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The role of environmental factors on linguistic and cognitive development in preschool children

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“Riusciamo a pensare limitatamente alle parole di cui disponiamo,
perché non riusciamo ad avere pensieri a cui non corrisponde una parola.
Le parole non sono strumenti per esprimere il pensiero,
al contrario sono condizioni per poter pensare."

Martin Heidegger

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Abstract

The studies reported in this thesis, are inserted in the research line aimed to investigate the influence that some environmental factors - Socioeconomic Status, Bilingual exposure, and literacy environment - have on cognitive and linguistic development in pre-school age. The rationale of these studies is that, although the role of environmental factors on children development as well as the long-term effects of early interventions are well established, still, there is a conspicuous percentage of children that begin their formal schooling process unprepared to handle the demands of the school learning processes.

The first Chapter provides an overview of theoretical background and previous literature concerning the effects that several environmental factors have on the cognitive and linguistic development of preschoolers.

In Chapter 2, results of a study aimed to investigate the specific and unique effect of SES and Bilingual exposure on a large set of cognitive and linguistic abilities, are reported. Findings provide new evidence that the two environmental factors examined contribute uniquely to language and cognitive development, irrespective of the other factor.

In Chapter 3, results of a study aimed to examine the contribution of receptive vocabulary in narrative comprehension of sequential bilingual children are reported. Findings suggest that a low vocabulary does not prevent children to comprehend adequately a narrative text, highlighting the involvement in narrative comprehension, of other higher-order skills.

In Chapter 4, are reported results of a study in which, starting from evidence of the previous study, we analyzed structural relations among a large and comprehensive set of linguistic and cognitive abilities and narrative comprehension, within the framework of "multicomponent model of comprehension".

In Chapter 5 are reported results of a study aimed to analyze the efficacy of a classroom-based shared book reading direct intervention aimed to foster broad oral language abilities in preschoolers coming from low-SES families.

In Chapter 6 are reported results of a study aimed to analyze of a Parent Training on dialogic book reading aimed to foster broad oral language skills of pre-school children.

Eventually, in Chapter 7, a general discussion highlights the main findings presented in this thesis, by considering them collectively, and by raising future proposals and questions about the topics debated in these Chapters.

CHAPTER 1- General Introduction

1.1. Theoretical background: Neuro-constructivism

The theoretical framework of the studies reported in this thesis is the Neuro-constructivism, the theoretical perspective of reference for researchers, who, recognizing themselves in the approach of Developmental cognitive neuroscience, are interested in investigating cognitive development in its relations with brain development, in effort to close the gap between these two levels of development explanation (Macchi Cassia, Valenza, & Simion, 2012).

According to Neuro-constructivism, child development implies a series of changes in neural structures that are driven by experience-independent processes - based on genetic information - that combines with experience-expectant processes triggered by experience with the typical environment of the species, and with experience-independent processes, triggered by the individual experience to which each individual is subject.

The possibility for experience to play a relevant role, especially in the early stages of development, is guaranteed by the period of immaturity and prolonged postnatal growth of the brain, and the presence of innate predispositions that characterize the functioning of the perceptual system predisposing the child to pay attention and process some categories of information present in the species-specific environment. Due to their partial functioning, neural structures and sense organs can impose constraints on the information that the child experiences from the environment, directing the path of his subsequent development in specific directions.

Neuro-constructivism considers cognitive development as a result of a complex bidirectional interaction between genetic predisposition (Nature) and experience (Nurture). The changes in the neural structures are driven by experience-independent processes which

interact with experience-expectant and experience-dependent processes (Karmiloff-Smith, 1992; 2006), thus, recognizes to experience, both individual and coming from the species-specific environment, a very important role in the development process, linked to the possibility of shaping the development of the brain and cognition.

1.2. Environmental factors and cognitive and linguistic development

As previously reported, Neuro-constructivism, considering cognitive development as a result of a complex bidirectional interaction between Nature and Nurture, confers on the experience and therefore, on the developmental environment, an important role in children's cognitive development in general and linguistic development (Karmiloff-Smith, 1992).

The literature has been specifically interested in the influence of the family environment on cognitive development, highlighting some variables more related to atypical evolutionary trajectories including a low socio-economic status, a low cultural level of parents - factors that correlate significantly - and belonging to an ethnic minority. The studies in the literature that confirm the negative influence of these factors are many and show how these exert their effects even for language acquisition, both in the early stages and in the more advanced ones, probably through a cumulative effect (D'Odorico & Zampini, 2013).

The theoretical evolution regarding the acquisition of language has led to the progressive transition from the study of language as an intra-individual and intrapsychic phenomenon to a vision of this phenomenon as inter-individual and interactive experience: the child learns language during the interactions with adults of reference. Research is making efforts in investigating which are the variables that most affect these interactions.

From the results obtained through the numerous scientific works within this field of investigation, it can be concluded that the environment has to be considered as an element, that largely affects the development of language and that the socio-cultural context determines considerable differences in the linguistic development of children from different social and

economic levels (Accorti Gamannossi, 2003). The social context, in which the child is born and grows up, has a major role in influencing its future development. In particular, first experiences, determined by parents and home environment in general, affects globally the child's development.

In this work, three types of environmental factors will be analyzed, which influence the children's language and cognitive development. The three environmental factors, specifically examined below in their relations with cognitive and linguistic development from the early stage of development, are bilingualism, familiar socio-economic status, and home literacy environment.

1.3. Which are the environmental experiences that may shape cognitive and linguistic development?

1.3.1. Bilingualism

The term "bilingual" refers to people who speak, or are regularly exposed to, more than one language in everyday life (De Lamo White & Jin, 2011). The definition of bilingualism is more complex than a "yes/no" categorization and indeed, bilinguals, may show individual differences in their linguistic competence in second language (L2), based on age, onset of language exposure, amount and quality of linguistic input and circumstances under which each language is acquired (Paradis, 2011).

Children coming from bilingual families receive less exposure to each language than children coming from monolingual families because their parents need to divide language input between two languages (Hoff, Core, Place, Rumiche, Señor, & Parra, 2012), thus their linguistic and cognitive development is different from that of monolingual peers.

The strongest effect of bilingual exposure on language development concerns vocabulary growth. Bilingual children typically obtain lower scores than monolinguals on measures of both receptive (Bialystok, Luk, Peets, & Yang, 2010) and expressive vocabulary

(Oller & Eilers, 2002) in each spoken language. Moreover, bilingual preschoolers perform worse than monolingual peers on morph-syntactic comprehension tasks (Marinis, Armon-Lotem, & Pontikas, 2017), although these differences seem to be driven by vocabulary differences; group differences in morphosyntactic comprehension, in fact, disappear once vocabulary size is taken into account (De Abreu, Baldassi, Puglisi, & Befi-Lopes, 2013; Komeili & Marshall, 2013).

Currently, an increasing number of studies have addressed the issue of narrative skills in bilingual preschoolers. Narratives allow for a parallel assessment of linguistic skills that are not susceptible to the disadvantages of standardized tests (vocabulary and morphosyntax) and represent an additional, more ecological, measure of linguistic skills in which children may be stimulated to use everyday language (Bonifacci, Barbieri, Tomassini, & Roch, 2018).

Through narratives, two distinct but interrelated areas that underlie narrative competence can be analyzed: microstructure and macrostructure (Justice, Bowles, Kaderavek, Ukrainetz, Eisenberg, & Gillam, 2006). Narrative microstructure concerns the linguistic forms used in the construction of coherent narrative discourse and is thus much more language-specific (Berman & Slobin, 1994; Hickmann, 1991). On the other hand, narrative macrostructure concerns the higher-order mental organization of narratives. It allows establishing locally the connections between sentences and globally the relations between all the propositions contained in the text through cohesive and coherent ties where content connectedness is achieved through a global organization structure following an underlying narrative schema (Heilmann, Miller, & Nockerts, 2010). Thus, Microlinguistic processes are responsible for intra-phrasal functions, whereas Macrolinguistic processes are responsible for the inter-phrasal functions (Marini, Carlomagno, Caltagirone, & Nocentini, 2005).

To date, the few studies regarding narrative skills in bilingual children have shown that macrostructural knowledge in narrative production and comprehension is invariant across

the two languages (Bohnacker, 2016). Moreover, bilingual preschoolers, even with limited expertise in one of the two languages, are able to produce stories in their weaker language with an adequate narrative structure and a good global quality (Gutiérrez-Clellen, 2002; Squires, Lugo-Neris, Peña, Bedore, Bohman, & Gillam, 2014). These findings suggest a different pattern for narrative competence than for vocabulary, indicating development in the two languages may vary as a function of linguistic level (Roch, Florit, & Levorato, 2016).

Differences between monolinguals and bilinguals, in all the linguistic aspects mentioned above (vocabulary, morphosyntactic and narrative abilities) are also dependent on the amount of bilingual exposure to each language (Unsworth, 2013). Previous studies that have investigated the effect of the amount of bilingual exposure on language development converge in identifying major differences compared to monolinguals, for consecutive bilingual children and less pronounced differences for simultaneous bilinguals (Thorandottir, 2011; Unsworth, 2016). Bilingual children usually show higher vocabulary scores in the language that they are exposed to most frequently (Mancilla-Martinez & Lesaux, 2011; Hoff et al., 2012). Moreover, it is well known that the host language becomes increasingly important once children enter formal education in general and formal reading education in particular (Uccelli & Pàez, 2007).

A parallel body of research has examined the effects of bilingual exposure on cognitive abilities. Nowadays there is large debate about the so-called "Bilingual Advantage" which refers to research findings demonstrating that bilinguals often outperform monolinguals on tasks that tap into Executive Functions (EF) such as those requiring inhibition, shifting, and updating. (Miyake, Friedman, Emerson, Witzki, Howerter, & Wager, 2000). Bilinguals are thought to develop EF advantages because they manage multiple languages and continuously monitor the appropriate language for each communicative interaction (Costa, Hernández, Costa-Faidella, & Sebastián-Gallés, 2009). Over the past several years, there has

been an increase in the number of studies that support these claims (Adesope, Lavin, Thompson, & Ungerleider, 2010; Bialystok & Martin, 2004) as well as those that reject them (de Bruin, Treccani, & Della Sala, 2015; Gathercole, Kennedy, & Thomas, 2016; Paap & Greenberg, 2013).

The existing literature on whether there are differences in the efficiency of EF functioning between monolingual and bilingual individuals, particularly children, has therefore reported mixed results. On one hand, some research with preschool and early school-aged children has shown better performance by bilinguals than monolinguals on attentional shifting (Martin-Rhee & Bialystok, 2008), response inhibition (Yang, Yang, & Lust, 2011), inhibitory control (Poulin-Dubois, Blaye, Coutya, & Bialystok, 2011), and cognitive flexibility (Bialystok, 1999; Bialystok & Martin, 2004) highlighting a cognitive advantage in bilinguals. On the other hand, numerous studies consistently failed to find any significant difference in the performance between monolinguals and bilinguals in cognitive tasks (Blom, Boerma, Bosma, Cornips, & Everaert, 2017; Paap & Greenberg, 2013).

This large corpus of studies whose results are at odds with prior evidence of a bilingual advantage has challenged the generality of the effect. Paap, Johnson, and Sawi (2015) argue that bilingual cognitive advantages are a mere artifact of experiments, namely, either do not exist, or are restricted to specific aspects of bilingual experience that enhance only specific components of EF such as non-linguistic cognitive control (Hilchey & Klein, 2011; Mercier, Pivneva, & Titone, 2014). In addition to the results reported on EF, also findings in the research area focused to determine whether bilingual children perform better on Theory of Mind-related tasks (ToM) are inconsistent. Goetz (2003), for instance, found that bilinguals performed significantly better than monolinguals on the ToM-related tasks, whereas, in a more recent study conducted by Dahlgren and colleagues (Dahlgren, Almén, & Dahlgren Sandberg, 2017), earlier results on five different ToM tasks were not replicated.

Few studies have investigated the possibility that working memory (WM) is also affected by bilingualism. Bialystok and Martin (2004) and Morales, Calvo, and Bialystok (2013) found some fragmentary evidence of bilingual advantage on WM showing that young bilingual children performed at the level of older monolingual in a visuospatial working memory task. However, other studies comparing simple working memory performance of monolingual and bilingual children have found no evidence for significant differences (Bialystok & Feng, 2009; Bonifacci, Giombini, Bellocchi, & Contento, 2011). Therefore, the few studies on this topic are inconclusive, so there is no clear evidence regarding whether working memory is enhanced for bilinguals (Morales et. al, 2013)

Recently, more controlled studies have argued that the advantages found in many published papers may be due to hidden demographic factors, namely SES and ethnicity, and not to bilingualism per se (Blom, et al., 2017; Hilchey & Klein, 2011; Morton & Harper, 2007). Between-group variability in SES has been identified as a potentially important contributory factor in studies reporting cognitive advantages in bilinguals over monolinguals (Naeem, Filippi, Periche-Tomas, Papageorgiou & Bright, 2018). Another important aspect in the field of bilingualism is the "publication bias" against studies showing null or negative effects. De Bruin, Treccani, and Della Sala (2015) found that studies that show a clear bilingual advantage on executive function tasks are more likely to be published than studies that show mixed results, null results, or a disadvantage for bilinguals and reported that only 29% of the studies that showed no effects of bilingualism or even a bilingual disadvantage were published. The presence of hidden factors, often not controlled, in previous studies and the existence of this publication bias have likely led to a misrepresentation of the effect that bilingualism has on cognitive development. Therefore, more controlled studies are needed to prevent confounding effects due to, for example, SES, and to obtain a clearer representation of the effects of BE on cognitive development.

1.3.2. Socio-economic status

The term Socio-Economic Status (SES) refers to a measure of the economic and social position of a person (or family) in relation to the level reached by the society in which he/ she lives. The SES is typically measured as a combination of parental education level, employment status, occupation prestige, and household income (Ensminger, Fotherill, Bornstein, & Bradley, 2003), and it is generally referred to as a family status index, which can be low, medium or high (National Center for Education Statistics, 2018)[1].

SES is predictive of a broad range of important life outcomes as intelligence, academic achievement and school readiness of kindergarteners (Gottfried, Gottfried, Bathurst, Guerin, & Parramore, 2003; Sirin, 2005). Typically, children coming from low-SES families show lower levels of oral language if compared with peers from more advantaged backgrounds on measures of language processing, comprehension, and production, from infancy through high school (Hoff, 2013). The strongest relationship between SES and language development is usually found for vocabulary size (Hoff, 2003; 2006; Pan, Rowe, Singer & Snow, 2005). The gap between low and mid-high SES in vocabulary is already evident as early as the age of 18 months, and by age of 24 months, this gap reaches already a 6-months disadvantage (Fernald, Marchman, & Weisleder, 2013). Hart and Risley (1995), in their pioneering work, estimated that by age 3, children from higher-SES backgrounds had heard 30 million more words than children from lower-SES backgrounds, and other recent studies report similar trends (Hoff, 2006; Romeo et al., 2018). Morpho-syntactic skills and narrative competence were also found to be influenced by SES (Dollaghan et al., 1999; Hoff, 2013). Although there is no data on the effect of the SES on narrative comprehension, the few studies that addressed narrative production show that children coming from lower-SES backgrounds produce narratives less sophisticated than narratives produced by middle-class children of the same age in terms of

[1] National Center for Education Statistics https://nces.ed.gov/programs/coe/glossary.asp#s

topic coherence and independence from the non-linguistic context (Vernon-Feagans, Hammer, Miccio, & Manlove, 2001).

Behaviourally, it is well accepted that the quantity and quality of the language young children are exposed to, predicts their later linguistic and cognitive skills. Disparity between low and high SES has been attributed to a generally impoverished linguistic input in low-SES families that concerns the nature of the interaction between caregivers and children, the quantity of speech to which the child is exposed and the nature of that speech (Ginsborg, 2006). Hoff (2006) and Rowe (2012) found that even when SES is controlled, differences in exposure partially or fully explain the SES-related gap in language skills.

The effect of SES is not limited to the verbal domain but influence the cognitive domain as well (Ardila, Rosselli, Matute, & Guajardo, 2005; Klenberg, Korkman, & Lahti-Nuuttila, 2001). Numerous studies have reported SES-related disparities on composite or latent measures of executive functions (EF) in children as young as 2 years old through age 5 (Hughes & Ensor, 201; Noble, Norman & Farah, 2005; Raver, Blair & Willoughby, 2013; Rhoades, Greenberg, Lanza & Blair, 2011). While there is consistent evidence that children with lower-SES, compared to children with higher-SES, have worse performance in tasks of inhibitory control, executive attention, flexibility, and planning (Lipina, Martelli, Vuelta & Colombo, 2005; Mezzacappa, 2004; Noble, McCandliss & Farah, 2007), for what concerns WM, previous findings are inconsistent. There are studies showing that SES (Gardner, Froud, McClelland, & van der Lely, 2006) affects verbal short-term memory capacity, while other findings show no effect of SES (Engel, Santos, & Gathercole, 2008). In a recent study, Meir and Armon-Lotem (2017) analyzed the relations between SES and WM using several tasks to deepen our understanding of the role of SES. One hundred and twenty children aged between 5; 7 and 6; 7 coming from different SES families were tested on a forward digit span, non-word repetition, and sentence repetition. Children from lower SES backgrounds scored lower

on the forward digit span and sentence repetition, while no effects of SES were found for the non-word repetition task, suggesting that this task is free of SES influence.

Even the relationship between SES and the Theory of Mind (ToM) has been the subject of numerous investigations however, to date, mixed findings are reported and thus this relationship is still unclear. Some researchers, in fact, have found that children of low-SES backgrounds have difficulty understanding false beliefs, (Shatz, Diesendruck, Martinez-Beck, & Akar, 2003) while others have not found support for a link between SES and false belief understanding (Yagmurlu, Berument, & Celimli, 2005; Weimer & Guajardo, 2005).

To summarize SES seems to have a strong influence on child linguistic and cognitive development from early stage. Numerous studies try to investigate how family's SES leads to disparities in child development showing that how a low family socioeconomic status affects cognitive and linguistic development through the type of material that children are provided with and the type of interaction that parents are able to put in place with their children (Tamis-LeMonda, Bornstein & Baumwell 2001).

Since language input can influence children's development, SES can also indirectly affect linguistic and cognitive outcomes. It is well known that children coming from families with higher SES are raised in more stimulating home environments, with more reading activities and more books available (Guo & Harris, 2000; Bradley, Corwyn, McAdoo & Garcıa Coll, 2001; Korat, Klein & Segal-Drori, 2007; Hindman & Morrison, 2012). In contrast children from families with low-SES are exposed to few literacy activities conducted moreover with a poor language, characterized of short statements, oriented mainly on concrete elements, closely related to the immediate context and personal experiences, rather than a language capable of formulating abstract discourses and open questions, unrelated to the immediate context (Spedding, Harkins, Making & Whiteman, 2007).

Therefore, in addition to the above reported direct effects of SES on linguistic and cognitive development, also indirect SES effects, through the Home literacy environment (HLE), are widely reported in the literature.

1.3.3. Home Literacy environment

The home literacy is the process of literacy that takes place within the child's family system which, is not limited to a formal and explicit teaching of certain symbolism (such as the alphabet or number), but refers to a broader set of practices organized socially and aimed at enriching the child's knowledge, cultural, cognitive and linguistic skills.

In the home literacy model, Sénéchal and LeFevre (2014), identify two dimensions that constitute domestic literacy practices an informal one and a formal one, each of which plays a different role in the development of language and literacy. The discriminating factor between the two types of experience resides in the presence (central or not) of linguistic devices based on the symbolism of press-format communication and on the use of these to teach basic school skills, such as reading and writing.

Home literacy environment includes several physical aspects of the home environment that may contribute to the cognitive stimulation of the child, such as availability of books and toys (Lee & Croninger, 1994). It also includes the frequency of story reading activities (Crain-Thoreson & Dale, 1992), letter naming activities (Evans, Shaw, & Bell, 2000), parental support of, and beliefs for such activities (Snow, Burns, & Griffin, 1998). Home literacy environment and parent-child involvement in home literacy activities (reading books and storytelling) are essential for the growth of children's language and emerging literacy.

Previous studies found that, for instance, the availability of educational materials at home supports children's language and literacy skills (Tabors, Roach, & Snow 2001), the number of picture books in the house predicts children's receptive language skills and expressive vocabulary (Payne, Whitehurst, & Angell, 1994), and that familiarity with books

correlates with later vocabulary of preschoolers and early reading skills (Sénéchal, LeFevre, Hudson, & Lawson, 1996). Further, it was shown that early exposure to toys, which promote symbolic play (e.g. kitchen sets) and motor skills (e.g. blocks), is associated with children's receptive language skills (Tomopoulos et al. 2006), intrinsic motivation, self-regulation (Perkins, Finegood, & Swain, 2013) and approaches to learning (Gottfried, Fleming, & Gottfried 1998).

A rich and supportive home literacy environment allows a more rapid and accurate acquisition of new words, but also a greater phonological awareness, as well as a knowledge of alphabetical symbols and their organization within the text during reading. Book reading activities, in particular, are beneficial for the development of linguistic and narrative skills, but not only. These practices, and in general all those of home literacy, also represent strong emotional and cultural experiences providing children with the opportunity to look out over a fantastic and imaginary world, experiencing the moods of characters and exercising the ability to predict events in a process of socio-cultural construction capable of conveying values and ideals of the individual and the community (Spedding et al., 2007).

All these findings point out that the home literacy environment plays a crucial role in determining the child's degree of cognitive and linguistic development, and later school readiness and success (Spedding et al., 2007). Moreover, it seems obvious, that a stimulating home literacy environment especially for preschoolers may prevent or reduce the impact on emergent literacy development and later school readiness of other environmental factors.

This overview offers an examination of those environmental factors, more specifically socio-contextual factors, that contribute to explaining children’s individual differences. The main aim is to emphasize the need to consider contextual factors both in the assessment of child's linguistic and cognitive skills, and during educational interventions planning, in order

to develop effective programs able to make all children, regardless their family environment, ready to learn at school (school readiness) and eventually to prevent later difficulties.

1.4. School Readiness

School readiness is relatively a new construct, widely studied in the last decades from different theoretical perspectives. School readiness represents an educational milestone in child development, experienced when the child is independent and mature enough to listen, work, and play in a structured learning environment as the school. This first definition taken from the Medical Dictionary[2], is completely centered on the child, and does not take into account the individual's multiple interactions with the growth environment. However, different theoretical models of school readiness have succeeded one another and, nowadays, the theoretical model which is receiving the most success and response is the Interactionist or Ecological model (Murphey & Burns, 2002) that interprets school readiness as a property of several components, including several influential factors on child development such as children themselves, schools and families.

Therefore, in the definition of school readiness we have progressively moved from a developmental vision to a constructivist-social and ecological one; from a conception in stages of genetically established development, to the determination of a characteristic in continuous evolution, in function of the environmental support; from a unique attribution to the property of the child, to a responsibility of school, family and society. Children, families, and schools are considered ready when they have gained the competencies and skills required to interface with the other dimensions and support a smooth transition for children into primary school and advance learning for all children (Pianta & Kraft-Sayre, 2003).

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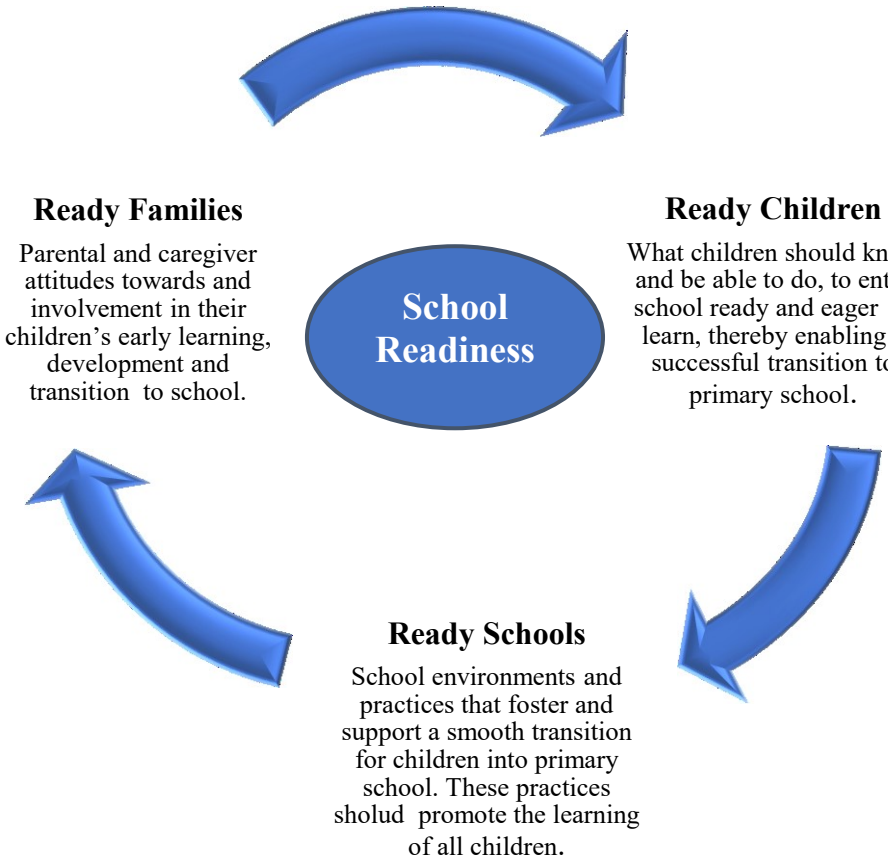
[2] Medical Dictionary. (2009). https://medical-dictionary.thefreedictionary.com/school+readiness

In particular, a child is considered ready for school if he/she has the basic minimum skills and knowledge in a variety of domains that will enable the child to be successful in school. These minimum standards set the threshold for what children should know and what they should be able to do, so they enter school ready to learn, thereby enabling a successful transition into a primary school learning environment (Lara - Cinisomo, Pebley, Vaiana, & Maggio, 2004). Success in school is determined by a range of basic behaviors and abilities, including literacy, numeracy, ability to follow directions, working well with other children and engaging in learning activities (Rouse, Brooks-Gunn, & Mclanahan, 2005).

Another concept related to school readiness is family readiness defined in terms of parenting beliefs, attitudes, knowledge, and practices related to school and learning processes. Supportive parenting, parents' beliefs, and education goals for their children, attitudes and commitment to education are considered crucial for school success (Alexander, Entwisle, & Bedinger, 1994). The learning environment provided at home, namely Home literacy environment – which is expressed by parents' engagement with children in learning activities such as singing, reading books, telling stories and playing educative games – is considered one of the characteristics of family readiness (Britto, Fuligni, & Brooks-Gunn, 2002) and represents the strongest predictor of school performance during primary school and beyond (Bradley & Corwyn, 2005; Morrison & Cooney, 2001; Rogoff, 2003; Werner & Smith, 2001; Whiting & Edwards, 1992).

To summarize, according to this definition well connected to our theoretical framework and fully embraced in this work, school readiness is not entirely due to the individual characteristics of the child, but is closely related to characteristics of the surrounding environment with which he/she interacts, conferring on the environment a role of primary importance.

Figure 1. Graphical representation of the Interactionist model of School Readiness



1.4.1. Children School Readiness: Emergent literacy

With regard to child school readiness, as mentioned earlier, a child is considered ready for school when he/she has the basic skills and knowledge in several domains that will enable him/her to be successful in school. We refer to these minimum skills and knowledge, necessary in the transition from preschool to school, with the term *Emergent Literacy.*

Emergent literacy is an umbrella term for a wide set of interrelated linguistic and cognitive skills, knowledge and attitudes that children acquire before and during preschool years and that are identified as developmental precursors of conventional forms of reading and writing, foundational skills of school readiness (Lonigan, Burgess, & Anthony, 2000; Wise, Sevcik, Morris, Lovett, & Wolf, 2007).

Nowadays there is growing interest in identifying emergent literacy skills that support literacy development and promote children's school readiness. Extensive research on emergent literacy indicates that oral language abilities broadly conceived – vocabulary, syntax and discourse, as well as phonemic awareness – are central to early literacy development and school success. Whereas there is a general agreement about the relevant set of abilities for school readiness, now efforts are underway to understand the emergence of and long-term contribution of several cognitive and oral language abilities alongside the environmental factors to literacy acquisition.

It is widely agreed that oral language abilities in infancy are associated with early socio-emotional skills, behavioral control, math, and literacy performance, and they are considered the best predictors of school readiness, reading and school success (Hogan, Bridges, Justice, & Cain, 2011). The developmental links between oral language abilities and reading have generally been ignored in the literature, so it is legitimate to think that vocabulary and other oral language skills are positively and causally related to reading at all levels of a child's development of reading, and thus to school readiness.

Key for school readiness is the development of effective communication skills: children need communication skills (Crais & Roberts, 1996; Walker, Greenwood, Hart, & Carta, 1994), especially expressive communication (Kaiser, 1993), to develop cognitively. When children enter school without these essential communication skills, they are at greater risk for delays (Hart & Risley, 1995). These findings underline that the majority of reading problems could be prevented by, among things, increasing children's oral language skills. Several studies, in fact, demonstrate positive correlations between individual differences in oral language skills and later differences in reading and school readiness showing that children who have larger vocabularies and a greater understanding of spoken language, have higher reading score and are more "ready to learn".

Now researchers are examining these links more fully as they strive to understand the relationship between various aspects of language and literacy. Although there is a general agreement that emergent literacy skills established in preschool, namely, lay an important foundation for later formal reading instruction (Justice & Ezell, 2001) and that oral narrative comprehension represents the most important factor in predicting later reading comprehension (Hogan et al., 2011; Wise et al., 2007), this intricate picture is not completely clear. All these findings emphasize the need to study the development of cognitive and linguistic skills that allow a better understanding of the spoken language, as a skill closely related to reading and to the ability to understand a written text, an ability that characterizes the transition between preschool and school.

1.5. Narrative comprehension: a brief definition

Ample evidence suggests that reading comprehension is based on two basic components: word decoding (or code-related reading precursors) and oral language skills (Dufva, Niemi, & Voeten, 2001; Storch & Whitehurst, 2002). Whereas skills such as phonological awareness and letter identification allow decoding individual words, oral language skills such as vocabulary (Perfetti & Stafura, 2014; Silven, Poskiparta, Niemi, & Voeten, 2007) and narrative comprehension (Paris & Paris, 2003) lay the foundation for understanding meaning from text.

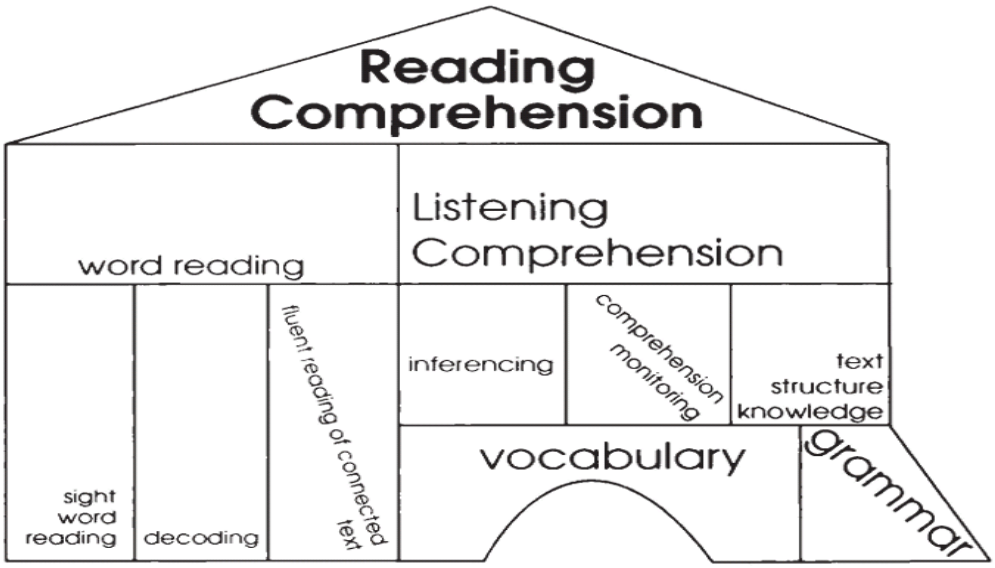
According to the *Simple View of Reading*, a theoretical model of reading comprehension proposed by Gough and Tunmer (1986) widely studied and validated, the skills and processes that determine reading comprehension are captured by two broad components: decoding and linguistic comprehension. These two components, partially independent, are proposed to be "of equal importance" (Hoover & Gough 1990) in that successful reading comprehension relies on both components: neither decoding nor linguistic comprehension is sufficient by itself. The decoding component refers to the ability to convert

graphic stimuli into linguistic referents and is specific to reading whereas the linguistic component refers to higher mental processes that concern the processing of language more broadly (Florit & Cain, 2011). Listening comprehension figures prominently as a component in theoretical models of reading (Hoover & Gough, 1990; Joshi & Aaron, 2000) and has been considered to provide the foundation for the acquisition of reading comprehension (Sticht & James, 1984).

In the last decade, more attention has been given to the high correlation between narrative and reading comprehension, included within *The Unitary View of comprehension* by Diakidoy, Stylianou, Karefillidou, and Papageorgiou (2005). Several longitudinal studies supported the idea of shared processes between listening and reading comprehension, in which the former is the best predictor of the latter (Diakidoy et al., 2005; Kendeou, van den Broek, White, & Lynch, 2009).

The idea that the comprehension of oral and written texts shares and is based on the same underlying processes, although there are some differences mainly in the decoding of auditory and visual stimuli, is one of the main principles of The Simple View of Reading (Hoover & Gough, 1990).

Figure 2. A visual representation of "Simple View of Reading" model (Hogan et al., 2011).



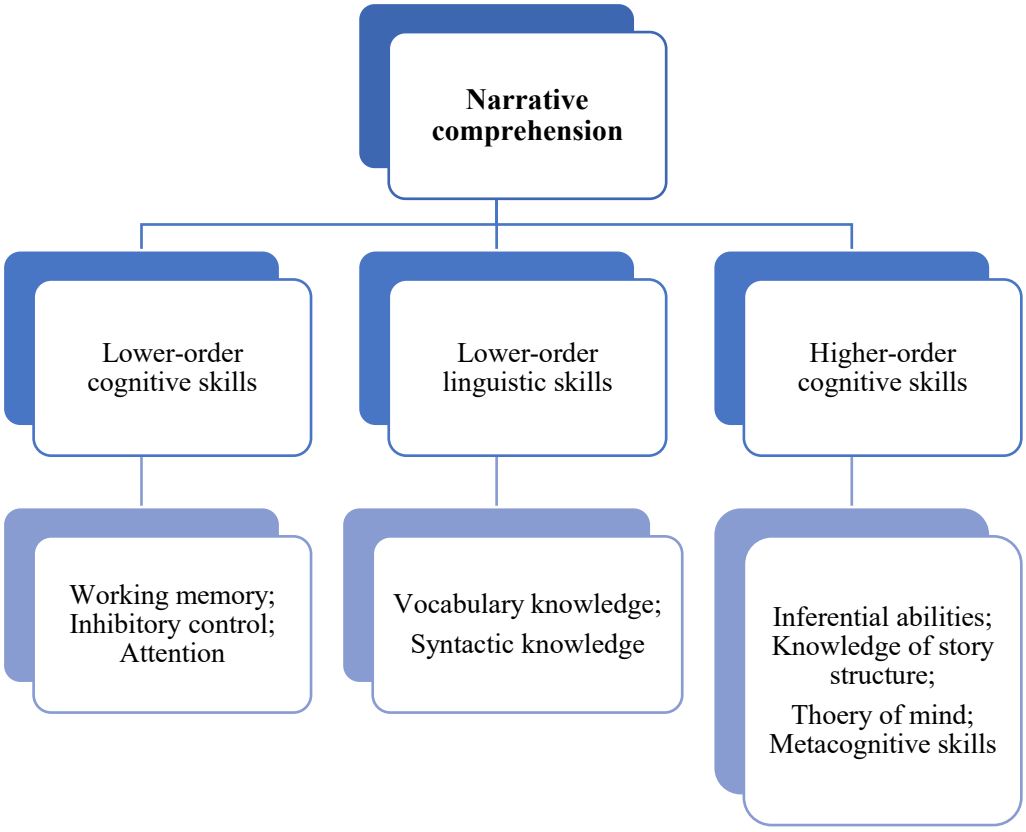
Because of the strong association between listening or narrative comprehension and reading comprehension, it is necessary to investigate the development of narrative comprehension and its components during preschool age and the role of environmental factors on their early development. The reason is to identify early predictors and risk factors for preventing later difficulties with reading comprehension through educational programs fostering narrative comprehension and its components.

1.6. Multicomponent Model of Comprehension

Narrative comprehension is an essential ability for many daily activities as well as for literacy acquisition and pivotal for reading acquisition and children's school readiness.

According to the theoretical framework of the Multicomponent Model proposed by Oakhill and Cain (2007), a successful narrative comprehension requires different components that interact dynamically between each other. Findings of several studies that examined this model support a multilevel representation of language and cognitive skills involved in narrative comprehension, which are included in one of three broad categories, namely lower-order cognitive skills, lower-order language skills and higher-order cognitive skills, and entailed in two different levels of processing (Cain, Oakhill, & Bryant, 2004). The first level of processing (lower level) involves components that allow basic processing of linguistic information, such as vocabulary and grammar, whereas the second level (higher level) involves components that allow reaching a coherent global representation of text meaning, such as inferential abilities, integration of previous knowledge with text information, knowledge of story structure and metacognitive abilities. All the components involved at lower and higher level of processing, interact dynamically and reciprocally by means of the presence of cognitive resources, namely memory, attention and inhibition which processing, re-elaborating, storing in memory, inhibiting and selecting information, and allow to build a coherent and cohesive mental representation of narrative meaning (Oakhill & Cain, 2007).

Figure 3. A visual representation of the Multicomponent Model of Comprehension



This Model provides a theoretical interpretative structure regarding which processes are involved in narrative comprehension and in which role they operate. Below are reported all the cognitive and linguistic skills included in the model and involved in comprehension.

1.6.1. Lower-order Cognitive Skills

Since narrative comprehension, more than reading comprehension, requires remembering words and phrases, holding and retrieving information from previous sentences, and relating text information to background knowledge, it would seem obvious the involvement of the working memory in this process. Working memory is the capacity to store and manipulate information (see Baddeley, Eysenck, & Anderson, 2009, for a review). To date, the specific role of working memory in narrative comprehension, namely whether it is direct or mediated by other skills is still unclear. Strasser and del Rio (2014) found that inferential abilities and comprehension monitoring partially mediate the effect of working

memory on narrative comprehension; however, other possible relations between working memory and narrative comprehension components were not investigated.

Another lower-order cognitive skill that was hypothesized and demonstrated to be important for narrative comprehension is inhibitory control that is the ability to inhibit a strong response in favor of a weaker, more appropriate one (Diamond & Lee, 2011). It is important to evaluate the effect of inhibition on narrative comprehension because the ability to inhibit attention to irrelevant details and focus on elements that are more central may lead children to have more resources available for successful comprehension. However, there is scant research on the relationship between inhibitory control and narrative comprehension in any modality (Kim & Phillips, 2014; Strasser & del Rio, 2014).

The third lower-order cognitive skill involved in comprehension is attention, which refers to the ability to focus attention on relevant stimuli to solve a task and to shift attention from one stimulus to another as needed (Blair & Diamond, 2008). It seems reasonable to speculate that it is an important cognitive ability for successful narrative comprehension since requires to focus attention on relevant elements and relations to a global and coherent representation of text meaning.

1.6.2. Lower-order Oral Language Skills

The semantic competences of the linguistic processes on which the Multicomponent Model is based are represented by the lexical subdomain and by that of the syntactic structure. Vocabulary knowledge represents the core ability and one of the best predictors of narrative comprehension from kindergarten to school (Florit, Roch, Altoè, & Levorato, 2009; Kendeou, Bohn-Gettler, White, & Van Den Broek, 2008, Sénéchal et al., 2006). However, vocabulary itself is not sufficient for a successful comprehension; syntactic knowledge is necessary as well (Oakhill, Cain, & Bryant, 2003).

Children's syntactic knowledge was shown to be related to sentence processing (Pizzioli & Schelstraete, 2013), whereas only a few studies have investigated relation between syntactic knowledge and narrative comprehension and, consequently, its role is not yet completely clarified. Florit and colleagues (Florit, Roch, & Levorato, 2013) found that the role played by sentence comprehension is fully mediated by basic semantic, lexical and cognitive components, showing that syntactic knowledge necessary for understanding isolated sentences does not play a crucial role in establishing the meaning of a text, at least when word knowledge and verbal working memory are taken into account. Additionally, Kim (2015) investigated mediation via higher-order skills, of syntactic knowledge in narrative comprehension, finding that syntactic knowledge was directly related to narrative comprehension as well as indirectly via comprehension monitoring and ToM.

1.6.3. Higher-order Cognitive Skills

So far, the basic linguistic components that allow narrative comprehension according to bottom-up processes have been addressed, i.e. through the automatic processing of linguistic information that the child has implicitly acquired. However, narrative comprehension is not a mere process of adding linguistic elements and requires the use of top-down processes as well which process linguistic information to give it a meaning related to the context, previous knowledge and the interlocutor. Therefore, a successful narrative comprehension also relies on higher-order cognitive skills.

When children hear or read a story, to understand stories adequately, they must be able to draw spontaneously appropriate inferences (Oakhill, 1984). Inferential ability refers to the ability to integrate explicit contents of the story with previous knowledge to derive meaning that is not explicitly stated in the text (Lepola, Lynch, Laakkonen, Silvén, & Niemi, 2012). The ability to generate inferences has been found to contribute to young children's ability to

understand literal as well as inferred meaning, leading to a better comprehension (Florit, Roch, & Levorato, 2011; Tompkins, Guo, & Justice, 2013).

Although inferential abilities affect also inferences about internal states of characters, this kind of inferences is influenced presumably and additionally by children's theory of mind. Theory of mind refers to the ability to understand own and others' mental states and predict others' behaviors (Howlin, Baron-Cohen, & Hadwin, 1999). Several studies analyzed the role of ToM in narrative comprehension often reporting direct relations with different measures of narrative comprehension (Makdissi & Boisclair, 2006; Trabasso & Wiley, 2005; Strasser & del Rio, 2014).

Another higher-order cognitive skill involved in narrative comprehension is the knowledge of story structure. Story structure refers to the organization found in common children's stories (Graesser, Golding, & Long, 1991). Story structure elements include the setting and the main character, an initiating event and the characters' reaction, solution attempts, the outcome of these attempts, and the ending reaction. The relationships among these elements can also be expressed by story grammar (Graesser et al., 1991; Mandler & Johnson, 1977). Knowledge of story structure acts as a schema that supports comprehension (Mandler & Johnson, 1977; Nelson-Herber & Johnston, 1989).

Alongside the unconscious mechanisms involving cognitive and linguistic skills described so far, narrative comprehension is also based on a conscious and voluntary process that involve metacognitive skills. This voluntary monitoring takes place simultaneously during the process of understanding itself and consists in recognizing the meaning of words, selecting most important information and understanding the relationships between them; afterward, strategies for improving understanding, by recognizing possible inconsistencies and implement possible restorative strategies can be used (Florit & Levorato, 2013).

Metacognitive skills develop during primary school when children face tasks that are more complex and have to identify inconsistencies, link explicit and implicit information, and learn how to manage resources and strategies in the best possible way (Skarakis-Doyle & Dempsey, 2008). Research confirms the role of metacognitive ability in the comprehension process showing that children with difficulty in understanding a text (poor comprehenders), report difficulties in the use of control strategies, especially in detecting text inconsistencies, errors and omissions in a piece and, as a result, have difficulties in generating a coherent and cohesive mental representation of the text (Palladino, Cornoldi, De Beni, & Pazzaglia, 2001).

Narrative comprehension ability develops in a gradual process which starts in early childhood and improves with the development of lower and higher-order components as well as individual experiences (Lepola, et al., 2012), thus, the contribution of each component for successful comprehension, as the relations between these skills, gradually changes in development (Lynch, van den Broek, Kremer, Kendeou, White, & Lorch, 2008).

1.7. How to promote emergent literacy?

To date, there is a growing interest regarding the links between children's experience and early literacy development. This growing interest reflects the sense of urgency that results from an awareness of the serious gap in achievement between children from different social, racial and linguistic backgrounds. This urgency is related to the growing evidence of the remarkable and long-term stability of children's literacy-related skills from preschool years until high school (Neuman & Dickinson, 2002). There is still limited knowledge of the dynamics that account for this stability over time; nonetheless, there is greater malleability in the early phases of development and early interventions can produce long-lasting changes.

The amount of research and educational efforts to reduce the gap in the development of emerging literacy among children, witness the widespread awareness of the need of our

society to address the needs of children who are remaining behind. Numerous scientists in this area show how recognition of this urgent need has been translated into interventions. It is well known that the earlier communication problems are identified, the more likely a program of intervention can be implemented and the child can enter school with the skills needed to learn (Hart & Risley, 1992). These interventions are based on an understanding of the cognitive and linguistic components of literacy development and the deep understanding of the importance of the surrounding context in the development of the child. There is extensive evidence that wide-ranging interventions, which are aimed to foster cognitive and linguistic development of pre-school children, are particularly effective.

1.7.1. Interventions promoting emergent literacy

As we have become increasingly aware of the long-term effects of these interventions, several intensive interventions have been developed to assist struggling children. In the literature, there are numerous examples of interventions aimed at enhancing language skills and emerging literacy, realized not only through the direct involvement of children, but also indirectly through the involvement of teachers and parents. Interventions for and with preschoolers have shown that the inclusion of the home setting in combination with a school setting facilitates children's language gains to a greater extent than interventions in the school setting alone (Whitehurst, Epstein, Angell, Payne, Crone, & Fischel, 1994), highlighting that home environment is a robust context for promoting broader language and literacy skills (Whitehurst & Lonigan, 1998). In line with previous research on literacy environment and practices, it is highlighted the central role of family in children's linguistic and literacy development; nonetheless, interventions are effective also in educational contexts (Early, Maxwell, Ponder, & Pan, 2017; Van Craeyevelt, Verschueren, Vancraeyveldt, Wouters, & Colpin, 2017). Although home and school often are seen as separate spheres by parents and teachers, children develop in both spaces (Hull & Schultz, 2002), thus it is important to

develop interventions to promote better oral language outcomes involving both spheres, namely home and school.

1.7.2. Shared book reading

Regardless of the type of intervention - direct or indirect, at home or at school - most of the pre-school interventions on emergent literacy are based on the activity that is mostly related to greater outcomes, namely shared book reading, a prototypical literacy activity that provides a potentially rich source of information and opportunity to learn language in a developmental sensitive context.

Oral language in the classroom and at home tends toward functionality as teachers, parents, and children get on with the "business of life" (Bravo, Hiebert, & Pearson, 2007, p. 140). In contrast, book language is rich in unusual verbs, descriptions, and figurative language. As teachers or parents draw children into the reading, the ensuing motivation and engagement increase the possibility that new words will be learned (Bloom, 2000). Shared reading also contributes to the future reading ability by exposing children to "important ideas and themes of consequence" (Heisey & Kucan, 2010) before they are able to engage with text independently. Through the interactions during shared book reading, children develop a schema for topics and concepts beyond their own experiences that will support their later reading comprehension. Reading books aloud to children is a practice that is widely proved to have a positive influence on the development of different literacy skills, language development, and world knowledge. Shared book reading, in fact, provides opportunities to build oral language, vocabulary, comprehension phonological awareness (Neuman, 1999; Beauchat, Blamey, & Walpole, 2009), and to focus on more narrowly constrained skills such as print functions, directionality and book handling concepts, letter identification, concepts of word and written language conventions (Zucker, Ward, & Justice, 2009).

It is widely agreed that variation in the frequency of shared book reading has effects on children's language development and educational outcomes. Children who come from homes, or are attended educational contexts, in which these activities are frequent show verbal precocity, richer receptive and expressive vocabulary, and better print knowledge (Crain-Thoreson & Dale, 1992; Debaryshe, 1993; Wells, 1985; Scarborough & Dobrich, 1994); moreover they tend to enter school with more well-developed understanding of literacy (Senechal, Thomas, & Monker, 1995).

For all these reasons, shared book reading is often recommended as a very important home literacy activity that adults, both parents, and teachers, can do to promote emerging literacy. The well-known effects of shared book reading highlighted the need for more research that focuses on the effects of the quality of the interaction during shared book reading rather than the quantity of book reading experienced in early childhood (Scarborough & Dobrich, 1994). When adults read books with children, in fact, a dynamic context is created that has the potential to affect the quality of the activity and children's linguistic outcomes (Barton & Hamilton, 2000). Adults vary significantly in the amount to which they interact with children during shared book reading. Amount of interaction is strongly associated with the children's trajectory of language acquisition: the greater amount of interaction and parents' adjustments during interaction supports children's language acquisition and produce a long-lasting language advantage (Hart & Risley, 1995; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). The belief is that it is the interaction during shared book reading that facilitates children's language abilities and promotes better linguistic outcomes.

1.7.3. Dialogic book reading

Dialogic book reading represents a particular type of shared book reading developed by Whitehurst and colleagues (1988), and widely investigated and validated. Dialogic book

reading recognizes a more active role of the child in storybook reading, and thus it involves several changes in the way adults typically read books to children. The central aspect of this approach is a shift in roles: whereas during typical shared reading activity, the adults read and the child listens to the story, with this approach the child learns to become the storytellers.

This approach is based on three main principles: (a) encourage the child to participate actively, (b) provide feedback to the child, and (c) adapt adults' reading style and language to the child's growing linguistic abilities. Following these three principles, the adult assumes the role of an active listener, asking questions, adding information, and prompting the child to increase his active participation. A child response to the book is encouraged through praise and repetition and more sophisticated responses are encouraged by expansions of the child's utterances and by more challenging questions from the adult which can be summarized by the acronym CROWD, namely Competition, Recall, Open-ended, Wh-question e Distancing, briefly described below.

- Completion consists in inviting the child to conclude a sentence formulated by the adult and which lacks the final part; this type of request provides the child with information on the structure of the language which is fundamental for subsequent reading skills, and also provides a phrasal context thanks to which the child can make logical deductions;
- Recall consists in questioning the child about what happened in the story, favoring in this way the ongoing understanding of the story;
- Open-ended questions require the child to describe the events narrated and help them to increase their expressive fluidity and to pay attention to textual details that promote narrative comprehension;
- Wh - question, which means "who?" questions "what?" "Where?" "When" "Why?", can be asked either by referring to the illustrations in the book (for example, "tell me what this object is called") or to the events of the story. This type of prompt is useful for the lexical

acquisition process since the presentation of the word during the reading activates the fast mapping processes while the explicit request activates the slow mapping processes of semantic enrichment; at the same time, the more complex questions can strengthen the logical and cognitive processes necessary for the elaboration of the inferences, we refer above all to the temporal (questions "when?") and causal (questions "why?") connections;

- Distancing prompts consist in inviting the child to relate images, events and words present within the story to real-life events with the aim of generalizing what has been learned during reading into an external context, emphasizing the importance of the knowledge possessed for narrative comprehension and the importance of generalizing the use of words acquired to other context-life, thus improving verbal fluency, conversational and narrative skills (Whitehurst, 2009).

Dialogic book reading has been designed for preschoolers but clearly, the cognitive complexity of some of the stimuli requires that adults modulate the requests on the basis of the developmental peculiarities of children so that they operate in the area of proximal development, in order not to be cognitively too demanding. In this regard, it is important to keep in mind that dialogic reading must be a pleasant activity for the child. It is therefore important to follow his/her interests by adapting the requests, both to ensure that the child builds a positive idea (which is also useful for the subsequent school approach) and to prevent it from becoming a frustrating and threatening activity (Justice & Kaderavek, 2002).

Previous programs that induced parents and educators/teachers, not only to read more to children but also to use instructive behaviors and strategies to encourage adults to be more interactive and children to be more active, reported benefits to children's oral language, particularly on vocabulary (Crain-Thoreson & Dale, 1999; Lonigan & Whitehurst, 1998; Wasik & Bond, 2001; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, Epstein,

Angell, Smith, & Fischel, 1994), and broad emergent literacy skills (Sénéchal, 1997; Sénéchal, Thomas, & Monker, 1995).

From what has just been explained, dialogic book reading is an extremely successful activity for the development and enrichment of emerging literacy, with a view of enhancing linguistic, cognitive, communicative and socio-affective skills of children, who learn in a fun and enjoyable way and of preventing later learning difficulties. Similarly, dialogic reading intervention both at home and school have produced positive gains for children from low-income and otherwise dis-advantaged backgrounds that, generally, have limited vocabularies, as it promotes best practices in home and school literacy (Whitehurst et al., 1994; Simsek, & Erdogan, 2015; Zevenbergen, Whitehurst & Zevenbergen, 2003). Previous studies have shown that dialogic book reading intervention can be administered by a variety of adults (e.g., parents, educators, and teachers) with minimal training, and in different educational contexts.

In a recent study, Lonigan, Purpura, Wilson, Walker, and Clancy-Menchetti (2013) have found that children who received dialogic book reading intervention, phonological awareness, letter knowledge interventions experienced more growth than children who attended their classroom curriculum. All the findings reported above, highlight that although dialogic book reading was initially designed for the domestic educational context, can promote children's vocabulary acquisition and emergent literacy development also when carried out as a part of the preschool curriculum, (Lever & Sénéchal, 2011; Storkel, Voelmle, Fierro, Flake, Fleming, & Romine, 2017).

However, although the evidence in favor of highly dialogic reading is strong, adults do not typically read this way without instruction, but they read with directive style or at most by asking closed-choice questions (Huebner & Meltzoff, 2005). Nevertheless, evidence from previous implementations of dialogic reading programs demonstrates that it is relatively easy

to teach parents and educators how to maximize shared reading to foster language and literacy development in young children.

1.8. Aims of this work

The extensive literature exposed in previous paragraphs states that emergent literacy skills in preschool are among the best predictors of school readiness and later school success, which are associated with early socio-emotional skills, behavioral control, math, and literacy performance and set long-term trajectories that may translate into gaps in academic achievement, IQ in adulthood and general life outcomes.

Although the role of environmental factors on emergent literacy skills development as well as the long-term effects of early interventions are well established, still, there is a conspicuous percentage of children that begin their formal schooling process with low scores in basic emergent literacy skills and thus result unprepared to handle the demands of the school learning processes.

This evidence highlights the need for further studies designed to investigate the specific effect of the above reported environmental factors on the development of cognitive and linguistic skills in preschool, as well as the development and validation of new interventions aimed to foster the development of emergent literacy skills in preschoolers. It is within this broad theoretical framework and to fill these gaps present in literature that five studies were carried out as described in the following five chapters, each with its own specific aims:

- The purpose of the first study was to investigate the specific and unique role of familiar Socio-Economic Status and Bilingual exposure on a large set of cognitive and linguistic abilities, pivotal of school readiness, in preschool children in order to disentangle their usually confounded effects;

- In the second study, moving within the theoretical framework of the "multicomponent model of text comprehension", we examined the contribution of receptive vocabulary (the key component of narrative comprehension) in narrative comprehension of Italian-English sequential bilingual children;
- The third study, was aimed to expand our understanding on structural relations among a large and comprehensive set of linguistic and cognitive abilities and narrative comprehension, within the framework of "multicomponent model of comprehension", in preschool children speaking Italian as Native or non-native language, taking thus into account also the effect of cumulative exposure to language of context;
- The fourth study was aimed to analyze the feasibility and efficacy of a brief classroom-based shared book reading direct intervention aimed to foster broad oral language abilities in preschoolers coming from low-SES families;
- The last study was aimed instead to analyze the feasibility and efficacy of an indirect intervention on dialogic book reading involving parents, aimed to foster broad oral language skills of pre-school children at home.

As deductible from the brief description of the aims of each study, the first three were aimed to produce new theoretical knowledge on emergent literacy development whereas, the last two were, mostly related to practical implications through the implementation of these new findings to educational interventions. Understanding the specific role of each environmental factor in the development of Emergent Literacy, understanding the structural relations among components of narrative comprehension and promoting their development through effective interventions at pre-school age – an important step towards the literacy process - might enable all children to have the same opportunity to be "ready to learn" once they start school and prevent risk situations or school difficulties.

CHAPTER 2 – First study

2.1. Introduction

In the General Introduction have been mentioned some environmental factors related to the development of children's cognitive and linguistic skills, namely Bilingualism, Socioeconomic Status, and Home literacy environment (HLE). In this study, the focus was specifically on two of these environmental factors, Bilingualism and Socioeconomic Status.

Nowadays, it is well documented that Bilingual exposure (hereafter, BE) and socioeconomic status (hereafter, SES) impact children's developmental trajectories, yielding variation in their linguistic and cognitive profiles (Meir & Armon-Lotem, 2017), but rarely they have been studied jointly.

Several studies tried to identify the ways in which these environmental factors influence children's development, however, identifying the unique and specific role of BE and SES on children's linguistic and cognitive outcomes is particularly difficult because of the frequent coexistence of these two factors that produces confounding effects. Therefore, to date, the specific contribution of these two environmental factors (and interactions between these) on linguistic and cognitive skills is still unclear. To our knowledge only four studies have attempted to evaluate the independent and combined effects of SES and BE on linguistic and cognitive skills in children (e.g. Calvo & Bialystok, 2014; Chait & Polišenská, 2016; Gathercole et al., 2016; Meir & Armon-Lotem, 2017).

Previous studies, however, do not provide clear information on the type of bilinguals tested and provide scares information concerning the amount of exposure; most of them have used different measures to determine SES and adopted different tasks to assess language and cognitive skills. Finally, these studies adopted different methodologies to answer this research

question. The majority of these studies used a between-subjects design in order to compare the performance of bilinguals to demographically matched monolingual peers. Although such designs can establish fundamental group differences in their performance, they are largely insensitive to variability within each group of participants.

In this study, assuming that bilingualism is best described as a multidimensional construct rather than a categorical variable, we analyzed the influence of bilingual exposure - assumed as a continuous variable - and SES on a large set of tasks that cover four domains of executive function (inhibition, shifting, and WM) a range of linguistic tasks (semantic access, receptive vocabulary, grammar and narrative comprehension) and ToM. The current study is placed into the open-debate around Bilingual advantages and is expected to deepen our understanding of how bilingual exposure and SES affect linguistic and cognitive abilities in preschool children. Precisely, because these two experiences frequently coexist, it is important to disentangle the role of these environmental factors, both in terms of their specific role played in children's development and in terms of possible underlying mechanisms.

2.2. Aim

The main aim of the current work concerns the analysis of the specific and unique role of SES on the one hand, and of BE on the other, in language (vocabulary, grammar and narrative comprehension, lexical access), TOM and cognitive skills (inhibition, shifting and WM) in order to disentangle their role in preschoolers' development. In addition, the interaction between the two factors will be verified. Based on previous studies (for details see Chapter 1) it is expected that the two factors play independent, rather than interactive influence in language and cognitive development (cf. Calvo & Bialystok, 2014; Chait & Polišenská, 2016; Gathercole et al., 2016; Meir & Armon-Lotem, 2017).

2.3. Method

2.3.1. Participants

In this study, approved by the Ethical Board of the Representative Institution (protocol number 2064), participated one hundred and eleven children (61 boys and 50 girls) aged between 44 and 75 months (mean = 61.9 months, *SD* = 6.8 months). Parents were informed about the study during a parent-teacher meeting and were asked to sign a consent form if they agreed to take part and let their child take part.

2.3.2. Materials and procedure

Parents were asked to fill in a questionnaire at home and return it to the school, whereas children were tested individually in three sessions at school. All tasks were presented to children in Italian, i.e. language of context, which for children from bilingual families corresponded to L2. Tasks were presented in a fixed order and each session of assessment lasted approximately 30 minutes.

2.3.2.1. Background measures

A detailed questionnaire, developed by Roch, Florit, & Levorato (unpublished), was used to collect background measures in order to compute the following two independent variables:

- *Socioeconomic status:* We measured SES as the education level of both parents and the annual family income level. In both cases, data were collected categorically: parental educational levels were classified into 6 categories (1 = Primary education degree, 2 = Middle school degree, 3 = High school degree, 4 = Bachelor's degree, 5 = Master's degree, and 6 = Post-graduate education) and annual income was coded based on a 5- point scale (1 = below 24.000 €, 2 = 25.000-30.000, 3 = 31.000-34.000 €, 4 = 35.000-40.000 €, 5 = above 40.000 €). Categories were transformed into a continuous scale of years of education and Euro (in thousands). A composite SES score is calculated by combining income and education levels

into one variable trough Principal Components Analysis (Bryant, & Yarnold, 1995). For each participant, mother's education, father's education, and household income are entered into the model, and a composite SES score is computed.

- *Bilingual exposure:* we collected data from this section to obtain information on the languages spoken by family members, and to estimate children's current amount of exposure, as well as their amount of exposure over time to L2 (i.e. language of context). We used the following variables concerning the language status:

a) Cumulative exposure to language of context (CELC): difference between the age of onset and the age at the time of testing. This measure corresponds to chronological age for monolingual children while for bilingual children, provides the amount of time that they spent, in their whole life, exposed to the L2 (language of the context);

b) Daily exposure to language of context (DELC): the mean percentage of the current daily use of each language in different contexts and with different persons. For monolingual children this percentage corresponds to 100, for children exposed to more than one language, it ranges between 0 and less than 100%

2.3.2.2. Linguistic skills

Receptive vocabulary: The PPVT Revised (Dunn & Dunn, 1981; standardized for Italian speakers by Stella, Pizzoli, & Tressoldi, 2000) is a standardized test that evaluates receptive vocabulary. It consists of a list of words, in order of increasing difficulty, presented to participants who are asked to indicate which out of four pictures best represents the target word. A basal level is defined based on the child's ability to give 8 consecutive correct answers. Testing is then continued until the participant obtains 6 incorrect answers out of the last 8 words presented (ceiling level). Raw scores correspond to the number of correct answers minus the number of errors (range 0 - 175). Standard scores are computed based on

raw scores: Mean = 100, *SD* = 15. The reliability for the PPVT-R, which was evaluated using the split-half procedure, is .88.

Semantic access: Speeded naming subtest from the linguistic domain of *NEPSY-II* (Korkman, Kirk, & Kemp, 2007), was used to obtain normed measures of rapid semantic access and production of names of colors, shapes, sizes. Tester shows to the child an array of colors and shapes; colors, shapes, and sizes; or letters and numbers and asks to name them in order as quickly as possible. For each item, accuracy, self-corrections, and speed are recorded. Scaled Scores that combine time and accuracy were calculated (mean = 10, *SD* = 3). The test-retest reliability is .93 in the youngest children (3 – 4 years) and .72 for children between 5 and 6 years.

Sentence comprehension: The Prova di Valutazione della Comprensione Linguistica (Test for the Evaluation of Linguistic Comprehension; Rustioni & Associazione "La Nostra Famiglia", 1994) is a standardized test for children aged between 3;6 and 8 years which evaluates grammar comprehension. Sentences contained salient morphosyntactic cues, such as gender and number agreement, conjunction, negation, different types of phrasal structures (i.e., relative, passive, temporal). Children, who were presented with the form of the test appropriate for their age, were required to choose which picture from among a set of four correctly represented the sentence spoken by the experimenter. One point was credited for each correct answer and the percentage of correct answers was the total raw score. Raw scores can be converted into weighted scores ranging from 0 to 100; these scores evaluate children's overall performance taking into account the number of correct answers and also the level of difficulty of each item.

Narrative comprehension: The test TOR 3-8 (Levorato & Roch, 2007) is a standardized test for the Italian language, which evaluates narrative comprehension of children aged between 3 and 8 years of age. The tester reads two stories aloud and, to minimize the cognitive and

memory load, he/she interrupted reading at two predetermined points and asked multiple-choice comprehension questions. The tester presents four alternative answers, both verbally and using pictures, and asks participants to point the correct picture. Comprehension was assessed for each story using 10 questions, half concerning information explicitly stated in the story and half-requiring inferences to be generated. The score consists of the sum of correct answers, 10 for each story, with a maximum score of 20. Raw scores are transformed into standard scores having the Mean = 10, *SD* = 2. The internal reliability, evaluated by calculating Cronbach's alpha over items, ranges from .52 to .72.

2.3.2.3. Cognitive skills

Working memory: the digit span, WISC sub-test (Wechsler, 2003, standardized for Italian speakers by Orsini, Pezzuti & Picone, 2012), was used to assess working memory. Tester reads aloud a list of pre-determined random numbers ranging from two to nine digits in the forwards trial and from two to eight digits in the backward trial. In the forwards trial, children were asked to repeat the digit sequence in the same order. In the backward trial, that requires simultaneous storage and processing of information in memory, children were asked to repeat the sequence in reverse order. Digit span score corresponds to the total number of trials, forwards and backwards, completed correctly (range 0 - 32). The longest list length correctly repeated in the two trials were reported as Forward and Backward span (forwards = 9; backward = 8). The reliability for this task, evaluated using the split-half procedure, is .81.

Executive functions: Two subtests of FE-PS 2- 6 (Usai, Traverso, Gandolfi & Viterbori, 2017) namely Day & Night test and Dimensional Change Card Sort were used.

Day & Night test (Gerstadt, Hong & Diamond, 1994) was used to assess inhibition, the ability to suppress a dominant response related to perceptual stimuli in the task while selecting and executing a competing, conflicting response. This task contains two decks of cards: the first contains 8 cards depicting a chessboard and 8 an X; the second deck contains 8

cards depicting a sun and 8 a moon. In the control condition, the tester trains the child to say "day" when there is an X card and "night" when there is a chessboard card. In the Inhibition condition (i.e. Stroop condition), the child has to say the word 'day' when viewing a card depicting a nighttime sky and to say 'night' when shown a picture of the daytime sky. Each child completed 16 trials for each condition that were scored 0 (incorrect) or 1 (correct). Three different scores are calculated: accuracy (range 0-16), speed (in seconds); inhibition score is given by subtracting the accuracy in the Inhibition condition from performance in the Control one (range -16 to 16). The reliability, evaluated by calculating Cronbach's alpha over the items, is .85.

The Dimensional Change Card Sort (DCCS) was used to assess attention-shifting skills. This task involves sorting neutral cards based on characteristics of the object presented on cards. The DCCS consists of 3 decks of cards one for each phase and requires that children sort each card presented into one of two locations/piles according to a rule provided by the experimenter. During the first phase ("shape game"), children are instructed to sort cards into the correct piles based on shape. In the second phase, children are told that the rule has changed and they now must sort cards based on color ("color game"). In the third phase ("border game"), children are told that cards with border would be sorted according the role of the "shape game", while cards without border would be sorted according to the role of the "color game". Tester records how many cards the child can classify correctly in each trial: performances on the shape and color version are scored as the number correct choices out of 6; performance on the border version is scored as the number correct choices out of 12 (range accuracy 0-24). Total accuracy was used. The reliability, evaluated by test-retest, is .36.

Theory of Mind (ToM): We developed a Contents False Belief task (adapted from Gopnik & Astington, 1988). In this task, children were shown the "pasta box" and were asked to guess its content. Then, the tester showed the actual content of the box (i.e., pencils) and asked

children to identify what the object was. In the control trial ("self" question) the tester asked, "What did you think was there when you saw it?". The second part of this task involves the ToM trial: another person come into the room for a while, looked at the "pasta box" and went out; after this, the tester asks the child what the other person thought would be in the box ("other" question). The score ranged between 0 - 2 (Molzhon, 2016): either 1 (correct) or 0 (incorrect) is given to the "self" and "other" question.

2.4. Results

2.4.1. Descriptive statistics

2.4.1.1. Socioeconomic status:

Table 1: Descriptive statistics of SES measures

Variable	N	Percentage	range	Mean (SD)
Years of Maternal Education			5 - 22	13.4 (3.4)
Less than High school degree	22	22.6		
High school degree	39	40.2		
More than High school degree	26	37.2		
Years of Paternal Education			5 - 20	12.9 (3.5)
Less than High school degree	25	26		
High school degree	44	45.8		
More than High school degree	27	28.2		
Household income			18.000 - 46.000	30.340 (8.3)
below 30.000 €	36	37.1		
31.000-34.000 €	34	35.1		
above 35.000€	27	27.8		

The group varied widely in socio-economic status: years of education ranged from 5 to 22 for the mothers and from 5 to 20 for the fathers, with mean 13 years, equivalent to receiving a

high school degree (*SD* = 3.3); household income ranged from € 18.000 to over € 41.000 with mean equal to € 30.340 (*SD* = € 8.317).

Income and education levels were combined into one variable (SES) using Principal Components Analysis (Bryant, & Yarnold, 1995). The first principal component weighted education and income equally and accounted for 64 percent of the original variance. The mean score of the composite is 0 (*SD* = 1). Families with high scores on the SES composite variable have high annual income levels and high level of education.

2.4.1.2. Language status and use:

In 28 families of our final group there was at least one parent whose native language was not Italian. All the children raised in these families have been receiving significant continuous exposure to both languages starting before the age of 3 years, and have received at least 2 years of formal language provided in educational settings.

These children correspond to 25% of the sample, a percentage higher than that found in the last National survey, according to which in this area the percentage of children exposed regularly to more than one language during preschool is 15% (Istat, 2014)[3].

Concerning the age of first exposure to the language of context (L2 = Italian) we found that the range of age of onset (AoO) was very wide: from 0 months to 36 months (mean = 6.3; *SD* = 10.1 months). Starting from this information we computed the cumulative exposure to language of context (CELC) which ranged between 24 and 75 months. The ranges of current daily exposure to language of context (DELC) and the daily language use were very wide. Current daily exposure to language of context (DELC) ranged between 29 and 100, whereas children's daily language use ranged between 33 and 100.

[3] Istituto nazionale di statistica https://www.istat.it/it/archivio/134686

2.4.1.3. Language and cognitive skills

All participants, except one child, completed all the tasks (descriptive statistics are reported in Table 2). Performance on the majority of tasks covered a large range of scores and none suffers from ceiling effects whereas we found a floor effect on Digit span task. Distributions of the majority of the variables approached symmetric, with the exception of performance at DCCS task. An inspection of frequencies of scores indicated that large kurtosis value was because 75% of children scored between 16 and 21.

Table 2: descriptive statistics (range, mean, standard deviation, Skewness and Kurtosis) for age and performance on linguistic and cognitive tasks

Variable	Min	Max	Mean	SD	Skewness	Kurtosis
Linguistic skills						
PPVT-R: Receptive vocabulary (M = 100; sd = 15)	53	118	82.6	13.4	.32	-.34
Speeded naming: Semantic access (M = 10; sd = 3)	4	16	9.69	2.8	-.18	-.56
PVCL: Sentence comprehension (range 0-100)	11	93	55	19.2	.13	-.73
TOR 3-8: Narrative comprehension (M = 10; sd = 2)	7	15	10.5	1.8	-.10	-.73
Cognitive skills						
Digit span: Working memory (range 0-32)	2	15	7.5	2.9	.03	-.82
Day & Night: Inhibition (range -16-16)	-11	14	1.8	4.4	.91	1.9
DCCS: Attention shifting (range 0-24)	7	24	18.4	2.9	-1.01	3.8
ToM: Theory of Mind (range 0-2)	0	2	1.2	.68	-.30	-.81

2.4.2. Correlations between SES, BE and performance on linguistic and cognitive tasks

As can be seen from Table 3, cumulative (CELC) and daily exposure to language of context (DELC) shown from weak to moderate correlation ($.19 < r < .55$) with all linguistic and cognitive outcomes. The greatest correlation ($r = .55$, $p < .001$) was, as expected, between DELC and receptive vocabulary. For what concern SES, we found a moderate correlation with receptive vocabulary ($r = .44$, $p < .001$), grammar and narrative comprehension, working memory and ToM. A pattern of significant correlations emerged among language and cognitive skills.

Table 3: Correlation matrix of Bilingual exposure, SES and linguistic and cognitive measures

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. CELC	1	.32**	.15	.53**	.20*	.25**	.42**	.43**	-.26**	.30**	.19*
2. DELC		1	.46**	.55**	.27**	.33**	.42**	.11	-.21*	.04	.24**
3. SES			1	.44**	.19	.31**	.24*	.31**	-.06	.02	.22*
4. Receptive vocabulary				1	.48**	.50**	.68**	.45**	-.27**	.20*	.45**
5. Semantic access					1	.26**	.41**	.38**	-.09	.26**	.30**
6. Grammar comprehension						1	.46**	.43**	-.07	.27**	.39**
7. Narrative comprehension							1	.34**	-.26**	.15	.33**
8. Working memory								1	-.20*	.39**	.38**
9. Inhibition									1	.01	-.01
10.Attention Shifting										1	.11
11.Theory of Mind											1

**. Correlation is significant at the 0.01 level (2-tailed)

*. Correlation is significant at the 0.05 level (2-tailed)

2.4.3. Specific contribution of Bilingual Exposure and SES to linguistic and cognitive skills

In order to identify the unique and specific contribution of bilingual exposure and SES on linguistic and cognitive skills in preschoolers, a series of hierarchical regression analyses were carried out on the scores obtained on each task. Predictors were cumulative exposure to language of context (CELC) inserted in the first step, daily exposure to language of context (DELC), SES, were inserted in the second and third step, and the interaction between DELC and SES in the fourth step. For each skill, two hierarchical regression analyses were carried out in which the order of entry of DELC and SES (second and third steps) was inverted whereas the remaining predictors were unvaried. This procedure allowed us to assess unique variance accounted for by each predictor controlling for the other. In the following tables, the specific contribution of SES (model 1) and the specific contribution of DELC (model 2) are reported, cumulative exposure to language of context (CELC) and interaction which are common to both models. Results of analyses are shown in Table 4 (a-h) with R^2 change, partial β coefficients, *t* values, and significance levels.

Table 4a. Results of the hierarchical regression analyses on receptive vocabulary (PPVT-R)
$R^2 = .78$

	Predictors	R^2 change	ß	t	*p*
	CELC	.284*	.523	6.099	.000
Model 1	SES	.047**	.245	2.876	.005
Model 2	DELC	.060▵	.290	3.253	.002
	SESxDELC	.001▵▵	-.135	-.269	.788

*F change (1, 94) = 37.198, $p < .001$; ** F change (1, 92) = 8.269, $p < .05$.
▵ F change (1, 92) = 10.580, $p < .05$; ▵▵ F change, n.s.

Table 4b. Results of the hierarchical regression analyses on Semantic Access (Speeded Naming) $R^2 = .06$

	Predictors	R^2 change	ß	t	*p*
	CELC	.038*	.195	1.917	.058
Model 1	SES	.015**	.136	1.206	.231
Model 2	DELC	.006∴	.093	.793	.430
	SESxDELC	.001∴∴	.198	.287	.775

*F change, n.s.; ** F change, n.s.;
∴ F change, n.s.; ∴∴ F change, n.s.

Table 4c. Results of the hierarchical regression analyses on Grammar comprehension (PVCL) $R^2 = .13$

	Predictors	R^2 change	ß	t	*p*
	CELC	.079*	.281	2.822	.006
Model 1	SES	.038 **	.218	2.037	.045
Model 2	DELC	.014∴	.139	1.242	.217
	SES X DELC	.003∴∴	.375	.573	.568

*F change, (1, 93) = 7.956, $p < .05$; ** F change, (1, 91) = 4.150, $p < .05$
∴ F change, n.s.; ∴∴ F change, n.s.

Table 4d. Results of the hierarchical regression analyses on narrative comprehension (TOR) $R^2 = .22$

	Predictors	R^2 change	ß	t	*p*
	CELC	.176*	.419	4.479	.001
Model 1	SES	.006**	.086	.839	.404
Model 2	DELC	.041∴	.238	2.237	.028
	SESxDELC	.000∴∴	.008	.013	.990

*F change, (1, 94) = 20.058, $p < .001$; ** F change, n.s.
∴ F change, (1, 92) = 5.006, $p < .05$; ∴∴ F change, n.s

Table 4e. Results of the hierarchical regression analyses on Working Memory (Digit span)

R^2 = .30

	Predictors	R^2 change	ß	t	*p*
	CELC	.180*	.424	4.539	.000
Model 1	SES	.092**	.343	3.405	.001
Model 2	DELC	.032∴	-.210	-2.002	.048
	SESxDELC	.000∴∴	-.141	-.239	.812

*F change, (1, 94) = 20.605, $p < .001$; ** F change, (1, 93) = 4.008, $p < .05$
∴ F change, (1,92) = 11.591, $p < .001$; ∴∴ F change, n.s.

Table 4f. Results of the hierarchical regression analyses on inhibition (Day & Night) R^2 = .10

	Predictors	R^2 change	ß	t	*p*
	CELC	.075*	.273	2.753	.007
Model 1	SES	.002**	-.055	-.488	.627
Model 2	DELC	.023∴	.179	1.531	.129
	SESxDELC	.000∴∴	.619	.944	.348

*F change, (1, 94) = 7.579, $p < .05$; ** F change, n.s.
∴ F change, n.s.; ∴∴ F change, n.s

Table 4g. Results of the hierarchical regression analyses on Attention shifting (DCCS)

R^2 = .11

	Predictors	R^2 change	ß	t	*p*
	CELC	.107*	.326	3.331	.001
Model 1	SES	.001**	-.003	-.028	.978
Model 2	DELC	.003.∴	-.063	-.549	.978
	SESxDELC	.006∴∴	-.541	-.802	.452

*F change, (1, 93) = 11.097, $p < .001$; ** F change, n.s.
∴ F change, n.s.; ∴∴ F change, n.s.

Table 4h. Results of the hierarchical regression analyses on Theory of Mind (ToM) $R^2 = .10$

	Predictors	R^2 change	ß	t	p
	CELC	.038*	.194	1.907	.060
Model 1	SES	.025 **	.176	1.562	.122
Model 2	DELC	.004∴	.070	.610	.534
	SESxDELC	.040∴∴	1.35	2.014	.047

*F change, n.s.; ** F change, n,s
∴ F change, n.s.; ∴∴ F change, (1, 90) = 4.058, $p = < .05$

Results revealed that the model, which includes BE, SES, and their interaction explains a range between 6 - 78% of variance in several linguistic skills. The highest amount of variance is explained for vocabulary, narrative comprehension, and WM. For all measures except for semantic access and ToM, cumulative exposure to language of context (CELC) contributed to the highest amount of total variance of both linguistic and cognitive skills: the longer is the exposure to the language of context, the higher are the linguistic and cognitive outcomes. In particular, for what concerns linguistic skills, it explains 28% of variance in receptive vocabulary, 8% and 17% in grammar and narrative comprehension whereas for cognitive skills it explains 18% of variance in working memory, 7% in inhibition and 10% in shifting.

Independent and specific effects of both SES and DELC in linguistic and cognitive skills were found. SES accounted for 4 - 9% of unique variance in various cognitive and linguistic abilities. Children's performance is higher in function of greater SES condition in receptive vocabulary, grammar comprehension, and working memory. On the other hand, DELC contributed specifically to children's outcomes in receptive vocabulary and narrative comprehension, with higher performance associated to greater daily exposure to the language of the context. DELC contributed significantly to the performance in working memory, which is higher in function of greater daily bilingual exposure. The largest account of DELC is in

receptive vocabulary (6% of unique variance), followed by narrative comprehension (4% of unique variance) and working memory (3% of unique variance). There is only a significant interaction that emerged between SES and DELC on ToM performance, showing that better outcomes were found for higher SES children more exposed to the language of context.

2.5. Discussion

The main purpose of this study was to investigate the unique and specific contribution of two environmental factors, namely Bilingual Exposure and Socioeconomic Status, on a large set of cognitive and linguistic skills and to analyze whether their effects were interactive or independent.

The main finding of the current work is that both Bilingual exposure and SES contribute to individual differences in a large number of linguistic and cognitive skills during preschool age, and their contribution, with exception to ToM, is independent, unique and specific. In particular, we found a unique contribution of SES, after controlling for BE, in vocabulary, grammar, and working memory. On the other hand, BE, over and above the effect of the SES, predicted specifically vocabulary, narrative comprehension and working memory. Finally, an interaction between the two factors in predicting ToM was found, suggesting a higher ToM associated with a condition of higher SES and greater monolingual exposure. We failed to find specific effects of both SES and BE on rapid naming, inhibition, and shifting.

Research investigating the effect of environmental factors on language and cognitive outcomes has led to the awareness that the life situation of each child is uniquely complex and that life experiences might not be wholly independent of each other (Calvo & Bialystok, 2014). However, the current work provides new evidence that the two environmental factors examined contribute uniquely to language and cognitive development, irrespective of the other factor. The specific contribution of each factor is discussed in the following sections.

2.5.1. The role of SES in language and cognitive skills

The current findings are in line with previous studies that consistently demonstrated a negative effect of low SES on language development indicating that the impact of SES was equivalent for both monolingual and bilingual children (Calvo & Bialystok, 2014). Moreover, in line with previous studies, it was demonstrated that a negative effect of SES is not limited to the verbal domain: living in underprivileged backgrounds, which provide fewer and less adequate social-cognitive stimulation, affects children's cognitive abilities as well (Ardila et al., 2005; Fernald et al., 2013; Klenberg et al., 2001). In particular, the results of the present study indicated that SES variations are paralleled by variations in working memory (measured through a forward and backward digit span).

2.5.2. The role of Bilingual exposure in language and cognitive skills

One of the most original contributions of the current work concerns the way in which we defined the variable Bilingual Exposure, a continuous and multidimensional variable.

The cumulative exposure to the language of context, which indicates the precocity of potential bilingual exposure, explained the highest amount of variance in all the tasks considered ranging from 7 to 28% of variance. This means that variations in linguistic exposure should occur as earlier as possible in children's life and later onset of bilingual exposure produces a negative impact on a large set of linguistic and cognitive skills, especially in first phases of bilingual exposure. Our data support this claim by showing that the longer the bilingual experience, the higher the outcomes in language and cognitive skills.

As far as the specific contribution of the current exposure, namely the daily amount of linguistic input is concerned, it explained 3 - 6% of variation in linguistic comprehension (vocabulary and narrative comprehension) and in WM, independently form SES. Lower outcomes in vocabulary and narrative comprehension are obtained in association with increasingly bilingual environments. This finding was unsurprising, given that usually

children who acquire two languages simultaneously are not able to devote as much time to each of their languages as they would if they were learning only one (Gollan, Fennema - Notestine, Montoya, & Jernigan, 2007; Namazi and Thordardottir 2010; Thordardottir, Rothenberg, Rivard, & Naves, 2006).

On the other hand, children's performance on WM was higher in function of greater daily exposure to the language of context showing some benefit of bilingual exposure on WM. Perhaps, the continuous daily experience of exposure to more than one language requires greater memory load and this enhances the working memory. Besides WM, we failed to find any significant specific contribution of the amount of daily bilingual exposure on executive functions and ToM suggesting that we do not have any evidence supporting the "bilingual advantage" in cognitive abilities due to bilingual exposure.

2.5.3. Combined effects of SES - BE in linguistic and cognitive skills

Alongside evaluating independent effects, we assessed also the combined effects of SES and BE. For the majority of the tasks, the results for the combined effects are coherent with the previous research showing no interaction between SES and bilingualism (e.g., Calvo and Bialystok, 2014; Chiat and Polišenská, 2016). These findings suggest that SES similarly affects bilingual and monolingual children and that Bilingual exposure affects similarly children from different SES levels. An exception is provided by the significant interaction between SES and BE emerged for the performance in the ToM task, showing that higher ToM is paralleled by increasing SES and more exposure to the language of the context; conversely lower ToM is associated to lower SES and higher amount of BE. We speculate that our result might be related to a lower language comprehension of children coming from low-SES families and exposed to a bilingual environment, that prejudice performance on false belief task performance, highly dependent on language skills (Milligan, Astington, and Dack, 2007).

To sum up, BE and SES influence, at least in part, different skills. When both factors affect certain skill in the same direction, as it occurs for vocabulary, it means that children who come from low-SES and bilingual families are more vulnerable, since their performance is affected by more than one environmental factor. On the other hand, when both factors affect certain skill but with an opposite trend, as it occurs for working memory, it is desirable that the WM benefits from BE have a stronger impact than the negative impact of the SES: at least, this should be one of the promising purposes of intervention targeting low-SES children.

CHAPTER 3 – Second study

3.1. Introduction

In Chapter 1 has been thoroughly reported our theoretical framework about narrative comprehension, i.e. the Multicomponent Model of Comprehension (Cain & Oakhill, 2007), according to which narrative comprehension is a multi-component ability that involves several linguistic and cognitive skills to gain a coherent mental representation of text meaning (Kintsch & Kintsch, 2005).

Although several studies have investigated the effect of each specific component, inserted in the model, vocabulary still represents the most investigated component of narrative comprehension. Vocabulary is the core linguistic ability and one of the best predictors of narrative comprehension from the early stages of development (Sénéchal et al., 2006; Kim, 2016). On one hand, the knowledge of words is crucial for understanding the meaning of the whole narrative. On the other hand, exposure to texts represents the main source for the acquisition of new words (Roth, Speece, & Cooper, 2002; Cain, Oakhill, Barnes & Bryant, 2001). It has been also demonstrated that the relationship between the two is reciprocal: the better children understand the narrative, the greater the opportunity to learn vocabulary, and increased vocabulary knowledge results in a greater chance that the narrative is understood (Seigneuric & Ehrlich, 2005).

Additionally, it is well known that the relationship between vocabulary and narrative comprehension changes with development. Whereas between 4 and 5 years of age there is a strong correlation between vocabulary and narrative comprehension (Florit et al., 2009), it becomes much weaker at the age of 6 (Lynch et al., 2008).

Chapter 1 provides evidence, also supported by results from the study presented in

Chapter 2, about the effect of Bilingual exposure on linguistic and cognitive skills. The strongest effect of bilingual exposure on language development concerns vocabulary growth. Simultaneous and sequential bilingual children typically have lower scores than monolinguals on measures of both receptive (Bialystok et al., 2010; Morales et al., 2013) and expressive vocabulary (Oller, 2005; Person, 2002) in at least one, but frequently in all the spoken languages. Additionally, they show a slower rate of vocabulary development in both languages compared to monolingual peers (Geva & Farnia, 2011).

However, while the investigation of vocabulary development in bilingual children received conspicuous attention in previous literature, to date, research on narrative comprehension is scant (Florit et al., 2011). In recent years, narratives have been used for assessing bilingual language development during preschool and for establishing the relationship between bilingual exposure and language delay (Cleave, Girolametto, Chen, & Johnson, 2010; Iluz-Cohen & Walters, 2012; Pesco & Bird, 2016). A general result that emerges from the existing literature on pre-schoolers is that bilingual children show similar narrative competence as far as macrostructure (the higher-order mental organization of narratives) is concerned, while they tend to struggle with microstructure of narratives (linguistic forms used in the construction of the narrative) (see Boerma, Leseman, Timmermeister, Wijnen, Blom, 2016). In summary, the existing literature shows that pre-school bilinguals even with limited linguistic competence are able to comprehend narratives as far as macrostructure is concerned, albeit showing poor vocabulary and morphosyntactic comprehension (Gutiérrez-Clellen, 2002; Squires et al., 2014; Bonifacci, et al., 2018), but to date, research about the relationship between vocabulary and narrative comprehension in bilingual pre-schoolers is very scant.

Another important issue that concerns linguistic development in bilingual children is related to the inter-relations between L1 and L2 levels and the cross-linguistic transfer of

linguistic skills. Cross-linguistic transfer has been observed in simultaneous bilingual children in phonology (Paradis, 2001; Barlow, 2002; Brulard & Carr, 2003), vocabulary (Nicoladis, 1999; 2003) and syntax (Yip & Matthews, 2000; Paradis & Navarro, 2003). As for narrative competence, previous research has shown moderate cross-linguistic associations for narrative production regarding macrostructure. It has been hypothesized that the macrostructure should be invariant across the two languages due to its dependency on cognitive processes that are common across languages. On the other hand, narrative productivity, i.e. microstructure, being language-specific, is less likely to transfer from one language to another and may be more easily affected by exposure. Moreover, this hypothesis suggests that second language skills are a function of skills previously developed in the first language. All instances of cross-linguistic transfer that have been reported in preschool children have been in the production of language rather than comprehension (Nicoladis, 2006), and in simultaneous rather than sequential bilingual pre-schoolers, thus cross-linguistic correlations of narrative comprehension in sequential bilinguals need more attention. Understanding cross-linguistic influence might help us both theoretically and practically, providing information on how the development of narrative comprehension of children learning two (or more) languages differs from that of children learning only one and then designing successful educational interventions that might help bilingual children.

3.2. Aims

Findings reported above highlight the need for further advancing our understanding of the relationship between L1 and L2 narrative and vocabulary comprehension.

The main research question of the current work concerns whether a poor vocabulary knowledge generally reported for bilingual children may constrain broad, higher-level language processing, such as narrative comprehension. The rationale is that any weakness or developmental delay at core oral language skills may act as a bottleneck and constrain the

ability to engage in higher-level comprehension processes, such as inference making and integration and consequently, impede a successful narrative comprehension.

The following research questions guided the current study: i) To what extent bilinguals show different performances in L1 and L2 receptive vocabulary and narrative comprehension and to what extent their performances change between 5 and 7 years?; ii) Are the two linguistic systems independent?; iii) To what extent L1 and L2 vocabulary contribute to narrative comprehension in both languages?

3.3. Method

3.3.1. Participants

In this study, approved by the Ethical Board of the Representative Institution (protocol number 1521sixty-two Italian sequential bilingual children attending the English International School thus exposed to English daily at school for approximately 8 hours every day. Thirty children attended the last year of preschool and thus not yet conventional readers (mean age 5;5, *SD* = 3 months, range 5 - 6 years) and 32 children attended the first year of primary school (mean age 6;6, *SD* = 4 months, range 6 - 7;2 years) mostly exposed to pre-reading exercises. The mean age of first exposure to English was 3 years, 3 months (*SD* = 1 month) for preschoolers and 3 years, 6 months (*SD* = 2 months) for schoolers. In order to avoid confounding effects due to the socioeconomic background, only children coming from middle-high SES families were involved.

3.3.2. Materials and procedure

Children were tested individually in one session, in a quiet room in the school. Tasks were presented in a fixed order and lasted approximately 30 minutes.

Nonverbal Ability: Children were presented with the nonverbal subtest "Picture Arrangement" of the WISC-III (Italian adaptation by Orsini & Picone, 2006). In this task, children are

presented with a series of cards in an incorrect order that must be placed in the correct order to tell a story that makes sense. This task gives information about children's knowledge of narrative text structure, specifically their ability to sequence a series of picture cards into a causally and temporally coherent story. The pictures on the cards involve human characters and interactions, so to some degree, the test draws on the ability to understand antecedents and consequences of social interactions. Raw scores can be converted into standardized scores (M = 10 and SD = 3).

Receptive vocabulary and Narrative comprehension were assessed using PPVT-R (Dunn & Dunn, 1981; standardized for Italian speakers by Stella, Pizzoli, & Tressoldi, 2000) and Tor 3-8 (Levorato & Roch, 2007) in both languages, Italian and English. (Description and details about the tools were reported in Chapter 2).

3.4. Results

3.4.1. Descriptive Statistics

Table 1 shows mean scores and standard deviations, in brackets, obtained in the two linguistic tasks, namely receptive vocabulary (PPVT) and narrative comprehension (TOR) for both L1 (Italian) and L2 (English) in function of the age group (5-year old and 6-year old).

Table 1: Descriptive statistics

		L1 (Italian)		L2 (English)	
		PPVT	TOR	PPVT	TOR
5 years (N =30)	Raw score	79 (14)	6.5 (1.7)	56 (9)	5.2 (1.4)
	Std score	91.4 (11.6)	10.5 (1.5)	83.1 (9.5)	9.6 (1.1)
6 years (N =32)	Raw score	90 (20)	5.7 (2.3)	64 (9)	4.9 (1.7)
	Std score	94.1 (14.9)	9.7 (2.1)	87.9 (11.3)	9.1 (1.7)

As it can be seen, L2 resulted a weaker language. However, while in narrative comprehension children show age-appropriate performance in both languages, in receptive vocabulary, children are delayed in L2, showing a performance -1 *SD* with respect to monolingual scores of the normative sample.

3.4.2. Levels of narrative comprehension and receptive vocabulary: the role of age and language

In order to analyse whether the advantage of L1 over L2 decreases between 5 and 7 years, a mixed ANOVA 2 Ages x 2 Languages was performed on each of the two dependent variables: Receptive Vocabulary and Narrative Comprehension. As far as receptive vocabulary is concerned, both main factors yielded significance: age [F (1,60) = 11,40, p <. 001, η^2 = .116] was significant indicating higher receptive vocabulary for older children and a significant factor language [F (1,60) = 145,79, p <. 001, η^2 = .708] indicated a richer receptive vocabulary in L1 than in L2, whereas the interaction age x language was not significant (F < 1). Different results emerged from the analysis having narrative comprehension as depended variable: only language yielded significance [F (1,60) = 11,61, p <. 001, η^2 = .162] whereas age and the interaction between the two factors were not significant (F < 1 in both cases).

3.4.3. Relationship between narrative comprehension and receptive vocabulary

In order to investigate to what extent, the two linguistic systems are related. For this purpose, correlational analyses were run between the two measures in each language and cross linguistic correlations are reported. Table 2a shows the results of the 5year old group while table 2b shows the results of the 6-year old children.

Table 2a: Relationships across the two tasks and the two languages in 5-year olds children

		L1		L2	
		PPVT-R	TOR 3-8	PPVT-R	TOR 3-8
L1	PPVT-R	1	.14	.62**	.27
	TOR 3-8		1	.20	.32
L2	PPVT-R			1	.40*
	TOR 3-8				1

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

Table 2b: Relationships across the two tasks and the two languages in 6-year olds children

		L1		L2	
		PPVT-R	TOR 3-8	PPVT-R	TOR 3-8
L1	PPVT-R	1	.53**	.27	.04
	TOR 3-8		1	.42*	.09
L2	PPVT-R			1	.43*
	TOR 3-8				1

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

The correlation analyses suggest a different pattern of relations for younger and older children. In the younger group (5-year old), the two language domains correlate only in the weaker language (L2), whereas in 6-year old children, receptive vocabulary and narrative comprehension correlate in both languages. Furthermore, as far as cross-linguistic relationships are concerned, it emerged that in 5-year old receptive vocabulary correlated significantly between the two languages (r = .624, p < .001), whereas narrative comprehension in two languages was not correlated. On the other hand, no significant cross-linguistic correlations between vocabulary in L1 and L2 emerged for the group of 6-year old

children, whereas emerged a significant correlation between narrative comprehension in L1 and receptive vocabulary in L2. This analysis highlights a relative cross-linguistic independency between linguistic measures. In conclusion, receptive vocabulary and narrative comprehension correlate in each of the two languages for the 6-year old children and only in L2 for the 5-year old children.

3.4.4. The contribution of receptive vocabulary to narrative comprehension in L1 and L2

In order to answer the last research question, namely analyze the contribution of receptive vocabulary in accounting for individual differences in narrative comprehension, two multivariate linear regressions, one on narrative comprehension in L1 and the other on narrative comprehension in L2, were performed. In both analyses, the same predictors were inserted: in the first step was inserted the score obtained in the narrative comprehension task in the other language, in the second step was inserted the age in months in order to control for developmental changes, and finally, in the third step were included receptive vocabulary scores, in both languages. Table 3 reports the results of the regression performed on narrative comprehension in L1 whereas Table 4 reports the results of the regression performed on Narrative comprehension in L2.

The multivariate linear regression model predicting Narrative comprehension in L1 (Italian) explained a total of 28% of variance. The Narrative comprehension in L2, inserted in the first step, explained 3,6% of variance, which did not yield significance. The age added a small and marginally significant portion of variance, namely 6%. The third step accounted for 18.8% of unique variance in L1 Narrative comprehension. A closer inspection of the results revealed that only receptive vocabulary in L1 was significantly related to narrative comprehension in the same language ($\beta = .387$, $p < .01$) but not the receptive vocabulary in the other language ($\beta = .153$, $p = .281$).

Table 3: Summary of Multivariate linear regressions Analysis for Variables Predicting narrative comprehension in L1 (N = 62): $R^2 = .283$ [F (4,61) = 5.6, $p < .001$]

Step		R^2change		B	SE B	*B*
1	Narrative comprehension L2	.036º				
			Narrative comprehension L2	.251	.178	.189
2	Age	.059ºº				
			Narrative comprehension L2	.224	.165	.169
			Age	.074	.038	.245
3	Receptive vocabulary L1 Receptive vocabulary L2	.188ººº				
			Narrative comprehension L2	.108	.164	.082
			Age	.133	.038	.439*
			Receptive vocabulary L1	.045	.015	.387**
			Receptive vocabulary L2	.032	.031	.153

Note. º F change (1, 60) = 2.21, $p = .142$; ººF change (1, 59) = 3.89, $p = .053$; ºººF change (2, 57) = 7.47, $p < .01$
*$p < .05$; **$p < .01$

Table 4: Summary of Multivariate linear regressions Analysis for Variables Predicting narrative comprehension in L2 (N = 62): $R^2 = .186$ [F (4,61) = 3.26, $p < .01$]

Step		R^2change		B	SE B	*B*
1	Narrative comprehension L1	.036º				
			Narrative comprehension L1	.142	.096	.189
2	Age	.001ºº				
			Narrative comprehension L1	.135	.100	.180
			Age	.008	.030	.035
3	Receptive vocabulary L1 Receptive vocabulary L2	.149ººº				
			Narrative comprehension L2	.070	.106	.093
			Age	.038	.033	.166
			Receptive vocabulary L1	-.013	.013	-.151
			Receptive vocabulary L2	.074	.023	.462*

Note. º F change (1, 60) = 2.21, $p = .142$; ººF change (1, 59) = 0.07, $p = .794$; ºººF change (2, 57) = 5.22, $p < .01$
*$p < .01$

The multivariate linear regression model predicting narrative comprehension in L2 explained 18.6% of total variance. Narrative comprehension in L1, inserted in the first step explained 3,6% of variance, an amount which did not yield statistical significance, and age inserted in the second step did not add further variance. The third step accounted for 14.9% of significant unique variance in narrative comprehension. A closer inspection of the data revealed that only the receptive vocabulary in L2 was significantly related to the narrative comprehension in the same language ($\beta = .462$, $p < .01$).

3.5. Discussion

The current study aimed to analyze the role of receptive vocabulary in narrative comprehension of sequential bilinguals aged between 5 to 7 years. Two main issues were addressed and the following results were obtained. First, it was found that even after two years of continuative exposure to two languages, L2 remains a weaker language. Children performed better in L1 than in L2 both in vocabulary and in narrative comprehension. However, a comparison of participant's performance to the monolingual norms revealed that narrative comprehension falls within the age-appropriate performance in both languages, whereas vocabulary lags behind the typical performance, showing a 1 *SD* delay, again in both languages spoken. Vocabulary growth was evident within the age range considered whereas narrative comprehension performance remained stable. Any significant interaction between the effect of language and age was found, indicating that the pattern of results is similar for both languages. Second, was investigated the relationship between vocabulary and narrative comprehension both within each language and between the two languages. As for the schoolers, we found that vocabulary and narrative comprehension correlate within each language, whereas for the pre-schoolers only in L2. Moreover, significant correlations emerged between L1 and L2 vocabularies in preschool children, and between vocabulary in L1-and L2 narrative comprehension in L2, in school-age children.

Finally, as for the role of receptive vocabulary in narrative comprehension, the two regression analyses indicated that receptive vocabulary accounted for a relevant amount of the total variance in narrative comprehension, namely 18% in the stronger language (L1) and 14% in the weaker language (L2). Nor in L1 or L2 narrative comprehension, did vocabulary in the other language (namely, L2 skills for L1 narrative comprehension and vice versa) provide a significant contribution to the model.

The results of the current study are discussed for their theoretical relevance and practical implications within two different sections concerning the level of skills reached in each linguistic dimension on the one hand, and on the other, the role of vocabulary in narrative comprehension in each language and across the two languages.

3.5.1. Receptive vocabulary and narrative comprehension in sequential bilingual speakers

The greatest advantage of measuring language comprehension of bilinguals in both languages is that this allows comparing the level attained in the two languages. The current findings appear to be generally in line with what is reported in the literature on sequential bilinguals (Hoff et al., 2012): even after several years of exposure, vocabulary lags behind monolingual performance (i.e. - 1 *SD*), in each language, and vocabulary in L2 is significantly weaker than in L1. This result is not surprising for sequential bilinguals given that for the first years of life they were monolinguals, and from the introduction of the L2, they have been exposed less than monolinguals to both languages. In parallel, also for narrative comprehension better outcomes for L1 than for L2were found. This is in part in contradiction with the few studies that analyzed narrative comprehension in bilingual speakers (Bohnacker, 2016; Kapalkova, Polišenská, Marková, & Fenton, 2016) in which no significant differences were found between children's L1 and L2 comprehension, thus these results will have to be further confirmed with future studies involving children of different age groups in order to

better understand the developmental trajectories of oral narrative comprehension in both languages by bilingual speakers and how this ability transfers to reading comprehension and learning outcomes.

3.5.2. The relationship between vocabulary and narrative comprehension in each language and between the two languages

Vocabulary represents a relevant predictor of narrative comprehension for bilinguals, similarly as for monolingual children, and more interestingly, the current findings suggest that low vocabulary scores obtained in both languages did not prevent children to comprehend adequately a narrative text in each language. Moreover, receptive vocabulary emerged as an equally important predictor of narrative comprehension in both L1 and L2 and explained respectively 18% and 14% of significant variation in narrative comprehension.

This puts forward a hypothesis that other contributing factors may clarify how other skills, presumably cognitive, may promote narrative comprehension processes in children acquiring more than one language (Babayiğit, 2014). Multicomponent approaches of text comprehension emphasize that the construction of a coherent mental representation of the narrative is based not only on linguistic components but also on higher-level integrative processes, such as inferential abilities, knowledge of story structure and comprehension monitoring (Cain & Oakhill, 2007). These higher-level cognitive components might be even more important for narrative comprehension in bilingual speakers - who cannot rely completely on (poor) linguistic skills - and their role should be investigated in future studies.

This shed light on the fact that there is a need for further studies that investigate broader linguistic comprehension in bilingual speakers, in early stages of development and before they start formal education. This might facilitate the early identification of possible risk factors for narrative comprehension failure and might prevent future learning difficulties.

CHAPTER 4 – Third study

4.1. Introduction

The theoretical framework of the Multicomponent Model of Comprehension (Cain & Oakhill, 2007), has been examined in several studies whose findings support a multilevel representation of language and cognitive skills involved in narrative comprehension. These skills are included in one of three broad categories described in Chapter 1 and entailed in two different levels of processing (Cain et al., 2004). Each of these skills interacts with the others and has the potential to give rise to individual differences in narrative comprehension.

Studies investigating the relationship between each component, on one hand, and between each component and comprehension, on the other, have mainly focused on reading comprehension in school-age children (Cain, 2007; Oakhill, Hartt, & Samols, 2005). However, since longitudinal studies supported the idea of shared processes between oral narrative and reading comprehension, it became necessary to investigate narrative comprehension components' specific role, before the literacy process begins.

Systematic investigation on narrative comprehension's components has not received much attention until recently, especially in young children. Furthermore, the majority of these studies tended to focus on a few language and cognitive skills, providing piecemeal evidence, and very few information about structural relations among these language and cognitive skills (Kim & Phillips, 2014), and this represents a serious gap in our knowledge of narrative comprehension development.

Another important aspect that has rarely been considered in narrative comprehension analyses is the individual differences in children's linguistic and cognitive development, strictly related to the amount of exposure to language of context. It is well known, that

differences in the amount of linguistic input affect not only children's language and cognitive abilities but also the rate at which they acquire various linguistic skills (Unsworth, 2016).

Understanding structural relations between abilities involved in narrative comprehension, keeping into account also the exposure to language on the development of narrative comprehension components before formal school education, is important from a theoretical and practical point of view. From a theoretical point of view to gain insight relative to paths of relations (direct and mediated) of language and cognitive skills involved in narrative comprehension - described below- and relative to the effect of the amount of exposure to language and thus on narrative comprehension's development. Whereas, from a more practical point of view, the implication is to direct educational efforts aimed to increase pre-readers' narrative comprehension taking into account also environmental factors that may produce individual differences in children development, particularly nowadays in our increasing multicultural and multilingual society in which the number of children exposed to more than one language and involved in our school system increases year after years.

4.2. Aim

The main aim of this study was to examine direct and indirect pathways of a comprehensive set of skills namely, lower-order cognitive skills (working memory, attention and inhibitory control), lower-order language skills (vocabulary, sentence comprehension and semantic access), and higher-order cognitive skills (inferential abilities, theory of mind and knowledge of story structure) to narrative comprehension in preschool children, taking into account the relations of cumulative exposure to language of context (Italian), with both linguistic and cognitive lower-order components and narrative comprehension.

Since there are no specific theoretical models concerning how cognitive and linguistic skills are directly and indirectly related to narrative comprehension, 5 alternative models were examined and compared to empirically test plausible alternative direct paths systematically, as

proposed by Kim in her work with children in Grade 1 (2016). The first model tested was a complete mediation model in which lower order cognitive skills were directly related to lower order language skills, which in turn, were directly related to higher-order cognitive skills; the latter were directly related to narrative comprehension. The second, third and fourth models differed in terms of how lower order cognitive and language skills were specified to have direct relations to narrative comprehension. In detail in Model 2 lower order language skills were hypothesized to have direct relations to narrative comprehension over and above higher-order cognitive skills; in Model 3 lower order cognitive skills were hypothesized to be directly related to higher-order cognitive skills but not to narrative comprehension; Model 4 was the same as Model 3 except that lower order cognitive skills were also specified to have a direct relation to narrative comprehension. Finally, in Model 5 all direct and indirect relations were allowed from lower order language and cognitive skills to narrative comprehension.

4.3. Method

4.3.1. Participants

Participants of this study were the same participants of Study 1 presented in Chapter 1, namely one hundred and eleven preschool children (61 boys and 50 girls) with an average age of 61.9 months (*SD* = 6.8 months), representative of preschoolers in the context in which the research was carried out. Parents were asked to sign a consent form if they agreed to take part and let their child take part.

4.3.2. Procedure

Children were individually assessed by 3 research assistants - undergraduate students with extensive experiences with children, including language and literacy assessments - in a quiet room of their school.

4.3.3. Materials

Narrative comprehension was assessed through TOR 3-8 (Levorato & Roch, 2007); Lower-order cognitive skills were assessed through standardized test namely Digit span, WISC sub-test (Wechsler, 2003, standardized for Italian speakers by Orsini, Pezzuti & Picone, 2012), Day & Night test (Gerstadt, Hong & Diamond, 1994) and Dimensional Change Card Sort (Usai, Traverso, Gandolfi & Viterbori, 2017); lower-order linguistic skills were assessed through PPVT Revised (Dunn & Dunn, 1981; standardized for Italian speakers by Stella, Pizzoli, & Tressoldi, 2000), Speeded naming subtest from the linguistic domain of *NEPSY-II* (Korkman, Kirk, & Kemp, 2007) and PVCL (Test for the Evaluation of Linguistic Comprehension; Rustioni & Associazione "La Nostra Famiglia", 1994). Higher-order cognitive skills were assessed through experimental tasks, namely a Contents False Belief task (adapted from Gopnik & Astington, 1988) to assess Theory of mind – described in Chapter 2-, Inferential abilities task and Knowledge of story structure task described below. (Description and details about the tools listed above were reported in Chapter 2).

Inferential abilities task: this task consisted of ten items, each containing two short sentences read aloud referring to common and familiar events, followed by two inferential questions. The questions focused on two types of inferences: knowledge-based and text-based inferences. The knowledge-based inferences require information from previously acquired world-knowledge to be incorporated within the episode (e.g. "That day Piero could not wait to put on the swimsuit to play with a scoop and a bucket; Where he had gone that day?"), instead, the text-based inferences are necessary to connect various pieces of information provided in the short episode and to identify their implicit relations (e.g. "Then Piero picked up the scoop and the bucket. He put the games in the bag; where are the scoop and the bucket?"). Answer to each question is evaluated on a 0 - 2-point scale: an incorrect answer is scored 0, whereas a partially correct answer or answer provided after a clarification are scored

1, and fully correct answer is scored 2. Three scores are calculated: knowledge-based inferences (range = 0 - 20), text-based inferences (range = 0 - 20) and total inferences (range = 0 - 40). The reliability, evaluated by calculating Cronbach's alpha over the items, was .54.

Knowledge of story structure: this task consists of six sets of illustrated stories each composed by 6 pictures. The sets are presented in a fixed sequential order, starting with relatively fewer complex stories and moving to the most difficult sets. For each story, the cards are provided to the children in a random order, the children are asked to observe the pictures and to arrange the cards to create a story and then tell the story. Children are presented with an example set of 4 cards to practice with the task; if children are not able to order the example set, the experimenter shows them how to arrange the set explaining the meaning of the story depicted, to be sure they understood the task. The score ranges between 0-36: 1 point is assigned for each card arranged correctly and 0 for each card arranged wrongly.

4.4. Data Analysis Strategy

Structural equation modeling was a primary data analytic strategy. Each ability was assessed by single measures, therefore, observed variables were used for these language and cognitive skills. Path models were fitted to address the main research question: this is an adequate and powerful approach for examining direct and mediated relations between observed variables. Model fits were evaluated by using the following multiple indices: chi-square statistics, comparative fit index (CFI), Akaike's information criterion (AIC), Bayesian information criterion (BIC), root mean square error of approximation (RMSEA), and standardized root mean square residuals (SRMR). Typically, RMSEA values below .08, and CFI values equal to or greater than .95, and SRMR equal to or less than .10 indicate an acceptable model fit (Schermelleh-Engel, Moosbrugger, & Müller, 2003). Chi-square

difference tests, AIC and BIC values are primarily used to compare the relative fit of models. Path analyses were conducted with R package lavaan, version 0.4-11 (Rosseel, 2011).

4.5. Results

4.5.1. Descriptive Statistics and Preliminary Analysis

Table 1 shows minimum, maximum, means, SD, Skewness and Kurtosis.

Table 1. Descriptive statistics and Characteristics of the participants

Variable	Min	Max	Mean	SD	Skewness	Kurtosis
Age (months)	44	75	62	6.8	-.05	-.78
Cumulative exposure to language (months)	24	75	60	8.8	-1.4	5.2
Dependent variable						
TOR 3-8: Narrative comprehension (M=10; ds=2)	7	15	10.5	1.8	-.10	-.73
Lower-order cognitive skills						
Backward Digit span: Working memory (range 0 - 8)	0	4	1.45	1.14	-.17	-1.18
Day & Night: Inhibitory control (range -16-16)	-11	14	1.8	4.4	.91	1.9
DCCS: Attention (range 0-24)	7	24	18.4	2.9	-1.01	3.8
Lower-order oral language skills						
PPVT-R: Receptive vocabulary (M = 100; d = 15)	53	118	82.6	13.4	.32	-.34
PVCL: Sentence comprehension (range 0-100)	11	93	55	19.2	.13	-.73
Speeded naming: Semantic ac. (M = 10; ds= 3)	4	16	9.69	2.8	-.18	-.56
Higher-order cognitive skills						
Inferential abilities (range 0-40)	1	31	15.5	7.36	-.13	-.63
ToM: Theory of Mind (z score)	-1.7	1.1	0	.99	-.30	-.81
Knowledge of story structure (range 0-36)	2	30	14.8	7.06	.31	-.90

As in Study 1, we used the cumulative exposure to language of context, as an indicator of exposure to Italian. The high value of kurtosis suggests that the cumulative exposure to language, for the majority of children, is around the mean with few children on distribution tales. The sample showed a low average score in the standardized vocabulary task (PPVT-R): the average performance lay under the lower boundary of the range appropriate for age while the standard deviation was comparable to that of the national standardization sample. Performance on the majority of tasks covered a large range of scores and none suffer from ceiling effects while we found a floor effect on Digit span task. Distributions of the majority of the variables approached symmetric, with the exception of DCCS task whose values of skewness and kurtosis were high. An inspection of frequencies of scores indicated that large kurtosis value was due to the fact that 75% of children scored between 16 and 21.

In Table 2 are shown correlations among all measures collected. For what concern lower-order cognitive skills, working memory was moderately related with attention, receptive vocabulary, sentence comprehension and knowledge of story structure task scores while was weakly related to semantic access, higher-order cognitive skills, and narrative comprehension. Attention was moderately related to knowledge of story structure task scores and weakly related to lower-order oral language skills and narrative comprehension. Inhibitory control instead was weakly related to receptive vocabulary and narrative comprehension. Lower-order oral language skills were moderately related to each other and with higher-order cognitive skills and narrative comprehension. Finally, higher-order cognitive skills were moderately related to each other except the Theory of Mind that shown a weak relation with inferential abilities. Regarding the correlation between cumulative exposure to language of context and lower-order cognitive skills we found from weak to moderate correlations ($-.26 < r < .36$) whereas, concerning lower-order oral language skills weak correlation with sentence comprehension ($r = .25$) and speed naming ($r = .20$) and, as

expected, the greatest correlation (r = .53) with receptive vocabulary. Concerning higher-order cognitive skills we found a weak correlation with ToM (r = .19) and moderate correlation with knowledge of story structure (r = .39) and inferential abilities (r = .49). Eventually, we found a moderate correlation (r = .42) between narrative comprehension and exposure to language of context.

Table 2. Table of Correlations among measures

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Narrative Comprehension	.27**	-.26*	.15	.68**	.46**	.41**	.65**	.33**	.53**	.42**
2. Working memory	1	-.19*	.26**	.39**	.38**	.22*	.24*	.24**	.38*	.36**
3. Inhibitory control		1	.01	-.27**	-.07	-.09	-.15	-.01	-.13	-.26**
4. Attention			1	.20*	.27**	.26**	.19*	.11	.37**	.30**
5. Receptive Vocabulary				1	.50**	.48**	.71**	.45**	.45**	.53**
6. Sentence comprehension					1	.26**	.40**	.39**	.36**	.25**
7. Speed naming						1	.49**	.30**	.13	.20*
8. Inferential Abilities							1	.45**	.34**	.39**
9. Theory of Mind								1	.19*	.19*
10.Story structure know.									1	.49**
11. Cumulative exposure										1

Note: * $p < .05$; ** $p < .001$

4.5.2. Direct and Indirect Pathways of Cognitive and Linguistic Predictors of Narrative Comprehension

In order to address the main research question, the 5 alternative nested path-models of hypothesized relation of lower-order cognitive skills, lower-order oral language skill, and

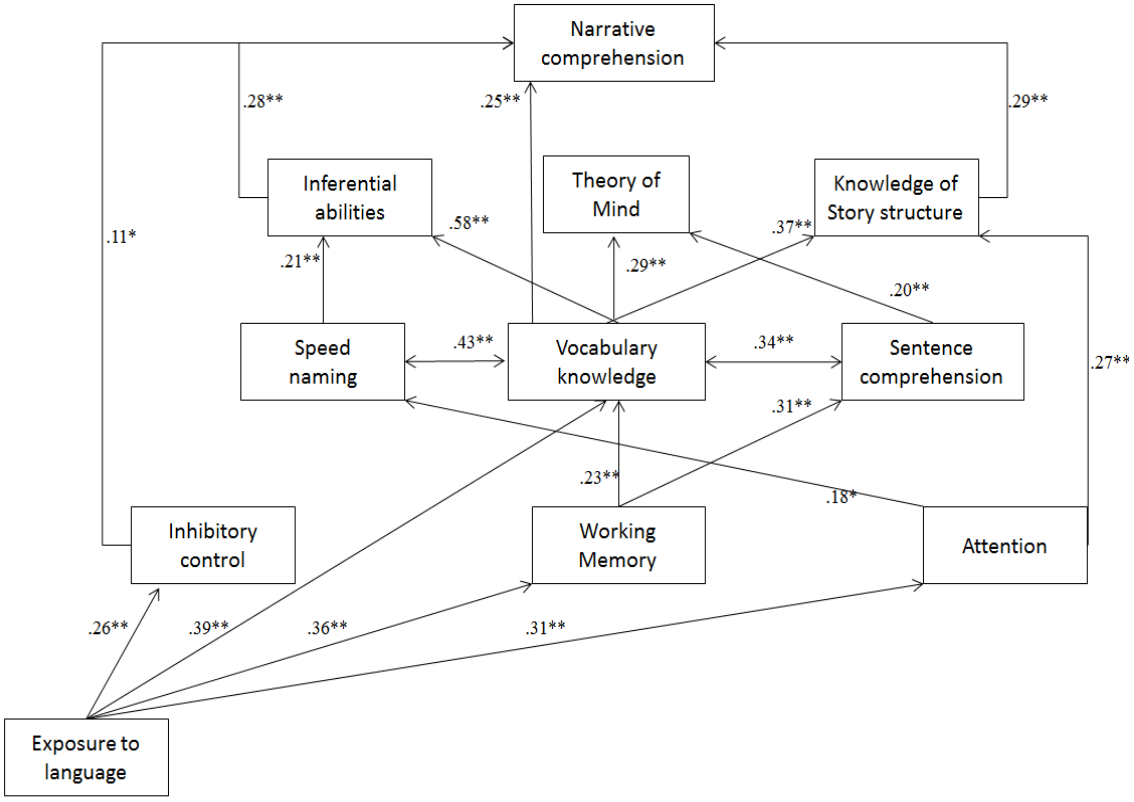
higher-order cognitive skills to narrative comprehension were fitted and compared. Moreover, for each model, we tested direct relations between cumulative exposure to language of context, lower-order cognitive and linguistic skills, and narrative comprehension.

Table 3. Model fit comparison

Model	χ^2 (df), *p*	AIC; BIC	CFI	RMEA; SRMR	$\Delta\chi^2$ (Δdf)	ΔAIC
1	66.27 (28), <.001	-412777; -412677	.90	.11; .084		
2	40.59 (22), <.001	-412788; -412674	.95	.08; .069	25.6 (6), <.001	13.68
3	47.68 (21), <.001	-412781; -412662	.93	.10; .073	-7.08 (1), = 1	-9.08
4	33.45 (13), <.001	-412780; -412639	.94	.11; .055	14.2 (8), =.07	-1.77
5	18.26 (10), =.053	-412789; -412640	.97	.08; .046	15.1 (3),< .001	9.19

Model 1 (complete mediation model), Model 2, 3 and Model 4 did not fit the data very well whereas Model 5, namely the model in which all direct and indirect relations were allowed from lower-order cognitive and language skills to higher-order cognitive skills and narrative comprehension, and cumulative exposure to language of context was directly related to lower-order cognitive skills and vocabulary, shown an excellent fit to the data. The model fit for the final model (Model 5) model was as follows, χ^2 (10) = 18.26, p = .53; CFI = .97; AIC = -412789; BIC = -412640; RMSEA = .08; SRMR = .046. Chi-square difference test between Model 4 and Model 5 supports that Model 5 is superior, $\Delta\chi^2$ = 15.1, Δdf = 3, p < .001. Completely standardized path coefficients of the Model 5 are shown in Figure 1 (Rosseel, 2011). It should be noted that, following conventions (Bollen, 2014), a gamma (γ) notation is used for the path between exogenous and endogenous variables, and a beta (ß) notation is used for the path between endogenous variables.

Figure 1. visual representation of the Final model (Model 5). Only statistically significant paths are reported



Concerning the relations of cumulative exposure to language of context with lower-order cognitive and linguistic skills and narrative comprehension, in the final model, we found that there were significant direct relations with lower-order cognitive skills and receptive vocabulary. In detail, we found that exposure to language of context was weakly related to lower-order cognitive skills ($.26 < \gamma < .36$), weakly related to speed naming ($\gamma = .09$), and moderately related with receptive vocabulary ($\gamma = .40$) whereas not significantly related to narrative comprehension. Concerning lower-order cognitive skills, attention was direct, although weakly related to knowledge of story structure ($\beta = .27$) and speed naming ($\beta = .18$); inhibitory control was directly, but weakly related to narrative comprehension ($\beta = .11$) whereas Working memory was directly related to lower-order oral language skills such as vocabulary ($\beta = .23$) and syntax knowledge ($\beta = .31$). Working memory was not directly related to higher-order cognitive skills neither narrative comprehension. Regarding lower-

order oral language skills, only vocabulary was related to all three higher-order cognitive skills, namely inferential abilities, theory of mind, and knowledge of story structure (.29 < β < .58), speed naming was related only to inferential abilities (β = .21), whereas sentence comprehension was only directly related to Theory of Mind (β = .20). Vocabulary was also directly related to narrative comprehension (β = .25), whereas speed naming and sentence comprehension were not after accounting for higher-order cognitive skills in the model. Finally, concerning the higher-order cognitive skills, we found that inferential abilities (β = .28), and knowledge of story structure (β = .29), were independently related to narrative comprehension whereas Theory of Mind was not (β = -.03, p = .697) after accounting for all of the other predictors included in the models. The amount of variance explained was as follows: concerning lower-order cognitive skills: .10 attention, .07 in inhibitory control and .13 in working memory; regarding lower order oral language skills: .08 in speed naming, .32 in receptive vocabulary and .17 in sentence comprehension. The amount of total variance explained was: .31 in knowledge of story structure, .52 in inferential abilities and .25 in Theory of Mind, concerning higher-order cognitive skills. To conclude, the amount of total variance explained in narrative comprehension by all the included predictors, was .60.

4.6. Discussion

Several studies investigated direct and indirect paths of each component in children's narrative comprehension, providing piecemeal evidence about structural relations among narrative comprehension components (Kim & Phillips, 2014), however, structural relations of cognitive and linguistic skills with narrative comprehension in young children are still unclear.

The main goal of the present study was to expand our understanding of structural relations among a very large and comprehensive set of linguistic and cognitive abilities and narrative comprehension in preschool children speaking Italian as Native or non-native

language. Within the framework of multicomponent model of comprehension (Cain & Oakhill, 2007), were examined direct and indirect pathways of lower-order cognitive skills (working memory, attention and inhibitory control), lower-order oral language skills (vocabulary, sentence comprehension and speed naming), and higher-order cognitive skills (inferential abilities, theory of mind and knowledge of story structure) to narrative comprehension. Furthermore, the role of the exposure to the language of the context was examined in determining individual differences in narrative comprehension through lower-level linguistic and cognitive components. As far as we know, no previous studies have examined such a large set of linguistic and cognitive skills involved in narrative comprehension and have taken into account the role of cumulative exposure to language of context that, it is well known to be a relevant source of variation in linguistic and cognitive developmental trajectories, especially in early phases. Furthermore, we examined whether knowledge of story structure was related to narrative comprehension after accounting for other higher-order cognitive skills, namely theory of mind and inferential abilities. Results of this study, have shown that a large amount of variance in children's narrative comprehension (60%) was explained by the included language and cognitive predictors and that the relations among all these skills reveal an extremely intricate picture.

Cumulative exposure to the language of context was directly related to lower-order cognitive skills, speed naming and, to a greater extent, to receptive vocabulary, whereas it was not directly related to higher-order cognitive skills and narrative comprehension. Concerning the hypothesized relations between lower-order cognitive and linguistic skills, it was found that working memory was moderately and directly related to vocabulary and syntax knowledge; attentional control was found directly related to speed naming and knowledge of story structure, whereas inhibitory control was directly related with narrative comprehension. Concerning the hypothesized relations between lower-order linguistic skills and higher-order

cognitive skills and narrative comprehension, the current findings highlight the importance of lower-order oral language skills in higher-order cognitive skills. Both receptive vocabulary and speed naming were related to higher-order cognitive skills such as inferential ability and knowledge of story structure; moreover, vocabulary was related to theory of mind. We failed to find a relation between sentence comprehension and higher-order cognitive skills, as well as with narrative comprehension. Vocabulary knowledge was the only linguistic skill that resulted to be directly related to narrative comprehension. Finally, concerning the relations between higher-order cognitive skills and narrative comprehension, it was found that inferential abilities and knowledge of story structure, were both independently and directly related to narrative comprehension whereas Theory of Mind was not.

Results from this study clarify the interplay among lower-order cognitive and linguistic skills, higher-order cognitive skills and exposure to language of context in explaining preschooler's narrative comprehension. Narrative comprehension is directly predicted by inhibition, vocabulary, and inferences, results that are coherent with previous results in literature considering children of the same age range (Florit et al., 2009, 2011; Lepola et al., 2012; Tompkins et al., 2013). A particularly innovative result concerns the role provided by the knowledge of story structure to narrative comprehension. Finally, to the best of our knowledge, the relevance of the role of the cumulative exposure to language of context as a mediating effect, to narrative comprehension, was highlighted.

These results have important theoretical and practical implications. Theoretically, this research provides insights into the development of a very complex cognitive process and contributes to our understanding of the role that each component plays in the development of narrative comprehension in preschoolers. Practically, the present study contributes to a more specific understanding of which skills are relevant to comprehension at this early age and therefore should be targeted by early intervention to increase pre-readers' narrative

comprehension. A better understanding of the relations between each component, on one hand, and narrative comprehension, on the other, may suggest more effective strategies to foster this ability during the preschool years and, presumably, promote later reading comprehension and school achievement.

CHAPTER 5 – Fourth study

5.1. Introduction

Children coming from low-SES families show lower levels of oral language skills if compared with peers from more advantaged backgrounds on measures of language processing, comprehension, and production from infancy through high school (Hoff, 2013). Decades of research converge on the finding that socioeconomic disparities increase the probability that a child will enter school behind their more advantaged peers in emergent literacy (Engle & Black, 2008; Ryan, Fauth, & Brooks-Gunn, 2006). Longitudinal data suggest that early gaps in measures of language for socioeconomically underprivileged children persevere, producing an effect on the "readiness to learn", and amplify as children progress through school (Huffman, Mehlinger, Kerivan, Cavanaugh, Lippitt, & Moyo, 2001). This negative cycle, known as the 'Matthew effect' (Stanovich, 1986) according to which individual differences in development increase more and more over time, motivates the need for children 'at risk' of reading difficulties to receive early intervention focusing on oral language skills (Lonigan, 2003).

Early intervention on language skills is critical to enhancing language and literacy outcomes to reduce the gap and, eventually, to promote school readiness of low SES children. Therefore, current research supports limited understanding about how to improve children's oral language components of narrative comprehension, before formal instruction, in children coming from low SES backgrounds.

Previous works have tried to identify the best practices for promoting narrative comprehension and its components before the formal instruction. Numerous examples of intervention have been suggested (Paris & Paris, 2007; van Kleeck, 2008) and several meta-

analyses have summarized three main approaches: (a) dialogic book reading, (b) direct teaching of oral language comprehension skills, and (c) approach that combines shared book reading, vocabulary instruction and exercises for higher-order components of narrative comprehension (Hagen., Melby-Lervåg, & Lervåg, 2017).

To date, it has yet to be established whether training on higher-level components are effective in improving narrative comprehension, also with respect to other relevant lower-level components, in pre-readers. If it is accepted that inferential abilities can be developed through teaching, then an important research goal is the development and validation of interventions that foster children's inferential ability and their narrative comprehension.

5.2. Aims

In the current study, assuming a long-term perspective oriented to facilitate school readiness and prevent later difficulties with reading comprehension for pre-schoolers coming from low from low-socioeconomic-status families, we developed and then analyzed the feasibility and efficacy of a brief classroom-based intervention (8 weeks) aimed to foster broad oral language components of narrative comprehension.

The target of this study were children from low SES background because they generally have a small vocabulary size (Rowe, 2008) if compared with peers coming from high SES background. Vocabulary represents the key component of narrative comprehension, thus their weakness in vocabulary may constrain the ability to generate inferences, in turn, to infer the meaning of novel words (Silva & Cain, 2015), and eventually hinder an adequate narrative comprehension. Furthermore, weak narrative ability, since is the main source for the development of vocabulary, may amplify the children gap in a negative cycle producing an effect on the "readiness to learn".

An additional issue also considered in this study, concerns the individual differences in the responsiveness to intervention. An increasing number of studies suggest that children

respond differentially to intervention based on their prior knowledge. Usually, according to the phenomena called Matthew Effect, whereby advantages and disadvantages accumulate, so that *"the rich get richer and the poor get poorer*" (Stanovich, 1986), children with stronger language make the greatest gains after interventions (Blewitt, Rump, Shealy, & Cook, 2009; Penno, Wilkinson, & Moore, 2002). However, explicit and sustained instruction may attenuate or eliminate this effect allowing, even children with lower initial levels of vocabulary, to make greater gains after a language-related intervention (Hassinger-Das, Ridge, Parker, Golinkoff, Hirsh-Pasek, & Dickinson, 2016; Justice, Meier, & Walpole 2005).

5.3. Description of the Intervention

For the aim of this study was develop an intervention that combined shared book reading, vocabulary instruction, and exercises on higher-order components aimed to improve narrative comprehension in preschoolers. The intervention consisted of eight weekly sessions, each lasting 45 minutes, during which 3 different activities were delivered:

(1) *Inferring words meaning*. Within an illustrated book were identified 5 challenging words (mist; joker; sparkle; incautious and colorful), each of which was repeated 4 times: 1) incidental exposure; 2) expansion and definition of the original context; 3) link to previous knowledge; 4) long term recall.

(2) *Inferring temporal and causal links during joint-book reading.* An illustrated book for children was divided into different sections, and each section was read aloud during one session. The reading, performed by two trainees while children were sited in a circle, was interrupted in predetermined points to discuss temporal or causal inferences. For temporal inferences, the order in which two events were narrated in the story was discussed, whereas for causal inferences children were stimulated to think and discuss the causal connection between two events, or between an event and a reaction of the story character. The difficulty

of inferences generation grows during at each session: events to be connected become more and more distant in the story or become gradually more implicit to infer.

(3) Inferring the correct sequence of the story. For this activity, we used a set of 5 pictured stories in each session. Children were asked to look carefully at the pictures and, in group, to re-arrange the sequences in order to obtain a story, and eventually tell the story obtained.

5.4. Method

5.4.1. Participants

In this study, approved by the Ethical Board of the Representative Institution (protocol number 1639) participated a group of sixty-seven children (36 female), aged between 4 years and 11 months to 6 years and 1 month (mean age = 5;5, SD = 4 months). Children were randomly assigned to control group (N = 17) or treatment group (N = 50).

Low socioeconomic status was determined through the educational level of both parents and annual family income. Information collected through a questionnaire administered to parents (mean age 38 years) showed that 78% of mothers and 83% of fathers had high school diplomas or less (from 5 to 13 years of education), whereas only 22% of mothers and 17% of fathers had pursued post-secondary studies. Concerning annual family income, from eighty-seven percent of parents (N = 61) who agreed to give this information, the majority (N = 52) declared a medium-low annual family income. In detail, 15 parents declared an annual income below 24.000 €, 16 between 24.000 € and 30.000 € and, 21 between 30.000 € and 34.000 € that represents the National mean income (Istat, 2016)[4]. Overall, the geographical location of the school and the socioeconomic information converge in showing that children involved in this study come from medium-low to low socioeconomic-status background.

[4] Istituto nazionale di statistica https://www.istat.it/it/archivio/185497

5.4.2. Materials and procedure

Children's vocabulary, inferential abilities, and narrative comprehension skills were assessed before and after the intervention with intervention-based measures and standardized tests to address both near and far transfer effects. Six trained master students individually administered all tasks in a fixed order: none of them was aware of the children's group assignment. Each child was tested over two sessions of 30 minutes each.

5.4.2.1. Intervention-based measures (near transfer effects):

Experimental probes were built to verify whether children benefited directly from each intervention activity described above.

Probes targeting Intervention activity 1: Inferring words meaning

In order to verify if the children learned the challenging five target words used during the intervention, two probes were developed.

1) Sentence completion task: in this experimental task, the examiner read brief sentences describing a situation in which the target word could be inserted. The context presented in the sentences was different from the original context, therefore, the children must have generalized the meaning of the new word learned to complete the sentences. Answer to each sentence was evaluated on a 0 – 1-point scale: an incorrect answer was scored 0 whereas correct was scored 1 (range 0 - 5).

2) Word recognition task: it consists of a list of target and filler words presented to children who are asked to indicate which out of three pictures best represent the word. Each item concerning target words was evaluated on a 0 - 1-point scale: an incorrect answer was scored 0 whereas a correct answer was scored 1 (range 0 - 5).

Probes targeting Intervention activity 2: Inferring temporal and causal links

In order to verify the children's textual and inferential comprehension of a story used during the intervention was developed a task in which participants were asked if statements

about the story were true or false. The task-focused on the two types of information necessary to understand the story: textual (18) and inferential (18). Answer to each item was evaluated on a 0 - 1-point scale: an incorrect answer was scored 0 whereas a correct answer was scored 1 (range = 0 - 36). Two separate scores (range = 0 - 18), one for textual and one for inferential answers were calculated. The reliability, evaluated by calculating Cronbach's alpha over the two scores, was .81 at Time 1 and .83 at Time 2.

Probes targeting Intervention activity 3: Inferring the correct sequence of the story

To verify whether participants improved their ability to infer the correct order of stories, was developed a task of story picture reordering. The task consists of rearranging two-story sequences in the correct order, each composed by 6 pictures, to obtain a story of complete meaning. Two different scores were obtained: accuracy (0 - 12) and speed.

5.4.2.2. Standardized tasks (far transfer effects):

In order to evaluate generalized effects on vocabulary, narrative comprehension, and inferential abilities, children were assessed through the PPVT-R (Dunn & Dunn, 1981; standardized for Italian speakers by Stella, Pizzoli, & Tressoldi, 2000), the test TOR 3-8 (Levorato & Roch, 2007) and the Inferential abilities task.

(Description and details about PPVT-R and TOR 3-8 were reported in Chapter 2, whereas details about the Inferential abilities task were reported in Chapter 4).

5.5. Results

5.5.1. Descriptive statistics and group comparison at T1

Table 1 shows descriptive statistics (means, standard deviations, minimum and maximum and variance) for treatment (TG) and control groups (CG) at Time 1.

Before the intervention, none of the children was able to produce the target word and only a few children were able to recognize the target words. Concerning story comprehension,

after the first plenary reading, children's performance covered a large range of scores with an average score of 25 out of 36 (no ceiling effects), whereas in picture story re-ordering task, children showed weak performance, rearranging on average 3 images out of 12.

Concerning Standardized tasks, as expected for children coming from a low-socioeconomic-status background, their average performance on receptive vocabulary (PPVT-R), lay at the lower boundary of the range appropriate for age, whereas performance in narrative comprehension was age-appropriate and their performance in inferential abilities task covered a large range of scores.

Moreover, group comparison, conducted with a one-way ANOVA, indicated that there were no significant differences between groups, namely the 2 groups were well matched.

Table 1. Characteristics of participants and group comparison at T1

Variables	Treatment group					Control group (N = 17)				ANOVA			
	N	Mean	*SD*	Range	Variance	Mean	*SD*	Range	Variance	*df*	*F*	*P*	*d*
Age	50	66.3	3.6	59-73	13.6	67	3.42	62-73	11.7	1,65	.419	.520	-.20
Intervention-based measures													
Recognition task	40	2.5	1.4	0-5	2	3	1.17	0-5	1.3	1,55	1.45	.233	-.32
Comprehension task (total)	27	22.5	5.5	14-30	30.9	22.2	5	14-31	25.1	1,42	.029	.865	.01
Inferential questions	27	10.4	2.7	5-15	7.4	10.1	2.6	6-15	6.9	1,42	.077	.783	.12
Textual questions	27	12.11	3.3	7-17	11.2	12	2.7	8-16	7.5	1,42	.003	.957	.03
Story re-ordering task	13	3	2.1	0-7	4.7	2.5	1.6	0-7	2.6	1,28	.624	.436	.28
Time re-ordering task	13	194.9	97.7	88-446	9547	103.1	29.6	51-149	880.5	1,28	12.7	.001	1.4
Standardized tasks													
PPVT (raw score)	50	79.5	22.2	21-136	495.5	72.7	24.2	18-107	587.4	1,65	1.15	.288	.30
PPVT (standard score)	50	92.3	14.8	65-122	220.8	88	14.1	65-110	200.1	1,65	1.07	.303	.30
TOR 3-8 (raw score)	50	13.1	3.2	3-17	15	11.8	2.6	8-16	7.1	1,65	1.92	.170	.43
TOR 3-8 (standard score)	50	11.1	1.7	6-15	2.8	10.2	1.4	9-12	1.3	1,65	3.13	.073	.56
Inferential abilities	50	19	6.6	6-35	44.3	17.5	6.5	5-28	42.8	1,65	.624	.432	.23

5.5.2. Intervention efficacy on Intervention-based measures (near transfer effects) and Standardized tasks (far transfer effects)

In order to examine the efficacy of the intervention, a series of mixed 2x2 Analysis of Variance (ANOVA) with one between-subjects factor Group (Treatment vs. Control) and one repeated-measure factor Time (pretest, posttest) on each measure was conducted.

Table 2. Mean (SD) on proximal abilities at T1 and T2 and group comparisons

	Treatment group		Control group		Anova	pη^2
	T1	T2	T1	T2	Time x Group	
Sentence completion task	0	.85 (1.1)	0	0	Time F(1, 28) = 9.411* Group F(1, 28) = 9.411* TxG F(1, 28) = 9.411*	.252 .252 .252
Word recognition	2.5 (1.4)	4 (.98)	3 (1.1)	2.6 (1)	Time F(1, 55) = 5.723* Group F(1, 55) = 3.674 TxG F(1, 55) = 17.321**	.094 .063 .240
Inferential questions	10.4 (2.7)	12.6 (2.8)	10.1 (2.6)	10.8 (2.3)	Time F(1, 42) = 18.699** Group F(1, 42) = 1.711 TxG F(1, 42) = 5.515*	.308 .039 .116
Textual questions	12.1 (3.3)	14 (2.8)	12 (2.7)	13.3 (4.3)	Time F(1, 42) = 18.954** Group F(1, 42) = .134 TxG F(1, 42) = .662	.311 .003 .016
Comprehension task (total)	22.5 (5.5)	26.6 (5.3)	22.2 (5)	24.1 (6.3)	Time F (1, 42) = 34.858** Group F(1, 42) = .676 TxG F(1, 42) = 4.353*	.454 .016 .094
Story re-ordering task (Accuracy)	3 (2.1)	8.3 (4)	2.5 (1.6)	4.8 (2.7)	Time F(1,28) = 41.345** Group F(1,28) = 6.387* TxG F(1,28) = 6.498*	.596 .186 .188

Note: * $p < .05$; ** $p < .001$

As it can be observed in Table 2, analyses of variance on Intervention-based measures show several significant interactions Group x Time. In particular, as far as Intervention-based measures are concerned, in all cases except for comprehension of textual information, a significant interaction Group x Time was yielded indicating that the Treatment group had greater gains than control participants in almost all intervention-based measures.

Table 3. Mean (SD) on distal abilities at T1 and T2 and group comparisons

	Treatment group		Control group		Anova	pη^2
	T1	T2	T1	T2	Time x Group	
PPVT-R	79.5	88.2	72.7	74.8	Time F(1, 65) = 9.072*	.122
(Raw score)	(22.2)	(20)	(24.2)	(23.9)	Group F(1, 65) = 2.945	.043
					TxG F(1, 65)= 3.264	.048
PPVT-R	92.3	98.2	88	88.3	Time F(1, 65) = 6.240*	.088
(std. score)	(14.8)	(14.9)	(14.1)	(15.3)	Group F(1, 65) = 3.196	.047
					TxG F(1, 65) = 5.323*	.076
TOR 3-8	13.1	15.3	11.8	12.6	Time F(1, 65) = 16.236*	.200
(Raw score)	(3.2)	(2.2)	(2.6)	(3.3)	Group F(1, 65) = 7.700*	.105
					TxG F(1, 65) = 3.968*	.058
TOR 3-8	11	11.5	10.2	10.5	Time F(1, 65) = 2.860	.042
(std. score)	(1.7)	(1.5)	(1.1)	(1.5)	Group F(1, 65) = 5.607*	.079
					TxG F(1, 65) = .138	.003
Inferential	19.1	22.6	17.5	19.1	Time F(1, 65) = 24.242*	.272
Abilities	(6.6)	(7.6)	(6.5)	(7.5)	Group F(1, 65) = 1.757	.026
					TxG F(1, 65) = 3.401	.050

Note: * $p < .05$

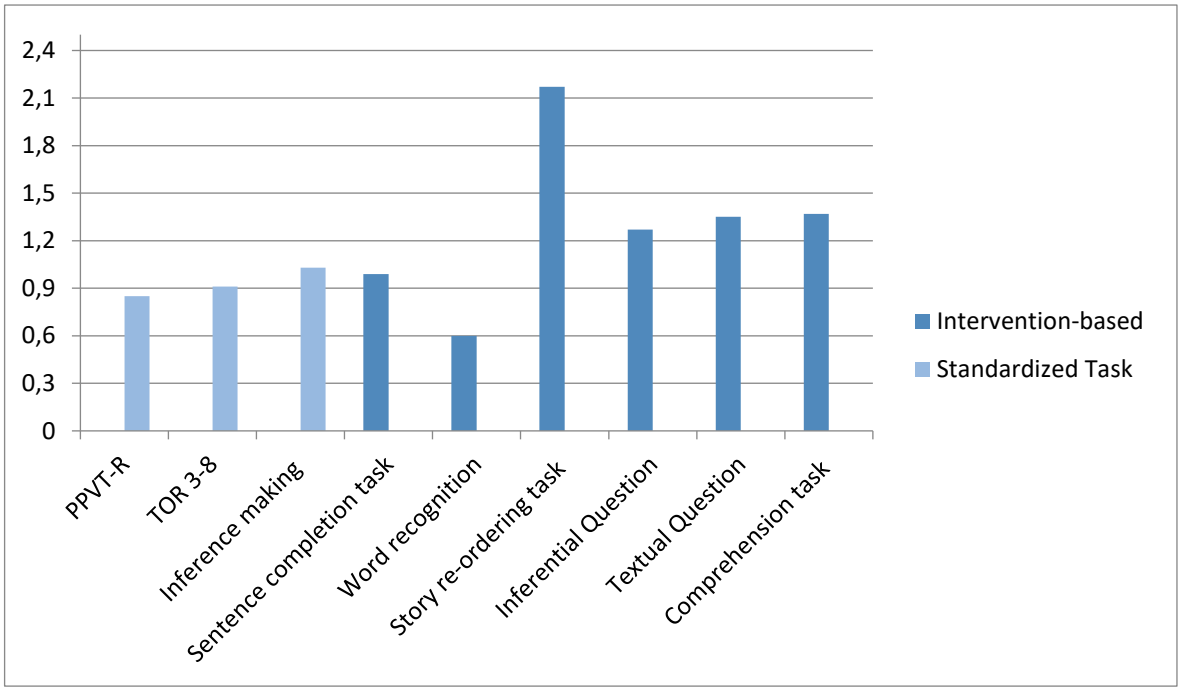
In addition, with regard to far transfer effects are concerned, we found a significant interaction Group x Time on vocabulary knowledge and narrative comprehension measured through standardized tests.

5.5.3. Benefit index

To better understand the effect size of the intervention, intervention gains for each participant as the difference between the improvement for the TG and the improvement for the CG divided by the standard deviation of the improvement from T1 to T2 for the group as a whole (Weisz & Hawley, 2001), were calculated. This enabled us to adjust the gains made by the treatment group with the gains made by the control group.

The results, reported in Figure 1, indicated large effect sizes (over .80) on all standardized tasks and all intervention-based tasks, except word recognition, highlighting that TG showed relevant near effects as well as far transfer effects of the intervention.

Figure 1. Standardized intervention gains for differences between pre-test and post-test



5.5.4. Intervention efficacy: who benefitted more from intervention activities?

In order to examine whether children responded differently to the intervention on the basis of their initial vocabulary knowledge (indicator of prior knowledge), only for TG were calculated the intervention gains for each participants as the difference between their pre- and

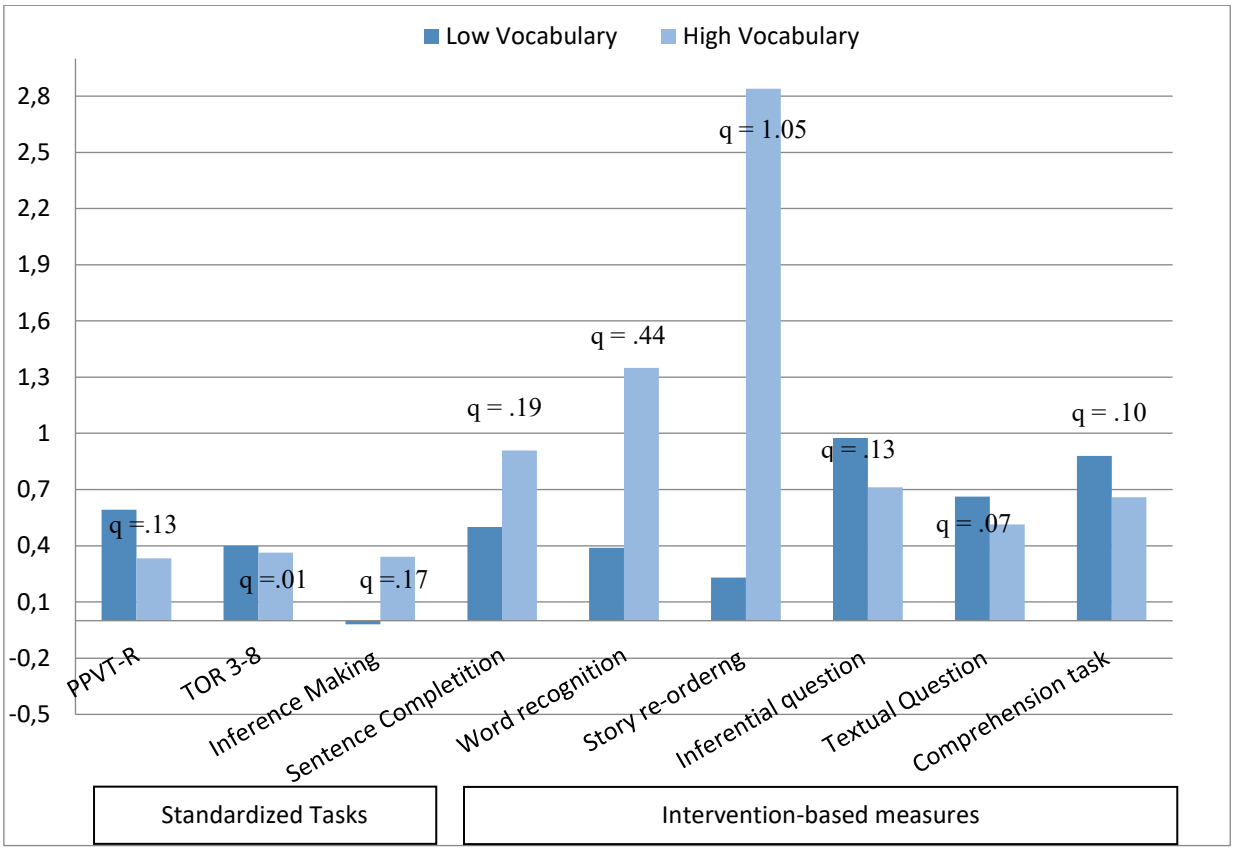
post-test performance divided by the standard deviation at pre-test for the group of participants as a whole (i.e. benefit index).

Secondly, TG was divided into two subgroups based on their vocabulary knowledge, measured trough the PPVT-R, at the pre-test. Children with an initial receptive vocabulary < 85, namely 1 standard deviation below the mean of the normative sample, were classified as low vocabulary children (N =13) and inserted in Low Vocabulary Group (LVG) whereas children with an initial vocabulary higher than 85 (N =37) were inserted in High Vocabulary Group (HVG). We compared intervention benefits for the two groups. As can be seen in Figure 2, both groups of participants benefitted from the intervention activities, however, differences between HVG and LVG were found in intervention benefits.

To compare directly if the two groups benefitted differently from the intervention, Cohen's *d* were transformed into r indexes and then compared. The size of the differences, expressed in Cohen's *q*, were reported in Figure 2 and interpreted according to Cohen's guidelines: a difference < 0.1: no effect; from 0.1 to 0.3: small effect; from 0.3 to 0.5: medium effect; > 0.5: large effect.

Concerning far effects, small differences were found in receptive vocabulary (q = .13), in favor of LVG, and inferential abilities (q = .17) in favor of HVG; no difference in the amount benefit between low and high vocabulary groups was found in narrative comprehension (TOR 3-8). Concerning near effects, large difference was observed in story re-ordering task (q = 1.05), a medium difference was found in the word recognition task (q = .44) and a small difference in sentence competition task (q = .19) all differences in favor of HVG, whereas small differences were found in intervention-based measures of story comprehension, namely Inferential questions (q = .13) and total comprehension score (q =.10) in favor of LVG.

Figure 2. Standardized training gains for differences between pre-test and post-test for 2 groups (high and low vocabulary)



5.6. Discussion

Efficacy of this intervention was analyzed both in terms of near transfer effects, using intervention-based tasks, and far transfer effects, using standardized tasks. Additionally, was analyzed differential responsiveness to intervention on the basis of children's initial vocabulary.

Concerning the first aim, although all children both in the treatment and control group improved their performance on each task from time 1 to time 2, TG showed greater gains than CG in almost all intervention-based measures. These results demonstrate near effects of the intervention showing that activities and materials developed were adequate for preschool children and that they benefitted from these activities. After the intervention, children from TG have shown to know the target words and to be able to use these in a different context;

they were more accurate in recognizing the correct order of pictured stories and they improved their ability to answer to inferential questions after they actively participated to a shared-book reading. Moreover, we found piecemeal evidence of generalizability of the intervention, namely TG showed greater gains than CG in receptive vocabulary and narrative comprehension evaluated with standardized tests whereas we did not find this result on the measure of inferential abilities. Taken together, these findings suggest that a relatively brief, but quite intensive intervention (6 hours in 8 weeks), can lead to sustained improvements in broad component skills of narrative comprehension in preschoolers.

Concerning the second aim of the study, namely the analysis of children's differential responsiveness to intervention based on their initial vocabulary knowledge, the analyses of effect sizes revealed that both groups of children, with high and with low vocabulary, benefited from the intervention showing, however, benefits in different measures. Children with low vocabulary showed higher gains in receptive vocabulary (measure with standardized task, PPVT-R) and inferential questions about the story (intervention-based task). Children with high vocabulary showed greater gains in the ability to use the story context for learning the target words (completion and recognition intervention-based tasks), in recognizing the correct story order (intervention-based tasks), but also, generalized these skills by improving significantly their inferential abilities (measured with Inferential abilities task).

Usually, in language-related intervention, children with stronger language make the greatest gains, however, explicit and sustained instruction during the intervention may mitigate this effect. From our results, it seems that children with low vocabulary have benefited from intervention in terms of "compensation": they made gains in the ability in which they were weak, reducing the initial differences namely vocabulary, whereas they did not benefit in inferential abilities, at least partly, because their poor vocabulary level did not allow them to engage in high-level processes. Children with high vocabulary, on the other

hand, improved more in their cognitive and integrative skills supporting the phenomena known as "Matthew effect" according to which, higher resources allow higher advantages from the learning process (c.f. Cain & Oakhill, 2011).

As previously reported (Silva & Cain, 2015), the relationship between vocabulary and inferential abilities is reciprocal. Better knowledge of words contained in the text facilitates the connections between different parts of the text, and between the ideas expressed in the text and previous knowledge. At the same time, inferential abilities facilitate new vocabulary acquisition, because the texts are the main source for new word learning from context. This may well represent a valid interpretation of our results concerning individual differences in the intervention benefits.

These results are in line with our main purpose namely meet the needs of both less advanced and more advanced children by providing sufficient support to enable those with lower initial levels to benefit from the intervention and, at the same time, providing sufficient challenging opportunities for more advanced children. We can speculate that early intervention with children from a low level of SES - before the age of 4 - should focus on vocabulary, in order to foster closing the gap with peers in this key component of language development, and then should move to other more complex oral language components of narrative comprehension, namely inferential abilities.

Moreover, the current findings suggest that, although interventions' gains might differ according to children's initial levels of vocabulary knowledge, even other oral language components of narrative comprehension, may be trained in preschoolers from low SES background. The inferential ability allows us to infer the meaning of novel words thus represent a crucial ability to learn vocabulary and increase vocabulary knowledge, therefore, it would seem useful to work also on the inferential ability to close the vocabulary gap that characterizes children coming from low SES background.

Skills trained in the current intervention are the foundation for literacy development, thereby, it is argued that narrative comprehension components, both lower and higher-level should be fostered before formal literacy has been started to promote literacy development and later school readiness of low SES children.

Findings of numerous studies indicate that the different academic paths followed by children from different SES background have their roots in skill differences established even before children start school and that differences in language skill are a significant component of these early differences (Dickinson & Tabors, 2001; Morrison, Bachman, & Connor, 2005). This effort to promote better oral language skills in children from low SES backgrounds before the formal school, could give them the same opportunity of peer from high SES backgrounds to be "ready to learn" once they start the school and attenuate long-term SES related effects.

CHAPTER 6 – Fifth study

6.1. Introduction

As reported in Chapter 1, emergent literacy skills development is strictly related to children's early literacy experiences such as practices to which children are exposed in kindergarten and, most importantly, at home. Children's parents are the most important source of early language input to children and, as such, are also the primary source of variation in input in daily life, particularly during home literacy activities, such as storytelling, shared book reading (Crain-Thoreson & Dale, 1992) and letter naming (Evans et al., 2000).

It is widely agreed that variation in the frequency of shared book reading, as well as, variation in the amount of interaction during these activities, have effects on children's language development and educational outcomes. Children who come from homes in which these activities are frequent show verbal precocity, greater later receptive vocabulary, and knowledge of print (Crain-Thoreson & Dale, 1992; Debaryshe, 1993; Wells, 1985; Scarborough & Dobrich, 1994) moreover enter school with more well-developed understandings of literacy (Senechal et al., 1995). For all these reasons, shared book reading is often recommended as the most important home literacy activity that adults can do to promote emerging children's literacy.

Moreover, greater amounts of interaction and parents' adjustments during interaction support children's learning and produce a long-lasting language advantage (Huttenlocher et al., 1991). The belief is that it is the interaction during shared book reading that facilitates children's language abilities and that promotes better linguistic outcomes.

Whitehurst and colleagues (1988), recognizing the importance of interaction during shared book reading activities, designed an intervention called "dialogic book reading" (for

detail see Chapter 1) which aims to encourage adults to create dialogues and interact more during shared-book reading activities. Results from several studies, shown that dialogic book reading is an extremely successful activity for the development and enrichment of emerging literacy, with a view of preventing and enhancing linguistic, cognitive, communicative and socio-affective skills of children, who learn in a fun and enjoyable way (Crain-Thoreson & Dale, 1999; Lonigan & Whitehurst, 1998; Wasik & Bond, 2001; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, et al., 1994; Sénéchal et al.,1995).

However, in evaluating the literature on dialogic book reading program, we were impressed by the fact that only few studies, especially those conducted in day-cares, included a control group. Such a control group is essential because it allows for the assessment of whether children learn from regular-reading sessions or whether they learn more from dialogic book reading sessions. Moreover, we found that almost all implementations of dialogic book reading, to date, have conducted self-instruction procedure using a videotape training package or training in-person (with or without additional videotaped explanation and examples). Besides, research studies on dialogic book interventions frequently used only receptive or expressive vocabulary development as a learning outcome (Justice, 2002; Senechal, 1997; Senechal & Cornell, 1993) whereas the effects of these programs on other relevant oral skills rarely have been investigated (Sénéchal et al., 1995). This study aims to fill these gaps present in the dialogic book reading program literature, incorporating these significant features.

6.2. Aim

The current study was aimed to analyze the efficacy of an original parent-focused intervention on dialogic book reading, aimed to promote parent-child interaction during shared book reading and, in turn, foster broad oral language skills of pre-school children. Efficacy of the intervention was verified by analyzing the improvements from pre to post-

intervention in children's oral language outcomes, through ad hoc and standardized tasks, namely by measuring proximal and distal abilities. We tested whether the beneficial effects of storybook reading would be greater when children were active participants during shared book reading as compared to when children were involved in a regular book-reading situation. According to the research design, to assess the feasibility and efficacy of the intervention and to obtain answers to specific research questions, three groups of participants were involved in this study, in detail:

1. Treatment group (TG) represents the group who actively participated in all the intervention sessions, described below: they received the materials, weekly assignments, and support to practice with dialogic strategies;
2. Information group (IG) represents the group who received, concomitantly with the intervention sessions, written information about language development, the same books used during the intervention sessions and assignment to read with their children 2/3 times for week;
3. Control group (CG) represents the group who received the same books used during the intervention, without any information about language development and intervention.

Higher scores in all experimental tasks and on standardized tests were expected for children taking part in the intervention (treatment group) compared to children who participated in regular-reading activities (control and information group). Moreover, higher scores were expected for children in the information group compared to children in the control group. The decision to include a control group was driven by the desire to investigate whether progress that the children of the treatment group would achieve in both types of tasks (intervention-based and standardized) were due to the typical developmental trajectory and whether the amount of reading produces differences in developmental trajectories. On the other hand, the decision to include within the research design a group of parents who only received information about language development, books and weekly assignments was driven

by the willingness to understand if, in the event that there were any effects for treatment group children, they were due to the use of dialogical strategies, learned directly from an expert, and not from the mere amount of reading of the books provided.

The second aim of this study was to develop an observational tool to assess parent-child interaction during book reading activity through which analyze whether parents learned how to use dialogic reading strategies and weather children became more participative during and after the intervention. We developed a new observation tool to code videos of interactions during shared book reading, to evaluate the efficacy of our intervention in producing behavioral changes of both participants during shared book reading activities and then to analyze whether these changes impact broad language skills development after the intervention.

6.3. Description of the Intervention

The intervention consisted of 4 educational modules, implemented in six weeks, that made use of the embedded behavior change strategies (quantitative linguistic feedback and video-modeling of strategies designed to increase the quantity and quality of child-directed talk). Parents attending the program were invited to take part in 4 evening training sessions (2 hours) held in the main room of preschool where children were enrolled. Each session was focused on one educational module aimed to foster a specific linguistic skill (see Table 1 for an overview of the content of each module, materials, and assignment). The four modules were built to be implemented in a sequence, with each new module building upon the content of all preceding modules. Topics of the educational modules were as follows:

- **Module 1: strategies and reading behaviours to increase children's active participation** In this module parents were taught fifteen strategies useful to promote active participation, love for reading activities and to switch from passive reading to dialogical, i.e.

responsive parenting skills that encouraged longer and strategic conversations about the book. In particular, the strategies were: to maintain physical proximity and eye contact; to make predictions from the title; to follow the child's attention focus; to refer to familiar experiences or content; to make reading attractive using the voice (prosody and different voice for each character); to leave the child to manage the book; to give positive encouragement and feedback; to take frequent and sufficiently long breaks; to suggest the expected information; to accompany sentences with representative gestures; to repeat the child's word or phrase in the correct form; to transform reading into a conversation (make different questions); to offer a reading model; to use terms referring to read-write; to ask a story re-telling.

- **Module 2: strategies to foster vocabulary and to allow acquisition of new words**

In this module, parents were taught and shown the main strategies of dialogic book reading for children aged 4-5, namely strategies to teach new words and foster vocabulary growth (Whitehurst, Epstein, et al., 1994). This module starts with the description of children's language development trajectories to make parents aware of the linguistic development phase of their children and thus to calibrate the words to be taught. Afterward, different vocabulary teaching strategies were shown through video, live examples, and written materials. Whitehurst and colleagues developed the acronyms PEER and CROWD to help parents to remember these techniques. PEER reminds adults to Prompt the child to label objects in the book and talk about the story, Evaluate the child's responses, Expand the child's verbalization by repeating what the child has said and adding information to it, and encourage the child to Repeat the expanded utterances (Zevenbergen & Whitehurst, 2003). The acronym CROWD refers to the five types of questions that parents can make to engage and encourage children to use the target word (see Chapter 1).

- **Module 3: strategies to foster inferential abilities, knowledge of story structure and narrative skills**

This module starts with theoretical introduction about narrative comprehension and components involved in comprehension with a specific focus on inferential abilities and use of script. Parents were taught and shown an example of inferences necessary to understand implicit information in books and narratives (knowledge-based and text- based). In the last part of this module the developmental phases of narrative competence were shown and, afterwards the strategies to foster children's narrative skills. In particular, the strategies illustrated to promote comprehension were: to expand lexical knowledge; to expand text-specific knowledge (identification of the topic); to encourage inference generation through questions; to emphasize characteristics of the story structure. Strategies to promote narrative production were: to ask impressions about the story; to ask to recall the story (re-telling); to ask questions about the main information to verify its comprehension; to ask to add more details through specific questions.

- **Module 4: strategies to promote print and letter knowledge**

This module starts with a theoretical introduction about emergent literacy skills and their relations with reading ability. Parents were taught and shown examples of the use of print referencing whose peculiarity is the use of any type of printed material as a tool to make a shared reading experience. In the last part of this module, it was discussed how to generalize the use of the strategies learned during the training and transfer them to different materials, namely E-books and educational software or Apps.

Table 1. Overview of the intervention sessions, materials and assignment

Module	Materials	Assignment
1. Strategies and reading behaviours to increase child's active participation (one week)	- Week diary - Overview of the strategies - Assignment Reminder - Book "Frog, where are you?" (Mayer, 2003)	Read the book 2/3 times trying to use some of the strategies illustrated during the first educational module; Videotape a reading session; Send video and diary
2. Strategies to foster vocabulary and to allow acquisition of new words (two weeks)	- Two Week diary - Overview of the strategies - Assignment Reminder 1st week - Book: "Il ladro di polli" (Rodriguez, 2011) - Written prompt to promote acquisition target words (10) inserted into the story	Read the book 2/3 times using the specific instructions (prompt) written on the pop-on next to the target word; Find new target word and try to teach them to your child; Videotape a reading session; Send video and diary
	2nd week - Book: "Il litigio" (Boujon, 2014) - Written prompt to promote the acquisition of target words (10) inserted into the story	2nd week Use the 2nd book Videotape a reading session Send video and diary Try these strategies with other books
3. Strategies to foster inferential abilities, knowledge of story structure and narrative skills (two weeks)	- Two Week diary - Overview of the strategies - Assignment Reminder 1st week - Book: "Il litigio" (Boujon, 2014) - Written script to promote narrative comprehension with questions on temporal (6) and causal (10) links	Read the book 2/3 times using the specific instructions (script) written alongside the target link; Find new link or inferences and try to work on them; Videotape a reading session; Send video and diary
	2nd week - Book: "Il ladro di polli" (Rodriguez, 2011) - Written script to promote narrative comprehension with questions on temporal (10) and causal (10) links	2nd week Use the 2nd book; Videotape a reading session; Send video and diary; Try these strategies with other books
4. Strategies to promote print and letter knowledge (one week)	- Week diary - Overview of all the strategies - Assignment Reminder - Book "Frog, where are you?" (Mayer, 2003)	Read the book 2/3 times trying to use all the strategies illustrated during the educational modules; Videotape a reading session; Send video and diary

This intervention used a facilitator expert in language development who in each module, through videos of parent-child interaction and ad hoc material, illustrated dialogic shared book reading strategies useful to promote positive linguistic development outcomes. Each session had the same schedule: introduction to dialogic reading strategies with particular attention to specific language skills, presentation of short training videos on dialogic reading strategies, role-playing, games with written instructions, discussions, delivery and demonstration of the material to use. At the end of each session, parents were provided with ad hoc material to be used in the following week (books and instruction), a handout summarizing strategies of dialogic book reading illustrated and a reminder with the assignments for the week. During the six weeks of the intervention, parents were asked to follow the instructions, fill in weekly diaries and videotape one parent-child reading session per week. Moreover, parents were asked to send back to the parent facilitator, using cloud storage software, weekly diaries, and parent-child reading sessions' videos.

6.4. Method

6.4.1. Procedure

According to the research design, three groups of participants were involved: Treatment group (TG), Information group (IG) and Control group (CG). Parents who declared their intention to be involved in the study and availability on dates scheduled for intervention sessions were randomly assigned to TG or IG whereas other participants were included in CG. Teachers were not aware of the groups' assignment of children and the purpose of the intervention.

6.4.2. Participants

In this study, approved by the Ethical Board of the Representative Institution (protocol number 2534) forty children, target of this intervention, aged between 4 years and 4 months to

6 years and 1 month (M_{age} = 62.9 months, *SD* = 6.3) were involved in this study. Children, according to the different involvement of parents into the intervention, were also divided in 3 groups: 1) Treatment group (TG): N = 12 children (F = 4; M_{age} = 62.6 months, *SD* = 6.9); 2) Information group (IG): N = 12 children (F = 5; M_{age} = 62.5 months, *SD* = 5.5); 3) Control group (CG): N = 16 (F = 5; M_{age} = 63 months, *SD* = 6.8). Information collected through a questionnaire administered to parents showed that all were typical development children coming from middle socioeconomic status families.

6.4.3. Materials

Children's broad oral language skills were assessed before and after the intervention with intervention-based measures, standardized tests and tasks not directly addressed in the intervention, to address respectively near and far transfer effects. All these tasks were individually administered in a fixed order by two trained master students: none of them were aware of children's group assignment. Each child was tested over three sessions of 30 minutes each. The pre-testing took place over the two-week before the onset of the intervention, and post-testing occurred during the week immediately following the intervention.

6.4.3.1. Intervention-based measures (near transfer effects):

Experimental probes were built to verify whether children benefited directly from intervention activities focused on vocabulary acquisition and comprehension of inferences.

Probes targeting vocabulary

To verify if the children learned the challenging twenty target words inserted into the two storybooks used during the intervention, two different probes were developed.

1) Sentence completion task: the examiner read brief sentences describing a situation in which the target word could be inserted. The context presented in the sentences was different from the original context and the prompt used by parents during the reading session,

therefore, the children must have generalized the meaning of the new word learned to complete correctly the sentences. Answer to each sentence was evaluated on a 0 - 1point scale where the incorrect answer was scored 0 and correct 1 (range: 0 - 20).

2) Word recognition task: it consists of a set of 30 pictures depicting the 20 target and 10 filler words. Children were asked to point which out of 3 pictures best represent the word orally presented by the examiner. Each item (target words) was evaluated on a 0 - 1-point scale where the incorrect answer was scored 0 whereas correct was scored 1 (range: 0 - 20).

Probes targeting comprehension of inferences

To verify children's comprehension of two storybooks used during the intervention, we developed a task in which participants were asked if the statements about the stories were true or false. The task focused on two types of information necessary to understand the story: textual, namely information explicitly stated in the story, and inferential, namely information that has to be inferred. The same number of true and false statements were provided for each type of information. Answer to each item was evaluated on a 0 - 1-point scale where the incorrect answer was scored 0 and correct 1. The score consists of the sum of correct answers, 36 for the 1st story and 40 for the 2nd, with a maximum score of 76 (range: 0 - 76). Two separate scores, one for textual and one for inferential answers were calculated (range: 0 – 38 for each).

6.4.3.2. Standardized tasks (far transfer effects):

In order to evaluate generalized effects of intervention on broad oral language skills, we assessed children with standardized tests and through tasks which were not directly addressed in the intervention, namely PPVT-R (Dunn & Dunn, 1981; standardized for Italian speakers by Stella, Pizzoli, & Tressoldi, 2000), TOR 3-8 (Levorato & Roch, 2007), PVCL (Rustioni & Associazione “La Nostra Famiglia,” 1994), Speeded naming NEPSY-II subtests (Korkman, Kirk, & Kemp, 2007), Theory of Mind task (adapted from Gopnik & Astington,

1988) and Inferential abilities task. (Description and details of these instruments are reported in Chapter 2 and Chapter 4).

Moreover, to assess print knowledge, children were shown in random order the entire set of printed letters and were asked to name the letters. The scores consist of the sum of correct answers 0 - 26 (number of letters included in the Italian alphabet).

6.4.3.3. Parent-child interaction during reading activities

Adult-Child Interactive Reading Inventory (DeBruin- Parecki, 1999) is an observational tool designed to assess the joint reading behaviors of an adult and child. It contains areas for both quantitative scoring and qualitative comments. For both the adult and the child portions, the observed interactive behavior is defined by three categories: (a) enhancing attention to the text, (b) promoting interactive reading and supporting comprehension, and (c) using literacy strategies. Each component assesses 4 interactive behaviors, for a total evaluation of 12 specific literacy behaviors.

6.5. Results

All children completed the tasks, standardized and intervention-based probes, at the two-time points. Table 2 shows descriptive statistics (means, standard deviations, and range) and group comparison across treatment (TG), information (IG) and control groups (CG) at Time 1. Standard scores are reported where available.

6.5.1. Descriptive statistics and group comparison at T1

Before the intervention, few children were able to produce and to recognize the target words suggesting that choice of words, inserted into the storybooks, was accurate and that target words were distant from the vocabulary of preschool children.

Concerning comprehension of inferences, after the first plenary reading during which children listened to the stories for the first time, performance covered a large range of scores with an

average score of 26 out of 38 on textual information and 23 out of 38 on inferential information, showing an average a good comprehension of inferences with some weakness for comprehension of implicit information.

Children's average performance on receptive vocabulary (PPVT-R) was 84 (*SD* = 12) thus it lays at the lower boundary of the range appropriate for age, whereas performance in narrative comprehension, sentence comprehension and speeded naming were age-appropriate. Performances on inferential abilities task covered a large range of scores, showing great variability (M = 17, *SD* = 6.9). Concerning letter knowledge children have shown to know on average 10 letters, whereas on ToM task 10% obtained 0, 64% obtained 1, 26% obtained 2.

Table 2. Characteristics of participants and group comparison at T1

Variables	Treatment group (N = 12)			Information group (N = 12)			Control group (N = 16)			ANOVA (*df* = 2.37)	
	Mean	*SD*	Range	Mean	*SD*	Range	Mean	*SD*	Range	F	*p*
Intervention-based measures											
Sentence completion task (range 0 - 20)	2.25	1.4	0-4	1.83	1.5	0-5	1.5	1.3	0-4	.792	.461
Word recognition task (range 0 - 20)	7.25	1.6	4-10	7	2.1	4-11	5.1	2.6	2-8	4.85	.013
Inferential questions (range 0 - 38)	25.9	4.8	17-34	22.9	6.3	15-34	23.4	3.5	16-31	1.30	.283
Textual questions (range 0 - 38)	30.5	4.7	21-36	26.5	6	15-36	25.2	6.9	13-35	2.62	.086
Standardized tasks											
TOR 3-8: Narrative comprehension (M = 10; sd = 2)	11.9	1.7	8-15	11.1	1.5	8- 14	10.1	1.3	8-12	4.74	.022
PPVT-R: Receptive vocabulary (M = 100; sd = 15)	89	7.7	75-102	86.6	13.9	68-118	79.8	12.1	65-99	2.39	.105
PVCL: Sentence comprehension (range 0 - 100)	66.4	14.8	43-87	61.5	13.4	39-86	47.9	17.2	20-93	5.43	.009
Semantic access (M = 10; sd = 3)	11.1	2.2	7-14	9.0	2.9	4-12	10.1	2.6	3-15	1.89	.165
Inferential abilities (range 0 - 40)	19.8	4.1	13–26	15.1	7.3	7-28	17.5	8.1	3-31	1.36	.269
ToM: Theory of Mind (range 0 - 2)	1.3	.65	0-2	1	.60	0-2	1.1	.61	0-2	.877	.425
Print knowledge (range 0 -26)	13.6	8.6	0-26	5.3	5.9	0-22	10.8	8.7	0-26	3.39	.044

6.5.2. Intervention efficacy on broad oral language skills

In order to answer to the first research question, namely to examine the efficacy of the intervention on broad oral language skills, we conducted a series of mixed 3x2 Analysis of Variance (ANOVA) with one between-subjects factor Group (Treatment, Information, and Control) and one repeated-measure factor Time (pretest, posttest). ANOVAs were conducted on Intervention-based measures, standardized tasks and tasks not directly addressed in the intervention, to analyze both near and far transfer effects.

Table 3. Mean (SD) on Intervention-based measures at T1- T2 and group comparisons at T2

Variables	Treatment group		Information group		Control group		Anova Time x Group	pη^2
	T1	T2	T1	T2	T1	T2		
Sentence	2.25	9.33	1.83	3.66	1.5	2.3	Time F(1,37)=55.96**	.602
completion	(1.4)	(4)	(1.5)	(3.3)	(1.3)	(2)	Group F(2,37)=13.03**	.413
							TxG F(2,37)=20.404**	.525
Word	7.25	13.6	7	10.4	5.1	6.4	Time F(1,37)= 82.59**	.691
recognition	(1.6)	(2.3)	(2.1)	(3.3)	(2.6)	(2.6)	Group F(2,37)=18.21**	.496
							TxG F(2,37)=13.139**	.415
Inferential	25.9	33.5	22.9	27.1	23.4	22	Time F(1,37)= 31.05**	.456
questions	(4.8)	(2.5)	(6.3)	(6.6)	(3.5)	(4.7)	Group F(2,37)=8.433**	.313
							TxG F(2,37)= 19.287**	.510
Textual	30.5	34	26.5	28.5	25.2	23.4	Time F(1,37)= 5.988**	.139
questions	(4.7)	(1.8)	(6)	(6.9)	(6.9)	(5.3)	Group F(2,37)=8.033**	.303
							TxG F(2,37) = 9.086**	.329

Note: * $p < .05$; ** $p < .001$

As for near effects, as it can be observed in Table 3, analyses of variance on all Intervention-based measures show significant Group x Time interaction. Bonferroni post hoc comparisons indicated that the TG had greater gains than IG and CG on inferential answers

and both vocabulary measures, word recognition and sentence completion task. As far as textual answers, we found a significant difference between TG and CG in favor of TG and between IG and CG, in favor of the IG. Moreover, we found also a significant difference in the word recognition task between CG and IG in favor of IG.

Table 4. Mean (*SD*) on Standardized task and tasks not directly addressed in the intervention not at T1 -T2 and group comparisons at T2

Variables	Treatment group		Information group		Control group		Anova Time x Group (1, 37)	pη^2
	T1	T2	T1	T2	T1	T2		
Narrative	11.9	12.6	11.1	10.6	10.1	11	Time F = 3.05	.076
comprehension	(1.7)	(1.3)	(1.5)	(1.6)	(1.3)	(1.7)	Group F =5.434*	.413
							TxG F =4.080**	.227
Receptive	89	97.7	86.6	94	79.8	87	Time F=11.583**	.243
vocabulary	(7.7)	(16.4)	(13.9)	(12.6)	(12.1)	(11.5)	Group F = 2.836	.136
							TxG F = .118	.007
Sentence	66.4	87.2	61.5	70.9	47.9	62.7	Time = 31.378**	.459
comprehension	(14.8)	(8.6)	(13.4)	(18.5)	(17.2)	(18)	Group = 9.001**	.327
							TxG F = 1.371	.069
Speeded	11.1	12.3	9	9.3	10.1	11.5	Time F= 5.164*	.121
naming	(2.2)	(2.4)	(2.9)	(3.6)	(2.6)	(2)	Group F= 3.613*	.163
							TxG F= .707	.037
Inferential	19.8	25.1	15.1	19.3	17.5	19.2	Time F=21.525**	.389
abilities	(4.1)	(4.9)	(7.3)	(6.4)	(8.1)	(9)	Group F = 2.121	.103
							TxG F = 1.843	.091
Theory of	1.3	1.7	1	1.5	1.1	1.6	Time F=16.269**	.305
Mind	(.65)	(.62)	(.60)	(.67)	(.61)	(.61)	Group F = .978	.050
							TxG F = .054	.003
Print	13.6	16	5.3	7.4	10.8	12.1	Time F=27.743**	.429
knowledge	(8.6)	(8.9)	(5.9)	(5.6)	(8.7)	(8.1)	Group F=3.597*	.163
							TxG F = .782	.041

Note: * $p < .05$; ** $p < .001$

Regarding far transfer effects, as it can be observed in Table 4, analyses of variance show significant interactions Group x Time on narrative comprehension and text-based inferences. Concerning narrative comprehension, Bonferroni post hoc comparisons indicated that the TG had greater gains than CG whereas no differences between TG and IG were found. As far as text-based inferences, post hoc comparisons indicated that the TG had greater gains than CG. In addition, Bonferroni post hoc indicated that the children in TG had greater gains than children in IG on speed naming and letter knowledge task.

6.5.3. Intervention efficacy on Parent-child interaction

The second aim of the study was to analyze the efficacy of the intervention in increasing the parent-child interaction during shared book reading. To answer to this second research question, through a methodologic work, we developed an observational tool to assess and evaluate parent-child interaction during shared book reading keeping into account all the strategies taught during the modules of our intervention, useful for detecting behavioral changes both in parents and children after the intervention.

6.5.3.1. Development of the observational tool

To this aim the following steps were carried out:

Step 1 - Analysis of the Adult-Child Interactive Reading Inventory.

In this first step, 16 undergraduate students participants in a developmental psychology workshop, were asked to assess a parent-child interaction during a shared book reading activity using the Adult-Child Interactive Reading Inventory (DeBruin-Parecki, 1999), to write down doubts and perplexities in using the tool, to indicate any suggestions to improve the tool. It emerged that the numerical score (0-3 scale) does not allow a marked distinction between the participants; some items are not well described and not mutually exclusive; although it is an interactive tool, the child is considered passive during the activity.

His behaviors are considered only in response to parent's attempts (no as child initiative); some behaviors considered relevant during a shared book reading activity, are not present; the simultaneous observation of both participants during the activity is quite difficult.

Step 2 - Discussion on issues arisen during the ACIRI's use.

Starting from the evidences reported by students, discussed with an expert of Language Development, the following changes were suggested: to remove items not mutually exclusive; to add several new items, in each category, to assess child's initiative; to use a 30 second interval coding system for the categories "Promoting interactive reading and supporting comprehension" and "Using literacy strategies"; to added a global evaluation for parents' reading style and adequacy of storytelling and for child's involvement in reading and level of story understanding (0 - 5 scale); to involve two different observers, respectively for parent and child-specific behaviors.

Step 3 - Definition of the new observational tool.

The variations proposed by the students at Step 2 were included in the observational tool: Moreover, to make this new observational tool specific to assess specific behaviors taught to parents during our intervention, a second round of coding, was added. The second round was aimed to detect the frequency of questions about a temporal link, about a causal link and attempts to teach word using different types of prompts (see CROWD).

These changes into the original observational tool, i.e. ACIRI, emphasize the active role of children during shared-books reading, would enable a better assessment of adult and child interaction during shared-books reading; additionally, it allows to remove the methodological bias present into the ACIRI concerning the simultaneous observation of both participants. The final version of the new observation tool is reported in Appendix A.

Step 4 - Preliminary use of the new observational tool developed.

To answer the second research question, videos of interactions during shared book reading required to and sent by parents in the 1st and last week of the intervention were coded by 16 undergraduate students involved in the development of the tool. Coders were divided into couples who were randomly assigned two videos to code, moreover, each coder was asked to code, following the items included in the tool, behaviors of one of the participants of the interaction (parents or child). Coders were not aware of the groups' assignment of dyads (TG and IG) and of time points of the interaction, namely, pre or post-intervention.

6.5.3.2. Preliminary results

To date, we were able to code only videos of 16 dyads (TG = 10; IG = 6) thus here are reported preliminary results. Considering the complexity of the observational tool, a large amount of information can be collected, however, only a few measures, reported and briefly described in Table 5, were used for the following preliminary analysis.

Table 5. Label and description of measures collected through video-coding

Label	**Definition**
Length	Length of shared book reading (in seconds)
PQuest	Number of parental questions
ChAns	Number of child answers
ParBe (range 0-17)	Number of different parent dialogic book reading behaviors
ChBe (range 0-17)	Number of different child dialogic book reading behaviors
ParLink	Number of temporal and causal link promoted by parents
ChLink	Number of temporal and causal link explained by children
TotPB	Total of parent dialogic book reading behaviors
TotCB	Total of child dialogic book reading behaviors

We examined the equivalency of the two groups (treatment and information group) at pretest on measures collected through video coding. The results of the Mann-Whitney Test

indicated that there were no significant differences between groups on length of reading and frequencies of several "dialogic behaviors", namely the 2 groups were well matched on all the above-reported measures (see Table 6).

Table 6. Group comparison at T1 (Mann-Whitney Test) on parent-child interaction measures

Variables	Treatment Group (N = 10)		Information group (N = 6)		Mann-Whitney Test (Independent sample)		
	Mean	*SD*	Mean	*SD*	*U*	*z*	*p*
Length	381	133	340	163	23	-.760	.447
PQuest	6.2	6	9.6	9.2	23.5	-.709	.479
ChAns	5.1	7.8	5.6	4.5	22	-.906	. 365
ParBe (range 0-17)	10.6	3.4	10.1	4.8	27	-.336	.737
ChBe (range 0-17)	6.8	4.4	8	2.8	22	-.875	.381
ParLink	2.6	3	1.5	1.9	24	-.675	.500
ChLink	1.2	2	.67	1.2	30	.000	1
TotPB	32	18.3	33	12.2	27	-.326	.745
TotCB	18.8	23.6	19.5	15.4	24.5	-.600	.549

In order to examine whether the intervention was effective in producing changes in parent-child interaction during shared-book reading after the intervention, due to the nature of variables and to the low sample sizes, we conducted a non-parametric test (Wilcoxon Test) on each dialogic behavior detected through the observational tool at pretest (1st week) and posttest (last week). As it is shown in Table 7, we found some significant differences between

pre and posttest only for TG. In detail, differences were found in length of shared book reading, in the number of parent questions and child answers, in the number of different parent and child dialogic book reading behaviors and Total dialogic book behaviors used during the reading. Information group did not show differences between pre and post-test thus we can speculate that the improvement in dialogic behaviors of both parents and children are attributable to the involvement in our intervention.

Table 7. Differences between pre and post-test on parent-child interaction measures for both groups

Variables	Treatment group (N =10)		Wilcoxon Test	Information group (N = 6)		Wilcoxon Test
	T1	T2		T1	T2	
Length (in sec)	381	639	z = - 2.497,	340	357	z = -.734,
	(133)	(310)	p = .013	(163)	(131)	p = .463
PQuest	6.2	20.6	z = - 2.666,	9.6	9.8	z = -.405,
	(6)	(13)	p = .008	(9.2)	(18.2)	p = .686
ChAns	5.1	14.6	z = - 2.253,	5.6	5.5	z = -.677,
	(7.8)	(9.6)	p = .024	(4.5)	(7.5)	p = .498
ParBe	10.6	13.5	z = - 2.199,	10.1	9.1	z = -.946,
(range 0-17)	(3.4)	(2.2)	p = .028	(4.8)	(3)	p = .344
ChBe	6.8	12.4	z = - 2.706,	8	9.5	z = -.420,
(range 0-17)	(4.4)	(4.6)	p = .007	(2.8)	(4.5)	p = .674
ParLink	2.6	4	z = - 1.292,	1.5	1.6	z = .000,
	(3)	(4.6)	p = .196	(1.9)	(3.1)	p = 1
ChLink	1.2	2.4	z = - 1.794,	.67	.50	z = -.272,
	(2)	(2.5)	p = .073	(1.2)	(1.2)	p = .785
TotPB	32	51.4	z = - 2.710,	33	28.1	z = -.734,
	(18.3)	(22)	p = .007	(12.2)	(17.3)	p = .463
TotCB	18.8	34.4	z = - 2.091,	19.5	25.1	z = -.736,
	(23.6)	(16)	p = .037	(15.4)	(19.9)	p = .462

Moreover, in order to preliminarily analyze the effect of the intervention on children linguistic outcomes, namely vocabulary and narrative comprehension measured through

standardized test, we performed a correlation between behavioral measures at the end of the intervention and standard residuals of linguistic outcomes calculated in order to obtain a measure of their improvement (Table 8).

Table 8. Correlations between parent-child interaction measures and improvement in receptive vocabulary and narrative comprehension

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1 Improvement Vocabulary	-	-.07	-.19	-.33	-.43	.44	.14	.53*	.17	-.01	-.32
2 Improvement Narrative Compreh.		-	.66**	.42	.55*	.68**	.34	.18	.53*	.71**	.57*
3 Length of activity			-	.44	.53*	.38	.43	.19	.62*	.81**	.66**
4 Number Parent Questions				-	.91**	.10	.27	-.05	-.01	.46	.54*
5 Number Child Answers					-	.17	.28	-.13	.04	.50	.60*
6 Number different parent dialogic behaviors						-	.49	.58*	.55*	.70**	.38
7 Number different Child dialogic behaviors							-	.38	.71**	.54*	.75**
8 Number parent temporal - causal link								-	.45	.28	-.01
9 Number Child temporal and causal link									-	.66*	.57*
10 Total Parent dialogic behaviors										-	.71**
11 Total Child dialogic behaviors											-

Note: * $p < .05$; ** $p < .001$

Regarding children's improvement in receptive vocabulary was found a moderate correlation with the number of temporal and causal links promoted by parents (r = .53). Regarding children improvement in narrative comprehension was found a significant moderate correlation with number of parent dialogic book reading behaviors (r = .68), a moderate correlation with number of temporal and causal link explained by children (r = .53)

and a moderate correlation with the total number of parent dialogic book reading behaviors taught during the intervention (r = .71).

6.6. Discussion

Efficacy of this intervention was analyzed both in terms of near transfer effects, using intervention-based tasks, and far transfer effects, using standardized tasks and tasks not directly addressed in the intervention. Additionally, thus we were interested in the analysis of parent-child interaction during shared book reading, after the development of a new observational tool, we analyzed the efficacy of our intervention to produce changes in the quality of interaction, i.e. to improve parent dialogic book reading behaviors that in turn may produce changes in child behaviors related to their linguistic outcomes.

The first analyses were aimed to analyze whether treatment group showed greater gains than information and control group in proximal abilities and, ideally, on distal abilities. Concerning the first aim, although children both in treatment, information, and control group improved their performance on each task from time 1 to time 2, treatment group showed greater gains than information and control group in almost all intervention-based measures.

These results demonstrate near effects of the intervention showing that activities and materials developed were adequate for preschool children and that they benefitted from these activities. After the intervention, children from the treatment group have shown to know the target words and to be able to use these in a different context; they improved their ability to answer to inferential and textual questions after they actively participated to a dialogic book reading activity. Moreover, we also found that the information group obtained greater gains than the control group in the word recognition task. This means that a mere and repeated exposure to books, even without specific intervention, can still lead to benefits in expanding children's vocabulary. However, the implementation of dialogic book reading strategies produces greater results on receptive and expressive vocabulary suggesting that the increasing

parent-child interaction on target words during shared book reading through the use of strategic conversations and specific prompts, produces greater benefit in terms of vocabulary.

Our results are in line with the previous literature on dialogic book reading programs that show improvement in intervention-based measures of explicitly taught vocabulary (Coyne, Simmons, Kameenui, & Stoolmiller, 2004). Moreover, we found that treatment group had great improvement in intervention-based measures of narrative comprehension, showing that a dialogic book reading program may sustain not only the improvement of receptive and expressive vocabulary but also broader linguistic skills such as inferential abilities. To the best of our knowledge, this is the first study on dialogic book reading with preschoolers that uses broad oral language skills and not only receptive or expressive vocabulary as learning outcomes. These findings highlight the need to recognize these skills as aspects to be promoted through dialogic book reading interventions with preschoolers.

These findings are also supported by results obtained on distal abilities that show greater gains for the intervention group compared to the control group on narrative comprehension and text-based inferences evaluated with the inferential abilities task. It can be speculated that the intervention had far effects providing piecemeal evidence of generalizability of our intervention.

Finally, children in treatment group had greater gains than children in Information group also on speed naming and letter knowledge task. Taken together, the findings reported so far suggest that a relatively brief parent-focused intervention (6 weeks) on dialogic book reading strategies, can lead to sustained improvements in broad language skills in preschoolers.

Concerning the second aim, namely to analyze the efficacy of our intervention in improving parent-child interaction and dialogic behaviors during shared book reading, treatment and information group were compared to investigate whether changes experienced

by parents and children in shared book reading activities were attributable to the participation to the dialogic book reading intervention and not to the increased amount of reading. Results from preliminary analyses have shown that the length of shared book reading activities became greater for parents in the treatment group than for parents in the information group. Moreover, for parents in the treatment group, the type, and frequency of use of dialogic book reading behaviors increased, from time 1 to time 2, whereas children increased the number of answers to parents' questions.

In addition, we investigated whether these changes were related to children's linguistic outcomes. The correlation between "dialogic behaviors" detected through the new observational tool at the end of the intervention with improvement on receptive vocabulary and narrative comprehension suggest that this intervention had effects on the parent-child interaction during shared book reading which in turn is related to outcomes in broader language skills. Results highlight that, although the amount of shared book reading is strictly related to children linguistic outcomes (Yaden, Rowe, & MacGillivray, 2000), the incorporation and practice of specific behaviors aimed to increase the parent-child interaction during shared book reading may produce greater results not only on vocabulary but also on broader linguistic skills related to school readiness and thus, may promote future academic success for children as they enter school.

In conclusion, we can say that our parent-focused intervention on dialogic book reading has been effective with respect to several factors. In particular, the intervention had direct effects on the shared book reading activity carried out by parents at home. We can speculate that these changes, together with the teaching of appropriate dialogical strategies, have resulted in better performance in tests related to the specific skills being trained, i.e. increased vocabulary and generation of inferences, by children of parents who participated at the intervention. These findings suggest that an effective way to promote children's literacy

skills is not only to act directly on them but, also, to work with parents showing them how an appropriately stimulating environment may be extremely important for their child's emergent literacy skills development. Once parents are aware of what they can do to help their child development, they will tend to change their behavior more persistently, since they are more aware of their role as educators and of what is useful to further child's linguistic development (DeBruin-Parecki, 1999).

The current findings, in line with previous works on literacy environment and practices, highlight the central role of the family in children's linguistic and literacy development over and above the role of the school. Moreover, our findings, in line with previous dialogic reading programs results, demonstrate that it is relatively easy to teach parents how to maximize dialogic reading strategies, that in turn promote language and literacy development in preschool children, strictly linked to future literacy skills (Hogan et. al., 2011; Pinto, Bigozzi, Vezzani, & Tarchi, 2017). Because of its potential and its easily implementation, there is a need for further studies aimed to develop and validate dialogic book reading interventions on a very large scale perhaps involving educators and teachers who could in turn provide the appropriate resources to all parents to provide children better opportunities to promote emergent literacy skills development already in preschool-age.

Further studies should directly involve parents through indirect intervention to promote better oral language outcomes, in particular for children experiencing conditions of vulnerability such as low economic status and multilingual exposure.

CHAPTER 7 – General Discussion

The main aim of the current dissertation was to investigate the specific effect of some environmental factors on the development of cognitive and linguistic skills in preschoolers and to develop specific interventions to support emergent literacy development and in turn, with a long-term perspective, to promote children' school readiness.

As reported in Chapter 1, although the role of several environmental factors on emergent literacy skills development, as well as, their long-term effects are well established, still, there is a considerable percentage of children that begin their formal schooling process unprepared to handle the demands of the school learning processes.

This evidence highlighted the need for further studies aimed to investigate the specific effect of several environmental factors on the development of cognitive and linguistic skills in preschool, in order to gain a clear picture about the importance and the role of the growth environment and eventually to give to parents, educators and psychologists practical tools to enable all children to have the same opportunity to be "ready to learn" once they start school and thus, to prevent subsequent risk situations or school difficulties.

This general and wide aim has been investigated through five different studies: in the first study (Chapter 2) the specific and unique role of familiar Socio-Economic Status and Bilingual exposure on a large set of cognitive and linguistic abilities has been investigated; in the second study (Chapter 3) the role of vocabulary in narrative comprehension in sequential bilinguals has been investigated together the effect that the amount of bilingual exposure has on the relation between these two skills; in the third study (Chapter 4) the Multicomponent Model of Comprehension, keeping into account individual differences in the amount of exposure to language of context, was investigated.

The results of these three studies raised the question of what could be done, during the early stages of development, to ensure better oral linguistic outcomes before formal school instruction to prevent possible subsequent risk situations or school difficulties. To answer to this relevant question, and aware of the impossibility of directly manipulating the two environmental variables investigated in previous studies, our efforts were directed to the literacy environment that has been extensively demonstrated to be strongly related to child development and school readiness. In detail, in the fourth study (Chapter 5) the effects of a new classroom-based shared-book reading intervention have been investigated and its role in the development of broad oral language skills in preschool children coming from low-SES backgrounds; in the last study (Chapter 6) the effects of a new, home-based, dialogic-book reading intervention on the development of broad oral language skills in preschoolers have been investigated. We decided to involve, in these two interventions, both spheres in which a child grows up, namely home and educational context, developing a direct intervention focused on children and an indirect intervention focused instead on parents.

The findings from all these studies contributed with evidence that environmental factors, such as Socioeconomic status, bilingual exposure and literacy environment, both at school and home, are relevant sources for individual differences in linguistic and cognitive developmental trajectories and thus in contributing to school readiness.

More specifically, the investigation of the specific contribution of Bilingual Exposure and Socioeconomic Status, on a large set of cognitive and linguistic skills and the analysis of their interactive/independent effects provided new evidence for the distributed impact of bilingual exposure and SES on the linguistic and cognitive development of preschool children as it has been shown that these two environmental factors impact different abilities of children, yielding variation in their linguistic and cognitive profiles, highlighting moreover the independence of these two environmental factors.

Once investigated the specific effects of SES and BE on the linguistic and cognitive development of preschoolers, in the second study we analyzed the effect of the amount of bilingual exposure in determining the relationship between receptive vocabulary and narrative comprehension. To avoid confounding effects of SES, only medium high-SES bilinguals were involved. Moreover, children's vocabulary and narrative comprehension were evaluated in both their languages. Results have shown, as predicted, that even after different years of continuative exposure to two languages, L2 remains still a weaker language. Concerning the role of vocabulary in narrative comprehension in each language and across languages, it resulted that, analogously as in monolingual children, vocabulary represents a relevant predictor of narrative comprehension and more interestingly, the findings suggest that a low vocabulary did not prevent children to comprehend adequately a narrative text in each language. Although the contribution of vocabulary in narrative comprehension is relevantly high, it is also evident that there is a conspicuous variation in narrative comprehension that cannot be attributed solely to vocabulary. This evidence reinforces the hypothesis that other factors, in a multilevel representation of language and cognitive skills involved in narrative comprehension, are involved and may promote narrative comprehension processes in preschool children exposed to one or more than one language.

In the third study, within a Multicomponent approach of text comprehension (Oakhill & Cain, 2007), all the relations across linguistic and cognitive components of narrative comprehension were investigated. Moreover, for the first time, to the best of our knowledge, the role that the amount of exposure to the language of context has on structural relations of cognitive and language skills with narrative comprehension in young children was investigated. Cumulative exposure to language of context was directly related to lower-order cognitive skills and, to a greater extent, to receptive vocabulary, whereas was not directly related to higher-order cognitive skills and narrative comprehension. Moreover, a direct

moderate relation of working memory to vocabulary and sentence comprehension was found; attentional control was found to be directly related to speed naming and knowledge of story structure, whereas inhibitory control was directly related with narrative comprehension. Both receptive vocabulary and speed naming were related to higher-order cognitive skills such as inferential ability and knowledge of story structure; moreover, vocabulary was related to the theory of mind. Vocabulary knowledge was the only linguistic skill that resulted to be directly related to narrative comprehension. Finally, it was found that inferential abilities and knowledge of story structure, were both directly related to narrative comprehension. These findings clarify the interplay among lower-order cognitive skills, lower-order linguistic skills, higher-order cognitive skills and exposure to language of context in explaining preschooler's narrative comprehension.

The results of the first three studies have important practical implications for the assessment of children exposed to more than one language and for children coming from different socioeconomic status families, emphasizing the need to consider contextual factors both in the assessment and during educational intervention planning. Moreover, these results contribute to a more specific understanding of which skills are relevant for comprehension at this early age and therefore should be targeted by early interventions to increase pre-readers' emergent literacy skills.

Starting from these evidence, in the last two studies, direct classroom-based and indirect home-based interventions were developed and evaluated. These interventions were aimed to improve learning environments in order to promote children's emergent literacy skills development and, in turn, make all children "ready to learn" once the move to school. Since, according to the Interactionist model of school readiness (Murphey & Burns, 2002), school represents a very influential factor for school readiness, in the fourth study it was developed a brief classroom-based intervention, focused on shared book reading activities. In

this study, we focused on a specific population, namely children from low SES backgrounds since they usually show weaker vocabulary knowledge that may hinder the development of their emergent literacy skills and as a consequence may constrain their transition to school. This intervention aimed to foster broad oral language skills thus the activities were focused on the development of several abilities central to early literacy development and school readiness namely vocabulary, inferential ability knowledge of story structure and narrative comprehension. Results are in line with the previous literature on interventions targeting oral language skills that show short-term improvement in trained tasks, showing that even in preschool and even children coming from low-SES backgrounds, may benefit from direct intervention. The results of this study highlight the potential for optimizing preschool instructional activities for children at risk for later difficulties including into the preschool curriculum activities aimed to promote the development of relevant emergent literacy skills and support a smooth transition to school.

In the last study, since home literacy environment plays a crucial role in determining the child's degree of cognitive and linguistic development, and later school readiness (Spedding et al., 2007), it was developed a brief home-based intervention focused on dialogic book reading activities, involving parents of preschoolers. Although it is well known that the frequency of adults reading storybooks aloud to children represents one of the most influential home literacy activities for promoting emergent literacy development of pre-readers (Yaden et al., 2000), in this study, we focused our attention on the amount and modalities of interaction during these activities. One of the most original contributions of the current work concerns was the design of an innovative observational tool that provides a unique means of evaluating adults' and children's interactions during shared book reading, emphasizing more the importance of the interaction during adult-child communication. Results, in line with previous studies, shown that greater amounts of interaction and parents adjustments during interaction

produced better children's linguistic outcomes and may produce a long-lasting language advantage.

Taken together, the results of these last two studies involving both spheres in which children's literacy development occurs, have shown that focusing on broad oral language skills instead of on single and basic skills, may enable children to develop the basic skills and knowledge in several domains, and support a smooth transition into primary school. Moreover, it is our concern to point out that, although the amount of shared book reading is strictly related to children's linguistic outcomes, the use of specific behaviors increasing parent-child interactions during shared book reading may produce greater results not only on vocabulary but also on broader linguistic skills related to school readiness and thus, may promote future academic success for children as they enter school.

Since child development is strictly related to the environment in which the child develops and in which the child interacts with caregivers and educators, the early identification of possible risk factors for emergent literacy skills development and the likewise early intervention in preschool might prevent future learning difficulties and, constrain the effect that other environmental factors, as seen, have on children early cognitive and linguistic development.

The results of these five studies, although each with limitations that may reduce the generalization of these results, are in line with the general theoretical framework of the study, providing relevant information on the importance that developmental environment and early individual experiences have on children cognitive and linguistic development. Neuro-constructivism confers to the experience an important role in the development process linked to the possibility, due to the partial functioning of neural structures, of shaping the development of brain and cognition (Karmiloff-Smith, 1992). Behaviorally, it is well known that the quantity and particularly the quality of the language young children are exposed to

early in life predict their later linguistic and cognitive skills (Huttenlocher et al., 1991; Rodriguez & Tamis-LeMonda, 2011). Nowadays, there is a growing number of neuroimaging studies investigating the effect that different environmental factors have on brain development. Ursache and Noble (2016) found, for example, evidence that variation in SES is associated with variation in brain development, including gray matter volume and surface area, in addition to white matter macrostructure and microstructure. Romeo and colleagues (2018) found the first evidence of a direct association between a specific aspect of children's language experience, namely adult-child conversational turns, and particular children neuroanatomical structural properties, further highlighting that variation in early childhood language experience underlie individual differences in neuroanatomy and behavior. To summarize, to date there are some first evidence relating children's language exposure to their brain structure that underline the important role of immediate environmental factors in determining children's neural disparities and thus cognitive development.

Results coming from studies reported in this thesis, in line with previous studies, show that low-SES and multilingual exposure usually negatively affect the development of certain skills. However, results of our two interventions show that through well-structured and validated educational interventions and in particular increasing adult-child interaction, it seems possible to limit their effects, allowing children who experience one or both of the risk conditions, to arrive anyway ready at school and to bridge any disparities with their peers.

Intervening indirectly and preventively through parent and/or teacher training aimed at providing useful strategies to promote linguistic and cognitive development of children, could amplify the beneficial effects as it would allow all children, regardless of their initial conditions, to benefit from effective interventions. Primary prevention interventions, such as an intervention on dialogic book reading, which effectiveness is well-proved, could intercept the needs of families, schools and children, enabling every subject involved in school

readiness to acquire the necessary skills that support a smooth and successful transition from pre-school to school.

Certainly, these are no definite conclusions, rather, they represent new starting points on which to build new knowledge on the debate about the role of environmental factors in children's early cognitive and linguistic development. There is still the need for further studies aimed to investigate the specific effects of several environmental factors, not included in the studies reported above, on the development of cognitive and linguistic skills in preschool children.

However, if some children's cognitive and linguistic development trajectories have negative consequences for children's literacy development and later school achievement, and if the trajectories with negative consequences have causes that can be remedied, efforts should be directed toward that goal. There is a need for further studies aimed to develop and validate interventions aimed to reduce early gaps in children's development. This effort may enable parents, educators and teachers to face and reduce the possible negative effects that disadvantageous environmental factors have on children's development, allowing to every child, within the limits of individual differences, to achieve skills necessary to be ready and successful once they start the school.

Appendix

Appendix A: Observational tool for Parent-Child shared book-reading behaviors

ADULT BEHAVIOR	CHILD BEHAVIOR
Enhancing Attention to Text (0-3 scale: 0 = no evidence of the behavior; 3 = 4 times or more)	
1. Attempts to promote and maintain physical proximity verbally	1. Responds and/or seeks/maintains physical proximity verbally
2. Attempts to promote and maintain physical proximity	2. Responds and/or seeks/maintains physical proximity
3. Sustains interest and attention through eyes contact	3. Sustains interest and attention through eyes contact
4. Provides judgments or feedback on the story	4. Provides judgments or feedback on the story
Promoting Interactive Reading and Supporting Comprehension (Coding done at 30s intervals)	
1. Connect the title with the story	1. Connect the title with the story
2. Poses and solicits questions about the book's content	2. Responds to questions about the book
3. Answers the questions that child poses	3. Poses questions about the book
4. Points to pictures during the reading	4. Responds to parent cues or identifies pictures and words on his/her own
5. Uses of representative gestures	5. Uses of representative gestures;
6. Suggests the expected information using first letter or syllable	6. Complete the Suggested information;
7. Attempts to teach a target word	7. Use or poses question about the meaning of target word
8. Connects two-time events (before, after)	8. Connects two-time events (before, after)
9. Connects two causal events (because, thus)	9. Connects two causal events (because, thus)
10. Relates book content and child's responses to personal experiences	10. Attempts to relate book content to personal experiences
11. Gives child opportunity to hold book and turn pages	11. Gives parent opportunity to hold book and turn pages
12. Holds book and turns pages	12. Holds book and turns pages
13. Refers to internal states of characters	13. Refers to internal states of characters
14. Uses direct dialogue	14. Uses direct dialogue
Using Literacy Strategies	
1. Elaborates and extends the meaning of visual cues related to story	1. Responds to parent and/or identifies or extends visual cues related to the story him/herself
2. Produces predictions on the story;	2. Produces predictions on the story;
3. Elaborates on child's ideas	3. Recalls information from the story
4. Uses concepts about printing	4. Uses concepts about printing
5. Plays with the letters and sounds of letters or words	5. Plays with the letters and sounds of letters or words
Interactive reading evaluation	**(0-5 scale: 0 = low; 5 = high)**
1. Dialogic reading style	1. Involvement in reading
2. Adequacy of story telling	2. Level of story understanding

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