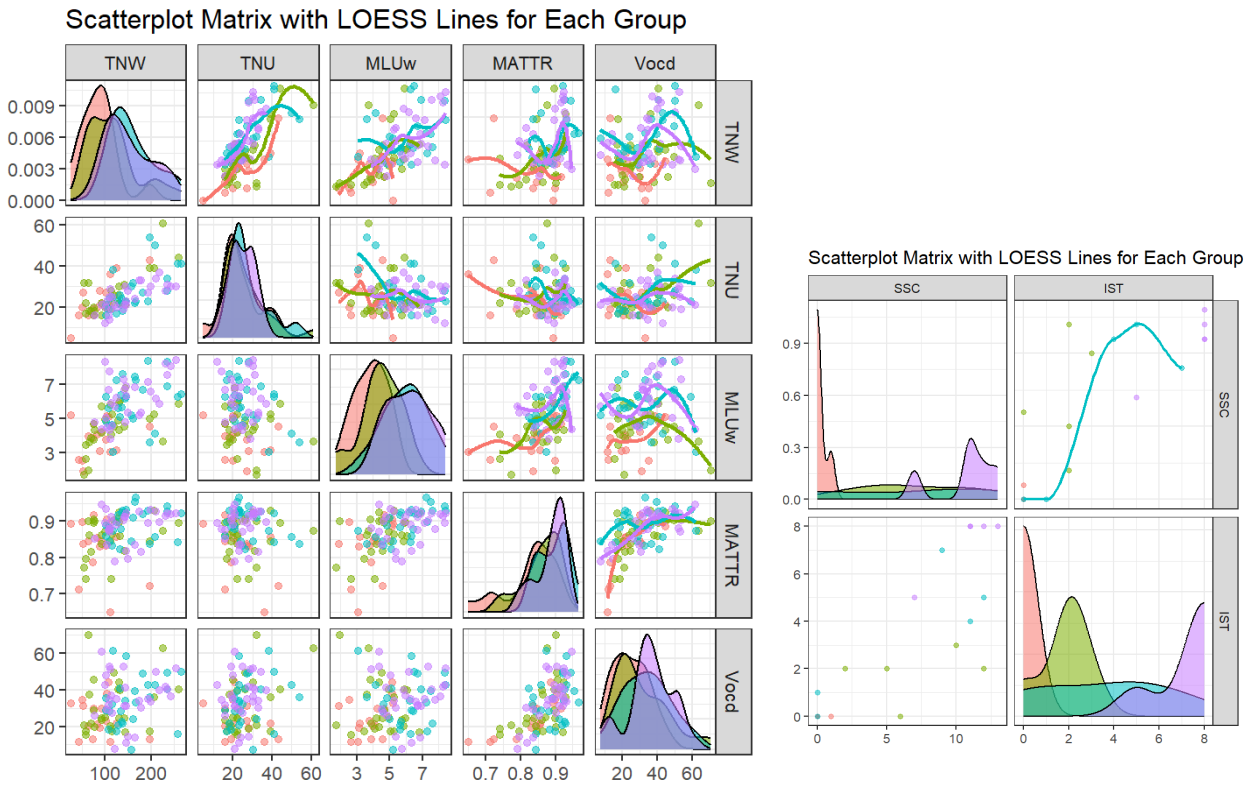
Age 6

	MLUw	MATTR	VocD
MLUw	1		
MATTR	0.43	1	
VocD	0.22	0.68	1

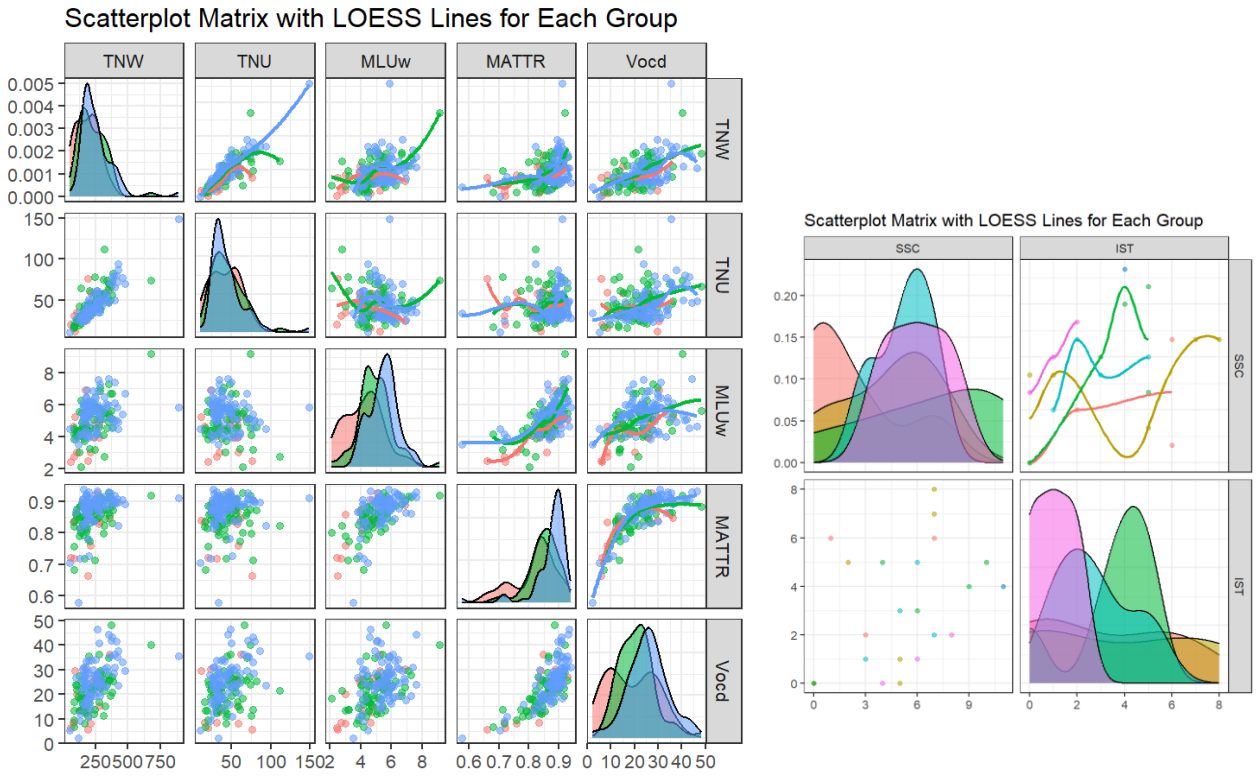
	IST
SSC	0.82

Appendix 11

Linearity check for RQ2



RQ2: Monolingual children IV- age; DV: microstructural or macrostructural metrics



RQ2: Bilingual children IV- age; DV: microstructural or macrostructural metrics

Multicollinearity check

*Multicollinearity was identified when r > .9

Monolingual group

	TNW	TNC	MLUw	MATTR	VocD
TNW	1				
TNC	0.67	1			
MLUw	0.59	-0.16	1		
MATTR	0.33	-0.086	0.54	1	
VocD	0.25	0.23	0.13	0.58	1

	IST
SSC	0.83

Bilingual Group

	TNW	TNC	MLUw	MATTR	VocD
TNW	1				
TNC	0.85	1			
MLUw	0.41	-0.072	1		
MATTR	0.42	0.14	0.64	1	
VocD	0.56	0.38	0.44	0.74	1

	IST
SSC	0.47