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How narrative competence develops from preschool to school-age period: a study with Italian children

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Declaration

I declare that the work presented in this thesis is my own.

Where information has been derived from other sources, I confirm that this has been reported in the thesis.

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Paola Zanchi

In loving memory of
Professor Laura D'Odorico

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Abstract

The onset of the use of narratives represents a fundamental step in an advanced phase of language development. Indeed, to tell or to understand a story, a child must be able to consider and integrate linguistic, cognitive, and social abilities (Boudreau & Chapman, 2000; Karmiloff & Karmiloff-Smith, 2002). Moreover, narratives evaluation is seen by several authors as a "naturalistic" approach in the study of language development, because narratives represent a real and contextualized request for children (Schraeder, Quinn, Stockman & Miller, 1999). Narrative's analysis, considering the several competences needed to tell a story, allows a multi-componential approach in the study of language development.

The dissertation presents four studies conducted within this PhD project, which aims at deepen the knowledge of narrative competence in Italian children.

The first chapter presents a new tool developed for the assessment of narrative competence, the Narrative Competence Task (NCT). It describes a scoring system based on the vast literature on this topic and that aims to be usable in both research and clinical field. Finally, it shows the NCT's validity in analysing the development of narrative competence in children from 3 to 8 years.

The second chapter aims to analyse gestural and verbal production when preschool-aged children are telling a story. The focus is to describe the gestures used by children during story-telling and the relationships among the use of gestures and measures of narrative's competence. The communicative function of the gestures is finally considered to determine whether gestures play an essential role in the narrative production of preschool-aged children or if they serve only an enrichment role.

The third chapter includes three studies focused on the prosody used during story-telling. Study 1 investigates longitudinally in a group of preschool children the relationships among narrative skills, syntax, and prosody. Study 2 describes the intonation used in narratives by children and adults within the Autosegmental-Metrical framework, a model recently adopted in the international filed in the study of children's prosody, but not yet been used with Italian children; the results are discussed considering the link between language and cognitive development. Finally, Study 3 investigates the prosody of children and adults' narratives as a cue of pre-planning.

The last chapter focuses on the relationships between narrative competence and learning abilities (i.e., reading and writing). Specifically, the aim of the work presented is to verify the possible associations among different aspects of narrative competence and reading and writing abilities, considering both the automatisms of learning (i.e., decoding and spelling) and more complex aspects of academic performance (i.e., text comprehension and production), during the first three years of primary school attendance.

Taken together the studies presented in the dissertation highlight the chances given by narratives in the study of language development. The results deepen our knowledge on language acquisition during the preschool and school-age period in Italian children and are discussed considering the relationships among several linguistic domains and the general cognitive development.

Introduction

The study of narrative competence in children

Narratives represent an important device for human communication. People use narratives in everyday communication, to recall and describe past experiences. Thus, narratives are a vehicle for cultural transmission. For this reason, narratives are cross-culturally used in children rearing systems.

How children acquire the ability to tell stories has a central role in language development research field. Language acquisition starts before birth, through the prenatal exposure to the native language and, by the age of 4, children typically comprehend and use several grammatical structures of their native language (for a review of studies on language development see for example D'Odorico, 2005; Guasti, 2007). However, language is far to be completely acquired by this age, indeed its development continues into the school years. The later language development of children can be synthetized by a growing mastery of discourse (e.g. Berman, 1998; Berman & Verhoeven, 2002). Narratives can be seen as one of the most significant domains of later language development (Karmiloff-Smith, 1995).

With no doubts, telling stories is a multi-componential competence. To tell a story, a child must be able to consider and integrate linguistic, cognitive, and social abilities (Boudreau & Chapman, 2000; Karmiloff & Karmiloff-Smith, 2002). First, a child has to understand the narrative's typical structure (i.e., the story's grammar), which includes an introduction, provision of the setting and description of the characters in the story, a problematic situation that shapes the protagonist's goal, attempts to solve the problem, and a conclusion (e.g., Pinto, 2003; Stein, 1988; Stein, Glenn & Freedle, 1979). Second, the ability to tell a story requires adequate linguistic competence. That is, the child must be able to use the correct words to communicate the meanings that he/she wants to express as well as the appropriate syntactic structures, prepositions and adverbs needed to make the story logical and cohesive (Orsolini, 1990). Third, to tell a story, a good level of socio-cognitive expertise is required. The child must know something about the world, people, and the potential motivations that can lead them to act while simultaneously maintaining psychological distance from the present situation and considering other people's points of view (Fernández, 2013; Gamanossi & Pinto, 2014).

Narrative competence development

Many studies have investigated children's narrative competence in both comprehension and production to describe its development and identify its cognitive and linguistic bases (e.g., Fiorentino & Howe, 2004; Norbury & Bishop, 2003; Orsolini, 1995; Westerveld & Gillon, 2010).

Scholars have studied children's narrative competence considering two levels of evaluation: microstructure and macrostructure. Microstructure refers to the language used in narration, including, for instance, the lexical variety, mean length of the utterance and syntactic complexity (e.g., Justice, Bowles, Pence, & Gosse, 2010; Mäkinen, Loukusa, Nieminen, Leinonen, & Kunnari, 2014). In contrast, macrostructure refers to global narrative characteristics, particularly the ability to produce a story that is well structured, coherent, and cohesive and provides evaluative comments, especially about the characters' mental or emotional states.

The macrostructural level is influenced by several factors, including general linguistic skills, cognitive processes, and everyday experience (Brice-Heath, 1983; Heilmann, Miller, Nockerts & Dunaway, 2010; Trabasso & van den Broek, 1985). During development, children's narratives show a remarkable increase at the macrostructural level (e.g., Castilla-Earls, Petersen, Spencer & Hammer, 2015), particularly in the transition from preschool- to school-age (e.g., Roch, Florit & Levorato, 2016). The narrative macrostuctural level includes several important story's characteristics: quantity of information, story structure, cohesion and the use of evaluative comments.

The amount of relevant information included in the stories (referred to as "quantity of information" or "information density") has been frequently considered as an index of narrative competence (e.g., Fiorentino & Howe, 2004). Analysing the stories produced by children ranging in age from 4 to 8 years, Schneider, Hayward and Dubé (2006) showed a significant increase in the quantity of relevant information included in the narrations as children's age increased. In addition, children's ability to tell stories continues to develop during primary and secondary school, as older children usually include more events than do younger ones (Stein et al., 1979).

Considering story structure, Orsolini (1995), analysing the narratives of 70 4- and 5-year-old children, identified 4 levels: chronicles, that is narratives without a problematic situation in which events are only temporally linked; incomplete episodes, that is narratives characterised by the presence of a problematic situation followed by the reaction of the protagonist that lack intermediate events; minimal episodes, that is narratives in which intermediate events such as attempts to solve the problem are included; and, finally, complete episodes, that is narratives characterised not only by the problem-attempts-consequence sequence but also by the presence of reactions and emotive responses of the characters. This author found that as children grow and develop their narrative competence, they gradually move from non-goal-directed sequences towards complete episodes. Additionally, Berman and Slobin (1994) analysed the development of story structure in children. These authors claimed that the global structure of a story is composed of 3 main components: a problematic situation, the attempts to solve the problem, and the overall outcome. They found that less than 20% of 3-year-old children included all 3 of these components in their stories. The majority of 5-year-old children were able to state the problematic situation. However, only 50% of them included the attempts to solve the problem and even fewer of them stated the conclusion of the story. Whereas 9-year-old children frequently included initiating events and attempts, they did not provide a story outcome in the same way as adults.

As regards cohesion, different indices have been used to assess this variable in children's narratives, including the use of conjunctions, articles and pronouns. Halliday and Hasan (1976) identified interclausal conjunctions (e.g., temporal and causal conjunctions) and pronominalization (i.e., the use of correct pronouns and articles) as means to make a narrative cohesive. Children are able to create cohesion at a relatively early age, although their ability to use a range of conjunctions correctly increases with age (Shapiro & Hudson, 1991). With regard to pronominal references, whereas preschool-age children are able to use pronouns and articles, they have problems with introducing and marking new referents appropriately in narration tasks (Pratt & MacKenzie-Keating, 1985). Karmiloff-Smith (1980), analysing narratives of picture storybooks, identified 3 levels of development in pronominal anaphora: 1. children ranging in age from 3 to 5 years produced sentences not linguistically connected to an overall narrative unit; 2. children from 5 to 8 years of age used pronouns to identify the protagonist; and 3. children from 8 to 12 years of age used a more advanced anaphoric strategy in which pronouns were used to maintain a reference to characters, whereas nominals were used to switch a reference.

Wigglesworth (1997), analysing the referencing strategies used by children, found that 4-year-old children used pronouns without any clear antecedents, while 10-year-old children used pronouns to refer to the main character, regardless of the situation (i.e., to maintain a reference or to switch a reference). With regard to the use of articles, Bamberg (1987), analysing the narratives of children ranging in age from 3 to 10 years, found that new referents were frequently introduced using a determinate article and that only 50% of the oldest children used an indeterminate article at the first occurrence of a new referent. However, this result can be partially explained by the fact that the child narrator and the adult listener in Bamberg's study focused their attention on the same book images. In fact, Kail and Hickman (1992) found that the use of an indefinite article for new elements increases when the child is telling the story to a blindfolded adult.

Finally, another aspect that has been broadly studied in narratives is the use of evaluative comments (Bamberg & Damrad-Frye, 1991; Gamanossi & Pinto, 2014). Bamberg and Damrad-Frye (1991), considering several types of evaluative comments (frames of mind, character speech, and causal connectives), found that as early as age 4, children are able to include in their narratives some information concerning the mental states of characters. They also found that the use of these devices increased with age (adults used 3 times as many as 5-year-old children and more than twice as many as 9-year-old children). Older children included in their stories not only more events but also more mental states as well as temporal and causal relationships between events than do younger ones (Stein, Glenn, & Friedle, 1979). The use of the mental state lexicon in narratives has been more frequently investigated in written texts than in oral texts (e.g., Fox, 1991; Longobardi, Presaghi & Piras, 2008; Longobardi, Spataro, Renna & Rossi-Arnaud, 2014). Data from written stories of children in the third, fourth and fifth years of primary school showed that females used significantly more internal state terms (particularly emotional terms) than males did (Longobardi et al., 2008). In addition, the children's use of mental state terms was correlated with the number of subordinate propositions and narrative categories included in their stories (Longobardi et al., 2014). With regard to oral narratives, Charman and Shmueli-Goetz (1998) found a significant relationship between the use of mental state terms and the ability to give a good structure to the story among children in primary school. Moreover, as Astington (1990) found, children's inferences concerning characters' emotions and intentions become an increasingly important aspect of their appreciation of literature in the transition from the preschool-age to the school-age years.

With regard to the microstructural level, researchers usually refer to sentence level productivity and complexity (Justice et al., 2006; Liles, Duffy, Merrit & Purcell, 1995). Typical measures of productivity are the number of communication or minimal terminable units, which are defined as a main clause and its subordinate clauses (Hughes, McGillivray & Schmidek, 1997), the total number of words, and the number of different words (Justice et al., 2006), this last also considered as a measure of lexical diversity (Heilmann, Nickerts & Miller, 2010). Indices of syntactic complexity can be the mean length of utterance or the clausal structures used in narratives (Bishop & Dolan, 2005; Justice et al., 2006).

Considering narratives' productivity, Westerveld and collaborators (Westerveld, Gillon & Miller, 2004) found differences among 5- 6- and 7-year-olds, but not between 4- and 5-year-olds, in the total number of different words and the total number of words. Justice and collaborators (2006) conducted a study aimed to develop a clinical tool that would account for microstructural aspects of narrative production for children. For this reason, they collected data on a huge number of participants, 250 children aged between 5 and 12 years. Their results highlighted a general linear increase in all the microstructural measures considered (i.e., total number of words, number of different words, total number of minimal terminable units, mean length of utterance in words and in morphemes, total number of utterances that contained two or more clauses, total number of coordinating conjunctions, total number of subordinating conjunctions and the proportion of complex utterances) through the age of 10 years, with a plateau in performance evident at this later age. In a recent study by Mäkinen et al. (Mäkinen et al., 2014) on a group of 172 Finnish children aged between 4 and 8 years, the results showed that older children produce longer (in terms of number of communication units, number of different words and total number of words) and syntactically more complex (considering mean length of utterances and clausal density) stories then younger children.

Studies on the relationships between narrative macro- and microstructure have revealed somewhat contradictory results, which may be due to different methodologies used as well to different languages studied. The strongest way to prove the existence (or absence) of this ling between the macro- and the microstructural level of narratives is with no doubts research on children with language impairment. Indeed, several studies have found that children with language impairment or language delay often perform more

poorly than typically developing children on tasks assessing narrative macrostructure (e.g., Manhardt & Rescorla, 2002; Soodla & Kikas, 2010), although well-structured narratives require not only linguistic skills but also non-linguistic abilities that are not usually lacking in children with language impairment (e.g., Norbury & Bishop, 2003).

How to collect data on narrative competence

Data on narrative competence can be collected using different tasks. The most used in the language development research filed are story generation, story retelling, and storytelling.

The story generation tasks usually ask the child to tell a story using an image as a prompt (e.g. Justice, Bowles, Kaderavek, Ukrainetz, Eisenberg, & Gillan, 2006; Ripich & Griffith, 1988), to finish or to complete a story began by the examiner (Merrit & Liles, 1989), or to create a totally new story (Roth & Spekman, 1986).

On the contrary, the story retelling task ask the child to retell the story told by the examiner or the story presented through a video (e.g. Gummersall & Strong, 1999; Liles, 1987). This kind of task has been broadly used in studies on narrative competence in children (e.g. Mainela-Arnold, Alibali, Hostetter & Evans, 2014; Pinto, Tarchi & Bigozzi, 2016; Wellman, Lewis, Freebairn, Avrich, Hansen & Stein, 2011) and in the clinical field for narrative competence evaluation (e.g., "Bus Story Test", Renfrew, 2010).

Merrit & Liles (1989) suggested an advantage in using retelling task, instead of story generation, in the study of story production. Indeed, children produce a higher number of grammatical components and more well-structured narratives in story-retelling tasks then in story-generation (Westerveld & Gillon, 2010). The better performance in story-retelling can be explained by the fact that in this kind of task the child is exposed to a model, generally the story told by the examiner, that necessarily influences his/her own narrative.

Anyway, the task that seems to better investigate narrative competence is storytelling. In storytelling, usually, the child is asked to tell the story represented in a picture-storybook. In this way, it is possible to exclude the influence of the examiner's model on child's narrative. The storytelling procedure is moreover very simple: the child is asked to look

carefully at the images and then to tell the story (looking again at the images). This method, storytelling, is that implied in the Frog Story ("Frog, where are you", Meyer, 1969), a story used as a prompt in a huge number of works on narrative competence (for a review see Strömqvist & Verhoeven, 2004). A sure advantage of this procedure is that the use of images reduces the child's cognitive charge, so that the child has "only" to tell the story he/she is looking at (D'Amico, Devescovi, Marano, & Albano, 2008).

With no doubts, the paradigm used to collect data influences children's performance. In a recent work by Roch and collaborators (Roch et al., 2016), story retelling and story telling were compared in a group of bilingual children, both in production and in comprehension. The results showed a better performance in story retelling than in story telling in all measures of narrative production and comprehension considered. In agreement to what suggested by Lever and Sénécal (2011), the authors claimed that story telling relies more on constructive processes, while story retelling relies on reconstructive processes.

The present work

The works presented in this dissertation try to give a contribution in the field of children narrative competence research. A large number of studies has been carried out in this area of investigation, but the majority of studies have focused on English-speaking children. As common in all language development, some language-specific variation is likely to happen in narratives too (Hickmann, 2004). Although some scholars put attention on some specific characteristics of Italian children narratives (see Serratrice, 2007 and Orsolini, Rossi & Pontecorvo, 1996, for the use of referents in narratives; Gamanossi & Pinto, 2014 and Longobardi, Piras & Presaghi, 2008, for the use of mental state words in narratives), or on specific groups of Italian children (see Marini, Tavano & Fabbro, 2008, for children with specific language impairment; Viziello & Giangrandi, 1996, and Guarini, Marini, Savini, Alessandroni, Faldella & Sansavini, 2016, form children born preterm; Roch et al., 2016, for bilingual children), only few focussed on a description of the development of narrative competence from preschool to school-age years in typically developing children (e.g. D'Amico et al., 2008). For these reasons, studies of a less extensively investigated language such as Italian are needed.

The data presented through the dissertation come from a large data collection, which included a total of 440 Italian children aged between 3 and 8 years. Narratives have been

elicited using a new task, specifically developed for this research project, the Narrative Competence Task [NCT] (all the results presented refer to narratives collected with the NCT, except for Study 1 in Chapter 3). Chapter 1 presents the NCT and the related coding system, created to consider both macro- and microstructural level of analysis and to be usable both in research and in the clinical field. Moreover, it shows the developmental trend in narrative competence in a group of 240 Italian children from the first year of kindergarten to the third year of primary school attendance and it highlights the relationships between the macro and the micro-structural dimensions of narratives through development. In sum, the study presented in Chapter 1 tries to give a complete description of narrative competence development from preschool to school-age in Italian children, taken into account the variables concerning properly the ability to tell a story (e.g., structure, quantity of information, cohesion and the use of mental states words) and indices referred to the general linguistic abilities (such as syntax and lexicon). The scoring system created is deeply grounded in the extended literature on this topic and aimed to be simultaneously exhaustive and brief.

Chapter 2 analyses gestural and verbal production of 45 preschool-aged children telling the NCT's story. Particularly, it describes the gestures used by these children and the relationships between the use of gestures and measures of narrative's macro- and micro-structure (unlike previous studies in the literature, which considered only the relationship between gesture and the macro-structural aspect of narratives).

Chapter 3 focussed on an understudied aspect of narrative production in children, that is prosody. It includes three studies: Study 1 investigates longitudinally the relationships among narrative skills, syntax, and prosody, searching for a "trade-off effect" in the development of complex linguistic skills; Study 2 describes the intonation used in narratives by Italian children and adults within the Autosegmental-Metrical framework, a model broadly used in the international research on prosody, but not yet been employed in studies of Italian children's intonation; Study 3 investigates the prosody of children and adults' narratives as a cue of narrative pre-planning.

Finally, Chapter 4, considering the evidence of a relationship between oral narrative production and academic achievement, tries to find this association in a group of Italian children, whose narrative competences were assessed using the NCT. Specifically, specific relationships among the different levels of narrative competence and the main learning abilities are explored.

Chapter 1

The Narrative Competence Task and the development of narrative competence from 3 to 8 years

1.1 Introduction

Narratives evaluation is seen by several authors as a "naturalistic" approach in the study of language development, because narratives represent a real and contextualized request for children (Schraeder, Quinn, Stockman & Miller, 1999). Moreover, narratives provide an exceptionally rich source of data for scholars and clinicians who want to study linguistic expressive competences.

Many authors have studied children's narrative competence considering two levels of evaluation (for a detailed description of narrative competence and its development see the general introduction of the dissertation). The first is the macro-structure, which refers to global characteristics of the narration, particularly the ability to produce a narration characterised by the typical story structure, coherent and cohesive. Macro-structural level is influenced by several factors, like the general linguistic ability, cognitive processes (for example, the memory recall of information and causal thought) and everyday experience (Brice-Heath, 1983; Trabasso & van den Broek, 1985). The second is the micro-structure, which refers to the language used in the narration, considering measures such as lexical variety, the mean length of utterances and syntactic complexity (e.g., Justice, Bowles, Pence, & Gosse, 2010; Mäkinen, Loukusa, Nieminen, Leinonen, & Kunnari, 2014).

Narratives could be used not only in the study of typical development, but also to compare the performance of children with atypical language development with that of children of the same age without language delays or deficits (e.g. Marini, Tavano e Fabbro, 2008; Norbury & Bishop, 2003). For example, children with Specific Language Impairment (SLI) produce narratives that are less complex (Fey, Catts, Proctor-Williams, Tomblin e Zhang, 2004), with a less complete structure (Wright e NewHoff, 2001), syntactically simpler, shorter and with fewer different words (Boudreau e Hedberg, 1999; Dodwell e Bavin, 2008; Merrit e Liles, 1987; Paul e Smith, 1993) than peers without language disabilities.

Considering the Italian context, there are only two standardized task developed for clinicians that want to evaluate narrative competence. The first one is the Bus Story test (Renfrew, 2010), a story retell task, largely used for the evaluation of language in English-speaking countries, and recently standardized by Mozzanica and collaborators (Mozzanica *et al.*, 2016) on a sample of 552 Italian children aged between 3;06 (age; months) and 9 years. As a retell task, the Bus Story Test gives to the child an example that he/she can follow during the retelling. In this way, it is not possible to exclude that the child uses words or syntactic structure which he/she doesn't really possess, but which he/she has just heard. The second one is a story-telling task included in a battery for the evaluation of language, the "Battery for the evaluation of language 4-12" (*Batteria per la valutazione del linguaggio, BVL 4-12*, Marini, Marotta, Bulgheroni, & Fabbro, 2014). In the BVL, narratives are elicited by a short 5-images story. Marini and collaborators propose a multi-level scoring and present a standardization on a group of 558 Italian children aged between 4 and 12 years. In our opinion, a 5-images story does not permit to highlight differences in the performance of children with typical language development, but it only allows to identify children with language deficits.

Considering the importance of narrative competence in language development, the range of possibilities that narratives represent for language evaluation and the lack of instruments for narratives' assessment in the Italian context, the main aim of the present work is to develop a task that can be largely used by both researchers and clinicians for the study of narratives in Italian children. Specifically, the purposes of the study are:

- To create a task for the elicitation of stories that respects the typical story-grammar, containing situations that can be familiar to children and with simple images;
- To develop an efficient and rapid scoring system, which can be useful both in the research and in the clinical field;
- To verify if the task created permit to show a developmental trend in narrative competence during preschool period and the first years of primary school;
- To highlight the relationships between the macro and the micro-structural dimensions of narratives through development;
- To verify the concurrent validity of the task created.

1.2 Methods

1.2.1 Participants

The participants in this study included 240 Italian children recruited from schools in Lombardy and in Puglia. At the time of the recruitment, 120 children were attending kindergarten and 120 children were attending the first three years of elementary school. The participants were randomly selected among the children attending the schools. Data will be analysed considering 6 groups of 40 children each based on the age of children: 3-year-old children (aged 36 to 47 months), 4-year-old children (aged 48 to 59 months), 5-year-old children (aged 60 to 71 months), 6-year-old children (aged 72 to 83 months), 7-year-old children (aged 84 to 95 months), and 8-year-old children (aged 96 to 107 months). All of the children's parents signed a written consent form. Descriptive data on the participants' characteristics are reported in Table 1.1. All children came from monolingual, Italian-speaking families, and none were reported as having any developmental problem.

Table 1.1: sample size, gender, age in months (mean, SD, range) for each group.

Group	N (F)	Age (months)		
		M	SD	Range
3 years	40 (21)	42.58	3.38	36-47
4 years	40 (20)	54.58	3.25	48-59
5 years	40 (20)	66.08	3.37	60-71
6 years	40 (19)	77.83	3.34	72-83
7 years	40 (20)	89.70	3.65	84-95
8 years	40 (25)	99.58	3.05	96-107

1.2.2 Procedure

All children participated in one test session lasting approximately 30-40 minutes at their school. Each child was tested alone in a quiet room. During the session, the *Narrative Competence Task* (NCT), a storytelling task created ad hoc for the study, was administered individually to each child.

The NCT is an 18-pictures storybook created to elicit children's narratives. The story is about two children, a boy and a girl, who go to the park. The boy finds a ball behind a bush and the two children start to play together. Suddenly, the boy throws the ball on a turtle, but children are able to get back the ball and start playing again. Then, a bigger trouble happens: the girl throws the ball on a high tree. The two children try to reach the ball in several ways, but they fail. At the end, a policeman arrives and helps the children, so that they can play again with the ball. The NCT was developed respecting the typical story grammar (presentation of the characters, problematic situation, attempts to solve the problem, solution and conclusion of the story). The situation described is familiar to children, indeed the events included represent what can occasionally happen in a park, and the images are very simple to be immediately clear (in Appendix 1 all images are reported). The children were first asked to browse the pages (*"Now, we are going to look at a picture book. Browse it and look carefully at the pictures because I want you to know what happens in the story"*) and were then invited to tell the story in their own words while browsing the pages again (*"Now, tell me the story looking again at the pictures"*). The examiner did not interfere with the narration; he only supported the child with some positive feedback ("*Good!*", "*Well done!*"). Each child's telling of the NCT was audiotaped by a digital voice recorder (inside microphone) placed on the desk in front of the child and then transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format. Transcripts were segmented into utterances, defined as an independent clause plus any modifiers, such as a dependent or coordinate clause (Marinellie, 2004). To fragment the story in utterances the prosodic criterion was used, so that an utterance is terminated when the listener can perceive a declination in the intonation (Bolinger, 1978) and a slowing down in the speech rate (Klatt, 1975).

Raven's Coloured Progressive Matrices, CPM (Italian standardisation by Belacchi, Scalisi, Cannoni & Cornoldi, 2008) were administered to ensure that all of the children had a general non-verbal intelligence in the normal range. In the CPM task the examiner shows to the child uncompleted matrices, then the child has to choose among 6 alternatives the one that better completed each matrix. The test consists of 36 matrices divided in three lists. The raw score is computed by counting the number of correct answers. The raw scores were converted in percentiles and then in IQ scores using the test's normative data.

To evaluate language comprehension, the *Test for Reception of Grammar – Version 2, TROG-2* (Italian standardisation by Suraniti, Ferri & Neri, 2009) was administered. The

TROG-2 is a multiple-choice picture task that aims to assess children's morphosyntactic comprehension abilities. The test consists of 20 blocks of 4 items (each block dealing with a particular grammatical construct). A block is considered to have been passed if the child correctly answers each of the 4 items. The raw score is computed by counting the number of passed blocks (ranging from 0 to 20).

To have one more measure of narrative competence, the *Bus Story Test* (Renfrew, 2010) was administered to a subgroup of 120 children, ranging in age from 36 to 72 months. The Bus Story Test is a story-recall task: in the first part of the administration, the examiner tells the story, illustrated on a story book, to the child. Then, the child has to retell the story, looking at the images again. We included the following indices in the Bus Story test's scoring: the total number of utterances, type, token, MLU, the total number of subordinated clauses and events (for a description of the indices see the next section in this chapter).

1.2.3 NCT coding

The evaluation of narrative competence considered two levels, macro-structural and micro-structural. For the macro-structural level we examined the "real" narrative ability of the child, such as the presence in the story told of all the key passages of the plot, the richness of the story's content, the coherence and continuity among the different parts of the story and the capacity of comprehend and communicate the mental states of the characters. For the micro-structural level, we evaluated the linguistic competence of the child, such as the syntactic complexity, the mean length of utterances and the number of different words used during story telling.

Macro-structural level

We based the scoring of the macro-structural level on the narration of 10 Italian adults (5 males and 5 females), aged between 20 and 33 years (M = 24; SD = 5.18). 7 adult participant had a high school diploma, one participant had a degree and two participants had a Ph.D. Each adult's telling of the NCT was audiotaped, transcribed and then coded

following the coding system described below. Adult's narratives permit to have a checklist of the elements (specifically events, structure and agents) that can be found in the story.

The macro-structural indices considered are:

Events

Adapting from the study by Fiorentino and Howe (2004), we counted the number of things that happened in the story (e.g., *"la bambina salta con la corda"* [*the girl is jumping with the rope*]). Descriptions (e.g., *"era una bella giornata"* [*the day was sunny*]) were not computed as events. Each picture in the story book (e.g., the first one, depicting a girl who is jumping with a rope and a woman who is doing a phone call) could contain no events (e.g., *"la bimba e la mamma"* [*the girl and the mum*]), one event (e.g., *"la bimba salta"* [*the girl is jumping*]), or more than one event (e.g., *"la bambina salta e la mamma fa una telefonata"* [*the girl is jumping and the mum is doing a phone call*]).

We considered in the list of events those told by at least the 80% of the adults. In that way, we established the presence of a maximum of 49 events. A child received 1 point for each of the events included in the narrative. Therefore, a child could have a raw score ranging from 0 to 49 points in the events index.

Structure

For the evaluation of the story's structure, we adapted the procedure developed by Norbury and Bishop (2003) for 6-10-year-old children. They evaluated the episodic structure by giving one or two points to each key passage included in the narrative (initiating event, problem event and resolution). In the present work, we considered as key passages the events included in the narrative by the 100% of the adults. In that way, we established the presence of 8 key passages for the NCT:

1. introduction (e.g., *"i bambini decidono di giocare insieme"* [*the children decide to play together*])
2. problem (e.g., *"la palla finisce su un albero"* [*the ball goes on a tree*])
3. attempt 1 (e.g., *"il bambino sale sul suo triciclo"* [*the boy goes on his trike*])

4. attempt 2 (e.g., *"la bambina cerca di prendere la palla con la corda"* [*the girl tries to get back the ball with the rope*])

5. attempt 3 (e.g., *"la bambina sale sulle spalle del bambino"* [*the girl goes on the boy's shoulders*])

6. turning point (e.g. "*i bambini chiedono aiuto al vigile*" *children seek help from the policeman*]

7. solution (e.g. "*i bambini riprendono la palla*" [*the children get the ball back*]

8. conclusion (e.g. "*I bambini giocano di nuovo a palla*" [*the children play again with the ball*]

A child received 1 point for each of the key elements included in the narrative. Therefore, a child could have a raw score ranging from 0 to 8 points in the story structure.

Agents

Adapting from the study by Fiorentino and Howe (2004), we counted the number of acting characters (Agents), i.e., the number of characters that were performing an action in the story. Contrary to what was done by Fiorentino and Howe (2004), the characters who were named but were not performing any action were not computed. This allowed for discriminating between children who were telling a story and children who were only labelling the images depicted in the book. Basing on adults' narrations we considered the presence of 7 different characters: the boy, the girl, the children, the mum/the woman, the grandpa/the man, the turtle and the policeman. Therefore, a child could have a raw score ranging from 0 to 7 points in the agent index. To simplify the scoring, we decided to give a point to each of the three possible expressions of the main characters of the story, which are: the boy, the girl and the children (a child that included in his/her narration all of the three expressions receives 3 points). A child received 1 point for each of the agents included in the narrative.

Anaphoric use of the article

We adopted the anaphoric use of the article as an index of cohesion. Specifically, we considered the passage from the indefinite article, normally used when a character or an object is presented for the first time in the story, to definite article, appropriated for

already given object or character. Basing on adult's narratives, we identified 8 possibilities: "Una bambina – La bambina [A girl – The girl]"; "Una signora – la signora [A woman – The woman]"; "Un bambino – Il bambino [A boy – The boy]"; "Un signore – Il signore [A man – The man]"; "Una palla – La palla [A ball – The ball]"; "Una tartaruga – La tartaruga [A turtle – The turtle]"; "Un albero – L'albero [A tree – The tree]"; "Un poliziotto – Il poliziotto [A policeman – The policeman]". A child received 1 point for each of these passages included in the narratives. Therefore, a child could have a raw score ranging from 0 to 8 points in the anaphoric use of article index.

Psychological Lexicon

For the evaluation of the psychological lexicon, we counted the number of different words referring to mental states included in the story. Based on previous works (e.g. Camaioni, Longobardi & Bellagamba, 1998; Lecce & Pagnin, 2007), we considered the following types of mental state words: perceptive words (e.g. to see, to hear, to pay attention, to feel tired); volitive or ability words (e.g. to want, to desire, to be able to, to try); positive emotional words (e.g., to have fun, to become friends, to be happy, to be glad); negative emotional words (e.g. to be sad, to hate, to cry, to be scared); cognitive words (e.g. to know, to think, to believe, to explain); moral words (e.g. to admire, to laugh at, to forgive, to be good). A child received 1 point for each of the different mental state words included in the narrative (if the child repeated the same mental words several times he/she received 1 point).

Micro-structural level

For the micro-structural level we considered:

Number of utterances

We counted the total number of utterances used in the narrative. The definition of utterance considered and the criterion used to fragment the utterances in the transcription are reported above.

Type

This measure corresponds to the total number of different words (e.g., bambino [child] and bambini [children] are considered as two different words) used by the child in his/her narrative.

Mean Length of Utterances (MLU)

This measure was calculated dividing the total number of words by the total number of utterances produced by the child.

Syntactic complexity

We considered the total number of subordinated clauses as an index of syntactic complexity. We included in the total number of subordinated clauses both explicit subordinated clauses, expressed using a verb in a defined mode (indicative, subjunctive, conditional and imperative), and implicit subordinated clauses, expressed by a verb in an undefined mode (infinitive, gerund and participle). The proportional frequencies of implicit and explicit subordinated clauses (calculated dividing the total number of implicit or explicit subordinated clauses by the total number of subordinated clauses) was calculated to better understand the development of complex utterances from 3 to 8 years.

In Appendix 2 we present a scoring sheet developed for the clinical use of the NCT.

1.2.4 Reliability

In scoring the narrative's macro and micro-structural level, inter-coder reliability was assessed on 20% of the stories, with two researchers independently scoring the children's productions.

For all the measures, except Type which is automatically obtained by CLAN, the Pearson's correlation was determined: total number of subordinated clauses: .98; events r = .95; structure r = .95; agents r = .96; anaphoric use of the article r = .97; psychological lexicon r = .91; total number of utterances r = .93.

1.3 Results

1.3.1 Data analyses

First, to verify the equivalence in non-verbal ability (CPM's IQ score) in all the age groups and the expected increase in the linguistic comprehension (TROG-2's raw score) with age a one-way ANOVA was conducted.

Second, to describe the narrative development from 3 to 8-years-old children a one-way ANOVA was conducted. Post-hoc Bonferroni permitted to highlight differences group by group. We report the Effect Size (η^2) for the ANOVA. For the interpretation of the effect size we considered the following values: small .01-.06; medium .07-.14; large > .14 (Choen, 1988).

To highlight differences between children and adults a non-parametric comparison between independent samples (Mann-Whitney test) was conducted.

To analyse the differences between male and female children in the NCT a t-test was conducted.

To control the existence of relationships between non-narrative and narrative measures and between macro and micro-structural indices Pearson's correlations were computed. We considered as significative values higher than .27058; this value was computed by G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) considering a sample size of 240 participants and a statistical power of .95.

Finally, to verify the concurrent validity between the NCT and the Bus story test Pearson's correlations were computed. This analysis was possible on a sample of 120 children.

1.3.2 Development of narratives from 3 to 8 years

In our results there were non-significant differences among groups in the IQ scores ($F_{(5,234)} = .851$; $p > .05$; $\eta^2 = .018$) and a significant increase in the grammar comprehension scores ($F_{(5,200)} = 78.29$, $p = .001$; $\eta^2 = .634$). Post-hoc Bonferroni showed that 3-year-old children had a lower score than all the other groups; 4-year-old children had a lower score than 6, 7 and 8-year-old children; 5-year-old children had a lower score than 6, 7 and 8-year-old children; 6-year-old children had a lower score than 8-year-old children; and, finally, 7-year-old children had a lower score than 8-years-old children (Table 1.2). This results

taken together make sure that our sample behaves like what is normally expected, with a non-verbal intelligence in the norm and a linear increase of grammatical comprehension with age.

Table 1.2: Mean, SD and Range of the CPM score (IQ) and of the TROG-2 score (raw score) for each age group.

Group	IQ (M = 100, SD = 15)			Linguistic comprehension (Raw score)		
	M	SD	Range	M	SD	Range
3 years	105.25	12.61	80-130	1.62	1.51	0-5
4 years	108.00	10.43	80-130	5.07	3.24	0-13
5 years	103.75	15.47	70-130	6.18	3.80	1-16
6 years	108.50	11.89	90-130	9.55*	3.77	2-17
7 years	106.25	13.34	80-130	11.76*	3.62	5-19
8 years	104.75	12.61	80-130	15.19°	4.08	4-20

*Calculated on 38 children
°Calculated on 36 children

Regarding the macro-structural level (see Table 1.3), all the indices considered showed a significant increase from 3 to 8 years. The pattern of development of the events, structure and agents indices seemed to be the same: 3-year-old children have lower scores than all the older children; 4 and 5-year-old children did not differ significantly from each other, but they obtained lower scores than school-age children; school-age children did not differ significantly from 6 to 8 years, but they performed better than all the preschool children. In the anaphoric use of article, 3-year-old children did not significantly differ from the older preschool children, but they differ significantly from school-age children; 4, 5 and 6-year-old children used a lower number of anaphoric articles than 7 and 8-year-old children; the two oldest group did not differ from each other. Finally, considering the psychological lexicon, 3-year-old children used the same number of mental state words than 4-year-old children, but a lower number compared to all the other age groups; 4-year-old children did not differ from 5-year-old children, but they had a lower score than school-age children; 5-year-old children did not differ from 6-year-old children, but they differed from the two oldest groups; finally, 6-year-old children differed from 7-year-old

but not from 8-year-old children, while 7 and 8-year-old children did not differ from each-other. We report the developmental trends in the macro-structural measures in Graph 1.1.

Regarding the micro-structural level (Table 1.4), the total number of utterances remained the same in the narratives of the children from 3 to 8 years. Conversely, there were significant differences in all the other micro-structural measures: the MLU, the Type score and the total number of subordinated clauses. For the MLU and Type values, we found significant differences between preschool and school age children; among the preschool children, the only significant difference in the MLU was between 3 and 5-year-old children, while no differences were found among the school-age groups. For the syntactic complexity the developmental pattern is nearly the same described above: we found significant differences between preschool and school-age children (except for the passage between 5 and 6-year-old) and no significant differences within the two levels of school.

Table 1.3: Mean and SD of macro-structural indices in each age group

	3 years		4 years		5 years		6 years		7 years		8 years		F	η^2	Bonferroni post hoc
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD			
Events	8.03	5.62	12.80	4.88	15.60	5.13	21.48	5.37	22.73	3.43	24.58	3.30	$75.15_{(5,234)}$*	.616	3 < 4, 5, 6, 7, 8 4 < 6, 7, 8 5 < 6, 7, 8
Structure	2.43	1.74	3.63	1.58	4.55	1.97	5.98	1.44	6.50	1.61	6.73	.85	$48.24_{(5,234)}$*	.508	3 < 4, 5, 6, 7, 8 4 < 6, 7, 8 5 < 6, 7, 8
Agents	2.40	1.48	3.40	1.53	3.53	1.18	4.85	1.23	5.08	1.31	4.65	1.03	$25.60_{(5,234)}$*	.354	3 < 4, 5, 6, 7, 8 4 < 6, 7, 8 5 < 6, 7, 88
Anaph.	.43	.75	.90	1.01	1.00	1.01	1.48	1.38	2.95	1.41	2.93	1.74	$29.30_{(5,234)}$*	.385	3 < 6, 7, 8 4 < 7, 8 5 < 7, 8 6 < 7, 8
Psyc. Lex.	2.23	1.86	3.05	2.02	4.05	1.85	5.20	2.01	6.98	2.83	6.15	2.25	$28.57_{(5,234)}$*	.379	3 < 5, 6, 7, 8 4 < 6, 7, 8 5 < 7, 8 6 < 8

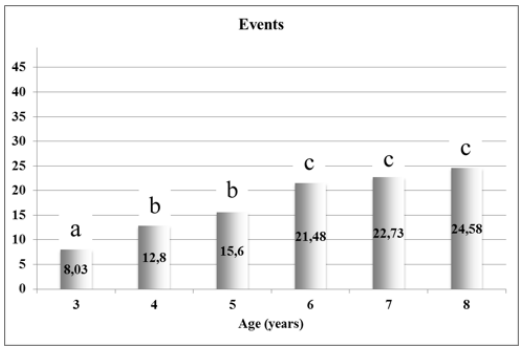
*$p < .001$

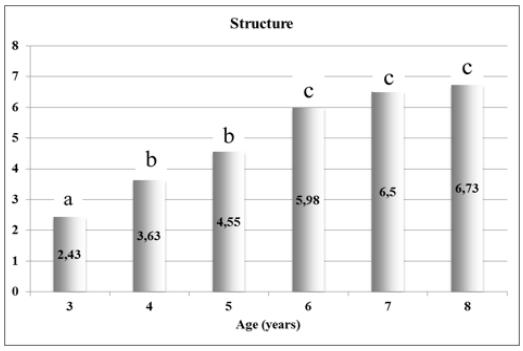
Table 1.4: Mean and SD of micro-structural indices for each age group.

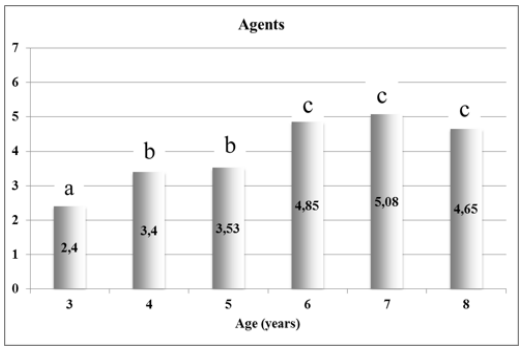
	3 years		4 years		5 years		6 years		7 years		8 years		F	η^2	Bonferroni post hoc
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD			
Tot. num. utt.	21.25	5.10	21.05	8.44	18.93	4.71	21.08	5.18	23.25	7.96	22.43	6.14	$2.10_{(5,234)}$	.043	
MLU	5.81	2.44	6.22	2.09	7.54	2.18	9.39	2.02	9.44	1.94	9.50	1.53	$22.42_{(5,234)}$*	.369	3 < 5, 6, 7, 8 4 < 6, 7, 8 5 < 6, 7, 8
Type	51.98	25.74	60.98	20.70	70.35	20.27	89.00	21.90	97.30	23.87	95.55	21.12	$29.24_{(5,234)}$*	.385	3 < 5, 6, 7, 8 4 < 6, 7, 8 5 < 6, 7, 8
Tot. num. sub. clauses	5.13	4.53	6.63	3.58	7.95	4.04	10.93	5.53	13.13	5.36	13.90	4.43	$23.95_{(5,234)}$*	.339	3 < 6, 7, 8 4 < 6, 7, 8 5 < 6, 7

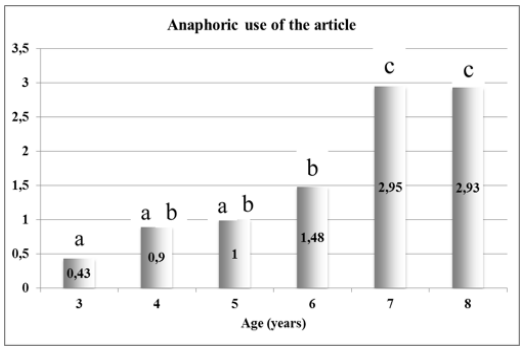
*p < .001

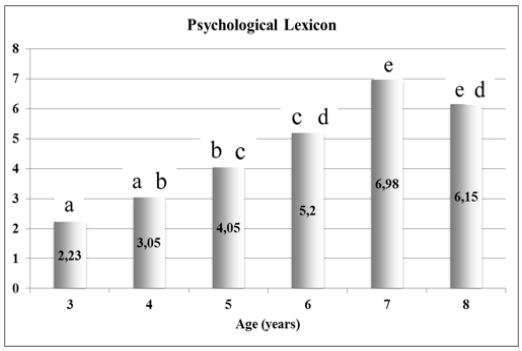
Graph 1.1: Macro-structural mean scores divided by age. A different letter (a, b, c or d) means a significantly different mean score.











The proportional frequencies of implicit and explicit subordinated clauses did not significantly change from 3 to 8-year-olds ($F = 1,68$, $p > .05$): in all age groups children used a higher percentage of implicit than explicit subordinated clauses (Table 1.5).

Table 1.5: Mean Percentage, Standard Deviation and Range of Implicit and Explicit subordinated clauses for each age group.

	Implicit Sub. Clauses			Explicit Sub. Clauses.		
	M	SD	Range	M	SD	Range
3 years	75%	28	65%-84%	25%	28	16%-35%
4 years	81%	20	74%-87%	19%	20	13%-25%
5 years	83%	18	78%-89%	17%	18	11%-22%
6 years	79%	17	74%-84%	21%	17	16%-26%
7 years	75%	12	71%-79%	25%	12	21%-29%
8 years	75%	13	70%-79%	25%	13	21%-30%

Table 1.6 shows the differences between the oldest group of children, 8-year-olds, and adults in the NCT. There are significant differences in all the macro and micro-structural measures, meaning that, even when children are 8-year-old, narrative competence development is not yet completed. Contrary to what was highlighted for children, between 8-year-olds and adults there is also a significant difference in the total number of utterances produced.

Table 1.6: Mean and SD of macro and micro-structural indices for 8-year-olds and adults.

	8 years			Adults				
	M	SD	Range	M	SD	Range	U	p
Events	24.58	3.30	18-31	31.40	4.14	22-36	359.00	< .001
Structure	6.73	.85	5-8	7.60	.70	6-8	312.50	.005
Agents	4.65	1.03	3-7	6.00	1.49	3-7	309.00	.007
Anaph.	2.93	1.74	0-7	4.50	1.90	1-6	294.00	.022
Psyc. Lex.	6.15	2.25	3-13	11.90	4.65	6-21	356.50	< .001
Tot. num. of utt.	22.43	6.14	15-46	28.80	7.52	13-38	312.5	.005
MLU	9.50	1.53	7-14	10.83	1.65	9-14	296.00	.019
Type	95.55	21.12	70-186	132.60	23.63	75-156	347.00	< .001
Tot. num. of sub.	13.90	.20	6-22	26.80	.22	1-38	377.5	< .001

Regarding the comparison between males and females, we found that males reached a higher score than females in the non-verbal intelligence task (Females M = 104.16, SD = 10.94; Males M = 108.17, SD = 14.30; t = 2.45, p < .05), while no differences emerged in verbal comprehension (Females M = 7.81, SD = 5.63; Males M = 8.35, SD = 5.58; t = .735, p > .05). In our data, no significant differences emerged between boys and girls in nearly all the macro and micro-structural measures considered: events (Females M = 17.61 SD = 7.42; Males M = 17.45, SD = 7.62; t = -.160, p > .05); structure (Females M = 4.96, SD = 2.15; Male M = 4.97, SD = 2.29; t = .048, p > .05); agents (Females M = 4.02, SD = 1.59; Male M = 3.94, SD =1.63; t = -.408, p > .05); anaphoric use of the article (Females M = 1.61, SD = 1.66; Male M = 1.62, SD = 1.51; t = .046, p > .05); total number of utterances (Females M = 21.89, SD = 6.64; Male M = 20.72. SD = 6.31; t = -1.39, p > .05); type (Females M = 79.75, SD = 30.20; Male M = 75.10, SD =25.74; t = -1.28, p > .05); MLU (Females M = 8.21, SD = 2.60;

Male M = 7.74, SD = 2.50; t = -1.41, p > .05); total number of subordinated clauses (Females M = 10.24, SD = 5.93; Male M = 8.92, SD = 5.24; t = -1.82, p > .05). The only significant difference in narrative competence regarded the use of psychological lexicon: girls seemed to utilize a higher number of mental words than boys in their stories (Females M = 5.00, SD = 2.78; Males M = 4.18, SD = 2.59; t = -2.35, p < .05)

1.3.3 Relationships among narrative competence, intelligence and linguistic comprehension

We did not find any significant correlation between non-verbal intelligence score and the macro- and micro-structural narrative indices. This means that the general non-verbal intelligence of a child is not in relationship with the narrative competence. On the contrary, our results showed significant correlation between the score of linguistic comprehension and all the narrative indices, except of the total number of utterances: in our data, linguistic comprehension is strongly related to narrative competence (Table 1.7).

Table 1.7: Pearson's Correlation between narrative's and non-narrative's measures

	IQ	Linguistic Comprehension
Events	.081	.662*
Structure	.124	.608*
Agents	.086	.479*
Anaphoric Use of Articles	.057	.573*
Psychological Lexicon	-.018	.475*
Total N. of Utterances	-.092	.058
Type	.052	.499*
MLU	.126	.462*
Total N. of Subordinated Clauses	.072	.513*

* p < .001

1.3.4 Relationships between micro and macro-structural measures

Table 1.8 reports the correlations between the macro and the micro-structural indices: all the macro-structural measures showed a strong positive correlation with nearly all the micro-structural measures, except for the total number of utterances, the only score that remains unvaried from 3 to 8-year-olds (only Psychological Lexicon shows a significant correlation with the total number of utterances).

Table 1.8: Pearson's Correlations between micro and macro-structural measures

	Total N. of Utterances	Type	MLU	Total N. of Subordinated Clauses
Events	.220	.778*	.716*	.670*
Structure	.094	.605*	.602*	.518*
Agents	.210	.654*	.615*	.577*
Anaphoric Use of Articles	.223	.504*	.416*	.502*
Psychological Lexicon	.395*	.769*	.578*	.649*

* $p < .001$

1.3.5 Concurrent validity of NCT

To prove that the NCT measures narrative competence we verified the existence of correlations between the scores obtained using this task and those collected employing the Bus story test with a subgroup of 120 children. As shown in Table 1.9, we found positive high correlations between the two tasks. The children that achieved a good performance in our story-telling task were also able to tell a rich and complete story in the Bust story test.

Table 1.9: Pearson's Correlations between NCT and Bus Story test's measures

NCT \ BUS	n. of utterances	Type	Token	MLU	n. of sub. Clauses	Events
n. of utterances	.478*	.379*	.369*	.124	.177	.312*
Type	.295*	.672*	.552*	.491*	.445*	.558*
Tokens	.403*	.616*	.544*	.385*	.367*	.533*
MLU	.139	.648*	.543*	.591*	.499*	.568*
n. of sub. Clauses	.134	.515*	.424*	.446*	.476*	.425*
Events	.062	.530*	.372*	.455*	.320*	.452*

* $p < .001$

1.4 Discussion

The main aim of this work was to analyse the development of narrative competence from the beginning of the preschool period to the third year of elementary school in a group of Italian children, using a new instrument, the Narrative Competence Task (NCT). The reason for creating a new task for the assessment of narrative competence is based on the lack of tests of this kind standardized for the Italian context. Indeed, only recently a story-recall task, the Bus Story test (Mozzanica *et al.*, 2016), and a short story-telling included in a battery for language evaluation, the BVL 4-12 (Marini et al., 2014), have been published. The NCT was created considering the typical story-grammar and including situation that can be familiar for a child. The coding of the NCT was developed grounding on previous studies (e.g., Fiorentino & Howe, 2004; Marini *et al*., 2008; Norbury & Bishop, 2003) and including macro and micro-structural measures. To simplify the scoring system, we decided to base some of the indices on the narratives of a group of Italian adults, so that the examiner has just to check the presence of specific elements in the story.

Our results showed a clear development in narrative competence from 3-year-olds to 8-year-olds in both the macro and micro-structural evaluation. The main differences can be found between preschool and school-age children, but for some measures also among nearly all the age groups. The strong development of narrative competence from the preschool to the school period could be influenced by the progressive learning of reading and writing (John, Lui & Tannok, 2003) and by school experience itself, which implicates an improvement in vocabulary and the possibility of more rich narratives (Pinto, 2003). The development in narrative competence found is not surprising, but confirms many previous studies (e.g. Bamberg, 1987; Berman & Slobin, 1994; Orsolini, 1995; Wigglesworth, 1997). At the same time, these results are beneficial for our aim and demonstrated that the NCT is a useful instrument in the study of narrative competence, because it permits to highlight the development of this ability through a wide age range. To control for the presence of a ceiling effect in the oldest group of children, we compared the narratives of 8-year-olds to those of adults and we found significant differences between them. This means that the NCT is a useful instrument for the evaluation of narrative competence at least up to 8 year of age.

Regarding the comparison between boys and girls, we found no significant differences, except for the females' higher use of psychological lexicon, a result previous found for Italian children also by Longobardi and collaborators (2008).

A clear result emerging from our sample, in agreement with the existing literature (e.g. D'Amico, Devescovi, Marani, Albano, 2008; Orsolini, 1990), is the strong relationship between the macro and the micro-structural level in narrative competence: children who can produce a higher number of different words and longer and more complex utterances can also realize richer narratives, characterized by a higher number of elements (events and agents), the respect of the typical story-grammar (structure), a larger use of grammatical cues of cohesion (anaphoric use of the article) and a more evident ability to take and explicit the protagonists' point of view.

Finally, the NCT demostrated a good concurrent validity, indeed children who have high score in ist macro and micro-structural indices reach a good performance in the Bust story test, a task largely used for the assessment of narrative ability in the international context and recently standardized for Italian children.

This work represents the first part of a longer path. At the moment, we can say that the NCT seems to be a good instrument for the evaluation of narrative competence in children, as indicated by its potentiality in displaying the development of this ability through a wide age span.

To reach an acceptable standardization of the task, the first future goal is to collect, transcribe and score the narratives of a larger sample of children (a work already in progress).

Another future purpose is to collect data on children with atypical language development, to verify which measures can better distinguish between these children and peers without language disabilities.

Finally, we aim to explore the possible applications of narratives analysis in the study of language development, because it is a powerful tool to examine several aspects of language acquisition (some of these applications will be presented in the next chapters).

Chapter 2

The use of gestures during story-telling: a study with Italian pre-schoolers

2.1 Introduction

It is well known that gestures have an important role in language development (Guidetti & Colletta, 2010). The first communicative gestures usually appear at the end of a child's first year, at the same time as the first words. During this stage of language development, the production of gestures, in particular pointing, is functional for the learning of new words. In fact, mothers usually include object labels in response to their 13-month-old children's pointing gestures (Olson & Masur, 2011). Later, as words become the preferred form of communication, gestures may be used by children to reinforce their verbal messages (Guidetti & Colletta, 2010) because the production of gestures in association with speech continues even when children achieve good verbal skills (Butcher & Goldin-Meadow, 2000). Moreover, data on atypical populations, such as children with Down syndrome, has shown that gestures remain an important strategy to express concepts that children are not yet able to express with words (Stefanini, Caselli & Volterra, 2007; Zampini & D'Odorico, 2011).

Many studies of children's communicative gestures have shown that the production of gestures can be considered a predictive index of both vocabulary development (Fasolo & D'Odorico, 2012; Thal & Tobias, 1992) and syntactic development (Butcher & Goldin-Meadow, 2000; Capirci, Iverson, Pizzuto & Volterra, 1996; Fasolo & D'Odorico, 2012; Iverson, Capirci, Volterra, & Goldin-Meadow, 2008). In particular, Fasolo and D'Odorico (2012) found that in 18-month-old children, complementary gesture-plus-word combinations (i.e., combinations in which the gesture and the word convey the same meaning) were related to lexical skills at 24 months, whereas supplementary gesture-plus-word combinations (i.e., combinations in which the gesture and the word provide different pieces of information about the referent) were related to utterance complexity at 24 months. Moreover, Iverson and Goldin-Meadow (2005), in typically developing children, and Suttora and Salerni (2012), in children who were born pre-term, found that

children who are first to produce gesture-word combinations that convey two different semantic elements are also first to produce two-word combinations.

In addition, some studies have analysed children's use of communicative gestures during more complex linguistic tasks, such as the production of narratives (e.g., Colletta *et al.*, 2015; Mainela-Arnold, Alibali, Hostetter & Evans, 2014). Some findings have shown that gestures continue to play an important role in language processing even at later stages of language development. For instance Colletta *et al.* (2015) have found that 5-year-old children and 10-year-old children did not produced gestures at a different rate in the context of a narrative task, though the kind of gestures children produced varied with age (e.g., older children produced more gestures of a discursive or pragmatic nature, which mark different aspects of discourse structure, such as contrast between topic and comment, discourse focus, or how different components of the discourse may be related to one another). In addition, it is important to note that there is also a considerable number of studies on the use of gestures to enrich verbal production in adults (e.g., Cassell & McNeill, 1991).

Data in the literature regarding language development has shown that gestures are important both in the comprehension and in the production of narrative texts. For instance, Demir, Fisher, Goldin-Meadow and Levine (2014) recently demonstrated that seeing gestures while listening to a narrative appears to improve children's narrative competence. These authors found that both typically developing children and children with early brain injuries told better-structured narratives in response to an elicitation format that involved the oral presentation of a story accompanied by gestures produced by the narrator. The authors concluded that rich multimodal input, which includes gestures, is more useful in enhancing children's narrative competence than only verbal input.

With regard to the production of gestures during children's narratives, some authors have found that gestures can be considered a means to tell better stories because children that use gestures reach higher levels of narrative competence. In their recent study, Demir, Levine and Goldin-Meadow (2015) found that children who were able to express a character's viewpoint in gesture (e.g., children who performed the character's actions) were more likely to tell better-structured stories at later ages. In particular, the gestures used at 5 years old that reflect a character's viewpoint predict well-formed narratives at

6 and 8 years. According to the authors, the hypothesis underlying this relationship is that the use of these gestures reflects the children's ability to assume the character's perspective.

However, other authors (e.g., Iverson & Braddock, 2011; Mainela-Arnold *et al.*, 2014) found that the use of gestures can be viewed as a strategy to improve narratives in children who have difficulties in narrative construction, such as young children or children with language impairment. Therefore, the use of gestures during the production of narratives could be considered a compensatory strategy in children who have not yet reached adequate linguistic competence. As shown by Iverson and Braddock (2011) in a storybook narrative task, children with language impairment (ranging in age from approximately 2 to 6 years) produced gestures at a higher rate than typically developing children of the same chronological age. In addition, the children with language impairment produced a greater proportion of gesture-only communications, conventional gestures and gestures that convey unique information to co-occurring speech, than the children in the control group. Therefore, for language impaired children gestures have a compensatory role. In their recent study, Mainela-Arnold *et al.* (2014) also found that children with specific language impairment, ranging in age from 5.5 to 10 years, produced a higher number of gestures than their typically developing peers when recalling a wordless cartoon story. In addition, in this study, younger children with and without specific language impairment were more likely to use non-redundant speech-gesture combinations (i.e., combinations in which the word and the gesture convey two different meanings) than older children. The use of gestures appears to be a functional strategy to help both children with language impairment and young children express the messages they want to convey. Therefore, the gesture-speech integration seems to be similar in children with language impairment and their typically developing peers, but children with language impairment (and younger children, rely more on gesture to express the message they want to convey.

Moreover, focussing on the use of deictic gestures during picture book storytelling, O'Neill and Holmes (2002) found that typically developing 3-year-old children used pointing gestures more frequently than 4-year-old children to unambiguously identify a newly introduced or reintroduced story character. However, it is important to note that these pointing gestures were not used to compensate for the children's inability to express a

referent in words but to help the children express some of the many aspects they were trying to include in their stories.

The principal aim of the present study was to analyse gestural and verbal production when preschool-aged children were telling a story from a book where the story is presented only in pictures. In particular, the focus of the study was to describe the gestures used by these children and the relationships between the use of gestures and measures of narrative's macro- and micro-structure (the macro-structure refers to global characteristics of the narration, particularly the ability to produce a narration characterised by the typical story structure, coherent and cohesive; the micro-structure refers to the language used in the narration. See for example, Justice, Bowles, Pence, & Gosse, 2010; Mäkinen, Loukusa, Nieminen, Leinonen, & Kunnari, 2014). Unlike previous studies in the literature, which considered only the relationship between gesture and the macro-structural aspect of narratives, we were specifically interested in including also the analysis of the relationships between gestures and microstructural aspects of narrative production (i.e., lexical and syntactic characteristics). In light of the hypothesis of gestures as a strategy to improve children's narratives, we expected higher gestural production in the children who were less competent in their narrative skills. In addition, the communicative functions of the gestures were analysed to determine whether gestures play an essential role in the narrative production of preschool-aged children or if they serve only an enrichment role. The results were discussed in terms of the possible role of gestures in supporting children's verbal abilities during a complex linguistic task.

2.2 Methods

2.2.1 Participants

The participants in this study included 45 preschool children recruited from a local kindergarten. The participants were randomly selected from among the children attending the kindergarten to form 3 groups of 15 children each: 3-year-old children (aged 38 to 47 months), 4-year-old children (aged 48 to 59 months) and 5-year-old children (aged 60 to 71 months). Descriptive data on the participants' characteristics are reported in Table 2.1. All of the children came from monolingual, Italian-speaking families, and none were reported as having any developmental problem. In addition, *Raven's Coloured*

Progressive Matrices (Italian standardisation by Belacchi, Scalisi, Cannoni & Cornoldi, 2008) were administered to ensure that all of the children had a general non-verbal intelligence in the normal range (all of the children's IQs ranged from 80 to 130).

Table 2.1: Participants Description for Each Age Group

	N (females)	Chronological Age (in months)		
		M	*SD*	*Range*
3 years old	15 (4)	43	3.97	38-47
4 years old	15 (8)	54	3.33	48-59
5 years old	15 (6)	66	4.00	60-71

2.2.2 Procedure

Each child participated in a test session, which lasted approximately 30 minutes, in a quiet room at their kindergarten. Each participant was individually administered 2 different tasks to assess his/her linguistic skills: the *Test for reception of grammar* (TROG-2, Bishop, 2003) and the *Narrative Competence Task*, which is a new storytelling task developed by our research team (for a description of TROG-2 and NCT see Chapter 1).

During the session, each child sat at a small table, with the book in front of him/her. The examiner sat in front of the child; therefore, they both shared the same focus of attention. The performance of each child was videotaped with a Sony Digital Handycam, which was placed on a tripod in front of the table to view both the child and the book. The children's narratives were transcribed using the CHAT format (MacWhinney, 2000). Both linguistic and gestural productions were transcribed and then coded.

2.2.3 Coding and Measures

Gesture Production

The communicative gestures produced by the children during their narratives were classified into the following categories (see Zampini & D'Odorico, 2011):

- pointing (i.e., extending the index finger in the direction of an object, a person or an event). Pointing gestures were divided into 2 sub-categories: proximal pointing (when the child pointed to something in the book) and distal pointing (when the child pointed to another thing in the environment);
- showing (i.e., holding up an object or the book in the listener's line of sight);
- conventional gestures (i.e., gestures with a culturally defined meaning and form [e.g., nodding or shaking the head]);
- iconic gestures (i.e., gestures that refer to objects, persons or events by reproducing aspects of their physical or functional characteristics [e.g., raising the arms to indicate "to jump" or cycling with the arms to represent a "bicycle"].

The total number of gestures produced during the narratives was computed. In addition, the frequency of each gesture category within the total number of gestures was calculated.

Narrative Production

The transcripts were segmented into independent clauses plus any modifiers, such as dependent or coordinate clauses (Marinellie, 2004). Pauses longer than one second were used to separate one utterance from another (D'Odorico & Jacob, 2006). Each narrative was coded considering the following measures (for a more detailed description of the measures see Chapter 1):

1. *Macro-structure*

a. <u>Events</u>

We counted the number of things that happened in the story (e.g., *"la bambina salta con la corda"* [*the girl is jumping with the rope*]). A child received 1 point for

each of the events included in the narrative. The raw score could range from 0 to 49 points in the events index.

b. Structure

We considered the key passages included in the narrative (introduction; problem, attempt 1, attempt 2, attempt 3, turning point, solution and conclusion). A child received 1 point for each of the key elements included in the narrative. Therefore, a child could have a raw score ranging from 0 to 8 points in the story structure.

c. Agents

We counted the number of acting characters (Agents), i.e., the number of characters that were performing an action in the story. We considered the presence of 7 different characters: the boy, the girl, the children, the mum/the woman, the grandpa/the man, the turtle and the policeman. Therefore, a child could have a raw score ranging from 0 to 7 points in the agent index.

d. Anaphoric use of the article

We adopted the anaphoric use of the article as an index of cohesion. Specifically, we considered the passage from the indefinite article, normally used when a character or an object is presented for the first time in the story, to definite article, appropriated for already given object or character. We identified 8 possibilities: "Una bambina – La bambina [A girl – The girl]"; "Una signora – la signora [A woman – The woman]"; "Un bambino – Il bambino [A boy – The boy]"; "Un signore – Il signore [A man – The man]"; "Una palla – La palla [A ball – The ball]"; "Una tartaruga – La tartaruga [A turtle – The turtle]"; "Un albero – L'albero [A tree – The tree]"; "Un poliziotto – Il poliziotto [A policeman – The policeman]". A child received 1 point for each of these passages included in the narratives. Therefore, a child could have a raw score ranging from 0 to 8 points in the anaphoric use of article index.

e. Psychological Lexicon

For the evaluation of the psychological lexicon, we counted the number of different words referring to mental states included in the story. A child received 1 point for each of the different mental state words included in the narrative (if the child repeated the same mental words several times he/she received 1 point).

2. *Micro-structure*

a. Number of utterances

We counted the total number of utterances used in the narrative.

b. Type

This measure corresponds to the total number of different words (e.g., bambino [child] and bambini [children] are considered as two different words) used by the child in his/her narrative.

c. Mean Length of Utterances (MLU)

This measure was calculated dividing the total number of words by the total number of utterances produced by the child.

d. Syntactic complexity

We considered the mean number of subordinated clauses for utterance as an index of syntactic complexity. We included in the total number of subordinated clauses both explicit subordinated clauses, expressed using a verb in a defined mode (indicative, subjunctive, conditional and imperative), and implicit subordinated clauses, expressed by a verb in an undefined mode (infinitive, gerund and participle).

Gesture-word associations

The proportion of gestures produced during verbal production was computed for each child with respect to the total number of gestures used. In addition, the communicative function of all of the gestures produced that were associated with words was assessed. Three different types of functions were identified:

– deictic function, in which the gesture serves to identify a referent that is not labelled (e.g., the child says *"va qui" [goes there]* and points at the tree; the child says *"questa" [that]* and points at the turtle);

– complementary function, in which the gesture strengthens one of the meanings expressed by words without adding any information. For instance, the gesture labels a referent (e.g., the child points at the ball and says *"la palla è rossa" [the ball is red]*), or the gesture expresses the same meaning as the words (e.g., the child makes an iconic gesture for jumping and says *"la bimba salta" [the girl jumps]*);

– supplementary function, in which the gesture adds information to the words (e.g., the child points at the girl and says *"salta la corda" [is jumping the rope],* or he/she makes an iconic gesture for throwing and says *"la palla sull'albero" [the ball into the tree]*).

The frequency of each category of gesture functions with respect to the total number of gestures associated with words was computed.

2.2.4 Reliability

To assess the inter-coder reliability, 9 stories randomly selected from our corpus (i.e., 20% of the corpus) were coded independently by two coders and their coding compared. With regard to gesture production, the mean percentage of agreement was 97% for gesture individuation. No disagreement was found in gesture classification. With regard to narrative production, for all the measures, except Type which is automatically obtained by CLAN, the Pearson's correlation was determined: total number of subordinated clauses: .98; events r = .95; structure r = .95; agents r = .96; anaphoric use of the article r = .97; psychological lexicon r = .91; total number of utterances r = .93.. No disagreement was found in the coding of gesture function.

2.3 Results

2.3.1 Data analyses

First, the data analysis focussed on the descriptions of the children's gestural and narrative production during the *Narrative Competence Task*. ANOVA with Bonferroni post hoc tests were used to compare both the production of gestures and narrative skills among the 3 groups of children. η^2 was calculated to estimate effect size. According to Cohen (1988), effect sizes of .01, .06, and .14 are considered small, medium, and large respectively. Second, the relationships between the use of gestures and the children's narrative production were computed using Pearson's *r*. For these analyses, all of the children in the 3 groups were considered together because we were not interested in differences between the age groups but in changes in the relationship between narrative and gestural production in relation to the children's increasing linguistic competence.

Finally, the data analysis (ANOVA with Bonferroni post hoc tests) focussed on the communicative function of the gestures in relation to the children's age.

2.3.2 Gesture production

The means and standard deviations of the gestures produced by the 3 groups of children are reported in Table 2.2. The data analysis showed that the children's gesture production decreased with increasing age, especially over the period from 3 to 5 years. No differences among the groups were found with respect to the proportion of the different categories of gestures. The gesture produced with the highest frequency by the children in the 3 groups was proximal pointing (which comprised at least the 75% of the gestures in each age level on average).

Table 2.2: Gesture production in the narratives of the children in the 3 groups

	3 years old		4 years old		5 years old		F (df)	η^2	Bonferroni post hoc
	M	SD	M	SD	M	SD			
Total number of gestures	14.93	13.01	7.93	9.11	5.87	5.94	3.53* $_{(2,42)}$	.07	3 > 5; p = .045
Prop. of prox. pointing	.82	.31	.97	.06	.73	.39	1.94 $_{(2,34)}$	.01	
Prop. of distal pointing	.00	.00	.00	.00	.03	.10	1.04 $_{(2,34)}$	.05	
Prop. of showing	.00	.02	.00	.00	.00	.00	.81 $_{(2,34)}$	.00	
Prop. of conventional	.04	.13	.01	.02	.21	.38	2.56 $_{(2,34)}$*	.10	
Prop. of iconic	.14	.24	.02	.05	.04	.06	2.38 $_{(2,34)}$	.09	

*p < .05

2.3.3 Narrative production

With regard to narrative's micro-structure, no significant differences were found among the groups in the number of utterances produced (see Table 2.3). In contrast, with regard to lexical variety, the number of different word types produced by the 3-year-old children was significantly lower than the number produced by the 5-year-old children. Significant differences were also found between the groups of 3- and 5-year-old children in the syntactic measures; in particular, the mean number of subordinated clauses for utterance and the MLU was significantly higher in the 5-year-old children. In addition, with regard to morphosyntactic comprehension skills (as assessed by the TROG-2), significant differences were found among the 3 groups ($F_{(2,42)} = 7.75$; $p = .001$). In particular, the 3-year-old children ($M = 1.73$; $SD = 1.75$) exhibited a significantly lower score than both the 4-year-old ($M = 4.53$; $SD = 3.36$) (Bonferroni $p = .026$) and 5-year-old children ($M = 5.60$; $SD = 2.97$) (Bonferroni $p = .001$).

Table 2.3: Micro-structure in the narratives of the children in the 3 groups

	3 years old		4 years old		5 years old		F	η^2	Bonferroni post hoc
	M	SD	M	SD	M	SD	(df)		
Total number of utterances	20.00	4.23	24.20	12.82	21.13	6.36	$.95_{(2,42)}$	.00	
Mean num. of sub. for utt.	.18	.15	.28	.16	.37	.22	$4.34_{(2,42)}$*	.05	3 < 5; $p = .016$
MLU	4.61	1.32	5.59	1.38	6.47	1.90	$7.27_{(2,42)}$**	.02	3 < 5; $p = .006$
Word types	42.93	15.00	59.13	20.81	68.87	20.09	$5.00_{(2,42)}$**	.03	3 < 5; $p = .001$

*p <. 05; **p < .01

With regard to narrative macro-structure, significant differences were found among the groups in all the measures (Table 2.4). Specifically, 3-year-old children obtained a significantly lower score in Events and Structure then 4- and 5-year-old children; in the anaphoric use of articles and in the number of mental state words used, the only significant difference was between 3- and 5-year-old children; finally, considering the number of agents, although the ANOVA showed a significant difference among the groups, this was so small that it was not possible to detect the specific developmental trend.

Table 2.4: Macro-structure in the narratives of the children in the 3 groups

	3 years old		4 years old		5 years old		F	η^2	Bonferroni post hoc
	M	SD	M	SD	M	SD	(df)		
Events	5.93	4.43	12.53	4.05	13.87	5.55	$12.14_{(2,42)}$***	.13	3 < 4 p = .001 3 < 5 p < .001
Structure	1.87	1.55	3.47	1.46	4.00	1.89	$6.84_{(2,42)}$**	.06	3 < 4 p = .033 3 < 5 p = .003
Agents	2.13	1.36	3.27	1.75	3.33	1.18	$3.26_{(2,42)}$*	.03	
Anaphoric articles	.20	.41	.73	1.03	1.13	1.19	$3.73_{(2,42)}$*	.09	3 < 5 p = .028
Psychological lexicon	1.53	1.46	2.53	1.64	3.93	2.12	$7.02_{(2,42)}$**	.08	3 < 5 p = .002

*p < .05; **p < .01; ***p < .001

2.3.4 Relationships between gestural and narrative production

First of all, the relationships between children's IQs and gestural and verbal measures have been computed to exclude an influence of children's cognitive abilities on the possible relationships between gestural and narrative production. None of the gestural (i.e., number of gestures produced) and verbal measures (i.e., TROG-2) was significantly correlated with children's IQs (all *ps* > .05). Considering the narrative measures, the only significant correlation was between children's IQs and the psychological lexicon (r = -.330; p = .027).

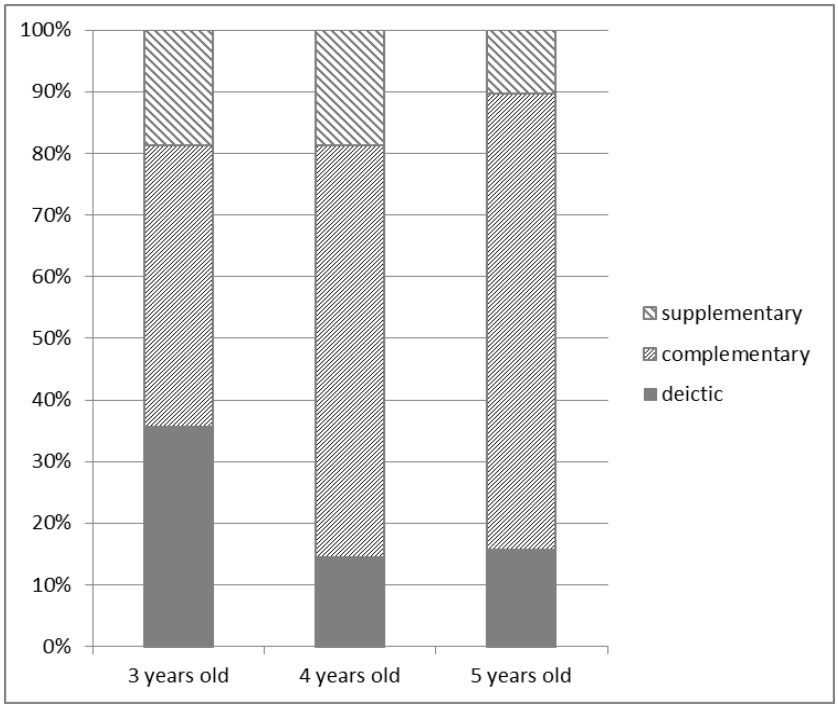
No significant relationships were found between the number of gestures produced by the children and their lexical production, in especially lexical types (r = -.119; p = .438). However, a significant correlation was found between the production of gestures and the children's morphosyntactic competence: the children who used a higher number of gestures were those with lower scores on the TROG-2 (r = -.435; p = .003) and worse syntactic production. In particular, the number of gestures produced was negatively correlated with the mean number of subordinate clauses (r = -.344; p = .021) and with the MLU (r = -.305; p = .041).

Considering narrative's macro-structure, no significant relationships were found between the number of gestures produced by the children and the anaphoric use of articles (r = -.269; p = .074) and the number of mental state words used (r = -.226; p = .136). However, significant negative correlations were found between the production of gesture and the others macro-structural measures, in especially events (r = -.397; p = .007), structure (r = -.405; p = .006) and agents (r = -.394; p = .007).

2.3.5 Communicative function of gestures

A high percentage of the gestures were produced in association with verbal production: 85% of the gestures produced by the 3-year-old children, 93% of those produced by the 4-year-old children and 92% of those produced by the 5-year-old children. For those gestures, we coded the gesture communicative function. With respect to the proportion of each communicative function (reported in Figure 2.1), a significant difference was found between the groups in the proportion of gestures with a deictic function, which decreased with increasing age ($F_{(2,34)}$ = 5.08; p = .012). Bonferroni post hoc tests showed that the proportion of gestures with a deictic function was significantly higher in the 3-year-old children than in the 5-year-old children (p = .014). In contrast, the proportion of gestures with a complementary function increased with increasing age ($F_{(2,34)}$ = 6.83; p = .003), and Bonferroni post hoc tests showed that the proportion of gestures with this function was significantly lower in the 3-year-old children than in the 5-year-old children (p = .014). No significant differences were found in the proportion of gestures with a supplementary function, which represented less than 20% of the gestures in each of the groups.

Figure 2.1: Communicative functions of the gestures produced in association with verbal productions



2.4 Discussion

The aim of the present study was to analyse the use of gestures during a storybook narrative task in preschool-aged children, who ranged in age from 3 to 6 years. Both the function of the gestures and the relationships between gestural and narrative production were analysed. Our results support the hypothesis of Iverson and Braddock (2011) and Mainela-Arnold *et al*. (2014), who argued that the production of gestures during narratives should be considered a compensatory strategy for children with low linguistic competence. Indeed, in both these studies, children with language impairment and younger children showed a higher use of gestures combined with speech compared to typical developing children and to older children. It must be noted that the use of communicative gestures did not appear to be a strategy to elude lexical problems; in fact, the children in our sample used a low percentage of iconic gestures, which are the gestures

that stand for words (less than 14% of the gestures in each age group). In addition, no significant relationships were found between the production of gestures and the children's lexical competence. Therefore, the gestures were not used to replace words; instead, we could hypothesise that they were used to support the narratives of those children who showed a lower syntactic level in both morphosyntactic comprehension (i.e., TROG-2 score) and narrative production (i.e., the children who produced less long and complex utterances).

Considering narrative's macro-structure, our results showed that children who used a higher number of gesture during storytelling produced narratives of a lower quality than children who used less gestures. Specifically, we highlighted the existence of a negative correlation between the number of gesture produced and the total number of events included in the story, the total number of key passages told and the total number of acting characters. This result is partially in agreement with what recently found by other authors (Demir et al., 2014; Demir et al., 2015), but it could lead to a different explanation. In the recent work by Demir and collaborators (2015), the authors claimed that children who were able to express a character's viewpoint in gesture were more likely to tell better-structured stories at later ages. Conversely, in our data, we did not find a relationship between the use of gesture and the use of mental state words, which could be interpreted as another way to show the ability to take other's point of view. We think that the use of gestures during storytelling by preschool children could be better explained considering the unquestionable role of gesture in supporting verbal language in development.

With regard to the communicative function of the gestures, the results of the present study contrast with those of previous studies of younger children (e.g., Fasolo & D'Odorico, 2012, who studied 18-month-old children), which claimed that the ability to produce supplementary gesture-plus-word combinations was predictive of a better linguistic outcome. Our study showed that in preschool-aged children, the persistence of the supplementary function of gestures could instead be considered an index of problems in verbal production, meaning an inability to express all of the elements of the sentence in words. In fact, in the 3-year-old children as well, less than 20% of the gestures produced served a supplementary function. However, the 3-year-old children produced a significantly higher proportion of gestures with a deictic function than the older children. Therefore, it was necessary to refer to the extra-linguistic context to interpret the meaning of the verbal productions more often in the younger children than in the older children.

The increase in gestures with a complementary function and the decrease in gestures with deictic and supplementary functions with increasing age could be explained as a gradual decrease in the essential role of gestures in interpreting the children's narratives. Therefore, the gestures gradually came to support verbal production, without adding new elements that were not expressed in words.

It must be noted that the large proportion of proximal gestures produced by the children in the 3 groups and the use of gestures with a deictic function could be explained by the type of task used in the present study: a storytelling task in which the examiner was sitting in front of the child and could therefore see the book that the child was telling the story of. Joint viewing of the same pictures could have led the children to produce more non-verbal references to the book. Future studies will investigate the production of gestures during a storytelling task in which the examiner could not see the pictures of the *Narrative Competence Task*. We hypothesise that the type of gestures produced in that situation could differ from those produced in the present study; for instance, we hypothesise a lower proportion of gestures with a deictic function. In addition, in accordance with Cameron and Wang (1999), who found that from age 4 onward, children created better narratives over the telephone than in a face-to-face situation, we hypothesise that children's linguistic level could increase in a situation in which gestures are not helpful in establishing a common ground.

Chapter 3

Prosody in Italian children and adults' narratives

3.1 Introduction

Prosody has a fundamental role in language acquisition. Although the prosodic characteristics of child directed speech and infants' ability to perceive them have been broadly studied (for a review see Morgan & Demuth, 1996), prosody in children's production has not been widely investigated. The first studies on this topic analysed longitudinally the prosodic characteristics of children's utterances in terms of global tune characteristics. Furthermore, most of these studies focus on children's first production, such as cries, vocalizations, babbling and one-word utterances (for a review see Snow & Balog, 2002), while just few works have investigated the prosody of multi-word utterances or complex linguistic production, such as narratives.

In oral language, prosody serves several linguistic and paralinguistic purposes (Cruttenden, 1997; Sorianello, 2006). First of all, prosody has a grammatical function, for example, contributing to the syntactic decoding of speech (Gleitman, Gleitman, Landau, & Wanner, 1988). Second, prosody has a fundamental modal function because it allows the listener to classify the type of utterance used in different speech acts (e.g., declarative *vs*. interrogative). Third, prosody has an additional paralinguistic function because through prosody, the speaker can transmit to his/her interlocutor information about the underlying psychological and/or emotional state.

The ability to transmit the proper speech act through intonation seems to be acquired very early in development (for a review, see Snow & Balog, 2002). For example, Marcos (1987) showed that already at 15 months of age, children use a falling melodic contour for declarative utterances and a rising contour for interrogative utterances, as found in adult speech. The ability to package clauses, or other units, in a tonal cohesive pattern represents an important grammatical function of intonation (e.g., Nespor & Vogel, 2007). The competence required to produce two or more words in a single melodic contour has been considered by several authors as a means for distinguishing between real word combinations and sequences of single words or chains of words (Bloom, 1973; Scollon,

1973). Moneglia and Cresti (1993) argued that words create a single complex speech act only when they have just one illocutionary force. For these two authors, an intonation pattern must have only one comment unit, and this comment unit is necessary and sufficient to form the pattern itself. However, at the beginning of the combinatorial phase, children produce only sequences of independent words with close temporal contiguity. It is only when they are approximately 22 months old (D'Odorico & Carubbi, 2003) that they become able to produce an informational pattern, in which one word, the comment, expresses the illocutionary force of the utterance, and the other, the topic, provides information about the linguistic element which this illocutionary force targets. Finally, two or more words can be connected within a single melodic contour through the process of linearisation: The words that constitute the utterance are no longer independent, but now they are semantically and prosodically linked (see also Moneglia & Cresti, 2001; D'Odorico & Carubbi, 2003). Therefore, the ability to package words within a single intonation contour is necessary to produce adult-like multi-word utterances.

It is well known that there is a relationship between syntax and prosody in language acquisition. Indeed, several studies have investigated the perceptive mechanisms that are considered as the basis of the prosodic bootstrapping hypothesis (for a review, see Morgan & Demuth, 1996). The idea, introduced by Pinker in 1984, is that the prosodic information available in speech may contain clues about the syntactic structure of language, providing additional constraints on children's syntactic and semantic analyses. In the literature on prosodic development, we can find a huge number of studies addressing children's ability to comprehend prosody in language (e.g., Choi, & Mazuka, R., 2003; Vernice & Guasti, 2014; Zhou, Crain, & Zhan, 2012). On the contrary, the relationship between syntax and prosody has rarely been investigated in children's productions (Behrens & Gut, 2005; Chen & Fikkert, 2007; D'Odorico & Carubbi, 2003; D'Odorico, Fasolo & Marchione, 2009; D'Odorico, Fasolo, & Zanchi, 2010; Prieto, Estrella, Thorson & Vanrell, 2012; Zampini et al., 2016). In one of the first studies on the prosody of the early multi-word utterances, D'Odorico and Carubbi (2003) focused their attention on the productions of a group of Italian children aged 19 months in the first observation, 22 months in the second and 23 months in the last. Their results show that the semantic relationship between the two words has an influence on intonation: the stronger the semantic relationship between words, the more advanced is the prosodic pattern used; in particular real word combinations, in which the two words represent a single speech act,

are produced with more advanced prosodic pattern than chain words or successive single words. Behrens and Gut (2005), in a single case study of a German child, partially confirmed these results: different types of two-word utterances lead to different prosodic manifestations, and different latencies in terms of attaining the mature structure. Recently, D'Odorico and collaborators (2010) found that the syntactic complexity of utterances influenced the realisation of prosodic aspects in 30-month-old children. When producing two-argument utterances, the children seemed unable to master some prosodic characteristics, such as the ability to "package" them into a single intonation contour (linearisation) and to use prosody to signal their pragmatic focus. These results suggest that at this point of development, children can syntactically construct a complex utterance, but they still cannot simultaneously exert total control over its prosodic features.

The studies described above have been conducted using a "holistic" approach, based on the description of the overall pitch contour. While a holistic approach could be useful in the description of the contour shapes of the first production, like babbling and on-word utterance, it doesn't allow a detailed analysis of the intonation of multi-word utterances. For example, when a two-words utterance is spoken with a rising contour, the rise can either begin on the first or on the second word, depending on which word receives the sentence accent. Furthermore, it could be difficult to compare children's data described in a holistic way with data collected for adults, which are usually described in Autosegmental-Metrical (AM) notation (Pierrehumbert, 1980; Ladd, 1996/2008). AM is a term coined by Ladd (1996) to refer to the approaches to intonation which developed following on from the seminal work of Pierrehumbert (1980). These approaches generally make use of two (H and L) levels for the description of intonation and they characterize the intonation contour as a sequence of tones (a more detailed description of the AM model for Italian is in the Methods section). The AM approach has guided research on intonation in several languages (for Italian see for example, D'Imperio, 2002; Gili Fivela *et al*., 2015; Grice, D'Imperio, Savino & Avesani, 2005) and it has also been in recent times employed in child intonation studies, but only a small set of languages has been examined so far (Chen & Fikkert 2007, for Dutch; Prieto & Vanrell 2007, for Catalan; Prieto, Estrella, Thorson & Vanrell 2012, for Catalan and Spanish; Astruc, Payne, Post, Vanrell & Prieto 2013, for Catalan, Spanish and English; Frota, Cruz, Matos & Vigario 2016 for European Portuguese). Within this theoretical framework, Chen and Fikkert (2007) analysed the

productions of three Danish children from 16 to 25-months. Results showed that children master adult forms of nuclear pitch accents when reaching a vocabulary size of 160 words, while prenuclear accents are mastered only later, at a vocabulary size of 230 words (hence after the beginning of the combinatorial stage). Furthermore, in the first multi-word utterances both words are pitch-accented, independently of their semantic relationship. Contrary to what found for Dutch children, Prieto and colleagues (Prieto et al., 2012), analysing the utterances produced by 4 Catalan and 2 Spanish children between the age of 11 and 26 months, showed that an adult-like inventory of nuclear contours is acquired before the age of two, independently of the onset of combinatorial speech. In a recent study, Frota and collaborators (Frota et al., 2016) investigated the emerging intonation and prosodic phrasing at syllabic, word and phrase levels of two European Portuguese children between 12 and 26 months. The results showed that European Portuguese children displayed an adult-like use of distinct nuclear contours as early as 17 months and approached adult-like tune-text alignment and scaling by 21 months. Simultaneously, prosodic phrasing seemed to develop in three steps: first, the prosodic unit is constrained to a one-syllable-one-prosodic word intonational phrase; second, the prosodic unit is enlarged at a one-prosodic word phrase where the word may be bigger than one syllable; finally, the prosodic unit is broadened at the phrase-level to contain a prosodic phrase with more than one prosodic word. In agreement with the data collected for Catalan ad Spanish children (Prieto et al., 2012), the development of intonation and phrasing were found to precede the onset of combinatorial speech.

Although some studies have addressed the prosodic realisation of children's first word combinations, to our knowledge, only a few studies have investigated the prosodic realisation of narratives in typically developing children. In a recent study Redford and collaborators (Redford, Dilley, Gamache & Wieland, 2012) studied the transitional prosody (the prosody that indicates whether a speaker intends to continue with a thought or has completed it; see Du Bois, Schuetze-Coburn, Cumming, & Paolino, 1993) obtained from the spontaneous narratives of 42 children aged between 5 and 7 years and 14 adults. The data highlighted that children marked phrases for completition less often and less appropriately than adults. Children and adults both used phrase-final tones and post-boundary pauses to mark continuation versus completition, but not in a completely identical manner. De Ruiter (2014) studied how German children, aged five and seven years, use intonation to signal information status in narrative discourse. The results show

that although children were able to use intonation in an adult-like way to give the information status of new and given elements of the narration, 5-year-old children were still not able to use intonation for a dialogue-structuring purpose. This finding suggests that some aspects of intonation are acquired only late in development.

The relationships among the different linguistic domains have often been the focus of the studies on language development in typically (e.g., Bates & Goodman, 1999; D'Odorico, Fasolo, & Marchione, 2009; Fasolo & D'Odorico, 2012) and atypically developing children (e.g., Fasolo, Majorano, D'Odorico, 2008; Zampini & D'Odorico, 2011, Zampini et al., 2016). In language development, some authors have hypothesised the existence of linguistic trade-offs—that is, that the increased demands in one component, such as syntax, may potentially cause a decreased performance in a second component, such as phonology (Bock, 1982; Crystal, 1987). Furthermore, the interrelationships among different components of language may vary depending on how recently a particular linguistic structure has been learned (Crystal, 1987; Masterson & Kamhi, 1992).

Based on the "trade-off hypothesis" and considering the current literature on the relationship between prosody and complex aspects of language, such as narratives, in which the child has to control simultaneously several linguistic and non-linguistic aspects, Study 1 has one main purpose: to investigate in a group of Italian 3- and 4-year-old children the relationships among narrative skills, syntax, and prosody and to verify whether these relationships are still present approximately one year later. With regard to the relationship between narratives and syntactic skills, we hypothesise that there will be a positive correlation between these abilities in preschool children, indicating that a more advanced use of syntax could lead to the realisation of better narratives. Therefore, a more effective use of language at the syntactic level could allow a child to produce a story characterised by a stronger structure and a higher number of acts described. In contrast, following the trade-off hypothesis (Bock, 1982), we expect to find a negative correlation between narrative and syntactic skills and prosody. In agreement with D'Odorico *et al*. (2010), we suppose that increased demands in one component (i.e., the narrative and syntactic skills) may produce a decreased performance in a second component of language (i.e., prosodic realisation of the utterances). This may be seen in our study as a trade-off between narrative-syntactic skills and prosodic competence.

Considering the recent studies that have analysed the emerging intonation going beyond the investigation of the overall pitch contour, Study 2 describes the intonation used in narratives by Italian children and adults within the AM framework. To our knowledge, the AM model has not yet been used in studies of Italian children's intonation. The main aim of Study 2 is to compare preschool children and adults in the intonative realization of narratives, specifically focusing on nuclear contours (nuclear pitch accent plus boundary tone) and phrasal timing. Differently from Study 1, we decided to include 3-year-old and 5-year-old participants to test the hypothesis that the proper use of some prosodic features, like the continuation rise at the end of the sentence (Hirschberg, Pierrehumbert, 1986), is linked to cognitive development, specifically the development of theory of mind, which seemed to reach a turning point at the age of 4 years (see for example Perner, 1999); we therefore expected to find that 3-year-old children would differ from adults in the use of the continuation rise in narratives, while 5-year-old children would use a more adult-like intonation. An important implication of Study 2 will be the first description of Italian children intonation within the AM framework and the possibility to compare the data with that available for Italian adults and for children in other languages.

Finally, the main purpose of Study 3 is to investigate the prosody of children and adults' narratives as a cue of pre-planning. We directed our attention to the scaling of initial utterance F0 values as a function of phrasal length. Indeed, there is controversial evidence of this phenomenon in Romance languages which has been interpreted as evidence for "soft" preplanning (Cooper & Sorensen, 1981; Rialland, 2001; Prieto, Shih & Nibert, 1996; Thorsen, 1980). For example, Prieto and collaborators (Prieto, D'Imperio, Elordieta, Frota, & Vigário, 2006), studying the intonation of 10 adults (2 Catalan, 2 Italian, 2 Standard Portuguese, 2 European Portuguese and 2 Spanish), found that the majority of speakers tend to begin higher in longer sentences, confirming the need of a certain amount of preplanning in tonal production. Anyway, the failure to find a correlation between phrase length and initial scaling for all speakers supports the idea that we are dealing with a soft-preplanning (Liberman & Pierrehumbert, 1984). We will test whether preplanning can be found in pre-schoolers' productions and, if this is the case, whether its features are similar to forms of adult preplanning.

3.2 Study 1

3.2.1 Methods

3.2.1.1 Participants

Participants included 30 Italian-speaking, monolingual children (15 females and 15 males). Each child was observed twice. The first observation occurred during the first year of kindergarten attendance (T1) at a mean age of 43 months (SD = 3.54; range = 35-48), and the second took place during the second year of kindergarten attendance (T2) at a mean age of 58 months (SD = 4.12; range: 50-65 months). All children included in the analysis had both cognitive development and lexical competence in the normal range. They had non-verbal IQs score ranging between 85 and 125, as measured by Raven's Progressive Coloured Matrices (Raven, 1998). To screen for lexical competence, we used the Phono-Lexical Test (TFL; Vicari, Marotta, & Luci, 2007), an Italian test for children aged 2 years and 6 months to 6 years. The TFL assesses both lexical comprehension (i.e., a multiple choice selection task) and lexical production (i.e., a picture denomination task). Both receptive and expressive scores were in the average range for their ages (number of correct answers for lexical comprehension: M = 32.83; SD =: 5.30; range = 21-43; number of correct answers for lexical production: M = 24.43; SD = 4.45; range = 16-36).

3.2.1.2 Procedure

All children participated in one test session lasting approximately 30-40 minutes at their kindergarten with an examiner. Each child was tested alone in a quiet room. The same examiner at both T1 and T2 collected all data. During the session, a storytelling task called the Picnic Story (Tavano & Biancuzzi, 2008) was administered individually to each child. The Picnic Story is a 13-picture storybook used to elicit children's narratives. The story is about two children, a boy and a girl, who go on a picnic with their dog. During the picnic, a storm arrives, prompting the children to seek refuge in a cave that happens to be full of bats. At the end of the story, the bats guide the children to the cave's exit, and the sun is shining again. The children were first asked to browse the pages (*"Now, we are going to look at a picture book. Browse it and look carefully at the pictures because I want you to know what happens in the story"*) and were then invited to tell the story in their own words while browsing the pages again (*"Now, tell me the story looking again at the pictures"*). The examiner did not interfere with the narration; he only supported the child with some

positive feedback ("*Good!*", "*Well done!*"). Each child's telling of the Picnic Story was audiotaped by a digital voice recorder and then transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format. Transcripts were segmented into utterances, defined as an independent clause plus any modifiers, such as a dependent or coordinate clause (Marinellie, 2004).

3.2.1.3 Coding and measures

Narrative measures

To assess the children's narrative competence, two aspects were considered: the story's structure and the quantity of information, operationalised as the number of acting characters and the number of events told (see also Chapter 1, *NCT coding*).

For the evaluation of the story's structure, we adapted the procedure developed by Norbury and Bishop (2003). In the present work, we considered 5 key events of the Picnic Story:

9. introduction (e.g., *"i bambini vanno a fare un picnic"* [*the children are going to have a picnic*])
10. triggering event (e.g., *"all'improvviso arriva un temporale"* [*suddenly a storm breaks out*])
11. problem (e.g., *"i bambini si rifugiano in una caverna buia e hanno paura"* [*the children take refuge in a dark cave and they are scared*])
12. problem solution (e.g., *"dei pipistrelli li aiutano a trovare l'uscita"* [*some bats help them to find the exit*])
13. conclusion (e.g., *"c'è di nuovo il sole"* [*it is sunny again*])

A child received 1 point for each of the key elements included in the narrative. Therefore, a child could have a score ranging from 0 to 5 points in the story structure.

To evaluate the information density of the story, two measures adapted from Fiorentino and Howe (2004) were computed:

1. Acting characters, i.e., the number of characters that were performing an action in the story.
2. Events, i.e., the number of things that happened in the story (e.g., *"arriva un temporale"* [*a storm comes*]). Descriptions (e.g., *"era una bella giornata"* [*the day was sunny*]) were not computed as events.

Syntactic measures

All utterances produced during the narrative task were classified on the basis of a hierarchical coding scheme (adapted from Zampini & D'Odorico, 2011). The following measures were computed:

1. Utterances without verbs, i.e., the number of utterances in which the child did not produce verbs (e.g., *"con la bicicletta"* [*with the bike*]).
2. Simple utterances, i.e., the number of utterances characterised by the presence of one single verb (e.g., *"il bambino mangia il biscotto"* [*the child is eating the cookie*]. Coordinated sentences were also considered simple sentences because they contributed to the lengthening of the utterance but not to an increase in its level of syntactic complexity (Diessel, 2004).
3. Isolated subordinate utterances, i.e., the number of sentences that were characterised by the presence of a single verb but attached to a main verb either implied by the child or produced in a previous utterance (e.g., *"perché avevano paura"* [*because they were scared*]).
4. Complex utterances, as defined by Bloom *et al*. (Bloom, Lahey, Hood, Lifter, & Fiess, 1980), the number of utterances characterised by the presence of at least two verbs and constituted by a main clause and a subordinate clause (e.g., *"scappano perché piove"* [*they run away because it's raining*]). We counted as complex utterances all utterances that had two or more verbs. Due to the limited number of utterances with more than two verbs, no further distinctions were made in this category.

Prosodic measures

A total of 1120 declarative sentences (501 at T1 and 619 at T2) were produced by the children during their storytelling. These sentences were analysed using the speech software PRAAT (Boersma & Weenink, 2005). Non-declarative sentences, sentences addressed to the researcher, and sentences characterised by many overlapping noise (less than 1% of the total) were excluded from the analysis. Moreover, non-fluent utterances, defined as utterances that contain unfilled and filled pauses, part-word repetitions, or restarts (McDaniel et al., 2010; e.g., "Faceva faceva // era duro" [He did he did // it was strong]), were excluded from the prosodic analysis. Because of the high variability in the number of utterances produced by children (at T1: M = 14.73, SD = 5.95, range = 3-36; at

T2: M = 18.20, SD = 7.92, range = 9-46), we decided to use the proportional frequency of the categories described below.

We included in the prosodic analyses only utterances containing one or more verbs because the number of utterances without verbs was too small to be considered. Prosody parameters considered in this study were extracted from pitch:

a. Prosodic packaging. As described in the Moneglia and Cresti model (1993), two or more words create a complex speech act when they have a single illocutionary force, i.e., they are linearised in a single intonation contour. Considering this assumption, all multiword utterances containing at least one verb were classified as follows:
    1. Linearised: utterances characterised by inclusion within a single melodic contour. The waveform of the frequency is in some way continuous and linear (see Figure 3.1);
    2. Non-Linearised: utterances characterised by not being included within a single melodic contour. In this case, the waveform of the frequency is not continuous and linear (see Figure 3.2).

Figure 3.1. Example of a linearised utterance: "poi sono andati insieme con la bici" [then they went by bike together]. Time is reported on the x-axis and frequency (Hz) is reported on y-axis.

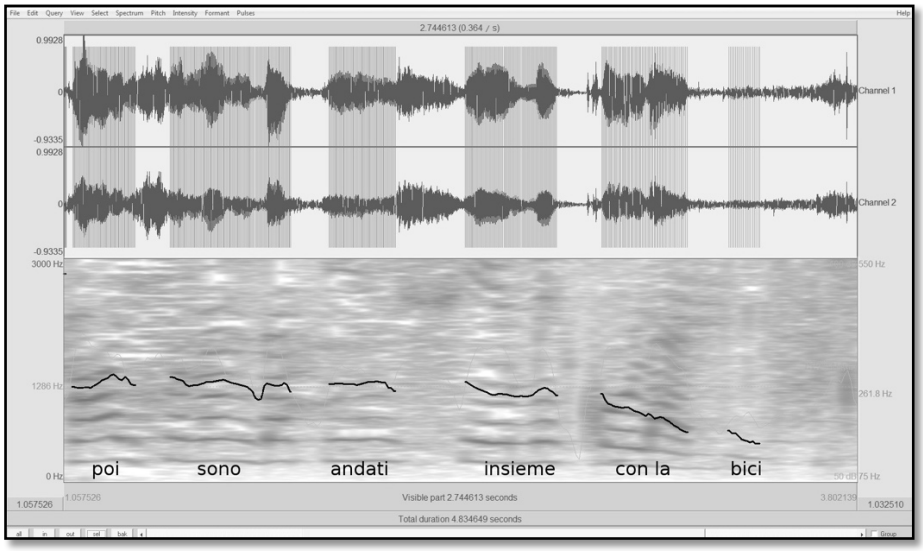
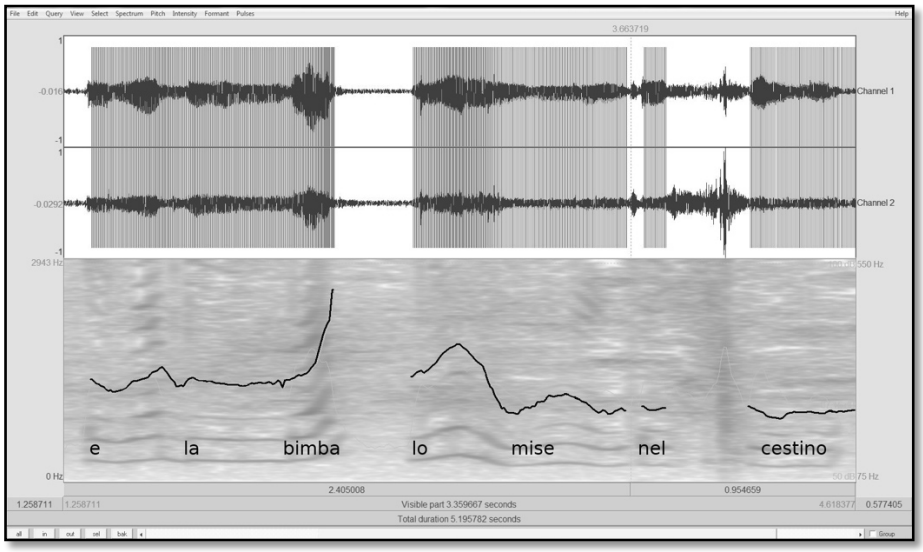


Figure 3.2. Example of a non-linearised utterance: "e la bimba lo mise nel cestino" [and the child put it into the basket]. Time is reported on the x-axis and frequency (Hz) is reported on y-axis.



b. The ending contour of each utterance

The ending melodic contour gives the utterance its illocutionary force. Declarative sentences end with a falling contour, and this seems to be a cross-linguistics characteristic (e.g., Sorianello, 2006). We analysed the last pitch movement realised on the last word in

the utterance (linearised or non-linearised) and classified each utterance having at least one verb as follows:

1. Rising: a pitch movement of at least 2 semitones upwards;
2. Falling: a pitch movement of at least 2 semitones downwards;
3. Level: characterised by a difference of less than 2 semitones between the maximum and minimum pitch.

Level utterances were less than 1% of the total. For this reason, in the analysis, we will consider the two complementary categories of falling and rising.

In accordance with the Italian intonation literature (e.g., Sorianello, 2006), we considered the presence of a falling ending contour and the ability to include all utterances within a single melodic contour (linearisation) as indicators of good prosodic realisation. In contrast, we considered the presence of non-linearised utterances as an indicator of immature prosodic realisation (as done in D'Odorico & Carubbi, 2003) along with a rising ending contour, which lends itself to the idea of a suspension rather than an ending. The two prosodic characteristics considered in the study are not mutually exclusive, so we can find linearised utterances with a falling ending contour, linearised utterances with a rising ending contour, non-linearised utterances with a falling ending contour and non-linearised utterances with a rising ending contour.

3.2.1.4 Reliability

In scoring the children's syntactic and narrative competence, inter-coder reliability was assessed on 20% of the stories, with two study authors independently scoring the children's productions.

The inter-rater agreement on the syntactic coding scheme and on the narrative indices, as indicated by Cohen's Kappa coefficient, was good (syntax: K = 0.95; structure: K = 0.79; acting characters: K = 1; events: K = 0.72).

For the intonation measures, two examiners acoustically analysed 20% of the utterances. The inter-rater agreement, as indicated by Cohen's Kappa coefficient, was .77 for the ending utterance contours and .96 for the single vs. multiple intonation profile. In case of disagreement, the utterance was analysed by a third examiner to reach a final agreement.

3.2.2 Results

3.2.2.1 Data analyses

First, descriptive data were presented to describe the prosodic, syntactic and narrative competences shown by the children at both T1 and T2. The T1 and T2 data were then compared, using a t-test, to highlight the development of these competences. The effect sizes (Cohen's d) for paired-samples t-test were calculated. According to Cohen (1988), effect sizes of .2, .5, and .8 are considered small, medium, and large respectively

Second, the relationships among the children's skills in syntax, narratives and prosody were considered. We considered the number of complex utterances as an index of the children's syntactic level, and we considered the proportional frequency of utterances having a falling contour and the proportion of linearised utterances as indices of children's prosodic competence. Partial correlations (Pearson's r, controlling for the number of utterances produced) were computed to control for different narrative lengths.

3.2.2.2 Descriptive data and competence development from T1 to T2

With regard to narrative competence (see Table 3.1), the score ranges showed a high individual variability for all indices considered at both T1 and T2. There were significant differences between T1 and T2 in the Structure and Events indices: From T1 to T2, children produced stories with a higher number of key passages and events.

With regard to syntactic competence, as shown in Table 3.2, at both T1 and T2, children produced a higher number of simple sentences than utterances with no verb or with more than one verb. From T1 to T2, there was a significant decrease in the use of utterances without verbs and a complementary significant increase in the use of complex utterances.

Table 3.1: Descriptive Statistics of the Narrative Measures and Comparison between T1 and T2 (t-test)

	T1			T2					
	M	*SD*	*Range*	*M*	*SD*	*Range*	*t*	*p*	*d*
Structure	.37	.85	0-4	1.23	1.04	0-4	-4.42	< .001	.81
Characters	1.43	1.57	0-5	2.40	1.25	0-6	-.2.73	.011	.50
Events	8.20	5.90	1-26	15.83	6.68	0-33	-4.87	< .001	.89

Table 3.2: Descriptive Statistics of the Syntactic Measures and Comparison between T1 and T2 (t-test)

	T1			T2					
	M	*SD*	*Range*	*M*	*SD*	*Range*	*t*	*p*	*d*
N. of utterances	18.60	10.12	0-55	19.10	8.66	10-47	-.246	.817	.04
No verbs	4.53	4.78	0-16	1.50	1.98	0-8	4.071	< .001	.74
Simple	11.47	6.78	1-31	13.80	7.42	2-35	-1.492	.146	.27
Complex	2.73	2.77	0-13	6.40	4.33	1-17	-4.023	< .001	.73

Regarding the prosodic characteristics of the utterances produced by the children, the mean percentage of linearised utterances was 86% (SD = 22; range = 0-100) at T1 and 66% (SD = 23; range = 5-100) at T2, whereas the use of a falling ending contour revealed a mean percentage of 65% (SD = 27; range = 0-94) at T1 and of 50% (SD = 30; range = 0-91) at T2. At T2 children produced a significantly lower number of linearised ($t = 7.99$; $p < .001$) and falling utterances ($t = 2.07$; $p < .05$) than at T1.

3.2.2.3 Relationships between syntactic and narrative competence

As shown in Table 3.3, the total number of complex utterances observed at T1 was significantly correlated with all the narrative indices; that is, the children who received better scores for narrative ability were the same ones who could use more complex utterances in their stories. At T2, the total number of complex utterances correlated only with the story structure index, indicating that at this point of development, children's narrative competence and syntactic skill seem to be less interrelated.

Table 3.3: Pearson's (r) Partial Correlations (Controlling for the Number of Utterances) Between the Production of Complex Utterances and Narrative Measures at T1 and T2

		Structure	Acting Characters	Events
Complex utterances	T1	.44*	.39*	.56**
	T2	.40*	.12	.19

* p < .05; ** p < .01(two tailed)

3.2.2.4 Relationships between prosodic skills and syntactic and narrative competence

As shown in Table 3.4, the number of complex utterances was negatively correlated with the frequency of linearised utterances at T1: Children who used more syntactically complex utterances used a higher number of utterances not included within a single melodic contour. This correlation was no more significant at T2. No correlation was found between the number of complex utterances and the use of a falling intonation contour.

With regard the relationships between prosodic and narrative skills, at T1, there were significant negative correlations between the proportional frequency of linearised utterances and the narrative indices of acting characters and events. We found significant negative correlations at T2 between linearised utterances and the indices of narrative competence. At both T1 and T2, we found no significant correlations between utterances having a falling ending contour and the narrative competence indices. We can conclude that at both T1 and T2, the children who were more proficient in storytelling were at simultaneously less able to produce their utterances within a single intonation contour

(linearisation); however, all children were sufficiently competent to end their declarative sentences with the appropriate falling contour.

Table 3.4: Pearson's (r) Partial Correlations (Controlling for the Number of Utterances) Between Prosodic Indices and Narrative and Syntactic Measures at T1 and T2

		Structure	Acting characters	Events	Complex utterances
Freq. linearised utterances	T1	-.23	-.53**	-.64***	-.63**
	T2	-.45*	-.48**	-.39*	-.31
Freq. falling	T1	.28	-.15	-.24	.12
	T2	.29	.27	.10	.23

* p < .05; ** p < .01; *** p < .001 (two tailed)

3.3 Study 2

3.3.1 Methods

3.3.1.1 Participants

The study included 55 Italian-speaking, monolingual participants, 40 preschooler and 15 adults. The children were divided into two groups based on age: 3-year-old children (11 females and 9 males) and 5-years-old children (10 females and 10 males). 3-years-old children had a mean age of 44 months (SD = 3.20; range = 37-48); 5-year-old children had a mean age of 66 months (SD = 3.73; range = 60-72); adults (10 women and 5 men) had a mean age of 26 years (SD = 7.72; range = 18-48), 11 had a high school diploma, 3 had a degree and 2 had a Ph.D. All children included in the analysis had both cognitive development and grammatical competence in the normal range. They had non-verbal IQs score ranging between 85 and 125, as measured by Raven's Progressive Coloured Matrices (Raven, 1998). The *Test for Reception of Grammar – Version 2, TROG-2* (Italian standardisation by Suraniti, Ferri & Neri, 2009) was administered to verify grammatical comprehension (for a description of Raven's Progressive Matrices and TROG-2 see Chapter 1).

3.3.1.2 Procedure

All children participated in one test session lasting approximately 30-40 minutes at their kindergarten with one trained examiner. Each child was tested alone in a quiet room. During the session, the Narrative Competence Task (NCT) was administered individually to each child (for a description of the task and its administration see Chapter 1). Adult participated in one test session lasting approximately 10 minutes in a university lab.

Each telling of the NCT was audiotaped by a digital voice recorder and then transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format. Transcripts were segmented into utterances, defined as an independent clause plus any modifiers, such as a dependent or coordinate clause (Marinellie, 2004).

3.3.1.3 Coding and measures

As mentioned in the introduction, we conducted the intonational analysis of Study 2 in the AM framework (Pierrehumbert, 1980; Ladd, 2008). In the AM model, the intonation contour of an utterance is described as a sequence of high (H) and low (L) tones. There are two kinds of tones: pitch accents and phrasal tones. Pitch accents refer to the tones associated with the stressed syllable of a word. It can be either monotonal (e.g. H*, L*) or bitonal (e.g. H+L*, H*+L) and is perceptually salient. The starred tone is realized on the stressed syllable. Phrasal tone is the tone associated with the edge of a sentence. It can be monotonal (e.g. H%, L%) or bitonal (e.g. HL%, LH%). The diacritic % is used to mark the tone associated with the right edge of an intonational phrase (IP), called boundary tone. An intonational phrase can have more than one pitch accent, among which the final one is referred to as nuclear pitch accent (for a detailed description of Italian intonation within the AM framework see D'Imperio, 2002, and Gili Fivela *et al*., 2015).

Intonation was transcribed using the Tones and Breaks Indices transcription (ToBI), a system developed within the AM framework aimed to have comparable data across languages. The ToBi transcription for an utterance consists of a recording of the speech, an associated record of the fundamental frequency contour and symbolic labels arranged in four parallel tiers. The four tiers of labels are: a tone tier, which consists of labels for distinctive pitch events (pitch accents and phrase tones); an orthographic tier, that is a straightforward transcription of all the words in the utterance; a break-index tier, which marks the prosodic grouping of the words in an utterance by labelling the end of each word for the subjective strength of its association with the next word, on a scale from 0 (for the strongest perceived conjoining) to 4 (for the most disjoint). The break index 3 marks the end of the intermediate phrase, while the break index 4 represents the end of the intonation phrase (see, e.g., Price, Ostendorf, Shattuk-Hufnagel & Fong, 1991). Finally, a miscellaneous tier, that, like the orthographic tier, can include events that are not part of prosody per se; however, many events that are marked on this tier are fundamental for interpreting the analysis on the tone and break-index tier, because they disrupt the utterance or interrupt the intonation contour (e.g. cough). Among these 4 tiers, the tone and break-index tier represent the core prosodic analysis. Complete systems, with published standards, training materials and intertranscriber consistency tests, have been developed for English, German, Japanese and Korean. Nearly-complete or partially-developed systems exist for Greek, Catalan, Portuguese, Serbian, English Glasgow variety,

Mandarin, Hong Kong Cantonese, Spanish, Taiwanese and Dutch. For our study, we based the transcription on the mentioned recent work by Gili Fivela and collaborators (Gili Fivela et al., 2015).

A total of 857 declarative sentences (Adults: Total = 198, M = 13.2, SD = 2.76, range = 9-19; 3-year-olds: Total = 334, M = 16.7, SD = 5.67, range = 9-33; 5-year-olds: Total = 324, M = 16.2, SD = 3.80, range = 7-23) were included in the analysis. These sentences were analysed using the speech software PRAAT (Boersma & Weenink, 2005) and the ToBI transcription system. Non-declarative sentences, sentences addressed to the researcher, and sentences characterised by many overlapping noise (less than 1% of the total) were excluded from the analysis.

We included in the prosodic analyses utterances without verbs, simple utterances and complex utterances with one implicit subordinated clause (e.g., "I bambini decidono di giocare insieme" [children decide to play together]). Prosody parameters considered in this study were (Figure 3.3):

- Nuclear Pitch Accent: we considered the last pitch accent of each utterance, also called nuclear pitch accent. We included two possibilities: H+L*, a tone realized as a F0 fall from high pretonic syllable to a low tone which is usually aligned within the tone bearing unit. It is the tone generally associated with broad focus statements in all varieties of Italian (Gili Fivela *et al*. 2015); other tones, a category that includes all the other possibilities except H+L*.

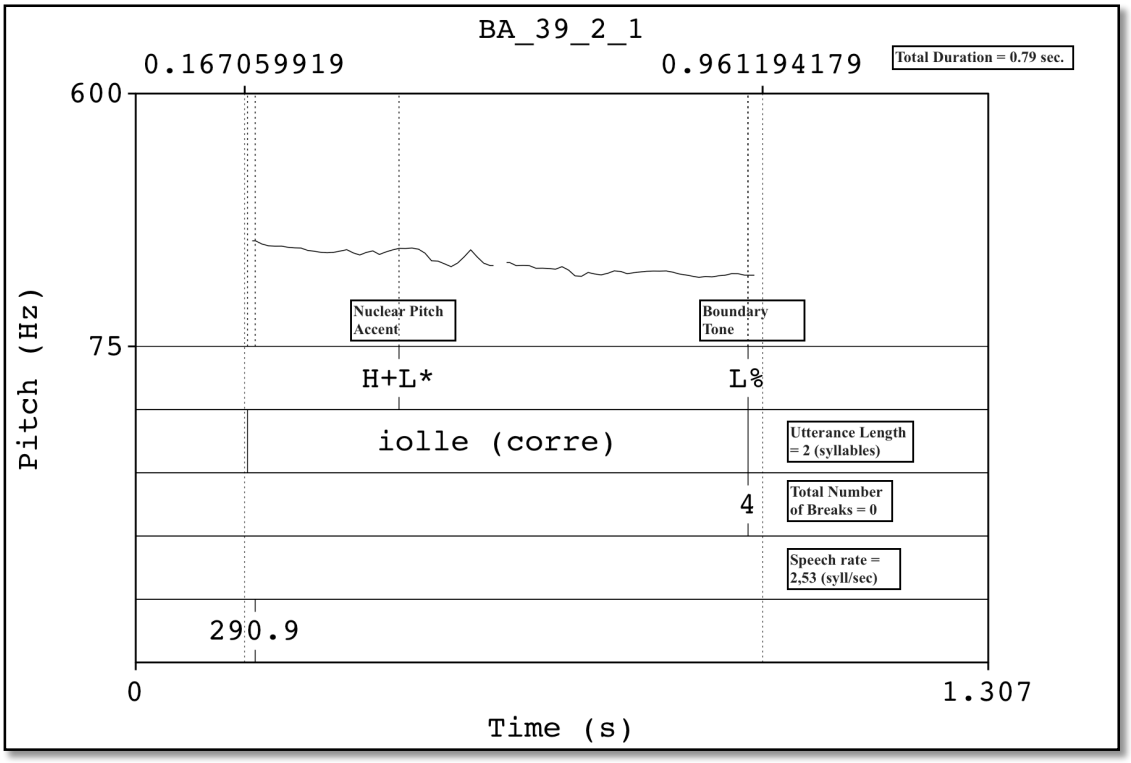
- Boundary Tone: we considered the right edge tones of each utterance. We included two possibilities: L%, realized as a low or falling tone whose target is toward the bottom of the speaker range, a tone characteristic of statements (we put in this category also the bitonal HL%, realized as a final fall from a rising or high level F0 stretch); H%, realized as a rising, high, or level high F0, normally used for the continuation contours (we put in this category also the bitonal LH%, realized as a final rise from a falling or low level of F0 stretch).

- Total number of breaks: we transcribed and counted the total number of breaks 3 and 4 within the utterance (we did not consider the break 4 at the end of the utterance). Basing on this measure we divided the utterances in two categories: utterances with breaks, indeed utterances characterized for the presence of breaks 3 and/or 4;

utterances without breaks, indeed utterances characterized by the absence of breaks 3 and/or 4.

- Utterance length: we considered the total number of syllables as a measure of
- Speech rate, calculated dividing the total number of syllables by the duration (syllable/second).

Figure 3.3: Example of an utterance ("corre" [(he) runs]) analysed as described above.



3.3.1.4 Reliability

Inter-coder reliability was assessed on 20% of the utterances, with two trained persons independently transcribing each sentence.

The inter-rater agreement, as indicated by Cohen's Kappa coefficient, was .98 for nuclear pitch accents, .78 for boundary tones and .76 for the identification of utterances with or without breaks. Pearsons' r was .97 for the total number of syllables and .99 for the total duration of utterances.

3.3.2 Results

3.3.2.1 Data analysis

To characterize the between-subject variance, the analyses of all utterances produced by children and adults were conducted using the mixed model procedure (restricted maximum likelihood for estimation technique). Mixed models are statistical methods that have been appropriated for longitudinal or repeated-measures studies. The mixed models allow researchers to describe the average behaviour of a population, accounting for the variability between different participants and within individual participants. In the present study, the individual measures that refer to each utterance may be considered repeated measures with respect to each participant who produced them. The mixed models allow us to evaluate the effect of the fixed factor relating to each participant considering individual variability. Within-subject covariance random effect was calculated to take into account variability between subjects. Several linear mixed models were calculated using group, utterance length (the total number of utterance's syllables) and the interaction between these variables as fixed effects. The group, utterance length and group × utterance length effects were calculated on the tones' use (i.e. nuclear pitch accents and boundary tones) and on the intonation timing (i.e. total number of breaks and speech rate). Linear mixed models were used for continuous dependent variables (i.e. total number of breaks and speech rate), and generalized mixed models were used for categorical variables (i.e. nuclear pitch accents and boundary tones).

3.3.2.2 Differences between children and adults in tones' use

The analysis of the prosodic realization of utterances produced by children and adults first evaluated the use of tones. The results showed no significant influence of group ($F_{(4,843)}$ = .087; p >.05), utterance length ($F_{(2,843)}$ = 1.063; p > .05) or group x utterance length interaction ($F_{(4,843)}$ = .227, p > .05) on the realization of the nuclear pitch accent typical of statements in Italian, that is H+L* (Table 3.5). All the participants demonstrated to be able to use the proper nuclear pitch accent in the most part of utterances analysed.

Table 3.5: Percentage Mean, SD and range of nuclear pitch accent H+L and other pitch accent (other PA) used by the three age groups.*

	3-year-olds			5-year-olds			Adults		
	M	SD	Range	M	SD	Range	M	SD	Range
H+L*	86.45	12.61	50-100	91.79	16.91	29-100	92.13	9.81	71-100
Other PA	13.55	12.61	0-100	8.21	16.91	0-71	7.87	9.81	0-29

On the contrary, the analysis highlighted the influence of group on the boundary tone used to finish the utterance ($F_{(2,70)}$ = 7.216; p = .001). No significant influence of utterance length ($F_{(1,70)}$ = .982; p > .05) or of group x utterance length interaction ($F_{(2,70)}$ = .994; p > .05) was found (Table 3.6). Specifically, 3-year-old children use a lower number of rising boundary tones, and contemporary a higher number of descending tones, than older children (p < .01) and adults (p < .001), while 5-year-old children showed no significant differences compared with adults (p > .05).

Table 3.6: Percentage Mean, SD and range of boundary tones L% and H% used by the three age groups.

	3-year-olds			5-year-olds			Adults		
	M	SD	Range	M	SD	Range	M	SD	Range
L%	85.97	14.17	50-100	41.37	37.77	0-100	35.95	28.33	8-100
H%	14.03	14.17	0-50	58.63	37.77	0-100	64.05	28.33	0-92

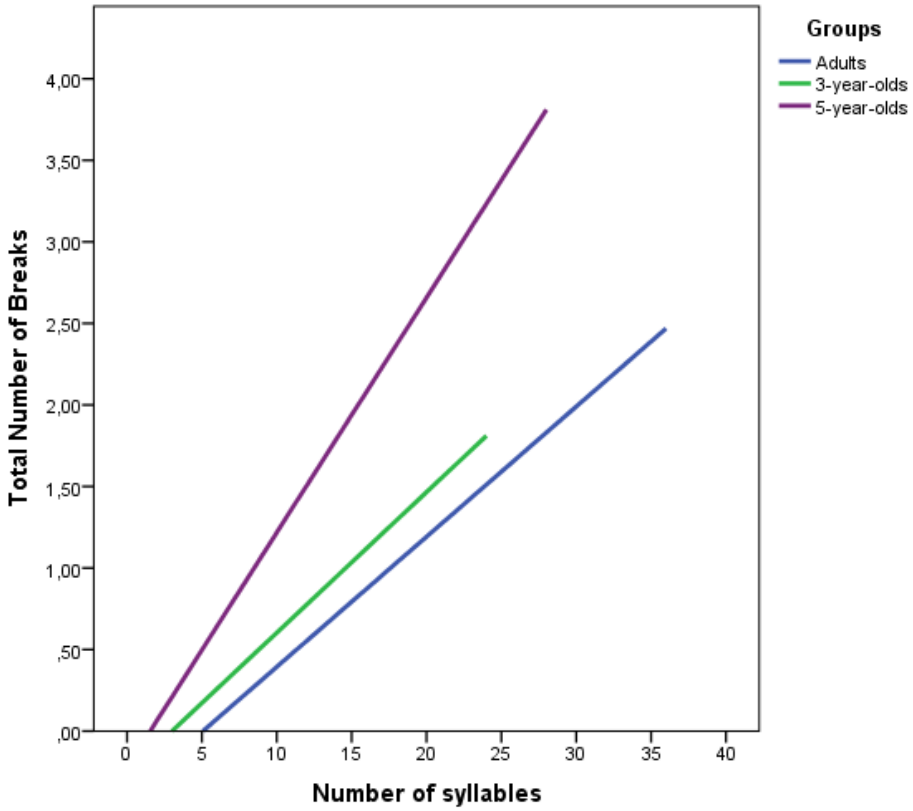
3.3.2.3 Differences between children and adults in intonation timing

Finally, the analysis considered some aspects of the timing of the utterances produced by children and adults. Regarding the total number of breaks 3 and 4 within the utterance (Table 3.7), our results showed no significant effect of group ($F_{(2,116)} = .266$; $p > .05$), but significant effects of utterance length ($F_{(1,821)} = 371.529$; $p < .001$) and of group x utterance length interaction ($F_{(2,820)} = 14.998$; $p < .001$). Graph 3.1 shows the interactive influence of group and utterance length on the total number of breaks 3 and 4 within the utterance: longer utterances are characterized by a higher number of inner breaks than shorter utterances in all age groups, but the difference among groups becomes more evident with longer sentences, specifically between 5-year-old children and adults (3-year-old children do not produce very long utterances).

Table 3.7: *Mean, SD and range of total breaks 3 and 4 within utterance used by the three age groups.*

	3-year-olds			5-year-olds			Adults		
	M	SD	Range	M	SD	Range	M	SD	Range
Total Number of Breaks	.54	.70	0-4	1.26	1.38	0-7	.72	.89	0-4

Graph 3.1: Group x utterance length interaction effect on total number of breaks; on the y-axis the total number of breaks (predicted values); on the x-axis the total number of syllables; different colours represent the three age-groups.

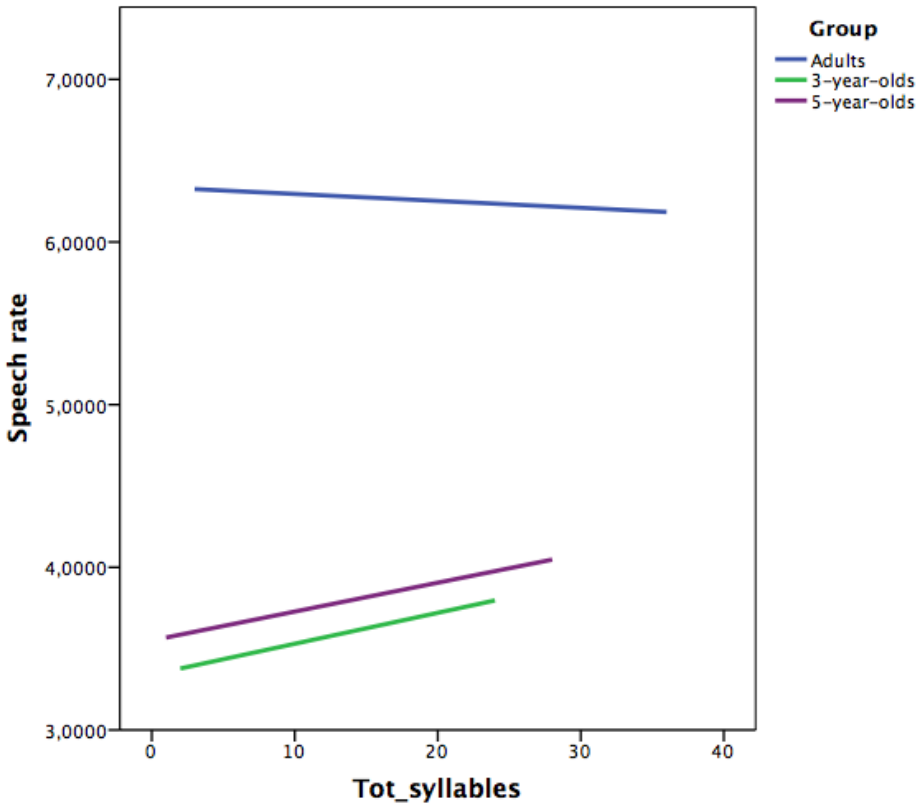


Considering the speech rate (Table 3.8), expressed in syllables per second, our data showed a significant effect of group ($F_{(2,245)} = 64.761$; $p < .001$), but no significant effects were found for utterance length ($F_{(1,843)} = 1.860$; $p > .05$) and for group x utterance length interaction ($F_{(2,843)} = 1.015$; $p > .05$). Graph 3.2 highlights that adults had a higher speech rate compared to children.

Table 3.8: Mean, SD and range of speech rate (syllables/second) used by the three age groups.

	3-year-olds			5-year-olds			Adults		
	M	SD	Range	M	SD	Range	M	SD	Range
Speech rate	3.53	1.01	.89-7.64	3.75	1.01	1.01-6.96	6.27	1.49	2.47-10.94

Graph 3.2: Group x utterance length interaction effect on speech rate; on the y-axis the speech rate (predicted values); on the x-axis the total number of syllables; different colours represent the three age-groups.



3.4 Study 3

3.4.1 Methods

3.4.1.1 Participants

The study included 30 Italian-speaking, monolingual participants, 20 3-year-old children (10 males and 10 females), aged between 37 and 48 months (M = 43.95; SD = 3.20) and 10 adults (5 males and 5 females), aged between 18 and 48 years (M = 27.79; SD = 8.80). Among the adults 4 had a high school diploma, 4 had a degree and 2 had a Ph.D. All children included in the analysis had both cognitive development and grammatical competence in the normal range (we administered Raven's Matrices for the evaluation of cognitive level and TROG-2 for the evaluation of grammatical comprehension; see Chapter 1 for a description of these tests).

3.4.1.2 Procedure

All children participated in one test session lasting approximately 30-40 minutes at their kindergarten with one trained examiner. Each child was tested alone in a quiet room. During the session, the Narrative Competence Task (NCT) was administered individually to each child (for a description of the task and its administration see Chapter 1). Adult participated in one test session lasting approximately 10 minutes in a university lab.

Each telling of the NCT was audiotaped by a digital voice recorder and then transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format. Transcripts were segmented into utterances, defined as an independent clause plus any modifiers, such as a dependent or coordinate clause (Marinellie, 2004).

3.4.1.3 Coding and measures

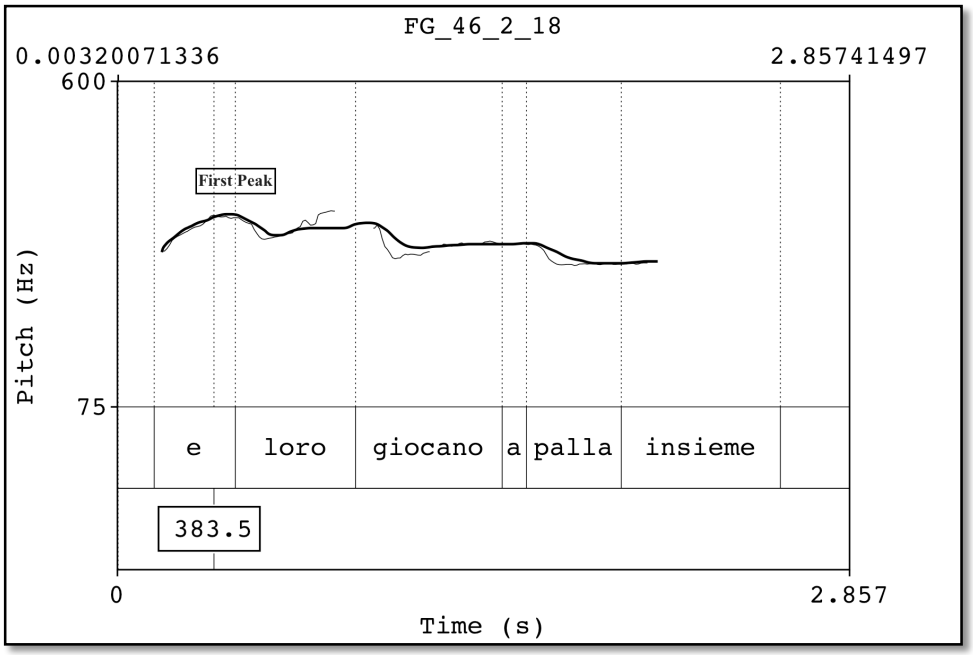
As explained in the introduction, we aimed this work to the analysis of the presence of intonation pre-planning cues in narratives. Basing on existing literature, we considered the presence of a relationship between the length of an utterance and the high of the first peak as a cue of pre-planning. For this reason, we included the following variables:

- Utterance length: it corresponds to the total number of syllables in each utterance;
- First peak value: it corresponds to the F0 (expressed in Hertz) of the first peak of each utterance. Because the pitch is represented by a logarithmic scale (this means

that the difference between equidistant points placed at different parts of the scale is not perceptive the same), we considered the normalized value of the first peak (to normalize F0 values their natural logarithm has been calculated; see for example Michelas & D'Imperio, 2012).

We restricted our analysis to utterances with no verb, simple utterances and complex utterances with one implicit subordinate clause (for a description of these types of sentences see Study 1 above) produced by the participants. A total of 466 declarative sentences (Adults: Total = 132, M = 13.20, SD = 2.66, range = 9-18; 3-year-olds: Total = 334, M = 16.7, SD = 5.67, range = 9-33) were included in the analysis. These sentences were analysed using the speech software PRAAT (Boersma & Weenink, 2005). Non-declarative sentences, sentences addressed to the researcher, and sentences characterised by many overlapping noise (less than 1% of the total) were excluded from the analysis (see Figure 3.4 for an example of analysis).

Figure 3.4: an example of analysis. The sentence reported ["And they play with ball together"] has a length of 12 syllables and a first peak of 383.5 Hz. The normalized value of the first peak is 5.95.



3.4.1.4 Reliability

Inter-coder reliability was assessed on 20% of the utterances, with two trained persons independently analysing each sentence.

The inter-rater agreement, as indicated by Pearson's r, was .97 for the total number of syllables and .99 for the first peak value.

3.4.2 Results

3.4.2.1 Data analysis

As explained in Study 2, to characterize the between-subject variance, the analyses of all utterances produced by children and adults were conducted using the mixed model procedure. A linear mixed model was calculated using group, utterance length (the total number of utterance's syllables) and the interaction between these variables as fixed effects. The group, utterance length and group × utterance length effects was calculated on the normalized value of the first peak.

Finally, we restricted our analysis to utterances without breaks 3 or 4 inside. Indeed, the presence of more than one intermediate and/or intonation phrase in a sentence is characterized by the resetting of F0 values (see for example D'Imperio & Michelas, 2010), a prosodic phenomenon that could have had consequences on our analysis. In this way, a second analysis on a total of 257 declarative sentences (Adults: Total = 72, M = 7.20, SD = .36, range = 1-12; 3-year-olds: Total = 185, M = 9.25, SD = 5.54, range = 2-25) was conducted

3.4.2.2 Relationship between utterance length and the first peak value

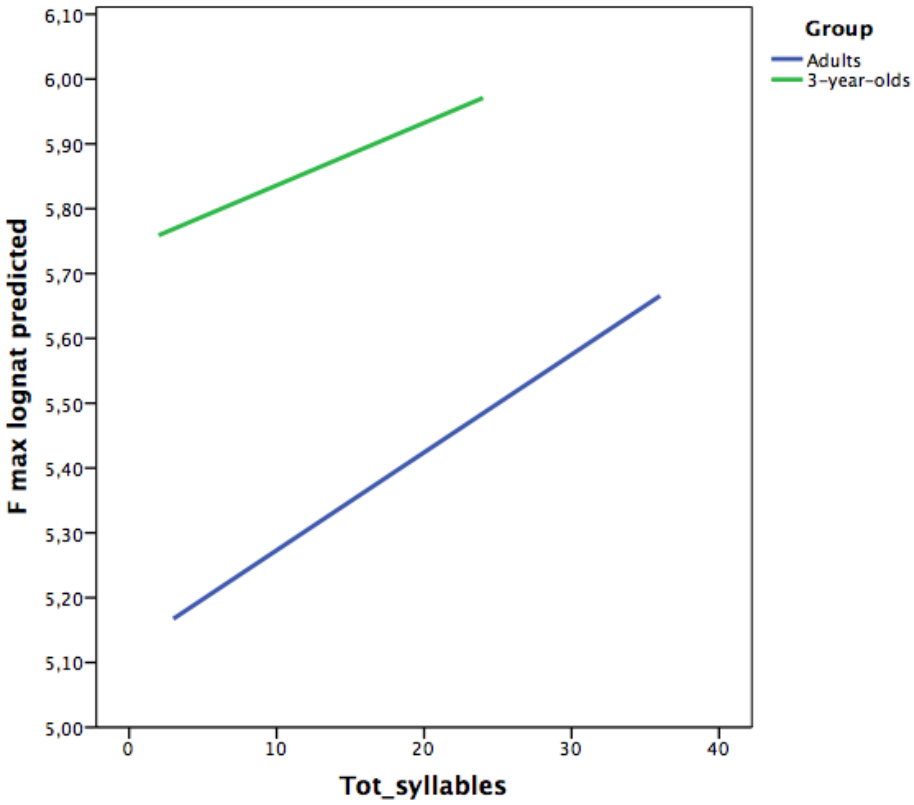
The first analysis, conducted considering all the utterances produced during the NCT by adults and children, showed the significant effect of group ($F_{(1,457)} = 84.344$; $p < .001$) and utterance length ($F_{(1,457)} = 23.496$; $p < .001$) on the first peak value. No significant effect was found for group x utterance length interaction ($F_{(1,457)} = 1.146$; $p > .05$). In Table 3.9 are reported the descriptive data for utterance length and the first peak. Graph 3.3

illustrates the relationship between utterance length and the high of the first peak for children and adults.

Table 3.9: Mean and SD of first peak values (Hz), normalized first peak and utterance length (number of syllables) for children and adults.

	First peak (Hz)		First peak (nat. log)		Utt. Length (syllables)	
	M	SD	M	SD	M	SD
3-year-olds	346.39	73.45	5.83	.20	9.11	4.27
Adults	226.59	96.82	5.33	.43	14.02	6.55

Graph 3.3: Group x utterance length interaction effect on the first peak; on the y-axis the normalized values of the first peak (predicted values); on the x-axis the total number of syllables; different colours represent the two groups.

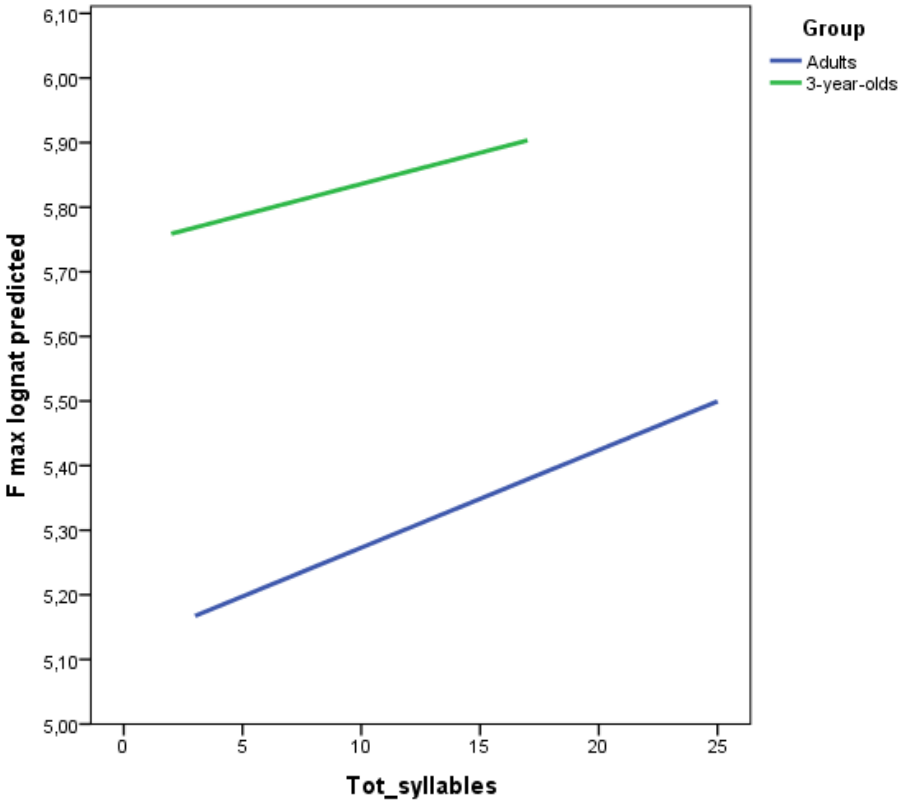


The second analysis was conducted considering only utterances produced without inner breaks, as explained in the plan of analysis above. The result confirmed the significant influence of group ($F_{(1,251)} = 77.854$; $p < .001$) and utterance length ($F_{(1,251)} = 22.444$; $p < .001$) and, contrary to the previous analysis, it showed also the significant effect of group x utterance length interaction ($F_{(1,251)} = 7.179$; $p < .01$). Table 3.10 and Graph 3.4 reported the data considering the sentences without breaks.

Table 3.10: Mean and SD of first peak values (Hz), normalized first peak and utterance length (number of syllables) of sentences without breaks for children and adults.

	First peak (Hz)		First peak (nat. log)		Utt. Length (syllables)	
	M	SD	M	SD	M	SD
3-year-olds	335.33	64.20	5.80	.18	7.31	3.28
Adults	212.69	99.02	5.26	.44	10.97	4.62

Graph 3.4: Group x utterance length interaction effect on the first peak of utterances without breaks; on the y-axis the normalized values of the first peak (predicted values); on the x-axis the total number of syllables; different colours represent the two groups.



3.5 Discussion

The primary aim of Study 1 was to identify the relationships among syntax, narratives, and prosody in preschool-age children. We found significant correlations at the first observation between the syntactic complexity of the sentences and each of the narrative indices considered. Children who expressed their thoughts using more complex sentences tended to produce more highly structured stories and a greater number of acting characters and events. In other words, these children produced a better story when considering all the different aspects. These findings are consistent with previous data described by Orsolini (1990), who claimed that the onset of a child's ability to form conceptual structures in stories is strictly connected to the linguistic competences essential for giving cohesion to the narrations. Because at the first year of kindergarten attendance, not all of the children were able to produce complex utterances, we can hypothesise that at this early developmental phase, the syntactic ability to use complex

sentences is necessary to create a good story. At the second observation, however, only the story structure index was still significantly correlated with children's syntactic level. This result is different from what reported in Chapter 1, indeed in the NCT it seemed to exist a significant relationship between macro- and micro-structural measures also in older children (for a detailed description of the data see Chapter 1).

Regarding the relationships between syntax and prosody, we found that the syntactic complexity of an utterance has an influence on its prosodic realisation: Narration with a high number of complex utterances was characterised by a smaller number of linearised utterances. These results are consistent with findings from D'Odorico *et al*. (2010), showing that for children aged 30 or 36 months, the syntactic complexity of their sentences could influence the prosodic ability to package the sentences within a single intonation contour. This relationship was no more significant during the second observation, although the comparison between the first and the second observations showed an increase in the use of complex utterances and a decrease in the number of linearised utterances. It seems to be a positive development in syntactic ability and a regression in prosodic ability.

We hypothesised that there would be a negative correlation between narratives and prosody, suggesting that children who were more competent storytellers would be less able to control the prosodic realisation of their utterances. The results of the present study at least partly confirmed our hypothesis. At both the first and second observations, we found negative correlations between prosodic competence (proportional frequencies of linearised sentences) and narrative ability. Therefore, children who exhibited greater narrative competence seemed less able to produce their sentences within a single melodic contour (linearisation), as if while producing a story, a competence in gradual acquisition during the preschool period, they could not simultaneously control their prosody. As we hypothesised, there is a trade-off (Bock, 1982) between prosody and narration. However, no negative relationships emerged between the use of utterances having a falling ending contour and the narrative indices, indicating that the children were generally able to end their declarative sentences with the appropriate falling contour. Indeed, it is well known that the use of a falling ending contour in declarative sentences is acquired early in development (e.g., Marcos, 1987). Although children generally used the appropriate falling ending contours for the declarative utterances that constituted their stories, our participants widely used rising ending contours in the production of declarative

sentences, which is the melodic contour appropriate for interrogative or suspended utterances. The type of storytelling task used in our study could possibly have contributed to this result because the children had to browse the pages during their storytelling, and thus, they could have used the rising ending contour as a strategy for connecting each page event to the next, as a continuation rise (e.g., Cruttenden, 1997). In a recent study by Marchione (2009) it was found that pre-schoolers (24-48 months old) engaged in a conversation or in a storytelling task use a large number of couples of utterances, produced in two separate speech acts but characterised by temporal and syntactic continuity. We can hypothesise that the utterances with a rising ending contour produced by the children in our study are in some way similar to those described by Marchione (2009). Redford (2012) highlighted that continuation rise is used in narratives also by older speakers, like 5- and 7-year-old children and adults. This data is confirmed also in Study 2, discussed in the following.

Study 1 could lead to many future investigations. First, we focused our attention on the relationship between prosody, narrative skills and syntactic competence in preschool children, specifically at their first and second years of kindergarten attendance. It could be interesting to broaden our investigation to later developmental phases. In addition, it could be useful to compare children's narrations to those of competent adult speakers to better understand the evolution of intonation in narratives. Moreover, because part of our results, particularly the use of a large number of rising ending contours, could be explained by the type of task used, it would be interesting to compare these findings on the prosodic realisation of sentences with results from a different storytelling task, such as a recall task or a simultaneous picture display task, in which the child is not asked to browse the pages.

Study 2 can partially answer to Study 1 open questions. Indeed, it enlarges the investigation to older children and adults. Furthermore, the intonation transcription system used allows to compare our data to recent work on the emergence of intonation.

One of the main results of Study 2 is that the nuclear pitch accents typical of broad focus statement is acquired early in development, as suggested by the absence of significant differences between children and adults, also considering the 3-year-old children. This data is in agreement with previous study on different languages, which recognized the inventory of the pitch accents typical of the mother-tongue also in younger children (Chen

& Fikkert, 2007; Prieto et al., 2012; Frota et al., 2016). On the contrary, 3-year-old children, but not 5-year-old children, used a lower number of rising final tone, the continuation rise tone (Hirschberg, Pierrehumbert, 1986), then adults. The continuation rise is necessary in some kinds of language productions, such as narratives, to suggest to the interlocutor the need of interpreting the meaning of the sentence with the next or not. In our sample, 3-year-old children finished a smaller percentage of utterances (14%) with a rise, compared to older children (59%) and adults (64%). Recently De Rutier (2014) found significant differences in the use of the continuation rise in narratives by 5- and 7-years-old German children, underlining a developmental trend that lead to an increase in the use of this boundary tone parallel with the increase of age. This result had been previously found for English by Redford and collaborators (Redford et al., 2012): 5- and 7-year-old children correctly use boundary tones and pauses to mark continuation vs. completition in narratives, but in a way not completely equal to adults. in our opinion, a possible explanation to the scares use of continuation rise by 3-year-old children could be found in the cognitive development; indeed, the ability to use the prosodic cues that allow the listener a proper interpretation of the meaning could be linked to child's knowledge of listener's point of view. Only the awareness that the other has not the same knowledges of the speaker (for example about what comes next in the story) could lead the speaker to connect the meaning of consecutive sentences through prosody. It is doubtless well known, even if controversial, the relationship between theory of mind and language (e.g., Milligan, Astington e Dack, 2007) and the uncomplete awareness of others' mind at 3 years of age (e.g. Perner, 1999). The fact that in our sample 5-year-old children, so children old enough to possess a more mature theory of mind than 3-year-old children, behave like adults in continuation rise's use seems to confirm our idea. Anyway, it would be interesting to collect data about narrative competence and theory of mind in a group of preschool and school age children, to directly highlight the relationships between cognitive and language development in aspects still underexplored in literature, such as intonation.

Considering intonation timing, Study 2 showed that longer utterances are characterized by a higher number of inner breaks than shorter utterances in all age groups and that the difference among groups, even if not significant, becomes more evident with longer sentences, specifically between 5-year-old children and adults. The fact that longer sentences have a more complex inner structure is not surprising, both for children and

adults, but we think that it would be useful to examine more in depth the inner breaks of sentences (e.g. position, duration, etc.) to highlight possible differences between children and adults. Indeed, we suppose that the planning strategies in narratives are not the same for children and adults and that breaks position, quality and duration could shed light on this aspect. It is possible that children plan their story "on-line", juxtaposing the parts of the story step by step, while adults could plan "a priori" and that this different planning leads to differences observable through prosody.

To partially verify what supposed above, in Study 3 prosody is used as a cue of intonation pre-planning, specifically the scaling of initial utterance F0 values as a function of phrasal length. Our results confirm the existence of an amount of pre-planning in intonation (Cooper & Sorensen, 1981; Rialland, 2001; Prieto et al., 2006): longer sentences have higher first peak than shorter sentences. Even more interesting, this effect is stronger in adults than in children, suggesting a different amount of pre-planning in the two groups.

Generally, taken together the three studies presented in this Chapter consider narratives as a useful tool to study language development in some aspects still underexplored, such as intonation and its relationships with the linguistic segmental level and the general cognitive development.

Chapter 4

Narrative competence and its relationships with learning abilities

4.1 Introduction

Many studies have explored the relationships between oral and written language (e.g., Bird, Bishop & Freeman, 1995; Nelson, 2010; Snowling & Hayou-Thomas, 2006). Most scholars agree that these two domains share several processes, i.e. semantic, syntactic and phonological processes (Gillam & Johnston, 1992). Furthermore, there is evidence for overlap in etiological basis and cognitive deficits of phonological disorders, language impairments and reading disabilities (Pennington & Bishop, 2009). Considering academic achievement, good literacy skills require both decoding of text as well as its comprehension. Generally, children with phonological difficulties have problems with decoding text, while children with other language impairments could have difficulty in text comprehension (Snowiling & Hayou-Thomas, 2006); moreover, children with language impairments are likely to have written language impairments as well (Owens, 2004).

The prospective of "emergent literacy" have highlighted the continuity existing between specific early skills and the formal acquisition of literacy (e.g., Lonigan, Burgess & Anthony, 2000; Whitehurst & Lonigan, 2000). Lonigan and collaborators (Lonigan et al., 2000) claimed that primary schools should not be considered as the starting point for studying the acquisition of literacy. The origins of literacy are indeed to be searched in the preschool age, specifically in the skills, knowledge and attitudes considered to be the precursors of children's formal acquisition of written language. Pinto et al. (Pinto, Bigozzi, Accorti Gamanossi & Vezzani, 2009) proposed an emergent literacy model for Italian which includes the following competences: oral narrative competence, phonological awareness and conceptual knowledge of the writing system. Phonological awareness is the ability to identify, discriminate and manipulate the unit of sounds in words (e.g., phonemes and syllables). Conceptual knowledge of the writing system refers to children's knowledge of the visual attributes of the letters included in words. Oral narrative competence, that is the focus of our work, is the ability to tell a story, which requires the

integration of linguistic, cognitive and social abilities (for a detailed description of oral narrative competence see the Introduction of this dissertation).

Studies on the development of narrative competence generally focus on one line of inquiry, that is oral narratives or written narratives, while only few studies have considered both these competences at the same time. Among scholars who used narratives to predict later academic achievement, Feagans and Appelbaum (1986) found that 6- and 7-year-old children with good narrative skills had better academic performances over a 3-year period than children with poorer narrative skills. In a 3-years longitudinal study, Fazio et al. (Fazio, Naremore & Connell, 1996) highlighted that the best kindergarten predictor of the academic status of the children in the sample who received academic remediation was story-telling; in particular, children who were in academic trouble (having been retained in a grade, required to attend remedial summer school or placed in special education) at the end of second grade, had previously failed the kindergarten story-retelling task.

Unlike the more general associations between early narrative competence and later literacy that have been documented in the first works on this topic (e.g. Pellegrini, 1993; Wells, 1986), some recent research tried to explore possible differentiated relationships between specific oral discourse skills and separate domains of literacy (e.g., Griffin, Hemphill, Camp & Palmer Wolf, 2004; Wellman, Lewis, Freebairn, Avrich, Hansen & Stein, 2011). In one of these studies (Griffin et al., 2004), 32 children participated in narrative and expository oral language tasks at age 5 years and reading and writing assessments at age 8 years. Results showed that children's use of evaluation in narratives (i.e., textual evaluation, that is evaluative elements that lexically modified or qualified the information reported; performed evaluation, that is evaluative elements that indirectly conveyed the narrator's attitude toward the information reported; character states, that is the use of internal state words) predicted reading comprehension skills at age 8, while the control of macrostructure at age 5 was associated with written narrative skill at age 8. Wellman et al. (2011), in their longitudinal study on children with isolated speech sound disorder, children with associated speech sound disorders and language impairment and typically developing children, found specific associations between narrative competence and literacy skills. Specifically, narrative macrostructure was the best predictor of the decoding of real words, reading comprehension and written language, while narrative microstructure was the best predictor of the decoding of nonsense words. Recently, Pinto

and collaborators (Pinto, Tarchi & Bigozzi, 2016) analysed the predictive power of oral narrative competence in kindergarten on written narrative competence in first grade in a group of 122 Italian children. In this longitudinal study, children's narratives were collected twice, in two different modalities: the first was a story retell during the last year of kindergarten; the second one consisted in a written story production (with the same story used in the first phase) during the first year of primary school. The results showed that, among the competences usually considered as precursors of written language competence within the "emergent literacy" perspective (i.e., oral narrative competence, phonological awareness and conceptual knowledge of the writing system), only narrative competence was a statistically significant predictor of the children's competence in written stories. Specifically, among macrostructural components, structure in oral narratives was the only significant predictor of narrative competence in written productions.

Considering the growing evidence of a relationship between oral narrative production and academic achievement, the main purpose of the present study was to investigate this association in a group of Italian children, whose narrative competences were assessed using the Narrative Competence Task. Grounded on the existing literature, we hypothesized to find specific relationships among the different levels of narrative competence and the main learning abilities: first, we expected to find an association between narrative microstructure and the automatisms of reading and writing (decoding and spelling abilities); second, we supposed to observe a relationship between narrative macrostructure and the more complex learning abilities (i.e., text comprehension and production).

4.2 Methods

4.2.1 Participants

The participants in this study included 70 school-age children recruited from 3 local primary school. The participants were randomly selected from among the children attending the schools to form 3 groups: 1st-year children, that is children who were attending the first year of primary school at the moment of observation (aged 74 to 84 months); 2nd-year children, that is children who were attending the second year of

primary school (aged 85 to 96 months); and 3rd-year children, that is children who were attending the third year of primary school (aged 96 to 108 months). Descriptive data on the participants' characteristics are reported in Table 4.1. All of the children came from Italian-speaking families, and none were reported as having any developmental problem. In addition, Raven's Coloured Progressive Matrices (Italian standardisation by Belacchi, Scalisi, Cannoni & Cornoldi, 2008) were administered to ensure that all of the children had a general non-verbal intelligence in the normal range (all of the children's IQs ranged from 80 to 130).

Table 4.1: Participants Description for Each Group

	N (females)	Chronological Age (in months)		
		M	*SD*	*Range*
1st- year	25 (13)	79.68	3.17	74-84
2nd-year	27 (16)	91.85	3.54	85-96
3rd- year	18 (14)	101.72	3.46	96-108

4.2.2 Procedure

Each child participated in two test sessions, which lasted approximately 30 minutes each, in a quiet room at their school. The first session was a collective session, during which children attending the same class were administered collective tasks. During the second session, each participant was individually administered several tasks to assess his/her cognitive, linguistic and learning skills.

Cognitive assessment

- *Raven's Coloured Progressive Matrices, CPM* (Italian standardisation by Belacchi, Scalisi, Cannoni & Cornoldi, 2008) were administered to ensure that all of the children had a general non-verbal intelligence in the normal range. For a detailed description of the CPM see Chapter 1.

- *Digit span test– WISC-IV* (Wechsler Intelligence Scale for Children – Fourth edition; Italian standardization by Orsini, Pezzuti & Picone, 2012). The digit span test of the WISC-IV was administered to evaluate each child verbal working memory, that plays a crucial role in learning (e.g., Gathercole & Alloway, 2004; Swanson, 2003). The task is composed by two different parts: the digit span forward, in which the child is asked to recall digit sequences of growing quantity in the same order used by the examiner; the digit span backward, in which the child is asked to recall digit sequences of growing quantity from the last to the first told by the examiner. Each item is composed by two sequences of equal quantity. The child can receive 0, 1, or 2 points for each item: 0 if he/she fails to recall both the sequences (in this case the task stops); 1 if he/she can recall just one of the two sequences; 2 if he/she recalls both the sequences.

Linguistic assessment

- *Test for Reception of Grammar – Version 2, TROG-2* (Italian standardisation by Suraniti, Ferri & Neri, 2009). The TROG-2 is a multiple-choice picture task that aims to assess children's morphosyntactic comprehension abilities. For a detailed description of the TROG-2 see Chapter 1.
- *Peabody Picture Vocabulary Test – Revised, PPVT-R* (Dunn & Dunn, 2000). The PPVT-R is a multiple-choice picture task that aims to assess children's lexical comprehension abilities. The test consists of 175 items of growing complexity. The raw score is computed by counting the number of correct answers given by the child (ranging from 0 to 175).
- *Narrative Competence Task, NCT*, a storytelling task created ad hoc for the study. For a detailed description of the NCT see Chapter 1. Each child's telling of the NCT was audiotaped by a digital voice recorder (inside microphone) placed on the desk in front of the child and then transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format.

Learning assessment

In reading and writing assessment, we considered both the automatisms (decoding and spelling) and more complex abilities (text comprehension and production). For the tasks in which the administration protocol provided different materials for each class, we

followed the instruction of the manual (i.e., passage reading and comprehension and text dictation). Specifically, the learning assessment included the following tasks:

Reading

- *Passage reading from the MT-2 battery* (Cornoldi & Colpo, 2011): this task aims to evaluate the automatism of reading ability. The child is asked to read aloud a brief text, while the examiner clocks the time and annotates errors and self-corrections. The child received two different scores, one for speed (expressed in syllables per second) and one for accuracy (each error counts as 1, each self-correction counts as 0.5). Different passages are provided for each class. In this study the middle year passage for the first class (i.e. "La storia di Babbo Natale" [The story of Santa Claus]) was administered to 1st-year children, the middle year passage for the second class (i.e. "L'uomo che non riusciva a crescere" [The man that can't grow up]) was administered to 2nd-year children and the middle year passage for the third class ("L'idea più semplice" [The simplest idea]) was administered to 3rd-year children.
- *Passage comprehension from the MT-2 battery* (Cornoldi & Colpo, 2011): this task aims to evaluate text comprehension in primary school children. Children are asked to silently read a text and then to answer to multiple-choice questions. This task was administered collectively to the children of each class in each school. The text provided for each class was administered (the middle year text for the 1st-class is not a proper text comprehension, indeed it consists in images for which the child has to choose the correct written word or sentence; the 2nd-year text is "La volpe e il boscaiolo" [The fox and the woodsman]; the 3rd-year text is "L'asino nel fiume" [the donkey in the river]).

Writing

- *Text dictation from the BVSCO-2* (Batteria per la Valutazione della Scrittura e della Competenza Ortografica – 2, by Tressoldi, Cornoldi & Re, 2013): this task aims to evaluate the automatism of spelling. The examiner dictates a text and children are asked to write. This task was administered collectively to the children of each class in each school. The child received an accuracy score, that corresponds to the total number of spelling mistakes done by the child. Different texts are provided for each class: for the 1st-year "La bicicletta del papà" [The father's bike], for the 2nd-

year "Il cieco e la fiaccola" [The blind and the torch] and for the 3rd-year "Il leone e il gallo" [The lion and the rooster].

- *Text production from the BVSCO-2* (Tressoldi, Cornoldi & Re, 2013) was used to evaluate children's competence in producing texts. This task was administered only to 2nd- and 3rd-year children, because 1st-year children were not able to take on this request at the moment of observation (the middle of the first school year). In this task children are asked to observe a three-images story and then to write the story (the images are always available for the child). The story proposed is about a boy and a dog that are playing in front of a school. Then the boy has to enter in the school and the dog remains outside alone, crying. The task was administered collectively. Each child's text was transcribed according to MacWhinney's (2000) Child Language Data Exchange System (CHILDES) format. For the scoring of text production see the next paragraph.

4.2.3 Coding and measures

NCT scoring

For a detailed description of the NCT scoring see Chapter 1. In the following it is given a brief description of the measures used in this work:

- Macrostructure
  - Structure: a child received 1 point for each of the key elements of the story included in the narrative (raw score range: 0-8).
  - Information density: a child received 1 point for each event (things that happened in the story) and agent (character that was performing an action in the story) included in the story. Differently from Chapter 1, in this work we considered events and agents together as a measure of information density (raw score range: 0-56).
  - Anaphoric use of the articles: we adopted the anaphoric use of the article as an index of cohesion. A child received 1 point for each anaphoric article included in the narratives (raw score range: 0-8).
  - Psychological lexicon: we counted the total number of different words referring to mental states included in the story.

- Microstructure
  - Token: as a measure of productivity, we counted the total number of words used in the narrative.
  - Type: as a measure of lexical variety, we considered the total number of different words used by the child in his/her narrative.
  - Mean Number of subordinated clauses: as a measure of syntactic complexity, we considered the mean number of subordinated clauses per utterance used by the child, calculated dividing the total number of subordinated clauses by the total number of utterances.

Text production scoring

For the text production scoring, we developed a scoring system similar to the NCT ones, which included nearly the same measure:

- Macrostructure
  - Structure: a child received 1 point for each of the key elements of the story included in the text. We considered three key passages: 1. The boy and the dog are playing together (the child has to express that the boy and the dog are playing together); 2. The boy goes into the school; 3. The dog is sad because the boy left him alone (the child has to express the reason why the dog is sad). The raw score can range from 0 to 3.
  - Information density: a child received 1 point for each event (things that happened in the story) and agent (character that was performing an action in the story) included in the story. The number of agents could range from 0 to 2, while we did not provide a fix number of possible events.
  - Psychological lexicon: we counted the total number of different words referring to mental states included in the story.

    We did not use the anaphoric use of articles as an index of cohesion because the story proposed included only two possibilities (a boy → the boy; a dog → the dog), so that the score range would had been too limited.

- Microstructure
  - Token: as a measure of productivity, we counted the total number of words used in the text.
  - Type: as a measure of lexical variety, we considered the total number of different words used by the child in his/her text.
  - Number of subordinated clauses: as a measure of syntactic complexity, we considered the total number of subordinated clauses used by the child.

We did not use the mean number of subordinated clauses in the text production scoring, contrary to what done for the NCT, because in this case we would have based utterance division on the punctuation used by the child, but punctuation learning is still not consolidated in the first years of Italian primary school.

4.2.4 Reliability

In scoring the oral and written narrative's macro and micro-structural level, inter-coder reliability was assessed on 20% of the stories, with two researchers independently scoring the children's productions.

For all the measures, except Type which is automatically obtained by CLAN, the Pearson's correlation was determined:

- NCT: structure r = .95; information density r = .95; anaphoric use of the article r = .97; psychological lexicon r = .91; total number of utterances r = .93; mean number of subordinated clauses: .98.
- Text production: structure r = .95; information density r = .99; psychological lexicon r = .93; total number of subordinated clauses r= .98.

4.3 Results

4.3.1 Data analyses

First, a one-way ANOVA was conducted to analyse the presence of significant differences among groups in the cognitive, linguistic and learning competences evaluated. Post-hoc Bonferroni allowed to highlight the differences group by group. In addition, a t-test was conducted to analyse the differences between 2nd- and 3rd-year children in text production. η^2 was calculated to estimate effect size. According to Cohen (1988), effect sizes of .01, .06, and .14 are considered small, medium, and large respectively.

Second, to verify the assumption about the significant relationships among language (i.e., morpho-syntactic and lexical comprehension and oral narrative competence), learning and cognitive development, 9 hierarchical regression analyses, one for each learning measure, were conducted. The aim of these regressions was to understand the contribution of linguistic abilities and cognitive skills in explaining the individual variability in the automatism of learning (i.e. reading speed and accuracy and spelling accuracy) and in the more complex learning abilities (i.e. text comprehension and production). First, to verify the unique contribution of language and cognition in reading (speed and accuracy) and spelling abilities, the hierarchical regressions were conducted entering the following components: digit span and NCT microstructural scores. Second, to test the contribution of language comprehension and narrative competence on written text comprehension, the hierarchical regression was conducted entering the following components: TROG, PPVT and NCT macrostructural scores. For these tasks, which provided different materials for each class (i.e. passage reading and comprehension and text dictation), we decided to use in the analysis the standardized score, obtained using the normative data included in the tests' manual. Third, to verify the unique contribution of oral narrative competence and chronological age in text production, two hierarchical regressions were conducted: 1. For text production microanalitical level, we decided to enter as components NCT microanalitical measures and the chronological age; 2. For text production macroanalitical level, we decided to enter as components one NCT macroanalitical measure and the chronological age. For the economy of presentation, we created two composite scores through addition: NCT-macro, calculated as the sum of the single NCT macrostructural measures, and Text-Production-macro, calculated as the sum of the single written text macrostructural measures. Subsequently, multiple linear

regression analysis was applied to examine the effect of single NCT macrostructural components on written narrative competence in primary school.

4.3.2 Development of cognitive, linguistic and learning abilities

The descriptive statistics of the scores obtained by the children, shown in Table 4.2, allowed to highlight the presence of a continuous increase in each cognitive and language comprehension measure collected. Univariate ANOVAs showed the existence of significant differences among the class groups for all the cognitive and linguistic tests. Considering Bonferroni post-hoc results, the performance of 1st-year and 2nd-year children appeared to be significantly different from that of the oldest children in nearly all the cognitive and linguistic tests administered, except for lexical comprehension, in which 1st-year children differ from both 2nd- and 3rd-year children.

Table 4.2: Participants' mean (SD) scores in the cognitive and linguistic tests

	1st-year	2nd-year	3rd- year	F (df)	η^2	Bonferroni
	M (SD)	M (SD)	M (SD)			
CPM	22.04 (4.31)	23.41 (5.12)	27.28 (4.15)	$7.034_{(2,67)}$*	.01	1st-year < 3rd-year 2nd-year < 3rd-year
Digit Span	11.12 (2.22)	12.52 (2.03)	14.28 (2.16)	$11.473_{(2,67)}$**	.01	1st-year < 3rd-year 2nd-year < 3rd-year
TROG	10.96 (2.82)	12.67 (3.99)	16.83 (2.91)	$16.556_{(2,67)}$**	.03	1st-year < 3rd-year 2nd-year < 3rd-year
PPVT	89.48 (15.83)	101.41 (15.103)	103.78 (14.81)	$5.823_{(2,67)}$*	.00	1st-year < 2nd-year, 3rd-year

*= p < .01; ** = p < .001

Regarding narrative competence, only some of the macrostructural and microstructural measures considered showed a significant increase from the 1st- to the 3rd-year of primary school, i.e. information density, anaphoric use of the articles, type (in this case 1st-year children differed significantly from 2nd-year children, but not from 3rd-year children), and

mean number of subordinated clauses. The measure used as index of productivity, token, showed a nearly significant increase in the passage from the 1st- to the 2nd- and 3rd-year of primary school (p = .052) (Table 3).

Table 4.3: Participants' mean (SD) scores in the NCT's macrostructural and microstructural measures

	1st-year	2nd-year	3rd- year	F (df)	η^2	Bonferroni
	M (SD)	M (SD)	M (SD)			
Structure	6.36 (1.52)	7.07 (.96)	7.00 (.84)	$2.775_{(2,67)}$	.00	
Information density	25.88 (4.68)	29.37 (3.87)	29.50 (3.47)	$6.029_{(2,67)}$**	.00	1st-year < 2nd-year, 3rd-year
Anaphoric use of art.	1.60 (1.35)	3.07 (1.33)	3.28 (1.99)	$8.369_{(2,67)}$**	.06	1st-year < 2nd-year, 3rd-year
Psychological lexicon	5.68 (2.73)	6.56 (2.34)	6.33 (2.25)	$.860_{(2,67)}$	.00	
Token	186.00 (49.24)	220.70 (50.81)	212.56 (56.45)	$3.100_{(2,67)}$	.00	
Type	85.68 (20.23)	99.15 (20.18)	94.94 (16.47)	$3.246_{(2,67)}$*	.00	1st-year < 2nd-year
Mean numb. of sub.	.46 (.22)	.60 (.23)	.72 (.20)	$7.539_{(2,67)}$***	.03	1st-year < 3rd-year

* = p < .05; ** = p < .01; *** = p < .001

Table 4.4 showed the descriptive data for passage reading (speed and accuracy), text dictating (accuracy) and text comprehension (because of the different total number of items in the protocols provided for the 1st-year of primary school and for 2nd- and 3rd-year of primary school, we decided to use the standardized score). The data showed a continuous increase in the three class groups in reading speed and a significant difference in the total number of errors, both in reading and in writing, between the 1st year and the

older children. No significant difference emerged for the standardized score of text comprehension: all the children showed a performance in line with the manuals' normative data.

Table 4.4: Participants' means (SD) scores in passage reading, text dictation and text comprehension

	1st-year	2nd-year	3rd- year	F (df)	η^2	Bonferroni
	M (SD)	M (SD)	M (SD)			
Reading Speed (syll/sec)	.50 (.27)	1.91 (.48)	2.51 (.60)	$114.092_{(2,67)}$*	.16	1st-year < 2nd-year, 3rd-year; 2nd-year < 3rd-year
Reading accuracy (n. of errors)	15.33 (11.07)	2.65 (2.55)	3.03 (2.04)	$26.544_{(2,67)}$*	.22	1st-year < 2nd-year, 3rd-year
Writing accuracy (n. of errors)	20.50 (11.83)	6.33 (5.07)	7.72 (5.22)	$22.158_{(2,67)}$*	.15	1st-year < 2nd-year, 3rd-year
Text compr. (stand. score)	.16 (.23)	.23 (.87)	.63 (.75)	$1.628_{(2,67)}$	.04	

* = p < .001

Finally, considering text production, the T-test (Table 4.5) showed significant differences between 2nd- and 3rd-year children in information density, psychological lexicon, type, token and the total number of subordinated clauses used (as explained in the *Procedure*, 1st-year children were not administered this task); therefore, there were increases from the 2nd- to the 3rd-year of school attendance in both macrostructural and microstructural measures of text production.

Table 4.5: Participants' means (SD) scores in macro- and microstructural measures of text production

	2nd-year	3rd-year	t	p
	M (SD)	M (SD)		
Structure	1.65 (.85)	1.78 (.81)	-.491	.627
Information density	5.50 (1.65)	7.17 (2.23)	-2.698	.011
Psychological lexicon	1.00 (1.13)	2.11 (1.74)	-2.377	.025
Token	34.81 (14.16)	58.56 (17.07)	-4.858	< .001
Type	24.81 (9.95)	41.61 (9.97)	-5.503	< .001
Number of sub. clauses	1.85 (1.32)	3.44 (1.82)	-3.189	.003

4.3.3 Associations among cognitive, linguistic, narrative and learning abilities

To understand the specific contribution of cognitive skills and linguistic abilities in explaining the individual variability in learnings' automatisms (i.e., reading speed and accuracy and writing accuracy), 3 hierarchical regressions were conducted (see Table 4.6 – 4.8). Basing on the existing literature, we included in the model the microstructural measures derived from the NCT. As explained in the data analysis section, standardized scores were used. Overall, verbal working memory and NCT microstructural measures explained 12% of children's reading speed (Adj. $R^2 = .12$; $F_{3,66} = 4.098$; $p < .05$). The only statistically significant predictor was verbal working memory (Table 4.6). 28% of reading accuracy was explained by children's working memory and NCT microstructural level (Adj. $R^2 = .28$; $F_{3,66} = 9.712$; $p < .001$). The statistically significant predictor seemed to be verbal working memory and syntactic complexity (Table 4.7). Finally, 23% of writing accuracy was explained by working memory and NCT's microstructural measures (Adj. $R^2 = .23$; $F_{3,66} = 7.742$; $p < .001$). The only statistically significant predictor was verbal working memory (Table 4.8).

Table 4.6: Results of regression analyses on passage reading's speed (standardized score)

Model	Beta	t	Sig.
(Constant)		-3.738	<.001
Digit span	**.365**	**3.134**	**.003**
NCT mean sub. Clauses	.069	.592	.556
NCT type	.047	.407	.686

Table 4.7: Results of regression analyses on passage reading's accuracy (standardized score)

Model	Beta	t	Sig.
(Constant)		-5.469	<.001
Digit span	**.420**	**3.973**	**< .001**
NCT mean sub. Clauses	**.213**	**2.005**	**.049**
NCT type	.143	1.378	.173

Table 4.8: Results of regression analyses on text dictation's accuracy (standardized score)

Model	Beta	t	Sig.
(Constant)		-5,299	< .001
Digit span	**.436**	**3.985**	**< .001**
NCT mean sub. Clauses	.148	1.347	.183
NCT type	.101	.933	.354

To understand the specific contribution of cognitive skills and linguistic abilities in explaining the individual variability in written text comprehension, a hierarchical regression was conducted. Basing on the existing literature, we included in the model the NCT-macro score and the measures of language comprehension. As explained in the data analysis section, standardized scores of text comprehension were used. Overall, the hypothesized components explained only the 9% of reading comprehension (Adj. $R^2 = .09$; $F_{3,66} = 3.251$; $p < .05$), but none of the single factor was statistically significant (Table 4.9).

Table 4.9: Results of regression analyses on text comprehension (standardized score)

Model	Beta	t	Sig.
(Constant)		-1.697	.094
NCT-macro	-.002	-.013	.990
TROG	.198	1.390	.169
PPVT	.211	1.538	.129

To understand the specific contribution of oral narrative competence and chronological age in explaining the individual variability in written text production, 4 hierarchical regressions were conducted (see Table 4.10-4.13). 29% of the macrostructural level of written narrative competence was explained by NCT macrostructure and chronological age (Adj. $R^2 = .29$; $F_{3,66} = 9.887$; $p < .001$). Both the components seemed to be significantly related to written text macrostructure (Table 4.10). We proceeded to analyse this association in more detail by exploring the impact of each of the four macrostructural oral narrative competences on each of the three macrostructural written narrative competences. The four NCT components did not predict text structure (Adj. $R^2 = .01$; $F_{4,39} = 1.103$; $p > .05$) nor the use of psychological lexicon in written texts (Adj. $R^2 = -.01$; $F_{4,39} = .856$; $p > .05$). The four components explained 19% of text information density (Adj. $R^2 = .19$; $F_{4,39} = 3.468$; $p < .05$); the only statistically significant components among the narrative macrostructural measures was information density (Table 4.11). Because of the recognised role of spelling competence in predicting text production in some languages (Berninger, Yates, Cartwrigh, Rutberg, Remy & Abbott, 1992; Juel, 1988; Puranik & Alotaiba, 2012), we decided to conduct a further regression analyses adding writing accuracy as a component. This regression showed that NCT macrostructure, chronological

age and spelling competence explained the 29% of written macrostructure (Adj. R^2 = .29; $F_{3,40}$ = 6.958; p < .001); anyway, only NCT macrostructure (Beta = .315; p < .05) and chronological age (Beta = .404; p < .01) were statistically significant associated with written text, while spelling accuracy showed no significant association (Beta = .133; p > .05). This result was in line to what found by other studies on orthographic transparent languages (Babayigit & Stainthorp, 2010; Mäki, Voeten, Vauras & Poskiparta., 2001).

Table 4.10: Results of regression analyses on text-production-macro

Model	Beta	t	Sig.
(Constant)		-2.935	.005
NCT-macro	**.307**	**2.320**	**.025**
Age (months)	**.413**	**3.123**	**.003**

Table 4.11: results of regression analyses on each macrostructural components of text production

Model	Beta	t	Sig.
Text Production: Structure			
(Constant)		.681	.500
NCT Structure	-.079	-.481	.633
NCT Information density	.222	1.273	.211
NCT cohesion	-.213	-1.372	.178
NCT psychological lexicon	.121	.744	.461
Text Production: Information density			
(Constant)		-.826	.414
NCT Structure	.083	.559	.580
NCT Information density	**.353**	**2.228**	**.032**
NCT cohesion	.001	.010	.992
NCT psychological lexicon	.234	1.593	.119
Text Production: Psychological lexicon			
(Constant)		-.352	.727
NCT Structure	.014	.083	.934
NCT Information density	.195	1.103	.277
NCT cohesion	-.204	-1.300	.611
NCT psychological lexicon	.084	.513	.611

Considering written text microstructural level, three regression analysis, one for each microstructural measure considered, were conducted. 40% of written productivity (Token) and 20% of written syntactic complexity (Total Number of complex sentences) seemed to be explained by NCT microstructural level and chronological age (Token: Adj. $R^2 = .40$; $F_{4,39} = 8.197$; $p < .001$; Total number of complex sentences: Adj. $R^2 = .20$; $F_{4,39} = 3.703$; $p < .05$). The only statistically significant predictor was chronological age (Table 4.12 and 4.13). Finally, 46% of written lexical variety (type) was significantly predicted

by NCT microstructural level and chronological age (Adj. R^2 = .46; $F_{4,39}$ = 10.320; p < .001). The statistically significant predictors seemed to be NCT lexical variety (type) and chronological age (Table 4.14).

Table 4.12: Results of regression analyses on Token of text-production

Model	Beta	t	Sig.
(Constant)		-4.545	<.001
NCT token	-.292	-.920	.363
NCT mean sub. clauses	.008	.064	.949
NCT type	.440	1.398	.170
Age (months)	**.648**	**5.210**	**<.001**

Table 4.13: Results of regression analyses on Total number of complex utterances of text-production

Model	Beta	t	Sig.
(Constant)		-3.090	.004
NCT token	-.033	-.090	.928
NCT mean sub. clauses	-.036	-.253	.802
NCT type	.202	.557	.581
Age (months)	**.490**	**3.412**	**.002**

Table 4.14: Results of regression analyses on type of text-production

Model	Beta	t	Sig.
(Constant)		-5.133	< .001
NCT token	-.530	-1.767	.085
NCT mean sub. clauses	.029	.252	.802
NCT type	**.660**	**2.220**	**.032**
Age (months)	**.682**	**5.799**	**< .001**

4.4 Discussion

The main aim of the study was to investigate the relationships between oral narrative competence and school learning. Indeed, in the literature we can find some evidences of the role of narrative competence in predicting reading and writing abilities. For some scholars, i.e. those within the "emergent literacy" perspective, narrative competence represents an important precursor of learning abilities (Lonigan et al., 2000; Pinto et al., 2009). For this purpose, a group of Italian children attending the first three years of the primary school was assessed with a battery of tasks aimed to evaluate their narrative competence, cognitive and linguistic abilities and reading and writing learning. Grounding on some recent works on this topic (Pinto et al., 2016; Wellman et al., 2011), we decided to focus our attention on two aspects of learning abilities: the automatisms of reading and writing (decoding and spelling) and some more complex learning abilities, such as text comprehension and written text production. In parallel, we considered both the macro- and the microstructural level of analysis for the evaluation of narrative competence (see Chapter 1 for a detailed description of these two levels on analysis). In this way, we have investigated associations among specific aspects of narrative competence and learning abilities, instead of a general relationship between these two complex domains. Specifically, we hypothesized the existence of an association between oral narrative microstructure and the automatisms of reading and writing (decoding and spelling) and between oral narrative macrostructure and the most complex learning abilities evaluated (i.e., text comprehension and written text production).

Considering decoding and spelling, we found that verbal working memory and narrative microstructure (i.e. mean number of subordinated clauses) can explained the 28% of reading accuracy, while only verbal working memory was a statistically significant predictor for reading speed and writing accuracy. The role of verbal working memory as a predictor of decoding and spelling abilities just confirmed a huge number of previous studies on the neuropsychological basis of learning (e.g., Gathercole & Alloway, 2004; Swanson, 2003). Most interesting for the present study is the association between oral narrative microstructure and decoding accuracy. We know that proficient readers use the lexical way in text decoding rather than the phonological way (Coltheart, Rastle, Perry, Langdon & Ziegler, 2001): this means that a good reader does not have to convert every single grapheme into the correspondent phoneme and blend them together to read a word (phonological way of reading), but he/she can anticipate the word basing on the general

meaning of the text, on his/her words knowledge and on his/her speed in recall words (lexical way of reading). So, the master of a good language ability, which in our data is evaluated by the mean number of subordinated clauses used in the narrative task, can play a role in the automatisms of reading.

Our results did not confirm the association between oral narrative macrostructure and written text comprehension previously found by Wellman and collaborators (Wellman et al., 2011). In our opinion, the reason could be found in the type of task used for the evaluation of text comprehension, specifically that proposed to the 1st-year children. In the MT battery (Cornoldi & Colpo, 2011), the text comprehension proposed to the children that are attending the first half of the first year of primary school consists of 14 item, independent of each other, which ask to the child to read single word or sentence and to match them with the correct picture. Then, it is not a proper story comprehension, and this could at least in part explained our results.

On the contrary, our data highlighted an association between oral narrative macrostructure and written narrative macrostructure, in agreement to what recently found by Pinto and collaborators (Pinto et al., 2016). However, differently from what reported by Pinto et al., in our results the only oral narrative macrostructural factor in relationship with written macrostructure is the information density, and not story structure, as found in Pinto's study. In our work, we used as a prompt for the generation of written texts a brief three-pictures story, with a very simple structure (the written text structure score could indeed range from 0 to 3 points); moreover, this index failed to show an evolution from the 2nd- to the 3rd-year in the written macrostructure, as proved by the absence of a significant difference between the two classes. On the other hand, the information density index proved to be more sensitive in the evaluation of differences in written stories generation. We suppose that these considerations taken together can explained the different pattern of associations between oral and written narrative macrostructure found in our work. Moreover, spelling accuracy seemed not to play a role in the ability to write a good story, confirming existing data on other languages with transparent orthographic systems (Babayigit & Stainthorp, 2010; Mäki et al., 2001). Finally, the statistically significant predictors of written narrative microstructure in our data were age, for all of the written microstructural measures considered, and oral lexical variety, but only for the lexical variety index. The comparison between 2nd- and 3rd-year

children showed that older children wrote longer stories (token), characterized by a higher number of different words (type) and of complex sentences than younger children.

The present study has some important limitations, that should be considered to guide future investigations. First, the absence of longitudinal data does not allow us to talk about predictors of learning abilities. What our results can highlight are just associations between developing competences. A future goal would be to fill this gap through a longitudinal research project. Moreover, extending the analysis to older children (e.g. children at the end of the primary school or that are attending the secondary school) would permit to better understand the associations between oral narratives and learning. In fact, we can hypothesize that during development the pattern of abilities needed to reach a good academic achievement would change. Second, the battery of tasks used for the evaluation of learning abilities seems to be not completely appropriate to deeply investigate these competencies, particularly the most complex (text comprehension and written text production). Considering text comprehension, it would be useful to homogenise the kind of request for all the classes, especially proposing a real story comprehension also to 1st-year children. For written text production, we think it would be interesting to propose the same picture story (e.g. the NCT) for both oral and written narrative tasks, as done in Pinto et al.'s work (Pinto et al., 2016). In this way, the associations between oral and written story generation could emerge more clearly, without a different influence of the kind of prompt used.

Research on the early predictors of learning abilities is certainly very important, and the recent studies on early narrative competence and its relationship with academic achievement have demonstrated the role of this ability in predicting reading and writing. Anyway, the data available are still restricted and the kind of associations between these two complex domains underexplored. So, it is evident the need of more research on this topic, to better understand the role of oral narrative competence in the development of academic competences; even more important, this kind of studies are essential to guide the curricular activities proposed in kindergarten and during the first year of primary school to support children's learning, and to develop evidence-based training program for children at risk for learning disabilities, considering not only the automatism of learning, but also more complex abilities, such as written text comprehension and production.

5. General Discussion

5.1 Narrative competence assessment and the presentation of a new tool for its evaluation

The first aim of the research project presented in this dissertation was the development of a new tool for the evaluation of narrative competence in Italian children. In fact, despite the well-recognised importance of narratives in children communication, the opportunity to study several levels of language and cognitive abilities through narratives and the large number of works on this topic, until now only few attempts have been made to create instruments which could be useful for narrative competence assessment in both research and clinical field. Focusing on the Italian context, we can find only two recent tests aimed to evaluate narrative competence: the Bus Story Test (original version by Renfrew, 2010; Italian standardization by Mozzanica et al. 2016), which consists in a story recall, and one subtest for the evaluation of narrative speech included in the BVL 4-12 (Marini et al., 2014), which is a story telling task. The first, the Bus Story Test, as a story recall test, gives to the child an initial version of narration, that unavoidably influences the child's telling of the story. The second is a very short story, that in our opinion does not permit to properly highlight different level of narrative competence in typically developing children and whose scoring guidelines refer most to narrative speech rather than narrative competence.

For all this reasons, we decided to create a new tool for the assessment of narrative abilities in Italian children, that we called Narrative Competence Task (NCT). The NCT is an 18-pictures storybook thought to elicit children's narratives, developed respecting the typical story grammar, the situation described is familiar to children and the images are very simple to be immediately clear. The procedure of administration is elementary: the children are first asked to browse the pages and are then invited to tell the story in their own words while browsing the pages again. The scoring system comprehends both the macro- and the microstructural level of narratives and it has been realized to be usable not only for scholars, but also for clinicians. The data for the Italian standardization of the NCT have been to date collected on a total sample of 440 Italian children, aged from 3 to 8 years, in three Italian regions (Lombardy, Piedmont and Puglia), but the data collection is still ongoing (the aim is to have normative data for age groups every six months from 3

to 8 years). Less than 1% of the participants refused to complete the procedure, demonstrating that the NCT's materials are engaging for children.

The NCT permitted to see a clear development in narrative competence from 3- to 8-year-old in both the macro and micro-structural evaluation, particularly between preschool and school-age children, in agreement with previous studies (e.g. Bamberg, 1987; Berman & Slobin, 1994; Orsolini, 1995; Wigglesworth, 1997). Moreover, 8-year-olds performed differently from the adults in our sample, and this conforms that the NCT is a useful instrument for narrative assessment also at later stages of language development. In agreement with the existing literature (e.g. D'Amico, Devescovi, Marani, & Albano, 2008; Orsolini, 1990), analysing the stories collected using the NCT, we found a strong relationship between the macro and the micro-structural level in narrative competence. Finally, the NCT demonstrated a good concurrent validity, as proved by the strong correlations between its indices and those collected with the Bus Story test in a subgroup of our sample.

5.2 Not only language: narratives as a tool to study gestures, prosody and learning

Another aim of the project was to explore children communicative development by means of narratives.

First, we focussed our attention on the use of gestures by children during storytelling. It is indeed well-known the relationship between gestures and language in communication development (Guidetti & Coletta, 2010), but only few studies have analysed children's use of communicative gestures during complex linguistic tasks, such as storytelling (e.g., Colletta et al., 2015; Mainela-Arnold, Alibali, Hostetter & Evans, 2014). Our results on preschool children support the hypothesis that the production of gestures during narratives should be considered a compensatory strategy for children with low linguistic competence (Iverson & Braddock, 2011; Mainela-Arnold et al., 2014). Considering the relationships between narrative competence and gestures, in our sample children who used a higher number of gesture during storytelling produced narratives of a lower quality (less events and a weaker structure) than children who used less gestures. Finally, we found that in preschool-aged children the presence of gesture with supplementary function, contrary to what happens in younger children (Fasolo & D'Odorico, 2012), could

be considered an index of problems in verbal production. From 3 to 6 years, gestures gradually come to support verbal production, without adding new elements that are not expressed in words.

Second, we used narratives for the study of prosody, an underexplored aspect of language development, at least from preschool onwards. We first focused on the relationships among syntax, narratives, and prosody in preschool-age children (Study 1). We found that for 3-year-old children, but not for 4-year-olds, the syntactic complexity of sentences could influence the prosodic ability to package the sentences within a single intonation contour, consistent with what previously claimed by D'Odorico et al. (2010). Moreover, it seems to be a positive development in syntactic ability and a regression in prosodic ability in the passage from the first to the second year of kindergarten attendance. Considering the relationship between narratives and prosody, for both 3- and 4-year-olds, we found negative correlations between prosodic competence and the ability to tell a rich and well-structured story. We explained our results within the trade-off hypothesis (Bock, 1982): while engaged in a complex linguistic request, such as telling a story using syntactically complex sentences, children cannot contemporary master other aspects of language, such as the prosodic realisation of the utterance in a single melodic contour.

In Study 2 and 3, the methods used for the analysis of the intonation, that is the transcription with the ToBI system, allows to compare our results to the growing amount of data recently collected on this topic in the international field. To our knowledge, these are the first works using the ToBI system of transcription in the investigation of prosody with Italian children. Study 2 focuses on the intonation of the last part of sentences, that represents indeed the most salient part for the listener. In agreement with previous studies on Dutch, Spanish, Catalan and Portuguese (Chen & Fikkert, 2007; Prieto et al., 2012; Frota et al., 2016), we found that Italian pre-schoolers master the inventory of the pitch accents typical of the mother-tongue. On the contrary, the youngest children in our sample (3-year-old) showed a difference in the use of the continuation rise, typical of suspended sentences and of particular kinds of speech, such as narratives, compared to older children (5-year-old) and adults. This result is similar to what found by De Rutier (2014) on 5- and 7-years-old German children, and by Redford and collaborators (Redford et al., 2012) on 5- and 7-years-old English-speaking children. We explained this important result considering the cognitive development of the child: 3-year-old children are still acquiring the ability to take other's point of view, as demonstrated by the large number of

studies on the development of theory of mind (e.g. Perner, 1999). Nevertheless, the awareness that the listener has not the same knowledges of the speaker (for example about what comes next in the story) could lead the speaker to connect the meaning of consecutive sentences through the continuation rise. We suppose that having a theory of mind could give reason to the differences found between 3-year-olds and older children and adults.

Finally, in Study 3 intonation in narratives is used as a cue of pre-planning. Our results confirm the existence of an amount of pre-planning in intonation (Cooper & Sorensen, 1981; Rialland, 2001; Prieto et al., 2006): longer sentences have higher first peak than shorter sentences. Even more interesting, this effect is stronger in adults than in children, suggesting a different amount of pre-planning in the two groups.

In the last work presented in this dissertation, we examined the role of narrative competence in explaining reading and writing learning. Indeed, several scholars highlighted the importance of narrative competence in predicting later academic achievement (e.g. Lonigan et al., 2000; Pinto et al., 2009; Pinto et al., 2016; Wellman et al., 2011). Our data only partially confirmed the relationships between oral narratives and learning abilities. Particularly, we found a relationship between narrative microstructure and reading accuracy, so that it seems that the master of a good language ability, which could be evaluated by narrative microstructure, can play a role in the automatism of reading. Moreover, our data showed an association between oral narrative macrostructure and written narrative macrostructure, in agreement to what recently found by Pinto and collaborators (Pinto et al., 2016). Specifically, children who tell rich stories in terms of quantity of information included, produce also written narratives with a high information density.

Generally, taken together all the studies presented, it emerges the role of narratives as a useful tool to study language development in several aspects. First, narratives represent a good instrument in the investigation of the interconnection between two important domains of communication, that is gesture and language. Second, narratives can be broadly used in the study of language levels still underexplored in children development, such as intonation and its relationships with the linguistic segmental level and the general cognitive development. Finally, narratives seem to be an important predictor of later goals in children development, like the ability to create a good written story, or, considering

together the results of recent studies, the possibility to reach positive academic performances.

5.3 Practical implications

There is a large agreement among scholars about the critical role of narratives in the study of children development. Experts have underlined the importance of including narrative evaluation as a part of language assessment for children with language delay and/or impairment (see for example, Muñoz, Gillam, Peña & Gulley-Faehnle, 2003). Indeed, there is a growing number of data suggesting that narrative evaluation is a valid and ecological way to assess language abilities (e.g. Muñoz et al., 2003; Thompson, Craig, & Washington, 2004). Nevertheless, there are not shared "guidelines" that indicate the most salient narrative variables to be studied during narrative assessment, but there are many studies suggesting a different way of narrative analysis each. Taken together all these studies, the best practice seems to be the study of narrative performance at two levels: macrostructure and microstructure. Presently, in the Italian context, there are only two recently standardized texts to assess narrative competence in children. The creation of the NCT tries to answer to the need of tools for the assessment of narrative abilities. The scoring system, developed partly as a checklist, could be useful both in research, because it allows a deep analysis of narrative's macro- and microstructure, and in the clinical field, as it permits a quite simple and fast assessment of children's narrative competence. Moreover, it is fundamental to ground the development of new assessment tools on strong theoretical basis and to have tasks which can highlight the development of abilities through a wide age range, and the NCT responds to both these characteristics.

The extension of our knowledge about less explored aspects of language development, such as intonation, or on domains strictly connected to language, such as gestures, and their inner relationships, can lead future research, both with typically and atypically developing children. Moreover, the evidence of the role played by narrative competence in predicting later learning outcome, and more in depth the specific relationships between the different aspects of narratives and learning abilities, should guide the development of educational practices, which take into account strong research results. In fact, even if telling stories is a widespread practice in Italian kindergarten and primary school and even if the guidelines for teachers and educators generally talk about the importance of

narratives as a basis for academic achievements (see MIUR, 2012), it is not a widespread practice the training of the children's ability to produce stories, as if it is a natural development, which does not need any kind of support. With no doubts, narrative competence goes through a natural development from preschool to the later stages of school-age, but nonetheless it is a multi-componential and complex ability that can take advantage from training, particularly for children with a history of language delay and/or with low language abilities (even without a diagnosis of language impairment).

5.4 Future aims

One of the main future goal is the transcription and scoring of the remaining narratives already collected and the collection of new stories produced by children becoming from other Italian regions, to reach an acceptable standardization of the NCT.

Second, it would be useful to have data on children with atypical language development, to verify which measures can better distinguish between these children and peers without language disabilities. Moreover, it would be interesting comparing children with typical and atypical communicative development considering the other aspects taken into account in this dissertation, that is gesture and intonation. Indeed, the possible differences among groups of children with specific deficits in some aspects of development could support (or not support) our ideas. For example, an analysis of the intonation used in narratives by children with autism spectrum disorders or with pragmatic language impairment could give new evidences about the relationships between the use of prosody and theory of mind.

Third, it would be interesting to investigate narratives produced while the examiner could not see the pictures that the child is looking at. Particularly, changing the procedure of the task, we suppose to find a different use of gestures, both in terms of quantity and quality, and narratives characterized by and increased linguistic level.

Finally, another future goal is to collect data through a longitudinal research project, to better describe the development of narrative competence and the changes in the relationships among different domains of language and cognitive development.

Considering especially the last chapter, longitudinal data are necessary to investigate the possibilities of narratives in predicting later learning abilities.

In sum, narratives represent a rich and ecological way to study not only language acquisition, but also cognitive development and the relationships between the two, from preschool period to later ages. Furthermore, works on children's narratives could improve the interconnection between research and educational and clinical fields, the first leading good practices in schools and children's assessment, the last suggesting future research's goals.

Appendix 1: Narrative Competence Task (NCT)

The drawings of the Narrative Competence Task are made by Dododesign (http://www.dododesign.it/).

Appendix 2
Scoring Record NCT (Narrative Competence Task)

Name: _____	Gender: _____
Age: _____	Date of birth:_____
Class: _____	Date of test:_____
Examiner: _____	Age in months: _____

Scoring Table

Macroanalytic measures		
	Raw score	*Percentile*
Events		
Structure		
Agents		
Anaphoric use of the article		
Psychological lexicon		
Microanalytic measures		
	Raw score	*Percentile*
N° of utterances		
N° of words		
Mean Lenght of utterance		
N° of subordinated clauses		
Implicits		
Explicits		

	Rax score	*Percentile*	*Target age range*
Macroanalytic (Tot.)			
Microanalytic (Tot.)			

Events

	0/1
A girl is jumping with the rope/ is jumping/ is playing with the rome/ is playing	
The mum is talking on the phone	
A boy comes with the grandfather	
The boy is riding the tike/is playing with the trike	
The grandfather sits down/ sits near the girl's mum	
The grandfather is reading the nwespaper/ is reading	
The boy finds a ball/ sees a ball	
The boy gets off the trike	
the boy asks the girl to play	
The children start to play/ decide to play	
The children are playing/ are threwing the ball	
The boy kicks the ball	
The ball goes towards a turtle	
The girl gets scared	
The ball hits the turtle	
The turtle closes in the shell/ gets scared	
The ball bounces/ goes faraway	

Appendix 2

The girl runs to get back the ball	
Lthe girl gets back the ball	
The children go on playing	
Lthe girl threws to high the ball/ threws badly the ball	
The boy can't catch the ball	
The ball goes on a tree	
The boy and the girl look at the ball/ cannot get back the ball	
The children try to find a way to get back the ball	
The boy goes on the trike	
The trike moves	
The boy can't get back the ball	
The boy falls/goofs	
The girl has fun/ laughs	
The girl tries to get the ball with the rope	
The girl fails	
The rope falls down	
The boy has fun/ laughs	
The children decide to work together	
The children have an idea	
The girl goes on the boy's shoulders	
The children cannot get back the ball	
A policeman comes	
The policeman looks at what is happening	
The policeman comes near	
The policeman asks what has happened	
The children explain the problem/ ask for help	
The children show the ball	
The policeman helps them/ decides to help them	
The girl goes on the policeman's shoulders	
They can get back the ball	
The children start to play again	
The adults go on with their activities/ the mum is talking on the phone/ the grandfather is reading	
Events (tot.)	

Structure

Structure tot. (= the bold events)	

Agents

	0/1
girl	
boy	
children	
Mum/ woman	
Grandfather/ man	
Turtle	
Policeman	
Agents (tot.)	

Appendix 2

Anaphoric use of the article

	0/1
A girl > the girl	
A lady/ a woman > the lady/ the woman	
A boy > the boy	
A sir/ a man > the sir/ the man	
A ball > the ball	
A turtle > the turtle	
A tree > the tree	
A policeman/ a man > the policeman/ the man	
Anaphor (tot.)	

Psychological lexicon

List all the mental words (roots) used

_____
_____
_____
_____
_____
_____
_____

Psychological lexicon (tot.)_____

Story transcript

_____
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