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# **Reading Comprehension in L2 Italian**

## **Connecting Psycholinguistic Research and Pedagogical Practice**

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## ABSTRACT

The results of national evaluations (INVALSI, 2019; 2021) show that second-generation immigrant students often obtain lower scores than their native peers at tasks that involve reading comprehension and the use of advanced Italian language skills. These difficulties have consequences also on the educational experience of these students who tend to obtain lower grades and face higher drop-out rates.

The present study aims to shed light on the origins of these comprehension difficulties. To this aim we carried out an experimental study that involved 109 pupils attending 4<sup>th</sup> and 5<sup>th</sup> grade of primary school. Among the participants, there were 61 language minority bilingual and 48 monolingual students. We analysed a series of linguistic and non-linguistic abilities that are considered potential predictors of reading comprehension, i.e., general cognitive abilities, decoding skills, receptive vocabulary, and receptive grammar. Among these measures, the two groups significantly differed only in vocabulary knowledge, confirming what emerged in previous studies with bilingual pupils. To identify which ability could more efficiently predict reading comprehension in the two groups, we conducted a Random Forest analysis. The results showed that, while vocabulary was the only predictor for monolingual students, the bilinguals' performance was modulated also by receptive grammar, word decoding speed, and general cognitive abilities. These findings suggest that reading comprehension for bilingual students is affected by a less automatised access to lexical and grammar knowledge with respect to that of their native peers and that, consequently, text comprehension is likely to be more cognitively taxing for this population. Furthermore, our results highlight the relevance of lexical knowledge to achieve advanced reading comprehension skills, especially for bilingual students who tend to obtain lower scores in this domain. Vocabulary is acknowledged to be a key element that connects local and global comprehension processes, as suggested by the Reading Systems Framework (Perfetti & Stafura, 2014).



Since grammar knowledge turned out to play a significant role in reading comprehension for bilinguals, we decided to examine on-line processing of specific complex structures (i.e., object relative clauses and passive voice). Using three Self-Paced Reading Tasks (SPRT), we explored three research questions concerning on-line language processing to verify whether there were behavioural differences between groups. We examined: (i) how morphological information that can facilitate the interpretation of sentences is processed; (ii) how the presence of pragmatically implausible situations can influence processing; and (iii) whether semantic violations affect processing. The analysis of reading times revealed that both groups followed similar processing patterns, but monolinguals obtained significantly higher scores in terms of accuracy. This seems to be consistent with Hopp's Fundamental Identity Hypothesis (Hopp, 2007; 2010; 2014), suggesting that non-native processing is quantitatively different from native processing and, thus, requires greater cognitive effort.

These results have also pedagogical implications because they highlight the importance of implementing teaching activities that support students in the development of a richer and more efficiently organised vocabulary and grammar knowledge. We tried to develop a teaching intervention aimed at developing the ability to use their grammatical skills in order to understand and produce meaningful language, instead of limiting language teaching to the presentation of a series of abstract rules to be practiced in formal exercises. Finally, we also carried out a series of experimental activities that aimed to practice the ability to make inferences, a skill employed during global processing. All the didactic activities developed and tested during the intervention aimed to stimulate the students' metalinguistic awareness and encourage peer-to-peer interactions.

## GENERAL OVERVIEW

This study has three main goals. First of all, we aim to investigate reading comprehension and its potential predictors to understand in more detail what skills and knowledge support monolingual and bilingual students during this activity. The second goal is to explore how the two groups behave during on-line reading and processing of complex grammar structures. Ultimately, the long-term goal of this study is to propose more inclusive teaching practices that can respond more effectively to the needs of multilingual classes. The thesis is organized as follows:

In the first chapter, I will present the context in which the study is developed, i.e., the challenges experienced by minority language pupils attending school in Italy. First of all, I will talk about bilingualism in migration contexts to describe the bilingual population we will focus on, thus second-generation immigrant students. The presence of this population in Italian schools have increasingly grown in the last two decades. As recorded by statistical analyses and national assessments (INVALSI, *Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e formazione* – “National Institute for the Evaluation of the Educational System, Education, and Formation”), this population faces more obstacles in their educational experience with respect to their Italian peers. In particular, they tend to obtain lower grades and face higher grade retention and drop-out rates. These difficulties are probably due to the fact that they have not developed high proficiency in a variety of Italian known as *ItalStudio* (MPI, 2006), thus the academic and technical language used in textbooks. *ItalStudio* does not only include a more sophisticated lexicon, but it also employs more complex structures, such as object relative clauses and the passive voice. In the last part of this chapter, I will present these two structures since we used them to investigate the students’ on-line processing abilities.

The second chapter of this dissertation is dedicated to reading. After discussing the difficulties to define the activity of reading, I will present how we learn to read and the different ways in which we adapt our reading strategies according to our goals. In this chapter, I will introduce the Component Skills

Approach (Grabe, 2009; Grabe & Yamashita, 2022), a framework which describes reading as the combination of several sub-skills that operate at different levels, so that we can distinguish lower- and higher-level processes. Crucially, the former processes are those that need to be automatized early on during learning to read in order to be able to achieve comprehension and they correspond to (i) decoding and word recognition, (ii) syntactic parsing, and (iii) meaning encoding. When these processes are automatized, they will not require the readers to employ several cognitive resources, which will be therefore available for the so-called higher-level processes. This second category includes all the processes that allow the readers to make sense of the text as a whole and develop an opinion about it. In particular, in this category Grabe & Yamashita (2022) include (iv) text-model formation, (v) situation-model building, (vi) inferencing, executive control and strategic processes. Furthermore, all these processes are orchestrated by the readers' working memory that allows them to keep the relevant information activated in order to achieve comprehension. Since reading comprehension is one of the aspects investigated in this study, I will also discuss some of the most influential theoretical frameworks that have been proposed to explain it. These frameworks are known as "models of reading comprehension". In the dedicated section, I will present four models, namely the Construction-Integration Model (Kintsch, 1998; Kintsch & Rowson, 2005), the Landscape Model of Reading (Goldman & van den Broek, 2007; Linderholm et al., 2004; van den Broek et al., 1996), the Simple View of Reading (Gough & Tunmer, 1986), and the Reading Systems Framework (Perfetti & Stafura, 2014). Among these, the Reading Systems Framework seems to be the one that fits our research questions the best because it accounts for the complexity of the activity of reading while taking into account the different components on which good reading comprehension relies.

The third chapter is dedicated to reading comprehension in a second language. First of all, we discuss its predictors taking into account two meta-analysis (Jeon & Yamashita, 2014; Melby-Lervåg & Lervåg, 2014) and a study conducted by Kovelman, Baker, and Petitto (2008) that investigates the influence of age of first bilingual exposure to the second language to understand bilingual reading development. In the second part of this chapter, I will focus on reading

comprehension in languages that have a transparent orthography, as the Italian one. This section will consider more precisely three studies, i.e., Verhoeven & van Leeuwe, 2012; Bonifacci, & Tobia 2017; Bellocchi, Tobia, & Bonifacci, 2017. The first one is a longitudinal study that investigates reading comprehension in primary school pupils who speak Dutch as a second language, whereas the other two studies focus on Italian as L2. All these studies assume the Simple View of Reading as the theoretical framework that explains how reading comprehension is achieved. In the last part of this chapter, we suggest the hypothesis that the Simple View of Reading may not be the most effective framework to describe how the different linguistic components contribute to reading comprehension, as the ‘oral comprehension’ factor on which it is based remains largely underspecified. A study conducted by Wolf, Muijselaar, Boonstra, and de Bree (2019) is presented in the last section of this chapter to discuss the relationship between the concepts of reading and listening comprehension. As argued by Wolf and colleagues, it is important to consider what skills contribute to the formation of comprehension from a written or oral input. Given these considerations, we advocate for the importance of considering the components skills when investigating reading comprehension because it will provide us with more detailed information to understand and address more efficiently the difficulties encountered by the students.

Chapter 4 presents an overview of theoretical frameworks that aim to describe processing in a second language. The outcomes of the studies exploring L2 processing led to the development of two main accounts. The first hypothesis is known as the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018) and argues that native and non-native language processing differ from a qualitative point of view. In other words, L2 speakers would rely on substantially different processing mechanisms and strategies. In particular, Clahsen and Felser (2006a; 2006b; 2006c; 2018) argue that L2 speakers would not rely on deep syntactic information during processing, but they would use semantic information more. The second account included in this chapter is the Fundamental Identity Hypothesis, which was proposed by Hopp (2007; 2010; 2014). This second framework argues for a computational difference between L1 and L2 processing. More specifically, Hopp suggests that non-native processing does not qualitatively

differ from native processing, but it is more demanding and taxing from a cognitive point of view. In particular, L2 processing would entail a heavier load on working memory and, thus, requires the use of more cognitive resources. In this chapter, we also discuss the Input Processing framework (VanPatten 2004; 2014), which describes the strategies used by L2 learners during processing to compensate the overload on working memory. VanPatten (2004; 2014) summarises these strategies into two main principles and several subprinciples. One of the subprinciples (the Event Probability Principle) claims that L2 speakers resort on expectations on plausibility rather than on syntactic relations between the constituents when they process their L2. This subprinciple motivated one of the research questions of this study. The last section of chapter 4 is an introduction to the Self-Paced Reading Task (SPRT), the method we used to study the participants' on-line language processing of Italian.

In chapter 5, I present the research questions we aim to investigate in this project. They are divided in two parts. Firstly, we want to explore reading comprehension and a series of linguistic and non-linguistic skills that are identified as its potential predictors in monolingual and minority language students. Furthermore, we aimed to determine the importance of these predictors in the two linguistic populations that took part in our study. As far as the research questions about on-line Italian language processing are concerned, we want to understand whether there are differences between monolingual and bilingual children during language processing. To do so, we conducted three SPRTs. The first SPRT investigated how the students process morphological cues that can help them interpreting sentences correctly during reading. Moreover, we aim to examine how the expectations about the event probability could affect processing for minority language bilingual children. This research question was motivated by the subprinciple known as "Event Probability" included in the Input Processing framework developed by VanPatten (2004; 2014). Finally, the last SPRT investigated how the students processed semantic violations. This condition was meant to establish a baseline in which we did not expect to find processing differences between groups.

Chapter 6 outlines the structure of the experimental study. First of all, I will describe the two groups of participants and how they were recruited. After that, I present the inclusion criteria we establish for this project. More specifically, our target participants were monolingual Italian and second-generation immigrant students who were attending 4<sup>th</sup> or 5<sup>th</sup> grade of primary school. We focused on this age because it is when children are expected to switch from “learning to read” to “reading to learn” (Byrnes & Wasik, 2009). Hence, at this age it is pivotal that children develop efficient reading comprehension strategies because these will support them during studying all school subjects. After describing how data collection is carried out, I will present all the tasks that were administered. I will start from the reading comprehension tasks. In order to investigate the participants abilities to comprehend texts, we adopted the texts of the *indagine approfondita* (“thorough investigation”) taken from the *Prove MT – classi 3-4-5- primaria* (“MT Task – grade 3-4-5 primary school”). Moreover, we administered a series of linguistic and non-linguistic tasks aimed to assess the participants’ abilities which are considered as predictors of reading comprehension. In particular, we examined general cognitive abilities (Raven’s Colored Progressive Matrices - *CPM*, Belacchi et al., 2008), decoding abilities (*Prova di lettura di parole e non parole* – “Words and non-words reading task”, Zoccolotti et al., 2005), receptive vocabulary (PPVT - Peabody Picture Vocabulary Test, Italian version, Stella et al., 2000), and their receptive grammar (TROG - Test for Reception of Grammar, Suraniti et al., 2009). Lastly, I will present the three SPRTs developed to examine the participants’ on-line language processing abilities and describe the manipulations used to investigate the research questions we wanted to address.

The outcomes of the analyses performed on reading comprehension and its predictors are presented and discussed in chapter 7. First of all, we compared the performances of the two groups to verify whether there were differences between bilingual and monolingual children. The results of these analyses revealed that, as the potential predictor abilities are concerned, the two groups obtained homogeneous scores in all tasks except for the receptive vocabulary one. In this task, monolingual students obtained significantly higher scores. Moreover, monolingual students achieved higher scores than their bilingual peers also in the

reading comprehension task. After checking the group performances, we ran a series of linear regressions to identify on what skills the students rely on the most during reading comprehension. These analyses revealed that the two groups rely on different abilities and knowledge during reading comprehension. More specifically, receptive vocabulary knowledge was the only predictor for monolingual students, whereas the bilingual group resorted also to receptive grammar knowledge, and general cognitive abilities. In order to have a more detailed picture of the role played by these predictors, we conducted a Random Forest analysis to obtain a ranking of importance. The results confirmed that the two groups rely on different sets of skills during reading comprehension. When we consider the bilingual group, we notice that several skills contribute to their reading comprehension scores. More specifically, we found that receptive grammar and receptive vocabulary knowledge are important predictors of reading comprehension for minority language bilingual students. Furthermore, these students rely also on word decoding speed. On the other hand, the outcomes of the Random Forest analysis for monolingual children confirmed what was found also with the linear regressions and, thus, that lexical knowledge is the only predictor for this group. As I will discuss in the last part of this chapter, these results have important implications for the development of more efficient teaching activities.

In chapter 8, I present and discuss the outcomes of the three Self-Paced Reading Tasks. For each task, we analysed accuracy using a mixed effect logistic regression and reading times in the areas of interest using linear mixed effect regressions. The outcomes of the analysis on reading times of the three SPRTs did not highlight group difference, suggesting that both minority language bilinguals and monolingual students managed to recognise and process the morphological information successfully. However, when we consider accuracy, the monolingual group obtained significantly higher scores. Overall, these findings indicate that both bilingual and monolingual children follow the same behaviour during on-line processing. The gap in performance in accuracy scores could hint that bilinguals' grammar knowledge is not enough automatised to be promptly and efficiently activated during reading and, that for this reason they might experience more difficulties than their monolingual peers creating their grammar representation,

especially when complex structures are considered. Because grammar knowledge is still not completely proceduralized, the task of reading might be particularly effortful for bilingual students. Our findings seem to be in line with Hopp's Fundamental Identity Hypothesis (2007; 2010; 2014), according to which native and non-native processing are not qualitatively different, but the latter requires more cognitive resources.

Chapter 9 is dedicated to the presentation of the activities that were developed for the pedagogical intervention that followed data collection. The aim of these activities was to test alternative ways to teach grammar and to enhance the students' reading comprehension abilities. The participants who took part also in the pedagogical intervention were divided into two groups. The first one worked on the passive voice structures, thus an aspect of local processing, whereas the other group worked on their ability to make inferences, hence an aspect of global processing. For the development of these activities, we followed five guiding principles (Piccinin & Dal Maso, 2022), namely: (i) providing context, (ii) encouraging discovery, (iii) engaging problem-solving activities, (iv) make grammar less abstract, (v) stimulating reflection. Before describing some examples of the activities carried out during the meetings, I will provide some background information about the reasons motivating these pedagogical interventions. More specifically, as the activities about the passive voice are concerned, we aimed to find a way to make grammar teaching less normative and abstract. Our goal, in fact, was to focus on making the students discover the rule governing language from the observation of how certain structures are used in different contexts. The second pedagogical intervention was meant to train the children's ability to make inferences. Our goal was to raise the students' awareness about the strategies they adopted during reading comprehension tasks. Stimulating whole-class discussion was fundamental to achieve this purpose because the pupils had the chance to compare and self-evaluate their insights and strategies without the pressure of being corrected.





# 1. INTRODUCTION

In this this chapter, I will discuss bilingualism in migration contexts and provide a definition of the concept of heritage language. Conducting research that includes heritage speakers opens up several issues that complicate the description of the speakers' development of language use and proficiency in the two languages. Thus, I will give an overview of these matters and discuss the factors that often contribute to the creation of an inequitable multilingual experience for immigrants.

In the second section, I will describe the student population in elementary schools in Italy, which is characterised by an increasing presence of students with immigrant background. In this section, the main obstacles that can hamper the educational experience of these students will also be presented. Furthermore, I will discuss the results of some international and national large-scale assessments investigating reading abilities and mathematical skills. The outcomes of these tests often show that students with immigrant background struggle more than their monolingual peers and, consequently, their possibilities of entering higher education are more limited.

Much research has been dedicated to understanding what can limit the educational experience of these multilingual students, and many scholars identify proficiency in different registers, such as conversational and academic language, as one of the main factors that determine scholastic success. I will give an overview of the main approaches proposed to describe academic language and then, I will present how this topic is discussed in Italy with reference to the concepts of *Italbase* and *Italstudio*.

Finally, in the last part of this chapter, I discuss the main features of the academic register of Italian. Here, I will also present some studies that explore the comprehension and production of relative clauses and sentences in the passive voice. In fact, these complex structures are frequently found in textbooks, and for this reason, they were selected for the investigation in this project.

## **1.1 *Bilingualism and migration***

Through history, migration has been one of the main factors that contributes to language contact and change. People move to different cities or countries looking for better living conditions and employment, or to escape war. As a result of this, societies become multilingual (Tabouret-Keller, 2012). However, due to the scarcity of linguistic policies to protect immigrant languages, when moving to a different country, people prioritize the societal language to the extent that the heritage language is often replaced also at home. Therefore, the use of languages of origin in immigrant families tend to stop within three or four generations (Tabouret-Keller, 2012). In such contexts, the languages of origin are considered heritage languages. As defined by Rothman (2009), a heritage language is “a language spoken at home or otherwise readily available to young children, and crucially this language is not a dominant language of the larger (national) society” (p. 156).

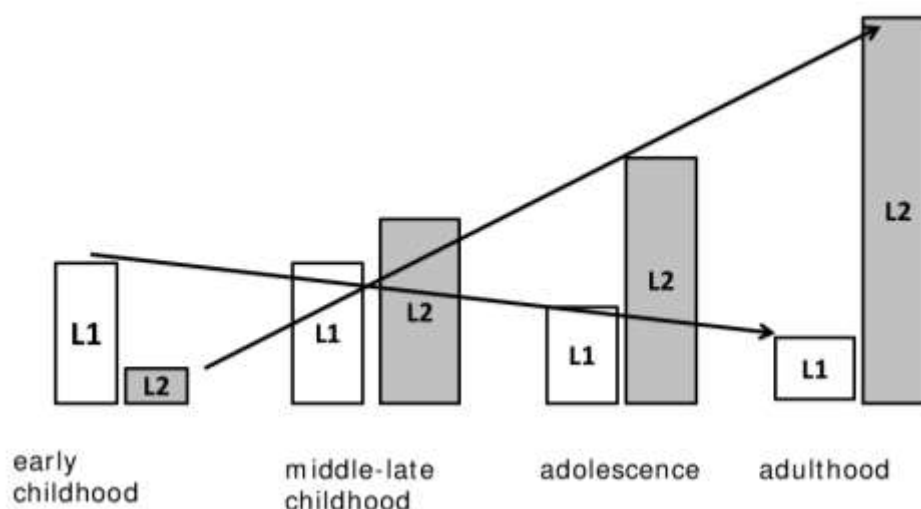
Language acquisition in a multilingual context that includes a heritage language and a societal majority language often follows a less straightforward path than L1 acquisition. There are, in fact, several linguistic and societal variables which can influence this process. Moreover, each family may have different practices and strategies when it comes to the languages used at home, thus the linguistic experiences of students with immigrant backgrounds can vary to a great extent. The idea that monolingualism and bilingualism cannot be considered as categorical entities is now widespread, and scholars talk about a continuum when describing linguistic experience (Luk & Bialystok, 2013). As suggested by Ortega (2019; 2020), when we accept that bilingualism is gradient, we should also assume that it is not possible to define amount of exposure in a categorical way. Nevertheless, it is of fundamental importance to try to delineate a timeline of the language experience of bilingual speakers and, for this reason, scholars describe bilinguals as simultaneous, early sequential, or late sequential (de Houwer, 2009). These three labels have been object of several debates and there are no unanimous definitions or age-ranges that can determine unequivocally to which category a bilingual speaker belongs. Armon-Lotem and Meir (2019) define simultaneous bilinguals as those children who are exposed to bilingual environment since birth,

whereas early sequential bilinguals are children who experienced a period of monolingual acquisition after birth and were exposed to a second language before they were introduced to formal literacy. Completing the scenarios of age of acquisition, we have the case of late sequential bilinguals, thus those children who began their bilingual experience only after being exposed to formal literacy in their first language. As Ortega (2020) points out, it is important to consider that the environment surrounding heritage language speakers is also bilingual. In the case of second-generation immigrant students, in fact, the children are in contact with at least two languages from a very young age, usually from birth. The input that these children receive change considerably as they grow up. Since the acquisition of two languages does not follow a linear or regular path and each individual experience is different and can change considerably during the lifespan, another difficult task that scholars face is how they can describe and define bilingual speakers' language dominance (Silva-Corvalán & Treffers-Daller, 2016). Normally, three main aspects are considered to describe dominance, and they are proficiency, quantity and quality of the input, and the language environment. However, when exploring bilingual experiences in immigrant contexts, the information we can gather about these three variables can vary to a great extent from year to year.

When we consider children who are heritage speakers, we should distinguish different types of situations according to their generation (Kupisch, 2019). As described by Montrul (2012a), first-generation immigrant children, for instance, will start their language experience in an environment dominated by the language of origin and, only after moving to a different country will they acquire the new societal language as a second language. Second-generation immigrant children, on the other hand, follow a different path: during the first years of their life, they are usually more proficient in the heritage language spoken in the family, and their knowledge of the societal language may be limited. However, as they start attending kindergarten or primary school, the proficiency of the two languages often switches, and as they are more and more exposed to the societal language, they start using it also at home. Finally, the case of third-generation immigrant children displays another scenario. These children, in fact, may have very limited competences in the heritage language and, in some cases, they may even grow up

as monolingual speakers of the societal language. Of course, it is not only the children’s proficiency that changes as they grow up, but parents will also become more accustomed to the majority language and may be prone to use it more frequently also at home. The variation in the language habits of the members of the family inevitably influences also the proficiency levels that children display in their heritage language and in the societal language. Figure 1.1 shows how proficiency in heritage language and societal language evolves across minority language speakers.

*Figure 1.1 - Development of heritage language and societal language in minority language speakers (Montrul, 2012b, p. 6)*



Unfortunately, as Lui & Quezada (2019) argue, it is not uncommon that language habits at home change also as a consequence of “micro-aggressions” that target immigrants during their integration to a new country. These micro-aggressions are frequently discriminations related to the ethnicity or the minoritized status of the migrants and can lead to an increase of stress, lower self-esteem, and pressure to learn the majority language, thus contributing to limiting the use of the heritage language even further (Lui & Quezada, 2019). It is clear that these types of putdowns and a marked hierarchical relationship between minority heritage languages and societal languages constitute obstacles that transform the

multilingual experience of immigrant into cases of “inequitable multilingualism” (Ortega, 2020).

In recent years, the European Union has encouraged the promotion of multilingualism (*Policy recommendation for the promotion of multilingualism in the European Union by the Civil Society Platform on Multilingualism*, Commission of the European Communities, 2011), but there are no clear indications of what type of policies the countries that are members of the Union should introduce in order to guarantee the development of a multilingual and multicultural society. In fact, the reality shows a very complex situation that does not always manage to give the same protection and importance to all languages and, despite declaring that all the languages spoken in the Union have the same importance, regardless of their status as territorial or Diaspora languages, we often witness a marked disparity and preferences for languages such as English, German, and French, which are more widely spoken in the Union (Catenaccio & Garzone, 2019). If we look at the situation in Italy, once again, we find normative references to the importance of preserving minority languages, but there is a lack of clear policies that can protect and give more importance to the heritage languages spoken by immigrants living there.

## **1.2 *Multilingual students in Italian schools***

In the last twenty years, the student population in Italy has changed considerably. The number of students enrolled in Italian schools who do not have Italian citizenship is constantly growing. As shown by the latest report of the Ministry of Education, University and Research (Ministero dell’Istruzione, Università e Ricerca - MIUR, 2021) about the non-Italian student population, 10,3% of the students in Italy have immigrant background. When primary schools are considered, the percentage of first- or second-generation immigrant children reaches 12%. Almost two thirds of these students were born in Italy from foreign parents and, thus, correspond to the definition of second-generation immigrant (Crul & Vermeulen 2003; Schneider, 2016). Even if these children were born in Italy, they do not have Italian citizenship, but they can acquire it either at the age of

18 or by transmission, if one or both parents become Italian citizens. These children grow up in a multilingual environment, and their exposure to Italian, that is the societal majority language, can vary significantly both in quantity and quality.

Since the year 2000, the number of students with immigrant background in Italian schools has spiked, going from 196.414 to 876.801 foreign students (MIUR, 2021). The fastest rate of growth took place in the first decade of the 2000s and, the Ministry circular n.2/2010 of the MIUR designed guidelines to guarantee a more balanced distribution of first- and second-generation students in schools in order to facilitate their social and educational integration. In particular, this circular sets a limit to the number of foreign students to 30%. This percentage is somewhat flexible, and it can be higher or lower based on the language knowledge of the foreign students enrolled. However, as mentioned previously, evaluating the language competences of multilingual students with immigrant background can be complicated, especially when they start primary school. These students, in fact, display native-like fluency in every-day language use, but they may need different support during the development of the more specialised language used in school. Students with immigrant background, in fact, may have different or limited access to input and tools that can strengthen their proficiency in the school variety of Italian when they are not at school compared to their Italian peers. Given the flexibility of this guideline, it is not uncommon to come across so-called “over 30%” schools (MIUR, 2021) where the percentage of foreign students can surpass 50%. For instance, in Veneto, the region where this study was developed, 13.8% of primary schools are “over 30%” schools and, more specifically, the schools involved in this study have classes where more than 80% of the students have immigrant background.

As far as newcomers are concerned, the guidelines published by the MIUR in 2014 also provide information about their enrolment. First of all, this document delineates the procedures that should be adopted in case newcomers are still undocumented and, therefore, illegal immigrants. The MIUR underlines that all underage children have the right to have access to education and, thus, undocumented children can also be enrolled in schools at any moment during the school year. Furthermore, the guidelines suggest that newcomers should be

preferably admitted directly to the grade which is appropriate for their age. However, as reported in a recent statistical analysis (ISTAT, *Italian National Institute of Statistics* 2020), very often it is not possible to admit new students in their age-appropriate grade because their linguistic competence in Italian is still too low, and they would encounter even more difficulties keeping up with their peers. As described by ISTAT (2020), about half of the newcomers join classes with students who are at least one year younger than they are. Schools help the students with limited knowledge of the Italian language and offer them Italian as a second language classes so that their linguistic needs can be addressed more directly. These lessons are carried out in separate rooms, away from the rest of the class, and they aim to facilitate and accelerate newcomers' integration. The didactic activities planned for students who attend Italian as an L2 classes can vary considerably. Some students already have basic knowledge of Italian and need to focus on strengthening their knowledge of specific school vocabulary used in class and in textbooks, whereas other children are exposed to Italian for the first time only when they start going to school and, in that case, they will need to develop also every-day language skills.

Recent data concerning the level of school attendance of foreign students (MIUR, 2021) highlights that this student population is still much more exposed to risk of grade retention, and their dropout rates are much higher than those of their Italian peers. During the school year 2019/2020, 82.3% of foreign students who were 10 years old were attending age-appropriate grade. This percentage drops to 61% in 14-year-olds, and it reaches 39.5% when we look at 18 years olds are considered. These rates are improving as the child gets older, but there is still a marked difference when we consider the percentage of 18-year-old Italian students who are attending age-appropriate grade (81.2%). These data remark that it is crucial to investigate further how to improve the educational experience of foreign students in Italy. Reducing the rate of grade retention and, thus of students who do not attend age-appropriate grades, will contribute also reduce the dropout rates. Foreign students tend to abandon education early and drop out of high school more often than their Italian peers. As reported by MIUR (2021), 35.4% of the students with immigrant background interrupt their education early, whereas the proportion



of Italian students who do not obtain upper secondary school qualification is 13.1%. It is important to note that the European goal for 2020 was to keep dropout rates below 10% (MIUR, 2021).

Among the factors that limit the educational experience of students with immigrant background there is also the fact that when they reach upper-secondary school, they more frequently choose to enrol to vocational courses rather than pursuing courses that would give them more chances to continue studying also after the high-school degree. Catenaccio and Garzone (2019) hypothesise that the strong preference for vocational courses that non-Italian students show may also be connected to some pressure, either from the families or from the teachers. As a consequence, students with immigrant background often do not have the possibility to access to higher education and this creates further obstacles in accessing careers that may give them higher salaries.

### *1.2.1 International and national large-scale assessments in Italy*

As the tendency of getting lower grades and having higher dropout rates than their monolingual peers show, students with immigrant background in Italy face some challenges in the course of their education. Unfortunately, this phenomenon is widespread all over the world and, often, the outcomes of international large-scale assessments, such as PISA (Programme for International Student Assessment) and PIRLS (Progress in International Reading Literacy Study) indicate that these students obtain lower scores than their native peers.

As Behr and Fugger (2020) point out, even though several studies have been conducted to investigate and improve our understanding of why students with immigrant backgrounds perform worse in these assessments, these analyses are often not followed by clear changes in educational systems and policies. A fundamental key to comprehending the performance gap that is often observed between immigrant and native students is the immigration policies and whether the immigrant population can be successfully integrated into the countries they have moved to (Kunz, 2016; Isphording et al., 2016).

PISA is an investigation carried out by the Organisation for Economic Co-operation and Development (OECD) that focuses on 15-year-old students, aiming

to explore the competences of students in relation to the economic development of the countries. Not all schools in a participating country take part in PISA. Each country selects 5000 students, who become the representative sample for that country. This assessment takes place every three years, and it includes three tasks that cover reading, mathematics, and science. The test is computer-based and lasts two hours. It consists of both multiple choice and open-ended questions. Moreover, information regarding the Economic Social and Cultural Status (ESCS) is collected through a one-hour long questionnaire that the students fill in after completing the tests.

In their analysis of the results of PISA 2016, Behr and Fugger (2020) highlight that there was a strong correlation between the ESCS level of the participants and their performance. More specifically, the participants who obtain lower scores tended to come from families with lower socio-economic status and immigrant background. Very often, in fact, newcomers in a country can face several obstacles that can complicate their integration and that can ultimately also have a negative effect on the educational performance of their children (Rinderman & Thompson, 2016; Camehl et al., 2018).

If we look at the performance of the students in Italian schools, their results during the latest PISA (OECD, 2019) show that their score is slightly above the average only in mathematics, but they performed below average both in the reading and in the science tests. These results follow the trend of the other centre-European countries that also do not have very selective immigrant policies (Damiani, 2016). Furthermore, as Damiani reports, Italy also displays high variation in scores between Northern and Southern regions. In her analysis of the influence of large-scale assessment on Italian education policies, Damiani remarks that the Italian media often do not give much space to the results of investigations such as PISA and, thus, the outcomes of these assessments are not at the centre of the attention of the public and political debate. Consequently, they do not manage to directly influence policy makers into reforming the educational system. Among the factors that create further obstacles to the achievement of deep and substantial changes to the Italian education system are the political instability that has characterised the Italian governments of the last 15 years, and the fact that, as a consequence of the

economic crisis in 2008, fewer economic resources were allocated to education. One of the responses to the results of PISA has been that the National Service for the Quality of Education (*Servizio Nazionale per la Qualità dell'Istruzione*) has strengthened the INVALSI system (*Istituto Nazionale per la Valutazione del Sistema Educativo di Istruzione e formazione*). This institute was constituted in 1999 to monitor the efficiency of the curricula that schools can develop autonomously. Other solutions that the Italian government has tried to implement to support the development of the students' competencies has been to focus more attention on teacher training, and to give more support to the schools in the Southern regions in order to reduce the gap in performance registered between different areas of the country.

Moreover, as mentioned above, in recent years, the results of PIRLS assessments have also provided useful insights into Italian students' abilities during reading comprehension tasks. PIRLS is another large-scale assessment organised by the IEA (International Association for the Evaluation of Educational Achievement). The test takes place every five years, and the target population of this evaluation is students who have attended school for four years. During the PIRLS assessment, students receive a booklet with two passages, which are selected from a total of eight texts. The purposes of this evaluation are twofold. The first one is to explore the participants' literacy experience, whereas the second one is to understand their ability to use texts to extract and learn new information. The investigation is completed by four surveys that are filled in by the students, parents, teachers, and headmasters. The goal of these questionnaires is to gather information about (i) the reading habits and attitudes of both students and parents, (ii) the students' early reading experiences, and (iii) the socio-economic indicators of the families of the participants. Moreover, teachers and headmasters are asked to describe the characteristics of the participating classes, the resources available in the schools, and how reading instructions are carried out (Gonzales & Kennedy, 2001). Since 2016, the ePIRLS has also been introduced, and the task could be administered on computers and not only on paper. The advantage of the computer-based administration is that it allows to also explore the students' ability to navigate on-line texts. The summary of the outcomes of the PIRLS carried out in 2016 is

presented in a document called “What makes a good reader” (PIRLS, 2016). The conclusions showed that the students who achieved higher scores in the task had benefitted from more resources for reading at home and engaged in literacy activities early on. Moreover, the availability of digital devices in the household also seems to have a positive effect on the development of reading abilities. Since the introduction of the PIRLS assessment in 2001, the results obtained by the Italian students has tended to be positive and, during the evaluation carried out in 2016, they were above the average. These results, thus, are in contrast with the outcomes of PISA. This difference is worrying because it shows that students’ performance does not improve as they advance in education. The outcomes of PISA in Italian schools, in fact, were below the European average. Overall, this suggests that students do not have enough support to improve their reading comprehension abilities during their education.

The development of Italian students’ competences from primary to upper secondary school is also monitored through a national assessment created by INVALSI. This institute aims to evaluate the Italian educational system and its efficiency. In the early 2000s, the INVALSI worked on the development of the so-called *Prove nazionali INVALSI*, a standardized measure administered in the schools of the whole country to assess the students’ fundamental competences in Italian, Mathematics, and English. The *Prove nazionali* were first administered in 2005/2006, and they were adapted over the years to improve the collection of data. Since 2018/2019, the national evaluation was extended to five grades, two in primary school (2<sup>nd</sup> and 5<sup>th</sup> grade) and three in secondary school (8<sup>th</sup>, 10<sup>th</sup>, and 13<sup>th</sup> grade). The tests are paper-administered for primary school students, while secondary school students take computer-administered tests. The results of the *Prove nazionali INVALSI* are published every year with a discussion that makes comparisons according to several parameters, such as gender, geographic areas, and type of student population. This last analysis is particularly relevant for the development of the research questions that motivate this study because it highlights critical differences in the performances of monolingual Italian students and first-, and second-generation immigrant students.

In the figure below 1.2, we can observe the results of the INVALSI national tests for 5<sup>th</sup> grade during the school year 2020/2021 organised by geographic area (i.e., North-West, North-East, Centre, South, South and Islands), and by population.

Figure 1.2 - Results INVALSI from RAPPORTO 2020

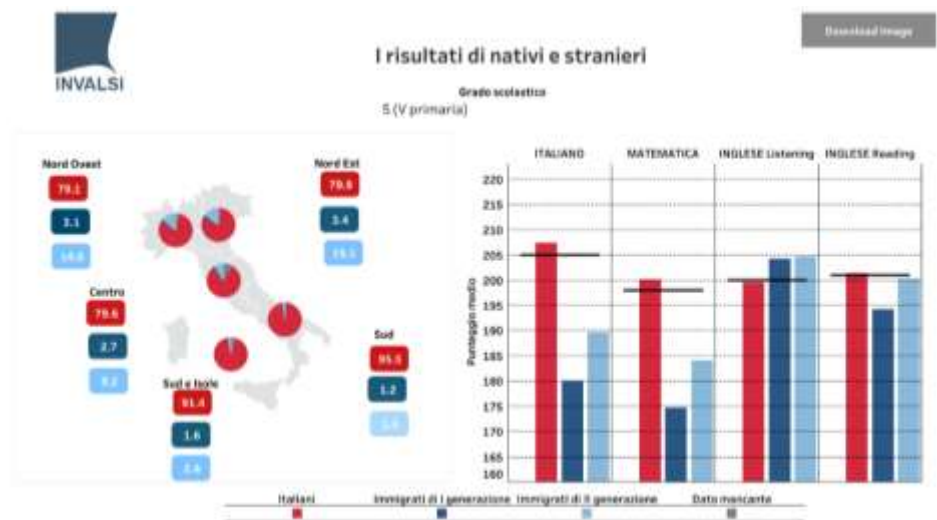
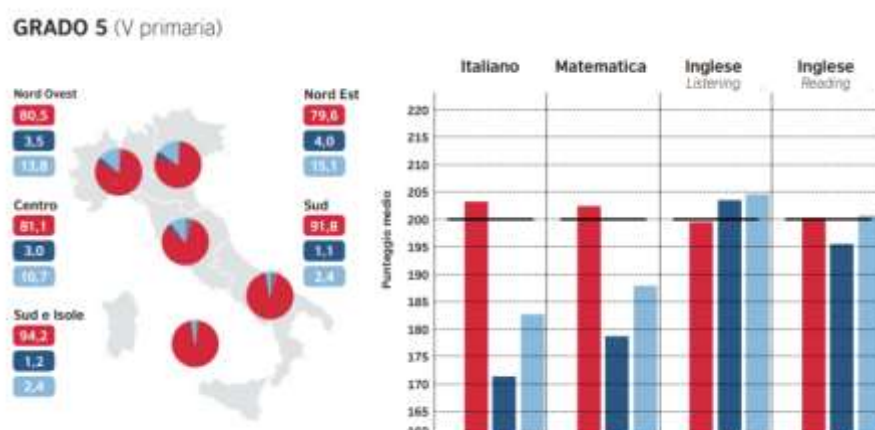


Figure 1.3, however, shows the outcomes of INVALSI in the year 2019, before the pandemic. The two graphs show similar results. The performance in Italian has improved slightly in recent years, and the scores obtained in the English tests seem to have been stable in the last two years. On the other hand, the mathematics results have decreased. A clear similarity that the graphics of both school years highlight is the gap in performance between Italian and foreign students in Italian and mathematics. However, for the English tests the situation is different. In fact, the scores of students with immigrant background are similar to those of the Italian students at the Reading task, and they perform better than the Italians in the Listening task.

Figure 1.3 - Results INVALSI from RAPPORTO 2019



The fact that the performances of the groups differ considerably in Italian and Mathematics but not in English suggests that the difficulties encountered by students with immigrant background are not subject specific. The reason behind these results could be the lack of specific linguistic resources that help students to master and accomplish complex tasks. Giberti and Viale (2017) explored how Italian and foreign students performed in the questions of the Italian and Mathematics tests of the INVALSI evaluation in 2010. As pointed out in this study, the gap between the performances of students with immigrant background and Italian ones is registered in all the grades which are investigated. Alarmingly, this shows that school does not provide foreign students with the proper tools and strategies to eventually achieve the specific and advanced linguistic abilities which are necessary to proceed and succeed in education. Given this premise, it becomes crucial to study in more detail where these difficulties originate in order to be able to develop appropriate didactic activities that will contribute towards reducing the gap in the performances of the different student populations. Thus, instead of looking only at the cumulative scores in percentage, Giberti and Viale (2017) analysed all the items contained in the tasks to find out what elements could be the source of the difficulties experienced by the students. Each item contained in the *Prove nazionali* has a “delta value” of difficulty and with a probabilistic model known as Rasch model, it was possible to calculate the probability of answering correctly to each item for a student who displays certain linguistic skills.

The analysis of the distribution of the scores considered in Giberti and Viale's (2017) study shows that a lower percentage of students with immigrant background manages to achieve very high scores. In the section of the Italian test dedicated to the reflection over language, these students encountered more difficulties with questions testing grammar knowledge. More specifically, as reported by Giberti and Viale (2017), the results suggest that foreign students struggled in particular with questions that examined normative grammar knowledge and in which metalinguistic competences were not required. As far as the reading comprehension task of the INVALSI test is concerned, the analysis of the individual items highlighted that open-ended questions constituted an obstacle for students with immigrant background, even when their delta value was low. Moreover, foreign students obtained lower scores at questions that required more specialised linguistic competences.

Let us now take a look in more detail at the Italian section of the *Prove Nazionali* of the year 2020/2021. This test consisted in two different parts, one evaluating reading comprehension and one investigating the students' ability to reflect about language. The reading comprehension task is further divided into two parts. The first one is a narrative text followed by 15 questions, and the second one presents an explanatory text and 11 questions. The two parts included both multiple choice and open-ended questions. As reported in the guidelines of MIUR (2012), the Italian test for primary school students has the aim to investigate what factors could hamper reading comprehension. In order to do so, students have to answer different types of questions that explore both their lexical and syntactic knowledge. Moreover, some questions specifically address the strategies employed by students to analyse the content of the texts they read. The *Guida alla Lettura* of the tests developed for the 5<sup>th</sup> grade in the school year 2020/2021 presents three aspects of reading comprehension that are investigated in the tests. The first aspect is the ability to find relevant information in the text. The second one refers to the ability to reconstruct the meaning of the text, both at a local and at a global level, thus both the meaning of the single sentences and the general meaning of the text as a whole, which includes also the information that the readers should extract by making inferences and connecting what is written in the text to their previous knowledge

(Guida alla Lettura, 2021). Finally, the last aspect of reading comprehension that is analysed for 5<sup>th</sup> graders is the ability to reflect and evaluate texts both for their content and their form. Each question of the test taps into one of these three aspects. As far as the section about reflection about language is concerned, the test included ten questions that explored their knowledge about lexicon, syntax, morphology, orthography, and semantics.

Foreign students seem to encounter more difficulties in the questions that tapped into normative grammatical knowledge, and this suggests that they struggle with the prescriptive methods of teaching grammar, which are still commonly used during grammar lessons. Let us, then, take a look at what the Italian Ministry of Education suggests improving grammar teaching in primary school. The guidelines developed by the MIUR (2012) indicate that textbooks and teachers should encourage the development of metalinguistic awareness during teaching grammar. However, as highlighted by Pescarini (2017), there are several incoherences that are found in this document. After talking about the importance of stimulating the children's natural curiosity for languages to make them reflect about grammar, the guidelines stress the fact that this reflection should be channelled to the development of the "acquisition and automatization of orthography" (MIUR 2012 or Pescarini 2017). Furthermore, the guidelines invite teachers to also encourage reflection on the other languages spoken by the children in their classes in order to create a multilingual and multicultural environment. Unfortunately, this suggestion remains vague and is not followed by concrete examples about how teachers could reach this goal (Pescarini, 2017). The consequence of this lack of clarity and coherence in the guidelines of the MIUR is that textbooks still follow normative methods of teaching grammar. The activities proposed in these books, in fact, insist on the importance of learning rules with the goal of avoiding mistakes. In other words, despite setting didactic goals such as the development of new methods of teaching grammar and the importance of encouraging metalinguistic reflections, the textbooks that are available to primary school teachers are still characterised by the presence of prescriptive rules, and they do not yet provide solutions or new strategies (Pescarini, 2017).



### ***1.3 Bilingual language proficiency***

Since the 1970s, there have been several attempts to describe language competence and explain its components, especially in the bilingual context. One of the most known proposals was advanced by Cummins (1979). He distinguishes between two levels of language proficiency called Basic Interpersonal Communicative Skills (BICS) and Cognitive Academic Language Proficiency (CALP). Cummins defines the BICS as conversational fluency and it corresponds to the context-embedded language that children use in their day-to-day living, i.e., the conversations they have with family members and friends. These competences develop spontaneously and involve the use of high-frequency words and simple grammatical structures. On the other hand, the term Academic Language Proficiency refers to the context-reduced language which is widely used in classrooms and is necessary to express more abstract contents and to perform more cognitively demanding tasks, such as summarizing, comparing, or analysing. The separation of conversational fluency and academic language proficiency responds to the necessity to distinguish different aspects of language performance. There are, in fact, aspects of language development in children that are acquired at different stages. For instance, phonology is acquired and reaches a plateau early on, but vocabulary follows a different progress and keeps developing through the lifespan. An aspect that differentiates conversational fluency from CALP is that the last one requires a specific training. In the case in which foreign students are not provided with the right tools and strategies to enhance their Academic Language Proficiency, they might never acquire these competences that are fundamental for advancing successfully in their education. According to Cummins, the poor performance of L2 students might be related to a lower Cognitive Academic Language Proficiency (Cummins, 1979). Children who speak a heritage language and are instructed in the societal language often seem very fluent in their societal language because they acquired a native-like pronunciation, but this should not lead to the overestimation of their language competence. These students, in fact, might still have difficulties in the comprehension of written texts. Reaching a sufficient fluency in the language necessary to cope in the schooling context may require between five to seven years to be developed (Cummins, 1979; D'Annunzio, 2014), whereas the Basic

Interpersonal Communicative Skills (BICS) can be mastered much faster, and a couple of years is sufficient to attain a good proficiency (Chini, 2009). To this respect, it is fundamental that students, especially those with immigrant backgrounds, are provided with efficient scaffolding strategies during their acquisition of academic language skills. The process of acquisition of Academic Language Proficiency is, in fact, pivotal to avoid underachievement in education (Cummins, 2018). Another example of the different registers used by children is provided in Gibbson's distinction between "playground language" and "classroom language" (Gibbson, 1998). Similarly to BICS, playground language is typical of face-to-face interactions that include also gestures and body language. This type of language does not require complex functions that are normally used in classroom such as hypothesising, inferring, and evaluating. These tasks involve more cognitive resources and are fundamental for all the subjects taught in school.

An alternative framework that describes academic language was developed by Scarcella (2003) in response to the dichotomy BICS/CALP. According to Scarcella, the distinction between conversational fluency and academic languages is not sufficient to describe the complexity of the different registers of language. The critique that Scarcella advances on Cummins' framework is based on the fact that there are several aspects of language development that do not fall either in the BICS or in the CALP poles, but they are shared by the two varieties, such as phonemic awareness. Another critical aspect is that conversational fluency and academic language interact a lot and the development of one register influences also the growth of the second. Furthermore, if we consider when BICS and CALP are acquired, as reported above, Cummins indicates that conversational fluency can be achieved at native-like level in about two years whereas academic language requires between five to seven years. However, as Scarcella points out, the situation is more complex than that because there are cases in which children may live in contexts in which they receive poor input in the societal language, and even BICS may require longer to develop. This proposal, supported also by other scholars such as Street (1985; 1996), McKey and Weinstein-Shr (1993), and Valdéz (2000), suggests considering multiple dynamic literacies. In other words, it is not possible to identify academic language as one specific and standard register, but it should include wider

varieties of expression that need to be equally considered during the acquisition of this language variety.

Within this scenario, academic language is a combination of competences which are connected with each other and continue evolving and changing together with the subdomain they belong to. Scarcella defines academic English as a “variety or a register of English used in professional books and characterized by the specific linguistic features associated with academic disciplines” (Scarcella, 2003: 9). To be proficient in academic language does not only mean to be acquainted with the technical lexicon of the different disciplines, but also to have developed several skills that are required in the school context, such as the ability to extract key ideas and concepts from the texts we are reading, to take notes and analyse the texts critically, or to summarise their content. The dynamic trait of this register makes it evolve continuously and, thus, proficiency in an academic language is not a static ability but is continuously evolving. Moreover, as Scarcella (2003) adds, academic language proficiency should not be conceived as separated by the personal, social, and cultural factors that characterise each student.

A more recent study conducted by Uccelli, Galloway, Barr, Meneses, and Dobbs (2015) tries to describe the skills that contribute to academic language proficiency in more detail. Their proposal considers Core Academic Language Skills (CALs), that is, a set of language skills that are considered to be fundamental in supporting reading comprehension during school tasks. Among the skills included in the CALs we find the following abilities: (i) to connect the ideas contained in the text logically; (ii) to interpret the point of view of the author; (iii) to recognise the main theme and characters; (iv) to extract information that is densely presented in the text; (v) to organise analytic texts; and (vi) to understand the specific metalinguistic vocabulary used in the academic language. These variables were analysed together with academic vocabulary knowledge, word reading fluency, and reading comprehension. The model used for the analysis also included the socio-economic status of the participants, which has often been found as an important factor contributing to educational success and even cognitive achievement (Rogiers et al., 2020). One interesting outcome of the study conducted by Uccelli and colleagues was that when the skills grouped in the CALs are

considered, the SES of the participants was no longer a predictor of reading comprehension. As they argue, this result should not be surprising since SES does not directly influence children's abilities, but this variable hides the fact that children with lower SES often have fewer opportunities to engage in activities that are relevant to the development of academic language proficiency.

Furthermore, an additional factor that can contribute to the development of language skills in a second language is proficiency in the L1. According to the Dual Iceberg representation of bilingual proficiency proposed by Cummins (1980), the skills of both languages would share a common base of underlying competences which can be transferred cross-linguistically. However, for successful transfer of skills between the two languages, it is fundamental that both languages are developed at threshold levels (Cummins, 1979). According to the Threshold Hypothesis, in fact, there are three different levels of bilingualism, which are separated by a lower and an upper threshold. Bilingual speakers benefit from enhanced skills only when their proficiency in the two languages is above the upper threshold. This structure has important implications for second language learning because the skills acquired in the first language will be an available resource also during the acquisition of the second language and, thus, it is crucial that they develop literacy both in their mother-tongue and in their L2. The hypothesis of a common underlying proficiency is corroborated by the evidence showing different types of cognitive and linguistic transfer strategies and concepts (Cummins, 2005). As argued by Grabe and Yamashita (2022), there are several cognitive processes that are shared between L1 and L2. Among these, we find rapid naming, verbal working memory, the ability to establish what reading strategy should be adopted, metacognitive awareness, and higher-level control processes that help readers to monitor their comprehension or infer information that is not explicitly contained in the text. On the other hand, as suggested by Siu & Ho (2015), language specific knowledge, i.e., language comprehension, syntax, and vocabulary, does not seem to be transferred between L1 and L2 as efficiently as the previously mentioned underlying cognitive processes.

#### 1.4 “*Italbase*” and “*Italstudio*”

When we consider the Italian context, BICS and CALP are translated into two other concepts, namely *Italbase* and *Italstudio* (MPI, 2006). It is important to highlight that the latter category does not simply correspond to the specialistic language of the school subjects, but, more precisely, it is the language used to teach and communicate technical and scientific topics to students who are not experts in those fields and, thus, are still building their knowledge and competences (Amoruso & Patrenostro, 2003). Hence, the language used at school is a simplified version of the specialistic language because it needs to reach and be understood by young students. As D’Annunzio (2014) observes, *Italbase* constitutes the first step to achieve the language competences of *Italstudio*. However, the development of Academic Language Proficiency does not only depend on the fluency in the basic communication competences and, thus, good *Italbase* skills do not automatically lead to the enhancement of the proficiency in *Italstudio*. As mentioned above, bilingual students with immigrant backgrounds, in particular second-generation immigrant students, have native-like competences in *Italbase*, but, according to the results of the national tests, they lag behind when they face tasks that involve advanced proficiency in a more specialised register of Italian.

Achieving an appropriate proficiency in the Academic Language is a process that needs to be guided by teachers and that involves both the development of various linguistic, cognitive, and metacognitive competences, and the expansion of the students’ encyclopaedic knowledge. Saccardo (2016) discusses the activities and goals that should be done with newcomer students who are acquiring Italian as L2. As she highlights, there are three different stages in the teaching of the Italian language, and teachers should adapt their methods to allow students to enhance their *Italstudio* proficiency. During the lessons, teachers should progressively pass from presenting the contents in simplified ways to increasing the use of specific terminology and more complicated structures that belong to the Academic Language. This progression is especially important to allow children who have recently arrived in Italy (NAI, Newly Arrived in Italy: Melero Rodriguez, Caon, & Bricchese, 2018) to gradually acquire *Italstudio*. The first stage broadly corresponds

to the development of Conversational Fluency, or BICS. During this phase, children will learn the basic and most frequent vocabulary, which will allow them to communicate with the other classmates and teachers. In the second phase, the acquisition of the *Italstudio* will be introduced, and students will start familiarising themselves with the more specific lexicon which is necessary to study school subjects. As Saccardo (2016) points out, this is a crucial stage of acquisition because the Italian language becomes the means to access contents and gain knowledge. Finally, the third phase, which Saccardo names *fase degli apprendimenti comuni* (“phase of the common learning”), represents a situation in which the same pedagogical methods can be applied for both Italian and non-Italian students.

In order to support students who speak Italian as an L2 during the acquisition of Italian and to facilitate their integration, the *Piano Didattico Personalizzato* (“Personalised Didactic Plan”, PDP) has been introduced. The PDP helps teachers define the organisation of the teaching activities for students who have special educational needs, either due to specific learning disorders or because of language difficulties. The activities which are proposed in the PDP are meant to help non-Italian students to potentiate their knowledge of Italian, in particular when they are learning the specialised lexicon which is used in class and in textbooks.

A study conducted by Borghi (2018) focuses on the importance of introducing specific terminology early on to help students find ways of integrating new technical words into their vocabulary. As Borghi (2018) concludes, simplifying the vocabulary in school texts that contain more advanced terms is not an efficient scaffolding method and does not help students during reading comprehension tasks. In her study, she compared three different simplification strategies used to modify the same historical-geographical text for a reading comprehension task. This study included first-generation immigrant students whose proficiency in Italian was rated between A2 and B2. The selected text was considered difficult to comprehend, and it contained some words that did not belong to the base vocabulary. This text was adapted in three different ways, and one of the three adaptations or the original one was assigned to the students. The task was preceded by an introductory activity aimed at stimulating the students’ prior knowledge of the topic. After that, the structure of the text was analysed before

giving the students the time to read it and complete three comprehension exercises. The first adaptation was an “elaborated text”, consisting of the original text with some extra glossae that helped students understand the most difficult words. The second adaptation was a simplified text in which the most complicated sentences were re-written using easier structures. Finally, the third adaptation corresponded to another type of simplified text in which not only the structure of some sentences, but also complex concepts were simplified. The outcomes of this study suggest that the adaptation that helped the students the most was the “elaborated text”. It is important to distinguish between simplification and facilitation of a text. The elements that were added to the “elaborated text” were meant to facilitate its comprehension without simplifying or reducing its contents (on the distinction between simplification and facilitation, see also: Grassi, Valentini, & Bozzone Costa, 2003; Bozzone Costa, 2003). As Borghi explains, the redundant nature of the text seemed to be very efficient because technical and more advanced terms were explained rather than merely replaced by more common words.

#### *1.4.1 Specific difficulties in Italstudio*

As we have seen from the results obtained in both the PISA and the INVALSI test, we notice that the academic variety of Italian known as *Italstudio* causes some comprehension difficulties for students of immigrant backgrounds. Crucially, a major aspect that makes *Italstudio* more challenging is that pupils are much less exposed to this variety than they are to conversational register. Moreover, as reported by Giberti and Viale (2017), among the features of this variety that may constitute obstacles for these students, we do not only find a more specific, technical, and abstract lexicon, but also more complex syntactic structures. Specifically, as far as grammatical features are concerned, *Italstudio* presents complex structures, such as passive forms, impersonal voice, and subordinate clauses, which are more difficult to process and, thus, require the employment of more cognitive resources during reading comprehension. Among the linguistic elements that can create difficulties in textbooks, we find the sentences displaying the passive voice and impersonal constructions, the use of nominalisations,

periphrases, subordinated and embedded sentences, and the presence of specific lexicon (Bertocchi, 2003). These characteristics make textbooks more complex to comprehend because information tends to be densely presented. Moreover, the use of embedded and subordinate sentences requires the employment of more memory resources in order to keep all the relevant information active. Lastly, impersonal constructions and passive voice sentences are not frequently found in every-day language and, thus, they can also constitute an obstacle during comprehension.

The language used in textbooks is characterised by objectivity. The information contained in manuals for school is typically presented in a neutral way and, thus, the opinions of the observer and of the author should be avoided. This needs to maintain objectivity translates into the use of an impersonal style of writing, which often lead to extensive use of passive structures and nominalisations. Since impersonal and passive voice do not require the specification of the agent, the focus of the attention is moved to the patient or on the action itself (Amoruso, 2010). Furthermore, the style adopted in textbooks includes longer sentences with many subordinate clauses (Amoruso & Patrenostro, 2003). This articulated structure allows the authors to include more information, but, during processing, subordinate clauses are more costly for readers. Relative clauses are an example of subordinated structures that are frequently found in textbooks.

Given the syntactic characteristics of the Italian variety used in textbooks described above, the present study will focus on object relative clauses and passive voice. By exploring the processing of these constructions we can uncover whether there are any differences between monolingual native speakers of Italian and students of immigrant background that might form the basis of the reading comprehension difficulties observed in the latter group.

### *Relative clauses*

Relative clauses are defined as subordinate sentences that are connected to the main clause through the relative pronoun *che*. This pronoun, however, can be very ambiguous (Balboni, 2014). These sentences, in fact, have the role of modifying the antecedent determiner phrase, which can be either the subject or the object of the main sentence. The modified antecedent becomes head of the relative



clause (Cinque, 1978, 1982; Bianchi, 1999). Moving a DP to the subordinate clause leaves a gap that marks the initial position of the relative clause (Volpato, 2010; Belletti & Guasti, 2015). We can distinguish two different types of relative clauses. The first one is called restrictive and the second one is called appositive. As shown in the examples below, in the former type (1), the relative clause contains information that is fundamental to comprehend the sentence. In the latter case (2), the relative clause provides further information that is not necessary for comprehension (Serianni, 2006).

(1) Restrictive relative clauses

Il cane che corre in giardino è spaventato.

*The dog that runs in the garden is scared.*

(2) Appositive relative clauses

Il cane, che è un animale fedele, aspetta il padrone.

*The dog, that is a loyal animal, waits for its owner.*

Relative clauses are acquired by Italian children around the age of 30-34 months (Guasti, 2002; Belletti & Guasti, 2015). Nevertheless, there is a gap between when this structure starts being produced and when it is fully comprehended. In fact, full comprehension of relative clauses seems to develop around 6 years of age. Moreover, several studies highlight that certain types of relative clauses require more effort during acquisition and processing (Adani, 2011). Subject relative clauses are the first ones to be mastered, while the comprehension and production of object relative clauses is more complicated and requires more time. Lastly, the most demanding type is object relative clauses with postverbal subjects (Volpato, 2012; Volpato & Vernice, 2014; D'Ortenzio, 2015). Below (3), I report the examples of these three types of relative clauses presented by Volpato (2010, p. 99):

(3)

a. Subject relative clause

Indica la tartaruga [che sta inseguendo i pesci].

*Point to the turtle [that is chasing the fish.<sub>PL</sub>].*

b. Object relative clause

Indica la tartaruga [che i pesci stanno inseguendo].

*Point to the turtle [that the fish.<sub>PL</sub> are chasing].*

c. Object relative clause with postverbal subject

Indica la tartaruga [che stanno inseguendo i pesci].

*Point to the turtle [that are chasing the fish.<sub>PL</sub>].*

Volpato (2010) investigated the comprehension and the production of relative clauses in young hearing and hearing-impaired participants. The first part of the study focused on comprehension and aimed to verify to which extent relative clauses were mastered by the children and, thus, measure their grammatical knowledge. During this task, children listened to the experimenter reading some sentences containing subject and object relative clauses (or filler sentences) and had to find and point to the picture that represented the sentence they heard. The target items were all displaying animate characters, humans or animals, and transitive verbs that could be semantically reversible, such as to hug, to push, or to help.

The conditions included the manipulation of the number of the subject and the object determiner phrases (DPs). When both subject and object were singular, the sentence was ambiguous, whereas when one was singular and the other plural, the number mismatch provided relevant information for the correct and unequivocal interpretation of the sentence. The second part of the study focused on the production of relative clauses. The aim of this investigation was to collect precise information about the development of the participants' language system and its content. During this phase, production was elicited through a Preference Task (Friedmann & Szterman 2006; Novogrodsky & Friedmann 2006). Two pictures were shown to the children. The participants were asked to choose the picture they preferred and then produce a sentence starting with: "*Mi piace*" ("I like"). The

pictures used for this task could prompt both subject and object relative clauses, i.e., the target structures, or simple SVO sentences, i.e., the fillers. The results of this investigation showed that both hearing and hearing-impaired participants displayed more difficulties both in the comprehension and in the production of object relative sentences. It is important to highlight that, despite the fact that object relative clauses were perceived as more demanding, the participants still managed to produce them. This outcome brings further evidence to Guasti's observations about the gap between production and comprehension of relative clauses (2002): the production of this structure, in fact, even if it does not occur frequently, appears before its comprehension is fully mastered. In conclusion, the study confirmed that primary school students still find relative clauses, especially the object ones, difficult to process.

However, there is not much information about when children with immigrant background start mastering and producing relative clauses. Thus, one of the goals of this study will be to collect data that focus on this population and to investigate whether they process relative clauses in a native-like way. In particular, we focused on object relative clauses, which are less frequent and more demanding, thus they could create more obstacles when students encounter them in textbooks.

### *Passive voice*

The passive voice is another complex structure which is often found in academic registers. The main characteristic of this clause type is that the arguments of the verb are not assigned the typical themes we would find in SVO sentences. In the active construction, the external argument of the verb, i.e., the subject, corresponds to the thematic role of agent and the role of patient can be assigned to the internal argument of the verb, i.e., the object. In passive sentences, however, the subject of the sentence is the patient, and we can choose whether to specify the agent through a *by-phrase* (Belletti & Guasti, 2015).

As shown in the examples below, in Italian there are two auxiliary verbs which can be used to build a passive sentence: the verb *essere* ("to be") and the verb *venire* ("to come"). The former is typically preferred to express stative or resultative

passive construction, while the latter is used with actional verbs (Renzi et al. 1991). Moreover, *venire* can only be used with simple verbal tenses.

(4)

a. La bambina è/viene lavata dalla mamma.

*The girl is/comes washed by the mother.*

b. La lettera fu/venne spedita da Gianni.

*The letter was/came sent by Gianni.*

(Belletti & Guasti, 2015, p. 130)

As mentioned above, this construction helps maintaining more impersonal style and highlighting the role of the patient or the action, instead of focusing on the person who performed the action. As the first noun encountered in passive sentences corresponds to the patient, the processing of these structures becomes more demanding because we tend to assume that the first noun has the thematic role of agent (First-Noun Principle in Input Processing Hypothesis, Van Patten, 2004). Thus, when we read a sentence that displays the passive voice, our expectations about the role assignment are not met, and we might need to elaborate its content a second time to comprehend it.

Let us take a look at data on the acquisition of passive voice in Italian. The studies conducted with monolingual children aged between 4- and 5-years old show that children of that age have already mastered the comprehension of passives of action verbs, but they still struggle with stative ones (Manetti, 2012; Volpato et al., 2013). Investigations on the acquisition of Italian passives in bilingual speakers are still few and involve adult participants who are learning Italian as a second language (Rastelli, 2015; Franciotti, 2016).

The study conducted by Franciotti (2016) analysed the acquisition of passives by adults who learnt Italian as an L2 and had different levels of proficiency in Italian. The participants were administered a Picture-Matching Task to evaluate their comprehension of the passive voice. Half of the items included in the task used the target passive structure whereas the other half were fillers and displayed the active voice. Each stimulus was introduced with two pictures, one that matched

the situation described by the sentence and one that showed roles of agent and patient inverted. The outcomes of this study showed that, all participants did not show difficulties in the comprehension of passive sentences. However, when the production of sentences with passive voice was elicited, the participants who had a lower proficiency tended to resort to (S)VO active constructions and the use of object clitic. The strategy adopted by the less proficient speakers suggests that they consider the passive structure more demanding and, thus, preferred to avoid its production.

Since, as mentioned previously, the use of passive forms is widely adopted in the academic register, it will be crucial to explore how children of immigrant background process such structures.

### **Summary of the chapter**

In this chapter, we focused on bilingualism in migration contexts and the issues that can be encountered by immigrants. More specifically, we defined what a heritage language is and considered how age of acquisition, the environment, quality and quantity of the input lead to different types of multilingual experience. Moreover, we introduced what difficulties are more frequently encountered by speakers of heritage languages. Another section was dedicated to describing the population in Italian schools. In the last decade, the number of students with immigrant background has increased considerably, but this population still faces more obstacles during their educational experience. In fact, first- and second-generation immigrant students tend to achieve lower grades and display higher dropout rates. Hence, it is pivotal to understand better where these difficulties arise, in order to develop more efficient pedagogical strategies that will help them integrate better in the Italian schools and improve their educational experience. We summarised the results of international and national large-scale assessments that show the difficulties that students encounter. For example, the outcomes of the INVALSI showed a gap in performance between students with immigrant background and their Italian monolingual peers. In particular, this discrepancy seems to be caused by difficulties in those subjects that require advanced linguistic abilities. Finally, in the last part of the chapter, we discussed the differences between conversational fluency and academic language. Furthermore, we analysed

the features that characterise these registers and the skills they require. In the last section, we also described the difference between *Italbase* and *Italstudio*, and examined two structures that are often found in textbooks: object relative clauses and the passive voice.



## 2. READING

This chapter is an introduction to the complex and essential activity of reading. After describing its importance in our everyday life, I will review how reading has been defined and investigated in the literature, paying attention to both the processes involved during reading.

First, I will introduce the concept of reading and how its invention has reshaped the human brain and life experience. As reading is a very complex activity that involves several skills and can fulfil different types of purposes, providing an accurate description and reducing it to a simple definition is a challenging task. In the first section of this chapter, I will explore some of the definitions that have been proposed in literature in order to extract an effective description of what reading is. Furthermore, six types of reading will be presented to show how we can tailor our reading pace in order to achieve different comprehension goals.

The second section will be devoted to disentangling the processes we need to master in order to read. In particular, I will refer to the “Component Skills Approach” proposed by Grabe (1991, 2009; Grabe & Yamashita, 2022) and to the distinction between lower-level (i.e., automatic word recognition skills, syntactic parsing, meaning proposition encoding) and higher-level processes (i.e., text-model formation, situation model building, inferencing, executive control and strategic processes) involved during reading. Each process of the Component Skills Approach will be addressed in a specific section in which I examine how these skills are learnt and how they contribute to the extraction of meaning from texts and to the development of comprehension. Moreover, another section will be devoted to the role of memory. I will describe how working memory allows us to orchestrate all the processes that are employed during reading activities, and how it also creates essential connections to our long-term memory to fill gaps and achieve comprehension.

In the last part of the chapter, I will review some of the models of reading that have been proposed since the 1980s. With the term “model of reading”, I refer to theoretical frameworks that were developed to account for the outcomes of the



studies that analysed reading comprehension and determine guidelines for the development of future investigations. Among the models that will be summarised in this section, the Reading System Framework proposed by Perfetti and Stafura (2014) is the one that adapts better to the research questions and the methodology designed for the current study.

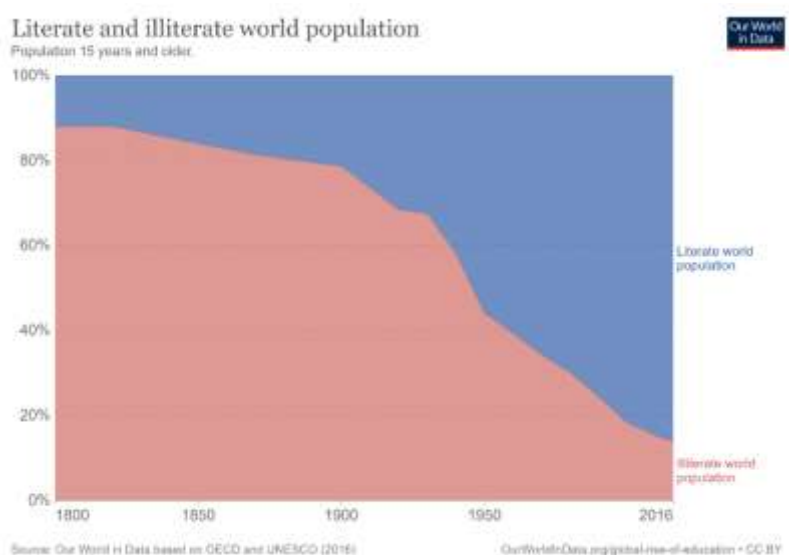
## 2.1 *Reading in history*

Reading is an essential activity that seem to be performed with little effort, if not almost *naturally* on a daily basis. However, since reading is a consequence of the invention of writing and an ability that humans developed only a few thousand years ago, there is nothing *natural* about it. As Wolf (2008) effectively summarised in the introduction of *Proust and the Squid*: “We were never born to read” and, as a consequence, our brain had to change and evolve to adapt to this activity that has become more and more pivotal and necessary in our lives. The plasticity of the human brain allowed us to become readers and, thus, to find new ways in which we can think about and understand the world. When we encounter reading for the first time, our brain changes both from a physiological and an intellectual point of view (Wolf, 2008). Physiologically, our brain has to adjust to the language we want to read and generates different neuronal connections according to the writing system that has to be decoded. Furthermore, when we read, we expand the information stored in our memory, we discover and pursue our interests, we develop opinions, and we can learn new information that will shape us intellectually. These two aspects connected to reading are intertwined in our development of human beings/individuals both as readers and as members of a community.

Even if communication via written texts and, consequently, reading have been part of human history since about 3500-3000 BCE, literacy became available to the vast majority of the world population only recently. As can be observed in the following figure 2.1, the percentage of the population that is literate has increased considerably in the last two centuries. In the early 1800, literacy was a privilege, and more than 80% of the population could not read nor write. Now, on the other hand, the situation is the other way around, less than 20% of the population

is illiterate today worldwide (OECD and UNESCO, 2016). Nevertheless, being able to read does not entail being a proficient reader and managing to understand, analyse, and reinterpret complex texts.

*Figure 2.1 - Literacy in the last two centuries*



Every day we engage in reading in many ways, and this activity has become automatised to such an extent that we do not seem to put in much effort when we read. We encounter written texts, both printed and digital, continuously, and we have different reasons for wanting to decode and understand them. We read to be informed about what is happening in the world, we read when we buy products or when we receive a message from a friend, we read for pleasure, or we read to learn something new. These few examples already show various contexts in which reading takes place, and each of them requires a different type of cognitive effort. In modern society, it is essential to become skilled readers in order to pursue and achieve academic success and to succeed at work (Grabe, 2009). Moreover, in the 20<sup>th</sup> century, it became more and more important to develop advanced reading skills also in a second language. In fact, with the increasing migration of people seeking better career opportunities, supporting and gaining a better understanding of how L2 reading is acquired has become a crucial issue to make sure that everyone can have access to equal opportunities.

## 2.2 *Defining reading*

Reading has been defined in many different ways that often highlight only part of the complexities of this activity. Some definitions, in fact, may stress only certain aspects of reading. At first glance, a short definition such as the one proposed by Urquhart and Weir (1998, p. 22) seems exhaustive: “Reading is the process of receiving and interpreting information encoded in language form via the medium of print”. However, this characterization does not convey how articulated the activity of reading really is. Another definition, proposed by Snow, Bruns, and Griffin in the RAND (Reading study Group report, 1998, p. 33), describes reading as: “a cognitive and psycholinguistic activity [that] requires the use of form (written code) to obtain meaning (the message to be understood) within the context of the reader’s purpose (for learning, for enjoyment, for insight)”, and then, highlighting additional important aspects of reading. Furthermore, Snow and colleagues define the concept of “receiving and interpreting” information more precisely, and they divide the process into three fundamental activities that are at work during reading, namely decoding, reconstructing, and understanding. Terms such as “decoding and reconstructing” help convey the idea that people are actively engaging in the task of reading. It is important to remember that, even when we become fluent readers, reading does not happen effortlessly or naturally, and, in fact, engagement plays a pivotal role in the development of the most efficient reading strategies (Guthrie et al., 1996). Another important aspect of this second definition is the reference to the cognitive and psycholinguistic features of reading. The cognitive (and biological) components connected to reading are not always at the centre of the definitions of reading that we find in literature, despite these aspects are fundamental to understand this activity.

Moreover, reading cannot be disentangled from comprehension, which is also a multifaceted aspect of reading that cannot be defined and described with a simple formula. More often, we find references to extracting the message contained in written language (Koda, 2005; Cain & Barnes, 2017), but a more complete definition of reading should also take into account the processes that allow us to understand what a text is about and how these processes operate. In other words, as

argued by Grabe and Yamashita (2022), when defining reading, it is crucial to start from the assumption that reading is the combination of many processes, and that it is not possible to summarise it in just one sentence.

Following these premises, Grabe and Yamashita (2022) proposes to define reading by describing the complexity of the processes that are at work during this task. First of all, reading is a *rapid and efficient process*. The speed with which we manage to coordinate and synchronise tasks such as rapid and automatic word recognition, syntactic parsing, meaning formation, text-comprehension building, inferences, critical evaluation, and connections to prior knowledge makes reading seem like an effortless task. Crucially, as mentioned previously, reading is a *comprehending process*. As Cutler and Clifton (1999) argue, the fact that comprehension is often the goal of a reading activity does not mean that we should consider comprehending as a synonym of reading. Listening, in fact, is another comprehension process, but reading crucially includes the connection of graphemes and phonemes and the processing of written linguistic information (Alderson et al., 2016; Jeon & Yamashita, 2014; Perfetti et al., 2005; Yamashita & Shiotsu, 2017).

As shown before, there are different types of reading, and achieving complete comprehension of the content of a text is not always the goal. Since reading involves the coordination of many cognitive processes, this activity can also be described as an *interactive process*. However, coordinated and synchronised processes are not the only way in which reading is interactive. Interaction also takes place between the author and the readers with the intention to communicate or make them understand something, often thanks to the activation of the readers' background knowledge. Furthermore, reading is a *strategic, flexible, and purposeful process*. As we will see in more detail in the following section, we may have different goals when we face a written text and, according to those goals, we should manage to adapt our reading strategies. Thus, it is pivotal to understand how fast or slow we should read a text to achieve those goals, to find a way to monitor our comprehension or fill the gaps in our background knowledge that might create obstacles during the interpretation of the contents of the text. In order to control whether the strategies adopted to attain certain reading purposes are efficient, readers should constantly evaluate their way to analyse and interpret texts.

Assessing whether we are planning our reading strategies carefully is not the only way in which reading can be considered as an *evaluative process*. During reading, in fact, we should also reflect about what we think about the content of the text, how we react to it, whether we agree or whether we find it useful. It is thanks to this type of evaluation, which is performed during reading, that we reach another fundamental process, namely *learning*. Evaluating and learning are strictly connected because it is thanks to the evaluation of the contents of the text that the reader understands what they should retain from it and, most importantly, learning through reading does not only happen when the reader has to study a certain text or book, but learning is achieved every time we establish what to do after reading and, thus, how to respond to the text (Grabe and Yamashita, 2022).

To sum up, reading is not simply the extraction of information via written form; it is the coordination of several cognitive, metacognitive, and linguistic processes that allow us to comprehend and learn through the interaction with a written text. Moreover, in addition to all the metalinguistic and cognitive abilities, such as memory and attention, that are involved during reading, the successful coordination of all these processes needs to be also motivated by a purpose (Snow et al., 1998).

### **2.3 *Types of reading and their aims***

As mentioned before, there are different types of reading, and they are neither acquired nor taught in the same way. When pupils have achieved appropriate decoding abilities, in order to progress in reading, it is pivotal to consider what the purpose behind reading is; in other words, it is necessary to determine what type of reading the reader is engaging in (Anderson, 2000). If we focus only on academic reading, we can already distinguish between at least six types of reading, as suggested by Grabe and Yamashita (2022). Each of these corresponds to a purpose that can be achieved using different reading techniques. First of all, one of the main goals of reading is to search for information in a text. When we engage in this activity, we do not need to spend too much time analysing every sentence, but we identify certain graphic elements (i.e., *scanning*) with the

intention of building a general and quick understanding of the content of the text (i.e., *skimming*). During this type of reading, we are looking at the text to find the key content or information we need. Scanning and skimming require very fast processes and they allow fluent adult readers to detect between 450 and 600 words per minute (Carver, 1991). *Searching for information* is not the only type of reading that involves skimming. This process can be also applied when we want to determine the general content of a text and understand whether it can be interesting or relevant to our goals. Grabe (2009) refers to it as reading for *quick understanding*, and it becomes particularly useful when the reader has to select the most relevant texts among many. Furthermore, one of the most common and important goals that we have when we read is *learning*. To achieve this goal, we cannot simply skim the text, but we need to pay more attention to the information contained in the text because it may be useful to complete some tasks. When reading to learn takes place, the reader should not only retain the general meaning of the text, but they should also remember and recall the main ideas presented in it. Moreover, the reader might need to extract information from more than one text, organise it, and synthesise it. The combination of these tasks is called *reading to integrate*, and it consists of a more complex type of reading than reading to learn (Grabe, 2009). To successfully integrate the content of different texts, readers need to develop their own way of organising the information they considered relevant; hence, they should come up with a personal organizational structure, which is alternative to the one adopted by the texts they read. Another purpose of reading is to *evaluate, critique, and use the information* presented in the text. This task is quite demanding and, especially in an academic context, readers have to perform it on more than one text or on a long one, and not only are they asked to retain the information contained, but also to consider if the contents are relevant, persuasive, or controversial (Grabe, 2009). Finally, according to the classification proposed by Grabe, the sixth and last type of reading is *reading for general comprehension*. Comprehending is the most common goal for readers, and it takes place in several reading context, which can be both academic and non-academic. Since reading for general comprehension may be performed for long periods and is generally driven by the reader's personal interest, it could be erroneously perceived that we perform this task automatically

and without particular effort. However, as argued by Grabe, this task involves several complex processes, and it takes a very high number of hours of practice to reduce the amount of effort required to do this. To achieve efficient reading for general comprehension, it is crucial to master other skills linked to reading and language processing. In particular, it is fundamental to recognise words automatically and to parse the syntactic structure of the sentences. Moreover, the reader also has to connect the meaning of single words and sentences to finally build the general meaning of the text (Grabe, 2009). As mentioned earlier, devoting a large amount of time to practice reading allows readers to automatise these processes and, thus, become fluent readers. When reading in a second language, the low exposure to print and the consequent limited practice with L2 reading is generally acknowledged to be one of the main reasons for the difficulties learners experience in L2 reading and text comprehension.

Before starting a reading task, it is important that readers have a clear idea of what their purpose is so that they can adjust their reading strategies to meet that purpose (Linderholm & van den Broek, 2002). For instance, if the text is followed by a comprehension task, the reader should not only scan it quickly but rather read at a slower pace and reflect about the most salient pieces of information it contains. On the other hand, if the readers' purpose is to understand whether a certain text can be of interest to them, they can skim through it to grasp its general content. Moreover, the reader's expertise in a certain topic or field also has an influence on the reading strategies that they should adopt. For instance, when facing a domain for the first time, the reading speed should be lower to allow the reader to get acquainted with the domain-specific lexicon, as they may need more time to connect the information effectively. The more background knowledge the reader has, the faster they will manage to process the content of the text they are reading, and this will have an impact also on the way in which they perform during post reading activities, such as answering to comprehension questions (Adams, Bell & Perfetti, 1995; McNamara & Kintsch, 1996; McNamara et al. 1996; Voss & Silfes, 1996). Thus, being aware of what the final goal of a reading exercise is, helps us determine the strategy that will let us achieve that goal. As was shown in a study conducted in which college students were by Linderholm & den Broek (2002) asked

to describe their reading strategies while reading either a text for study or a text for entertainment, both stronger and weaker readers managed to recall more information when they used reading strategies aimed at studying the texts rather than when they were reading for entertainment. In other words, when students approached the reading task with a clear purpose, i.e., to study, they managed to control extracting and recalling information more efficiently. These findings stress the importance of reflecting on the purposes of reading before facing a reading task in order to manage to choose the most efficient strategies to achieve those goals. A similar methodology was applied also by Horiba (2000) with L1 and L2 readers of Japanese. Interestingly, L2 readers had more difficulties adapting their strategies to meet their reading purposes.

## **2.4 *Learning to read***

As described in the previous paragraph, reading is a complex activity that includes several components and that develops when culture and biology intertwine (Carioli, 2014). Hence, studying reading also means to explore other fields such as ethnography, history, sociology, and child development (Snow et al., 1998). Both the quantity and the quality of the texts we read will define and shape the neural networks in our brain that enable us to become fluent readers. If we consider all the types of reading, the strategies, and processes that they entail, it is not surprising that learning to read involves learning several conventions, and that, cognitively speaking, it is a highly demanding task.

In order to reach fluent reading, children will first have to explicitly learn and automatise some several competences. At the beginning of this learning process, children need to become familiar with the alphabet and with the orthographic correspondences of the language they are learning to read. At first, decoding graphemes into phonemes requires the activation of wide regions of the brain, but this process becomes progressively faster and easier until the reader manages to transform written letters into sounds automatically. Once the automatization of this process is achieved, the reader will manage to perform this task employing fewer cognitive resources and, consequently, invest the remaining



ones to other types of processes, such as the integration of semantics and syntax (Carioli, 2015). At this stage, the readers are still building the foundations of what reading truly means. The ability to devote more cognitive resources to the hierarchical relations of the sentences and their content allows readers to build up the meaning of the text, but they can go even further. As Wolf (2007, p. 14) suggests, reading allows humans to go “beyond the information given” in a text. When we read, we do not only collect new information, but we also connect it with what we already know and with our beliefs, and, ultimately, we interpret it and develop new thoughts, both biologically and intellectually. As is made clear from the pages of *Proust and the Squid*, reading is an activity that has a strong generative power that allows us to keep moving forward: “the rich association, inferences, and insights emerging from this capacity allow, and indeed invite, us to reach beyond the specific content of what we read to form new thoughts” (Wolf, 2007, p. 14). Thus, learning to read shapes both our brains and our minds, and it prepares us to expand our knowledge, experiences, and cognitive capacities.

Crucially, one aspect that should not be underestimated during the creation of efficient didactic instructions to teach reading and to improve reading comprehension is awareness. As Grabe and Yamashita (2022) argue, it is important to make students aware of the strategies they can employ during reading. In particular, reflecting explicitly about goals and strategies of the reading process will contribute to the improvement of their monitoring skills. For instance, they can consider how much time they have to read the text and consider whether it is sufficient to read the text carefully or whether they will only manage to skim through it, or they will reflect about the content of the text to make sure they understand it. Moreover, when students are aware of the ways in which they can face different kinds of texts, they will be more prepared when they will encounter comprehension difficulties and they will have to adapt their strategies.

## **2.5 *The “Component Skills Approach”***

As mentioned in the previous section, reading is a complex process that includes many skills and cognitive abilities. If we want to better understand reading,

it is useful to break it down into smaller parts and analyse the sub-components which allow us to read and comprehend the content of texts. Reading is an activity of great importance to advance successfully in education and, as a consequence, investigating the mechanisms of reading is fundamental to understanding the issues that may arise during it.

In the previous paragraphs, I discussed the difficulties of giving a simple definition to the process of reading. One of the earliest proposals for a psycholinguistic model of reading was developed by Coady's (1979). According to his model, there were three fundamental components that needed to be analysed to understand reading. These components were: i) processing strategies, ii) background knowledge, and iii) conceptual abilities (Coady, 1979). Later studies delved deeper into the reading process and further developed the analysis of the components of reading. From Coady's set of three components, in the late 1980s, scholars proposed models that contain more component skills and knowledge areas (Carpenter & Just, 1986; Carr & Levy, 1990; Haynes & Carr, 1990; Rayner & Pollastek, 1989). According to Grabe & Yamashita (2022), reading could be interpreted as the result of lower- and higher-level processes, and the interaction of working memory:

**Lower-level processes:**

- i) word recognition skills
- ii) syntactic parsing
- iii) meaning encoding

**Working memory**

**Higher-level processes:**

- v) text-model formation
- vi) situation model building
- vii) inferencing, executive-control processes, and strategic processing

The labels of lower- and higher- do not indicate that the former processes are simple whereas the latter ones are more complex. Lower-level processes are those that should be automatised in order for someone to become a skilled reader.

In the following paragraphs, I will review the skills that reading is made up of and refer to the studies that investigated their role in the development of fluent reading abilities.

### *2.5.1 Word recognition Skills*

Recognising words automatically means that we do not need to consciously decode grapheme-by-grapheme (Adams, 1990; Just & Carpenter, 1987; Stanovich, 1990). When readers have been exposed to a considerable amount of written input, they will manage to convert graphemes into phonemes at a higher speed. At first, readers will become faster at recognising single letters, and later, they will also manage to recognise words without decoding them letter-by-letter. Furthermore, they will also start creating semantic associations between words that will help them creating expectations about the following words. As many studies in cognitive psychology show, automatic recognition skills are crucial to become fluent readers because if this task is performed unconsciously, it will not be cognitively demanding, hence, more cognitive resources will be available for other reading processes (Adams, 1990; Gough & Juel, 1991; Perfetti, 1991; Stanovich, 1986, 1991). Being able to recognise words automatically is pivotal to achieve comprehension both in first and in second language reading. As extensively highlighted in the literature (Cain, 2006; Castles et al., 2018; Nassaj, 2014; Perfetti, 1999, 2007; Perfetti, Landi & Oackhill, 2005; Stafura & Perfetti, 2017; Willingham, 2017), automatic word recognition is a major predictor of reading fluency and of reading comprehension and, as a consequence, when readers do not develop efficient recognition skills, they will encounter more obstacles in comprehension tasks.

When we look at how word recognition happens, we will see that this component of reading comprehension is made up of four subcomponents or constituents, namely: orthographic, phonological, semantic, and syntactic

processing (Perfetti & Hart, 2001). The first process involved in word identification is visual and it consists of the detection of the single letters that create a word. During this process, readers recognise the orthographic form of words. The visual component is immediately followed by a second process that allows readers to decode those letters into sounds, thus the *phonological decoding process* (Snow et al., 1998). Skilled readers do not need to dedicate many cognitive resources to the identification of letters. In fact, from the first phase in which orthographic processing happens, detecting letter symbols and learning to discriminate them, readers automatise these visual processes and manage to analyse the symbols simultaneously and, thus, they recognise words in their entirety without decoding them letter-by-letter. When the word is successfully recognised in its entirety, readers will activate their semantic knowledge connected to that word and the relevant morpho-syntactic properties. Nevertheless, not all words are as immediately recognised, and, in the case of long, complex, unfamiliar or unknown words, it is crucial that readers can exploit their knowledge about how words are created and how specific morphological information can help them derive their meaning (Grabe & Yamashita, 2022). Morphological awareness, in fact, can help readers to make hypotheses and infer the meaning of new complex words without using a dictionary because they would not only recognise the graphic form of those words, but also the *smaller bricks* that form them (Carlisle, 2003; Cunningham, Perry & Stanovich, 2001). Several studies investigated how morphological awareness contributes to improving reading comprehension scores and facilitating learning new words (Castles et al., 2018; Jeon, 2011; Stoffelsma et al., 2020). In particular, when we consider L1 students, knowledge about affixes becomes increasingly important after 3<sup>rd</sup> grade (Grabe & Yamashita, 2022).

Another fundamental aspect related to word recognition is to understand how semantic and syntactic neighbours influence lexical access and whether this information contributes in some ways even before achieving lexical access. As suggested in some studies (Coltheart et al. 2001; McRae, de Sa & Seidenberg, 1997), when a word is recognised, it can activate other semantic neighbours that are connected to it. This process is referred to as automatic spreading activation mechanism, and it results in the creation of a lexical network that makes other

semantically similar words more readily available thanks to the activation of its potential matches in the reader's mental lexicon. In other words, the recognition of a word followed by its lexical access generates a semantic priming effect that will allow the reader to speed up the association with new related words.

However, it is important to remark that word recognition does not always entail lexical access. In fact, it is possible to recognise a word without having access to its meaning. For instance, this happens when we read words that we do not know or when we read non-words that, thus, have no meaning at all. Even if in the majority of cases word recognition can be equated to lexical access, keeping this distinction in mind is pivotal especially in L2 reading. Children who are reading in their second language may recognise a word, but they might not be able to link it to its meaning. If meaning information is not available, there is no lexical access. As a consequence, the semantic neighbours of that word will not be activated, and they will not be readily available in the readers' mind to support them throughout the rest of the text. Moreover, if a reduced number of words is known by the L2 readers, the activation might not be as large and robust as it is for native speakers or skilled readers.

As mentioned above, decoding the written input from texts is paired with phonological activation. The orthographic and the phonological processes, in fact, happen before achieving lexical access.

Phonological activation plays a fundamental role even in written systems that are not alphabetic. Several studies have investigated the correlation between phonological processing skills and reading development and the outcomes showed that these skills are predictors of early reading success in children (Adams, 1990; Stanovich, 1986).

Phonological processing allows readers to recognise that words are formed by smaller phonological units. The phonological process can be divided in three fundamental components: phonological awareness, phonological memory, and efficiency of phonological access to lexical storage. First of all, phonological awareness is the ability to separate the sound of a word from its meaning. More specifically, it includes also *phonemic awareness*, which is the set of skills that allow individuals to reanalyse words as a combination of phonemes and syllables

(Snow et al., 1998). Phonological memory contains the specific phonological features of words in a verbal form. This storage has only a limited capacity and, in fact, it is also called phonological short-term memory. Effective phonological memory allows readers to direct more cognitive resources towards comprehension (Wagner & Torgensen, 1987). Finally, the third component of phonological processing skills is the efficient access to lexical storage or RAN (Rapid Automatic Naming). Unlike phonological memory, lexical access relies on long-term memory, and it allows readers to retrieve the phonological codes associated with written forms. When lexical access happens automatically, it contributes to the development of reading fluency (Wagner & Torgensen, 1987). As said previously, fluent readers do not need to analyse each word letter-by-letter in all of its phonological units, but they perform the so-called “sight word reading” (Castles et al., 2018; Ehri, 2015; Snowling, 2019) during which orthography leads them directly to whole word recognition.

There are two main hypotheses about the interaction between orthographic and phonological processes during reading. The first model was proposed by Coltheart (Coltheart, 2005; Coalheart et al., 1993; 2001) and it is known as the “Dual Route”. As Coltheart argues, phonological and orthographic information are processed separately. Crucially, the two parallel routes lead from the written form to the speech realisation of words, but in two alternative ways: a lexical route (the orthographic one) and a non-lexical route (a phonological one). On the other hand, Plaut (2005; Plaut & Booth, 2000; Plaut et al., 1996) proposed an opposing view, according to which phonological, orthographic, and semantic information is accessed and processed simultaneously following the exposure to the visual input of a written word. Models of this type have been referred to as “Single-Process” or “Connectionist” models and, as argued by Plaut (2005), they seem to reflect more accurately the way in which the human brain functions.

Another key aspect that should be mentioned is how children learn the words they read. When children approach reading, they already possess an oral vocabulary, and the phonological representations of those words are already linked to their respective meanings. Encountering the written form of those words several times allow children to also add the orthographic representation. Crucially, children

are not aware that they are teaching themselves new word forms, and, in fact, statistical and implicit learning support this process (Andrews & Reynolds, 2013; Castles et al., 2018; Verhoeven & Perfetti, 2017). Since explicit instructions are not required during new word learning, scholars call this process “self-teaching” (Jorm & Share, 1983).

Finally, one more factor that should be considered for word recognition is the effect of context information. There are cases in which the context is fundamental for lexical access. For instance, homographic words can be phonologically detected only thanks to the rest of the text in which they are presented. As argued by Gernsbacher (1990), skilled readers manage to exploit context more efficiently than poor readers, when it is necessary. However, this should not lead to the conclusion that context information is always an important resource during reading or that skilled readers use it extensively. In fact, this process is quite time consuming. The information that can be extracted from context is analysed considerably slower and, thus, fluent readers do not often exploit it because their rapid word recognition skills will be sufficient, and they do not need to slow down their pace to integrate context information in the process (Perfetti, 1999; Rayner & Pollatsek, 1989; Stanovich, 1980). On the other hand, a strong reliance on context information often indicates reading difficulties and, thus, poor readers may struggle with word recognition and lexical access because they spend more time and cognitive resources focusing also on the context (Grabe, 2009).

### 2.5.2 *Syntactic Parsing*

*A scattered is text only a not words of group: which in the they order and, fundamental are relations presented meaning are convey their to.*

When we read, it becomes immediately clear that *a text is not only a group of scattered words: the order in which they are presented, and their relations are fundamental to convey meaning*. Decoding letter symbols and recognising words is only one of the processes that fluent readers perform subconsciously. As highlighted by Perfetti (1999), parsing the syntactic relations connecting words is

fundamental to achieve reading comprehension. However, it is not only the order in which words are presented that is important in a text, but also the type of words that are used (e.g., nouns, verbs, adjectives, prepositions, articles, etc.) and the features they carry (e.g., number and gender or, in the case of verbs, mood and tense).

In the Reading Systems Framework, Perfetti and Stafura (2014) highlight a strong connection between syntactic parsing and lexical knowledge. They argue, in fact, that word-to-text integration happens thanks to the processing of lexical components and that syntactic parsing is also achieved thanks to the processing of lexical items. More specifically, readers develop knowledge of the syntactic structures combining the meaning of the lexical items with statistical knowledge about the ways in which they can be combined into larger units. Moreover, if we consider the way in which syntactic knowledge and parsing support reading comprehension, Perfetti and Stafura hypothesise that readers can store syntactic sequences among their knowledge resources. These abstract syntactic units, though, could be retrieved by readers and employed to reconstruct the meaning of the passage they are reading. Several studies including both normal readers and readers with disabilities have reported a correlation between syntactic knowledge and reading comprehension (Brimo et al., 2017; Deacon & Kieffer, 2018; Jeon and Yamashita, 2014; Staub, 2015; Yamashita & Shiotsu, 2017). However, L1 and L2 speakers do not develop syntactic parsing abilities in the same way and, in certain tasks, L2 readers do not manage to use them as efficiently as L1 speakers. In fact, as we will discuss later in chapter 4 dedicated to L2 processing, speakers who have acquired their L2 at a later stage or who have lower L2 proficiency are more likely to rely on other types of strategies, possibly based on the semantic and pragmatic information contained in sentences. Drawing more attention on the semantic or pragmatic strategies, in fact, is a way to counterbalance poor syntactic skills when it comes to process the sentences of the text (Pienemann, 1998; White, 1991). As suggested by Pienemann (1998), semantic and conceptual skills are more readily available for L2 speakers because they have already acquired these skills and knowledge in their L1 and, thus, they can transfer it also to their L2. According to Pienemann, it is pivotal for L2 learners to develop L2 structural knowledge to



achieve more rapid and efficient L2 sentence processing skills. A way to compensate for L2 learners' limited set of implicit syntactic knowledge when they approach learning to read L2 texts is to focus on the development of different teaching instructions. More specifically, L2 learners seem to benefit from activities that will explicitly stimulate their syntactic awareness. Moreover, some scholars argue that L2 connection between syntactic and lexical knowledge and processing may not be as tight as for L1 speakers (Jeon & Yamashita, 2014; Shiotsu, 2010).

Texts are densely filled with grammatical information that cannot be overlooked during reading (Deacon & Kieffer, 2018; Grabe, 2005). When readers proceed through a text, they do not only create a semantic web of activations for each word, but they also produce hypotheses about how single words are connected with each other. In other words, they generate a syntactic representation of phrases, clauses, and sentences. When readers put together all the syntactic information efficiently, they build their interpretation of the text and understand its content (Christiansen & Chater, 2016; Staub, 2015).

### *2.5.3 Meaning proposition encoding*

During word recognition and syntactic parsing, a third process is activated to extract meaning from the text we are reading. As described in the two previous paragraphs, after recognising the words that form a text and grouping them together in phrases with the help of structure-building skills, we need to analyse phrases and clauses also from a semantic point of view, in a word-to-text integration. Thanks to this process, we obtain semantic propositions, another building block to achieve reading comprehension (Perfetti & Britt, 1995). Semantic propositions can be defined as “small packets of information chunked together in a meaning unit” (Grabe & Yamashita, 2022, p. 43) which include the relevant networks of activation that readers use when they reconstruct the representation of the text they are reading.

In order to better understand how the semantic propositions work, it is useful to imagine them as a network of small tokens bearing information rather than separate units. This network of information contains nodes and linkages, that is, the



On the left, the image shows the sentences forming the text, and on the right side we have the steps leading to the formation of the semantic proposition. When we encounter elements in the text, we activate them in our memory. Moreover, as we proceed during reading, we will find new elements that will be linked to the previous ones and, thus, they will be reactivated in memory. In the image, the reactivation of information is shown using bold characters. The result is the generation of a network of activations that help during the extraction of information from a text.

The ability to access and connect rapidly the meaning of the words we read is fundamental for reading comprehension and it is the base of Perfetti's "Lexical Quality Hypothesis" (2007). According to this hypothesis, word knowledge would be the most important source of reading comprehension abilities. Perfetti (2007) argues that mental representations of words should be both "precise and flexible" (p. 359). Moreover, he observes that readers who display similar cognitive abilities may not achieve similar results during reading comprehension if their vocabulary knowledge is different (Adolf & Perfetti, 2014; Andrews, 2015). In particular, an extended vocabulary will help readers during the creation of more sophisticated associations and activations in memory. As a consequence, these sophisticated and well-established word representations are easily lit up. Hence, skilled readers will not need to focus much attention to further pieces of information contained in the context and building up the meaning of the sentences will not be too costly from a cognitive point of view (Andrews, 2015).

#### *2.5.4 Memory*

As can be inferred by the previous sections, memory makes a major contribution towards achieving fluent reading. Cognitive psychologists distinguish between two types of memory: long-term memory and working memory.

As reported in Grabe (2009, p. 32), long-term memory can be defined as "the total set of permanent records of our experiences and our efforts to understand our environment". Long-term memory plays a fundamental role during reading, and it has been extensively studied with a particular focus on the ways in which it

encodes and stores information. Long-term memory is characterised by declarative memory, procedural memory, episodic memory, and conceptual memory (Anderson, 2000; 2020). With declarative memory we refer to what has been explicitly learnt, hence the knowledge that is consciously available to us. Procedural memory is characterised by slower, unconscious, implicit learning that leads to the development of the rapid and automatic processing of certain skills (Ullman, 2004). Episodic memory is the memory system used to remember life experiences and to retain information we were exposed to in a specific place and time (Tulving, 1998). Finally, conceptual memory holds the collection of semantic representations we are familiar with. It is important to distinguish conceptual memory from lexical memory, which, instead, assembles words, that is, the labels we assign to the semantic representations (Coventry, Valdés, & Guijarro-Fuentes, 2010).

Long-term memory is very important during reading because it allows readers to retrieve information and knowledge they have previously encountered and stored. When previous knowledge is selected, it is also made available to the readers, and it allows them to use it in order to integrate the new information they are processing in the text they read. When information and knowledge are retrieved from long-term memory, they become a network of activations which remains available for a few seconds during reading activities. The ensemble of selected information that is activated is available working memory. Using Conway's words (2009, p. 3) working memory is "the ability to simultaneously maintain and process goal-relevant information".

Unlike long-term memory, working memory is a system that has limited capacity (Grabe and Yamashita, 2022). There are, in fact, several aspects of it that are limited: its storage, its connections to long-term memory and its content, and, finally, its capacity to perform several processes at the same time. As previous investigations suggest, we can maintain a specific piece of information active in our working memory only for a couple of seconds, and that amount of time can be prolonged only in case of mental rehearsal or reactivation (Christiansen & Chater, 2016; Cowan, 2010; 2015; Kintsch, Patel, & Ericsson, 1999). When describing working memory, it is important to clarify that, unlike long-term memory, it is not a "box" in our brain where we store information for a certain period of time, but it

is rather a network of activations from long-term memory that is essential to support and integrate lower- and higher-level processes in real time. As proposed by Cowan, working memory can be defined as “the retention of a small amount of information in a readily accessible form to be used in cognitive tasks” (Cowan, 2014, p. 197). Hence, it is not accurate to imagine that information is transferred from long-term memory to working memory. On the contrary, when the relevant pieces of information that we have stored in our long-term memory get activated, they become the network of activation that is referred to as working memory (Anderson, 2015; Cowan, 2015; Engle, Kane, & Tuholski, 1999). In other words, working memory emerges from long-term memory as part of its content when it is recognised as useful to support other on-going cognitive processes. As said before, working memory has the capacity to keep relevant information active only for a couple of seconds. However, the networks that were previously activated do not fade completely and they can get consolidated and stored in long-term memory. In this way, learning is achieved.

Let us now consider the role played by working memory during reading and how it helps readers achieve comprehension from a written text. Since, as we said, working memory is a network of activations, when we read, it allows us to keep certain information consciously ready and available through attention and reflection. Moreover, it facilitates performing lower-level processes in an unconscious and nearly effortless way. Thanks to working memory, readers can make inferences based on the content of the text and manage to connect this new information with their prior knowledge in their long-term memory (Daneman & Hannon, 2007).

Since the 1960s cognitive psychologists have been investigating working memory and exploring its effect on language processing. Currently, researchers refer mainly to two models that aim to describe how working memory is used during language processing. The first model I will refer to was developed by Baddeley and it is known as the “multicomponent model of working memory” (Baddeley, 2007, 2015) whereas the second more recent model is Cowan’s “embedded process model” (Cowan, 2010, 2015).

According to the first proposal of this model, working memory is made up by three fundamental components, which are the central *executive control*, and the auxiliary *phonological loop* and *visuo-spatial sketchpad*. In later works, a fourth subsystem called the *episodic buffer* was also included as support for the executive control system (Baddeley, 2000). Each of these systems is involved during the different stages of reading. The executive control component monitors all those processes that require attentional control and consciousness. For instance, it is essential when we monitor what we are reading or when we are facing problem-solving tasks. Crucially, as can be inferred by the importance of consciousness in these processes, this component has a strong connection also to the higher-level processes involved during reading (Grabe, 2009). Furthermore, the two subsidiary systems of executive control (i.e., phonological loop and visuo-spatial sketchpad) support lower-level processes, that is, the ones that have been automatised and require fewer cognitive resources. In particular, the phonological loop is where both phonological and visual information is stored, and it is employed for decoding written texts. Thus, when words are decoded, they are stored in the phonological loop for a limited time, and they are translated into sounds. Moreover, the information stored in the phonological loop can be retrieved for rehearsal. The processes carried out by the phonological loop allow us to recognise and learn words. In fact, this subsystem of working memory constitutes the base for learning vocabulary (Baddeley, 2006; De Jong, 2006). The functions performed by the sketchpad are similar to those carried out the phonological loop: it stores both visual information and spatial relations, it allows us to rehearse and actively process that information (Grabe, 2009). The sketchpad is also involved during reading activities because it allows readers to coordinate eye movements around the layout of a printed page and follow the text correctly when moving from line to line. Crucially, even if the sketchpad is not directly involved in grapheme-phoneme decoding, the cognitive abilities it entails, such as using and controlling visuo-spatial information, are important for language comprehension (Baddeley, 2003). Finally, in Baddeley's model, the episodic buffer constitutes a link between working memory and long-term memory, and it allows us to store the information obtained during the processes carried out by working memory. The term episodic is due to the fact that

its fundamental function is to link different “episodes”, that is, the pieces of information collected from different processing sources (Baddeley, 2000). In other words, the episodic buffer is the component that connects the activations created in the working memory network with the information we have already learnt and stored in the long-term memory.

Cowan’s proposal, on the other hand, assumes a stronger connection between working memory and long-term memory. In particular, after the few seconds of activation, the nodes of information in working memory do not fade away completely, but they remain more readily retrievable from long-term memory thanks to links that connected to the storage of implicit knowledge. In this model, a central role is played by attentional processes that determine what pieces of information should be activated in long-term memory to make them available in working memory. This model, thus, is in line with reading comprehension frameworks that assume a semi-active use and retrieval of the information stored in long-term memory (Grabe & Yamashita, 2022).

Several studies have focused on unveiling what the relationship is between working memory and reading abilities, especially in contexts concerning reading in an L1. The outcomes of these studies showed that working memory has a strong effect on reading abilities and reading comprehension especially in non-beginner readers and in academic contexts (Cain, 2006; Carpenter, Miyake, & Just, 1994; Daneman & Merilke, 1996; Hannon & Daneman, 2001). Ultimately, working memory capacity correlates with how subjects vary in reading abilities (Baddeley, 2006, 2007; Cain, 2007; Friedman & Miyake, 2004; Perfetti, Landi, & Oakhill, 2005).

Let us now consider the role played by working memory in the development of reading abilities in a second language. Once again, a strong relationship between the two has been detected, and it was found that working memory contributed to the development of L2 learning and reading abilities. However, as pointed out by Linck and colleagues, there are some other issues about the role of working memory in L2 development that should be addressed by future research (Linck, Osthus, Koeth, & Bunting, 2014). In particular, there is a need to explore more thoroughly how L2 processing and learning are supported by the subcomponents of working

memory, and which other factors, such as language proficiency or domain knowledge, should be included as moderators in the relationship between working memory and L2 development. Furthermore, another important aspect that should be developed further is how L2 readers employ working memory during reading comprehension tasks that go beyond the sentence level (Linck et al. 2014). A study conducted by Hambrick and Engle (2002) highlighted that passage comprehension was predicted independently both by prior knowledge and working memory. Moreover, subjects with higher working memory could access prior knowledge and use it more efficiently than those with lower working memory. It is yet to be determined whether the influence of working memory on L2 reading abilities depends on L2 proficiency and L2 processing abilities or if these factors are independent of each other. Joh and Plakans (2017) explored how prior knowledge influenced working memory during L2 reading comprehension task. The results revealed that working memory was a predictor of L2 reading comprehension only when it was supported by sufficient background knowledge. On the other hand, general L2 linguistic knowledge predicted levels of comprehension in those subjects who did not have sufficient background knowledge. The relationship between prior knowledge and working memory detected in this study highlights the importance of building appropriate topic knowledge and vocabulary during classroom activities.

#### *2.5.5 Text-model formation*

As we have discussed so far, reading comprehension is a multi-faced phenomenon that encompasses several skills and processes. For text comprehension to take place, the information contained in the text needs to be extracted and connected to what the readers' previous knowledge. The outcome of these operations will lead to the creation of a coherent representation of the content of the text (Kendeou et al., 2007). Achieving this representation of the text requires skills and processes that go beyond word recognition, syntactic parsing, and meaning encoding. Moreover, even if some of these processes can be automatized, especially the lower-level ones, they also need attention and more cognitive resources (Grabe,



2009). To sum up, readers need to integrate the comprehension of single words, clauses, and sentences contained in the text to reach the final goal of creating word-to-text integration (Stafura & Perfetti, 2017; van den Broek & Kendeau, 2017).

In order to achieve the integration of words into a model of the text, readers have to combine both automatic and strategic processing (Grabe & Yamashita, 2022). During this process, the readers have to connect the pieces of information from several sentences to a network of previous activations that are available thanks to their working memory. As we discussed in the previous paragraph, the role of memory is fundamental also during this stage of comprehension. In fact, memory allows readers to keep words and the propositions they encode readily available: “a word, as it is read, resonates with these memories [background knowledge] and connections are made without an active construction process” (Stafura & Perfetti, 2017, p. 24). Crucially, a text model is not only built from the sum of the notions and meanings of the single sentences forming that text but also involves the use of “bridging” inferences that allow the reader to analyse the text as a whole and re-use what they read before to support and facilitate the interpretation of the new passages they encounter. In other words, comprehension is achieved thanks to the combination of two essential activities: construction and integration (Kintsch, 1988, 1998). The construction-integration model accounts for the processes that are involved during sentence processing from the bottom-up. The recognition of words and their combinations allow readers to activate associative networks in their working memory. Ultimately, these activations help readers integrate what they read with their background knowledge, and they build a coherent representation of the text as a whole. Thus, the interplay of processes involved when we read a text contributes to the construction of expectations about the structures that may be found in the following passages or their content (Kintsch, 2005).

As readers go through a text, they will not only encounter brand new information. Some elements may, in fact, reoccur and, thus, they will already be active in their network. In this case, readers will not create new connections in their associative network, unless they face brand-new information, but the previous activations will be strengthened. Furthermore, the creation of a text-model relies also on other sources, such as background and genre knowledge. These types of

knowledge will support the reader during the development of expectations about the text, such as making hypotheses about how the story they are reading may proceed or trying to predict the conclusions following the author's argumentations. Crucially, they will contribute to the reinforcement of some connections in the network and to the creation of linkages between certain elements contained in the text.

Let us consider the following example to see how textual elements connect to each other and to prior knowledge that is not explicitly presented in the text during the creation of a model of the text.

1. He checked the time and gasped.
2. The boy ran as fast as he could despite the heavy backpack.
3. His face was red, he was panting.
4. The bus left.
5. "Oh no, I'll be late for school!" he said to himself.

When the reader encounters the first sentence, they will start creating a network connecting the words they recognised and organising them according to the syntactic structure of the sentence. The subject is identified only by the use of a 3<sup>rd</sup> person singular, masculine pronoun that will have to be connected to a noun phrase in the following sentence. This sentence presents two clauses: "he checked the time" and "(he) gasped". From this first stage of processing, the reader can begin to build inferences and expectations about what will happen. For instance, since the subject of the second clause in 1 is omitted, the subject must be the same as the one in the first one; furthermore, since the character checked the time and then gasped, the reader might start assuming that that person was late. Proceeding to the second sentence, it is revealed that "he" is a boy. The connection between "he" and "the boy" solves the cataphora and provides more specific information about the character. The fact that the boy started running fast strengthens the assumption that he was late for something. Moreover, the text adds that the boy is carrying a backpack which activates more information from the reader's background knowledge: a boy who carries a backpack is probably going to school. Moving on

to the following sentence, the reader encounters a possessive pronoun that matches in gender and number both “he” and “the boy”. At this point, another bridging inference should be created to solve the anaphora. Moreover, the clauses in 3 expand the activations of the network: as a consequence of running fast while carrying a heavy object, the boy’s face became red, and he was out of breath. These pieces of information will also strengthen the inference for the anaphora resolution and confirm to the reader that the person panting and with a red face is indeed the boy who was running fast in 2. In the fourth sentence, another event is presented: the bus left. Because of this information, the reader can infer that the boy wanted to take that bus and that he was trying to run as fast as he could not to miss it. Sentence 4 is not directly connected with the elements that the reader encountered in the previous parts of the short text, but, once again, their background knowledge can fill the gap: students often take a bus to go to school, and thus, adding the bus to the network of activations corroborates the hypothesis that the boy with the backpack may be going to school. The last sentence presents direct speech: “Oh no, I’ll be late for school”. Given the hints that the protagonist of the previous sentences was going to school, the reader will be able to connect that “I” should also be linked to the boy and that he is the person talking to himself. Finally, the reader’s background knowledge about the fact that punctuality at school is very important and that there may be consequences for being late will contribute to explaining why the boy said “Oh no” when he saw the bus leaving.

The vast majority of the processes described here happen automatically, without a conscious effort from the reader. As outlined in Kintsch (1998) and Grabe (2009), among the processes involved during the formation of a text-model, there are five fundamental operations that have to be performed. At the beginning of the activity, the reader has to create the first links to a network, e.g., the character checks the time and gasps, thus he may be late. Sometimes, new sentences might not bring completely new information and some elements might overlap, completely or partially, with those that triggered the previous activations. In these cases, some nodes of the network will be reinforced rather than cause the creation of brand-new nodes. For instance, in the example above, there is a partial overlap between the elements that suggested the boy was late. In other situations, the text

might present some information that is not essential to achieve general comprehension. When the reader encounters this type of information, they suppress it and keep it at the periphery because it will not be reactivated in the later stages of the reading activity. Throughout the whole text, there are also several inferences that the reader has to make to connect different elements, formulate expectations, and build coherence between the sentences. These inferences can be of different kinds, and they can either create a bridge between pronouns and phrases in different sentences or connect the information presented in the text with the reader's background knowledge. Ultimately, all these operations lead to a general comprehension of the content of the text and to the development of a summary that incorporate the author's core message.

Building a representation of the text means to be able to extract its content and to understand what the author wanted to convey (Grabe & Yamashita, 2022). To achieve this goal, readers need to have automatised several processing abilities and have to rely on coherent networks of activations in their working memory. When readers add new information that extends the network, the concepts that were previously lit up and share some features with the new activations do not disappear, but they passively resonate in the readers' working memory (Cook & O'Brien, 2015; Perfetti & Stafura, 2015; van den Broek et al., 2015). Fluent readers manage to use create implicit passive resonance quickly and efficiently because they automatised the lower-level processes involved during reading and, thus, they are also able to activate information in their background knowledge automatically.

#### *2.5.6 Situation model building*

Reading and text comprehension go beyond the extraction of information from the text. As mentioned in paragraph 2.3, we read for different purposes that often go beyond the mere reconstruction of the message that the author intended to convey. Given this premise, a reader often needs to add something else to create a complete mental model of the text. In line with previous studies, Grabe (2009) defines the mental model of a text as the combination of information contained in the text and the reader's interpretation of this information (Kintsch, 1998; Zwaan

& Radvansky, 1998; Zwaan & Rapp, 2006). Crucially, the way in which mental models are formed directly affects learning outcomes and the new information that is stored in long-term memory. In the previous subsection, we examined how readers build the model of a text and, thus, how they can extract its core message. Let us now focus on the importance of their interpretation and how these can contribute to building a so-called situation model (Kintsch, 2013).

Goldman, Golden, & van den Broek (2007, p. 32) define the situation model as “the integration of prior knowledge with the information explicitly ‘in’ the text”. This definition can be completed adding Schwanenflugel and Knapp’s (2016) observations about what readers bring to the construction of a situation model of the text. In fact, they argue that, during this process, readers do not only connect the content of the text to their background knowledge, but they also include their feelings about the text and their reading goals. The combination of the reader’s prior knowledge and attitudes towards the text correspond to the *mental circumstances* generated in response to the text. Grabe and Yamashita (2022, p.64) identifies eight factors that play a role during situation model building, namely:

- i) reader purpose
- ii) task expectations
- iii) text level of challenge
- iv) genre activation
- v) similar story instances
- vi) general background knowledge resources
- vii) evaluation of the importance of information, its enjoyment value, its interest value
- viii) attitudes (and inferences) toward writer, story, genre, episode
- ix) inferences needed for interpretation (of genre, episode, hierarchical organisation, purpose)

As we have already seen, the readers’ purpose is essential for building the appropriate strategy for reading a text. According to their purpose, in fact, readers can establish how fast or slow they are going to read, and they will employ different

cognitive resources to meet their goal. A factor that can influence how readers establish their purpose is the expectations they have about the task that will follow the reading activity. For instance, a multiple-choice task where the reader will be asked to recall literal information from the text will not require the reader to use too many resources to evaluate what they are reading, whereas if the reader has to express a critical opinion about the text, they will need to access their background knowledge or even compare several texts to form an opinion. Furthermore, knowing the genre of the text and being familiar with it can facilitate the development of expectations about how the story will unfold. If we read a fairy tale narrating the story of a damsel in distress, we will likely assume that, at some point, a brave knight will come and save her. Our assumptions will be based on the fact that fairy tales normally have a happy ending and that characters follow specific stereotypes. Of course, if we did not have any previous experience with the fairy tale genre, it would not have been possible to activate those expectations about the story or the characters. Our previous knowledge about the genre will also provide us with examples to base our representation of the characters on. Carrying out these operations and evaluating the text critically during reading has an influence also on our emotional attitude toward the text and may determine whether we want to finish reading it or not. Furthermore, we will be able to check whether the expectations we developed were met and whether we achieved our reading purpose.

Building the situation model of a text is particularly important when the reader's goal is to evaluate that text. The information extracted during text-model building would still play an important role in establishing what message the author wanted to convey. However, reflecting about our interpretation of that message will also activate other pieces of information and will allow the reader to channel more cognitive resources into the reading task. The level of attention will be higher than during other types of reading, and the reader will expect to find higher levels of coherence (Linderholm et al., 2004; Perfetti, Landi, & Oakhill, 2005). Moreover, to create the situation model of a text, the readers may also have to consult other sources in order to confirm or better understand specific passages of the text or even to compare different perspectives and choose the one that they find more convincing.

Knowing in advance what type of text we are about to read will allow us to prepare for how we can build its situation model of interpretation. In fact, the extent to which texts are meant to be interpreted can vary considerably. As exemplified in Grabe (2009), a manual of instructions is intended to lead to one, unequivocal interpretation, whereas a poem is written with the intention to stimulate the development of different interpretations. From this example, it becomes clear that it is not always possible to create both a text and a situation model during reading comprehension. Some types of text will only allow us to extract information whereas others will let us bring something more and even personal to their interpretation. The fact that not all texts can lead us to the development of situation-models is crucial to understanding why it is important to separate text- and situation-models during the analysis of the processes involved during reading comprehension. Furthermore, assuming the existence of a two-process model, i.e., extracting meaning and constructing meaning, also helps accounting for the way in which readers choose different strategies during reading and which models they build. For instance, when a reader does not have extensive background knowledge on the topic discussed in the text they are reading, they will resort to extracting pieces of information, but they will not manage to elaborate on those extensively and interpret them (Kintsch, 1998; Long, Johns, & Morris, 2006; McNamara & Kintsch, 1996; McNamara et al. 1996).

Creating a situation model requires several advanced cognitive abilities and executive functions, thus, working memory plays a crucial role also during this phase of reading comprehension. As described by Conway (2009, p. 3), readers need to “maintain information in an active and readily accessible state, while concurrently and selectively processing new information”. In other words, they have to evaluate what they have read previously in order to understand what the key concepts are, be aware of how they can connect them with the content of new paragraphs, if the text is coherent, and whether they agree with the author. In the case of L2 reading, it is fundamental to consider the effect of the readers’ L2 knowledge on the development of both types of models. In particular, as argued by Grabe (2009), limited vocabulary knowledge may hinder their ability to build a proper situation model. As Grabe and Yamashita (2022) argue, when L2 readers

with low vocabulary knowledge engage in the development of a situation model, they resort to a “preassembled” model based on their background knowledge. As a consequence, L2 readers may be able to recall the pieces of information they found in the text, but their ability to interpret or evaluate the content may not be sufficient. In conclusion, L2 students may be prone to rely strongly on the interpretations they make while building up the situation model of the text. This tendency often limits the outcomes of their comprehension because they may not possess enough prior knowledge to support them efficiently through the analysis of the text.

Grabe and Yamashita (2022) remark the importance of considering the two levels of text comprehension, i.e., text representation and situation model. When readers encounter texts of different genres or face reading tasks that involve different goals, they need to understand what strategies should be applied to achieve their reading purposes. During this phase of comprehension, it will be crucial for readers to clarify whether they simply need to extract information from the text and summarise the main concepts or whether they are asked to evaluate the author’s point of view (Kintsch, 1998).

#### *2.5.7 Executive control, strategic processes, and inferencing*

As mentioned in the subsection dedicated to working memory, executive control plays an important role for reading comprehension. This component of working memory is tightly linked to attention, as its most important contribution to comprehension is regulating where to focus attention. In particular, executive control enables the reader to shift attention, inhibit information that is no longer relevant for the task and, as a consequence, update which networks should be active in working memory (Friedman & Miyake, 2004; Miyake et al., 2000). Attentional processes are crucial to assign to the appropriate resources and ensure progress in the comprehension of the text. It is because of attentional processes that we manage to choose the reading strategy that will allow us to meet our reading goals. Furthermore, they help us determine when we need to draw information from our background knowledge to test the inferences we make or to monitor how we are evaluating the text.



Before and during reading activities, it is important to have a clear idea of why we are reading a certain text. Once we have defined our reading goals, we have a more precise idea of what information we need to extract from that text and what strategies we will have to employ to meet that goal. However, setting goals is not an automatic or immediate task and requires high levels of attention and consciousness. Previous studies have indicated that determining reading goals influences the way in which comprehension is pursued both during reading in a first and in a second language (Horiba, 2000; Linderholm & van den Broek, 2002; Linderholm et al. 2004; Perfetti, Landi, & Oakhill, 2005). Crucially, it is important that reading goals are set with conscious awareness to ensure that readers are able to control how and where they should direct their attention more efficiently. Ultimately, directing attention efficiently and strategically will lead readers to explicit learning (Grabe & Yamashita, 2022).

Awareness is another important factor, especially when the reader applies specific strategies during reading. Once again, executive control and attentional mechanisms determine our abilities to use or change reading strategies, and to monitor their impact on the reading outcomes. As argued by Nagy (2007), to achieve fluent academic reading abilities, readers should train three different types of metalinguistic awareness. With this term, we refer to the ability to explicitly analyse and reflect about language (Tunmer et al., 1984). Advanced metalinguistic awareness is fundamental to overcome difficulties during reading comprehension because it provides the readers with a set of skills that will guide them during the processing of more complicated texts. First of all, it is important that students are aware of the ways in which they recognise and learn words, e.g. from grapheme-to-phoneme decoding to using specific strategies to reconstruct the meaning of words. Furthermore, readers should develop awareness about syntactic structures and how words and clauses are organised in texts. Finally, the third type of awareness that supports students in the growth of their reading abilities is awareness of discourse organisation. More specifically, it is important that readers are able to recognise the genre of the text they are reading based on the content or the structure of the text itself and that they manage to extract the main ideas contained in it. Analysing and reflecting about these characteristics of the text will help readers determine what

strategy should be applied, based on the level of difficulty of the text and, consequently, they can monitor whether and to what extent they are attending to their reading goals.

Skilled readers tend to automatise certain reading strategies after they have used them successfully several times. For instance, they might read the same sentence or a few sentences twice, if they realise that they did not create a proper text model to analyse them. Since these strategies become part of their reading routine and guide skilled readers through the reading activity successfully, it becomes immediately clear when they do not work and need to be altered. Moreover, especially in academic contexts, reading comprehension processes and strategies are not only developed spontaneously, but they are also the result of explicit instructions, thus, they can be directly targeted and trained during classroom activities (Grabe, 2009). As mentioned above, a crucial task carried out by skilled readers, thanks to their attentional mechanisms, is monitoring whether their reading strategies are working efficiently or not, or whether they are making the correct inferences to connect elements of the text to their prior knowledge. Metacognitive awareness allows us to realise when a reading strategy should be changed and that our attention and cognitive resources should be channelled in a different way. Skilled readers have developed more sophisticated metacognitive skills that support them in controlling their actions during reading (Baker et al., 2015; Bialystok, 2001).

Another crucial aspect of comprehension is constituted by the ability to make inferences. Inferencing is not specific to reading comprehension, but we perform it continuously also during listening comprehension and, moreover, it is a skill that helps us decipher human behaviour and actions. In other words, without the ability to make inferences, we would not be able to interpret effectively what people say or do (Mason & Just, 2006; Tomasello, 2003). We can define inferences as “the act of deriving logical conclusions from premises known or assumed to be true” (O’Brien, Cook, & Lorch, 2015). There have been several attempts to organise all kinds of inferences that we make during comprehension. The most important distinction is between inferences that happen at the local level and at the global level of the text. The first type of inference includes those processes that help us

reconstructing cohesion in the text and create a bridge between words that share a common referent. These inferences are also called bridging inferences (Cook & O'Brien, 2015) and, following the categorisation proposed by van den Broek, Beker, and Oudega (2015), they are “backward causal inferences” because they connect certain elements of the texts with an antecedent that is currently active in the reader’s working memory or that belongs to a previous network of activation. Global inferences, on the other hand, correspond to elaborative and evaluative inferences, during which readers have to reflect about causes and consequences of what is described in the text, or about the author’s intent. Furthermore, van den Broek et al. (2015) also add “forward causal inferences” to their taxonomy. This category contains predictive inferences, hence predictions that readers create based on information that they gathered in the previous paragraphs of the text and their background knowledge. Fluent readers manage to perform most of the inferences automatically, without actively focusing cognitive resources to this task (Cook & O'Brien, 2015; Stafura & Perfetti, 2017; van den Broek et al. 2015). However, some inferences are very similar to reading strategies. This is especially true when academic texts are taken into consideration or when we are facing more complicated texts. In these cases, we may be required to carry out tasks that involve problem-solving skills or advanced evaluative abilities, and we need extensive background knowledge to support these processes (Elleman, 2017; Goldman et al., 2016; van den Broek et al., 2015).

## **2.6 *Models of reading***

In the section about the component skills approach, two types of models were introduced, namely the text- and the situation model of reading, and we also considered how these models are built. It is important to explain the difference between these models and the models of reading that will be presented in this section. Text- and situation models are discourse comprehension models, that is, they describe how readers construct text comprehension through specific processes that allow them to connect certain elements contained in sentences, or to evaluate texts according to their coherence and content (Grabe, 2009). On the other hand,

models of reading are theoretical frameworks that aim to explain how all the processes involved in reading are put together. In other words, a model of reading is a psychological representation of how reading operates and combines all the skills required to achieve reading comprehension (Goldman, Golden, & van den Broek, 2007; Sadoski & Paivio, 2007).

There are several reading models that have been proposed in the last thirty years that help explain the outcomes of empirical investigations examining reading abilities. In the following section I will briefly describe three of the models that are more frequently referred to in the experimental studies investigating reading comprehension, i.e. Construction-Integration Model, Simple View on Reading, and Landscape View of Reading. Subsequently, I will move on to the discussion of the Reading Systems Framework proposed by Perfetti and Stafura (2014), which seems to be better suited to account the outcomes of the current study.

One of the first frameworks proposed to explain how reading comprehension happens is the Construction-Integration Model, which was initially proposed by Kintsch (1988). This model is based on the idea that comprehension is achieved in two steps. First of all, the readers connect several pieces of information that are extracted from the text and that create new activations in the network, i.e., the construction phase. Afterwards, they filter that information in order to exclude what is not essential, i.e., integration and compression phase. As seen before, human cognitive capacities are limited and, thus, they allow us to retain only the most important pieces of information. In other words, since the construction of the meaning of the text starts by creating links between the smaller elements of the sentences, readers use bottom-up processes to reach text- and situation models. At this point, lower-level processes extract a lot of information from the text and some of it will become irrelevant or redundant. Hence, during the second stage of the Construction-Integration Model, only part of the previous activations will be integrated with the readers' background knowledge to create the final, coherent representation of the text. As argued by Kintsch in later works (Kintsch, 1998; Kintsch & Rawson, 2005), this model describes how we read in order to learn because after creating integrated models of the texts, we store the information they contain in our long-term memory and keep it available for retrieval. The

Construction-Integration model was the first one to focus on how comprehension is achieved during reading. However, more recent studies contributed to the definition of more precise frameworks that analyse the array of skills that lead to comprehension in more detail.

The reading model proposed by van den Broek (Goldman, Golden, & van den Broek, 2007; Linderholm et al., 2004; van den Broek et al., 1996) combines elements of the Construction-Integration Model and the Structure Building Framework (Gernsbacher, 1990; 1997) to explain comprehension into the Landscape Model of Reading. This model focuses more on the outcomes of comprehension rather than on the processes that lead to it. According to this framework, when readers build a representation of the text, they are trying to reconstruct a coherent interpretation of its content. In order to do so, they need to control what elements get activated in the networks of their working memory and establish which concepts are relevant and which ones should be suppressed. Crucially, fluent readers manage to carry out this selection passively, hence automatically. The concepts that get activated more intensely in the working memory correspond to the main ideas contained in the text and they guide the readers in achieving comprehension. As described by Grabe and Yamashita (2022, p. 136) readers are “navigating a ‘text’s landscape to arrive at a coherent situation model””. Nevertheless, the evidence supporting this view is based on comprehension tasks that did not include complicated texts; thus, it should be investigated further whether this hypothesis also holds for texts that include more complex syntactic structures and vocabulary.

One of the models of reading that is frequently referred to in literature is the Simple View of Reading. This model presents reading as the product of only two components. This view was originally proposed by Gough and Tunmer (1986) who described reading as the interaction of decoding and general comprehension skills. The formula describing this model is the following:  $R = D \times C$ , where R stands for Reading, D corresponds to Decoding skills, and C is general Comprehension. The scholars who developed and use this framework recognise that there are several other factors and processes which constitute reading abilities, but they propose that the investigation of reading comprehension can be reduced only to these two

fundamental variables (Foorman et al., 2015, 2018; Kim, 2017; 2020). The use of standard measures to assess decoding and comprehension abilities is important, and it is the base for calculating what the students' reading abilities are. In fact, the product of those scores will give a third score that is expected to highly correlate with the score obtained during reading comprehension tasks. Assuming that this model describes reading accurately, one important implication is that L1 readers would achieve good performances at reading comprehension tasks from early stages because they have already developed comprehension skills and would only have to acquire decoding skills (Bowey, 2005; Joshi, Williams, & Wood, 1998). However, the relationship between decoding and listening comprehension skills is not enough to describe reading comprehension abilities. The concept of oral comprehension abilities is a quite undefined construct that includes several abilities and pieces of knowledge that should be considered and measured separately. Hence, the calculation of reading comprehension abilities risks being oversimplified when the Simple View on Reading is followed. This is particularly true when we investigate reading comprehension in a second language. In fact, many factors, which are proved to have a significant impact on L2 reading comprehension, are excluded. Among these skills components, we can list linguistic factors such as background syntactic knowledge and vocabulary knowledge, and non-linguistic factors like executive control functions and general cognitive abilities (Grabe & Yamashita, 2022).

## ***2.7 Reading Systems Framework***

The reading model I decided to adopt is the Reading Systems Framework (Perfetti & Stafura, 2014), which is the result of the evolution of the Lexical Quality Hypothesis Perfetti (1992, 1999, 2007; Perfetti & Hart, 2001) and its combination with word-to-text integration processes. Several theories regarding reading comprehension focus more on the global processes of the reconstruction of text coherence and meaning. Unlike those models, the Reading Systems Framework account also for the importance of the lower-level processes that happen at the word-level.

This theory of reading comprehension is based on three fundamental claims. The first one regards the sources of knowledge that are used during reading. More specifically, Perfetti and Stafura (2014) recognise the importance of linguistic, orthographic, and general knowledge during reading. Furthermore, these types of knowledge are used both in constrained and in interactive ways during the processes of reading, i.e., lower- and higher-level processes (see section 2.5). With the term “constrained ways”, they refer to the contribution of linguistic and orthographic knowledge during lower-level processes, whereas “interactive ways” indicates the use of general knowledge and inferences to extract meaning from sentences. Finally, the third claim made by the Reading Systems Framework is that all the aforementioned processes happen thanks to the reader’s cognitive system that connects long-term and working memory. The automatization of reading processes and the development of the proper types of knowledge is fundamental to achieving adequate reading comprehension skills. As a consequence, reading difficulties may arise when the processes that should be automatised are slower or when some aspects of the readers’ knowledge are weak.

As mentioned before, the Reading Systems Framework is based on the Lexical Quality Hypothesis. Originally, this hypothesis was formulated by Perfetti and Hart (2002; 2002). They proposed that lexical access is achieved when readers combine phonological, orthographic, and semantic information. Crucially, as argued by Perfetti (2017) to achieve comprehension, good decoding skills are not sufficient, and it is fundamental that children are guided through the strengthening of the representation of both the form and meaning of words. In fact, lexical units are the basis onto which text comprehension is built. The second phase that leads to comprehension consists of creating syntactic associations between words. Consequently, this leads to the so-called word-to-text integration, during which readers combine also higher-level processes, such as inferencing and comprehension monitoring, and build a coherent situation model of the text.

The Reading Systems Framework is an approach to comprehension that takes into consideration all the processes involved during reading, from grapheme-to-phoneme decoding and syntactic parsing to text representation and situation model building. Moreover, with this framework, Perfetti and Stafura highlight the

importance of word knowledge and how an accurate representation of the form and the meaning of words can positively influence the text comprehension process. Finally, a theoretical approach that focuses on the interaction of both lower- and higher-level processes and that takes into account the readers' cognitive functions allows researchers to analyse in deeper detail the components of reading and, thus, identify and intervene with more precision where comprehension difficulties arise.

### **Summary of the chapter**

The concept of reading is very complex and difficult to define with a simple statement. In this chapter, we considered how literacy evolved in history and how migrations led to the necessity of developing good reading skills also in a second language. We discussed how reading cannot be separated from the concept of comprehension and the importance of aligning the reading strategies that should be adopted and the available time to the goal of the task.

Furthermore, we introduced the Component Skills Approach (Grabe, 1991; Grabe, 2009; Grabe & Yamashita, 2022) to define the set of skills required during reading. This approach distinguishes between lower- (i.e., word recognition skills, syntactic parsing, and meaning encoding) and higher-level processes (i.e., text-model formation, situation model building, inferencing, executive control processes, and strategic processing). Moreover, to orchestrate these skills, working memory plays a fundamental role during reading tasks.

The last part of the chapter is dedicated to the theoretical frameworks that were developed to explain how reading comprehension is achieved. In this section, we presented four “models of reading”: the Construction-Integration model, the Simple View on Reading, the Landscape View of Reading, and the Reading Systems Framework. We chose to adopt this last model because it focuses also on the importance of lower-level processes and it claims that it is fundamental to support the children's strengthening of the representation of both form and meaning of words. Finally, according to the Reading Systems Framework, advanced lexical knowledge should also be combined with word-to-text integration to achieve reading comprehension.





### **3. READING COMPREHENSION IN A SECOND LANGUAGE**

This chapter is dedicated to understanding what factors play a role during reading comprehension in a second language. First of all, I will summarise three studies that investigated the predictors of reading comprehension in a second language. Two of these studies are meta-analyses (Jeon & Yamashita, 2014; Melby-Lervåg & Lervåg, 2014) whereas the third explores the differences in comprehension achievements between early and late bilinguals (Kovelman et al. 2008).

In the second section of this chapter, I will discuss three other contributions analysing L2 reading comprehension in languages that display a transparent orthography (L2 Dutch: Verhoeven & van Leeuw, 2012; L2 Italian: Bonifacci & Tobia, 2015; Bellocchi, Tobia, & Bonifacci, 2017). All these studies also aim to verify whether the theoretical framework known as the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) also holds for L2 comprehension in languages with transparent orthography.

However, as discussed in the previous chapter, more precisely in the section about the models of reading, the theoretical framework assumed for this study is the Reading Systems Framework (Perfetti & Stafura, 2014) because it offers a more fine-grained analysis of the components that contribute to reading comprehension. Thus, in the last part of this chapter, I will refer to the importance of considering such model of reading in order to plan more effective teaching activities and interventions and thus improve reading comprehension in the different populations that we find in Italian schools. In favour of this argument, I will present another study (Wolf, Muijselaar, Boonstra, Bree, 2019) that analyses the components of reading and listening comprehension to understand which of these components are specific to the written or auditory domain and which ones belong to general language comprehension skills. This contribution highlights the importance of distinguishing the different components of comprehension to avoid confusing certain domain-specific aspects of comprehension with domain-general components of comprehension.

### **3.1 Predictors of L2 reading comprehension abilities**

Reading in a second language requires the use of higher cognitive efforts to overcome the obstacles that limited proficiency in L2 may cause. In order to develop efficient reading instructions for L2 readers, it is fundamental to understand what are the most important factors influencing L2 reading. Thus, in this section, I will present three studies that investigate the abilities that contribute to the development of reading comprehension abilities in a second language.

#### *3.1.1 Jeon & Yamashita (2014), "L2 reading comprehension and its correlates. A meta-analysis"*

A meta-analysis conducted by Jeon and Yamashita (2014) investigated ten correlates of L2 reading with the aim of identifying which are the most reliable predictors for L2 reading comprehension. The meta-analysis included the data of 59 studies from 1979 to 2011 that explored the correlates of L2 reading. The first step towards the identification of the correlates to analyse was to understand which predictors were the most frequently studied by previous studies. The result of this first analysis revealed that L2 decoding, L2 vocabulary knowledge, L2 grammar knowledge, and L1 reading comprehension were the most commonly analysed correlates in literature and, for this reason, Jeon and Yamashita referred to them as high-evidence correlates. Furthermore, this meta-analysis included six other correlates that were referred to as low-evidence because they were less frequently the object of research studies. The predictors included in this latter category were L2 phonological awareness, L2 orthographic awareness, L2 morphological awareness, L2 listening comprehension, working memory, and metacognition. Furthermore, Jeon and Yamashita investigated the effects of potential moderators such as age, i.e., distinguishing between child and adolescent/adult participants, script distance, i.e., whether the two languages used an alphabetic or non-alphabetic writing system, language distance, i.e., Indo-European versus non-Indo-European languages, and the proficiency level of the participants, i.e., basic versus beyond basic proficiency. The aim of their study was to understand whether reading

comprehension in a second language is better explained by advanced L2 linguistic knowledge or by more sophisticated cognitive and metacognitive processes.

**CORRELATES INCLUDED BY JEON & YAMASHITA (2014)**

HIGH-EVIDENCE CORRELATES	LOW-EVIDENCE CORRELATES	MODERATORS
a) L2 decoding	a) L2 phonological awareness	a) Age
b) L2 vocabulary knowledge	b) L2 orthographic knowledge	b) L1-L2 script distance
c) L2 grammar knowledge	c) L2 morphological knowledge	c) L1-L2 distance
d) L1 reading comprehension	d) L2 listening comprehension	d) L2 proficiency
	e) Working memory	e) Measurement characteristics
	f) Metacognition	

The meta-analysis highlighted that the strongest predictors of L2 reading comprehension corresponded to the high-evidence correlates, that is: (i) L2 decoding; (ii) L2 vocabulary knowledge; (iii) L2 grammar knowledge, and (iv) L1 reading comprehension. Furthermore, the effect of the four moderators on the correlation between high-evidence and L2 reading comprehension was explored. The outcomes of this analysis revealed that age and L1-L2 script distance did not have an effect on the correlation between L2 decoding and L2 reading comprehension. As far as the four moderators are considered, the age of the participants and the distance between L1 and L2 script had an effect in the correlation between L2 vocabulary knowledge and L2 reading comprehension. However, these two moderators did not have any effect in the correlation between L2 decoding and L2 reading comprehension. During this analysis, Jeon and Yamashita included also type of measurement among the moderators that could affect the relationship between predictors and reading comprehension. More specifically, with types of measurement they referred to the characteristics of the tasks used to evaluate the high-evidence correlates. Measurement characteristics for the investigation of L2 vocabulary included two distinctions: production vs selection (comprehension) tasks, and embedded items vs discrete items. The first

distinction referred to the methods in which L2 vocabulary knowledge was investigated, hence, whether participants took part in a receptive or productive vocabulary tasks. Moreover, the second distinction referred to how the items were presented and, thus, whether L2 items were part of a text or sentence, or if they were completely context free. As L2 grammar knowledge is concerned, Jeon and Yamashita (2014) considered completion tasks and grammar judgement tasks. The outcomes regarding the moderating effect of measurement characteristics on the correlation between L2 reading comprehension and L2 vocabulary knowledge showed a significant effect of age and type of task. More specifically, when investigating L2 vocabulary knowledge, embedded items showed a moderating effect. This datum is not surprising since these items were inserted in texts and, thus, their comprehension was dependent to the comprehension of the passage. Crucially, this result highlights how much a certain measure can impact the assessments of vocabulary knowledge and that the participants to the studies that included embedded items to measure L2 vocabulary knowledge tended to use the contextual information to infer the meaning of the words they did not know. Thus, it is important to consider that tasks with discrete items are a more reliable tool to explore context-free L2 vocabulary knowledge. Moreover, the analysis of the effect of age as moderator was statistically significant. However, as Jeon and Yamashita point out, such effect may be due to the type of measures adopted to test vocabulary knowledge. In fact, all the studies that included children participants used oral vocabulary tasks, whereas those that targeted adult participants made use of written measures. The moderating effect of measurement characteristics on the correlation between L2 grammar knowledge and L2 reading comprehension approached significance.

Furthermore, Jeon and Yamashita investigated whether L1-L2 distance and type of measurement had a moderating effect on the correlation between L2 reading comprehension and L2 grammar knowledge. Language distance was defined by considering the cognates shared among the languages. The results did not highlight a moderating effect of language distance in the correlation between L2 vocabulary knowledge and L2 reading comprehension. Thus, the participants who spoke two languages that shared several cognates did not display benefits during L2 reading

comprehension tasks with respect to those who spoke languages considered as distant. This outcome may seem counterintuitive, but it may be due to the fact that vocabulary tasks cannot capture cognates effect extensively. Lastly, the scholars investigated the moderator effects of L1-L2 language distance and proficiency on the correlation between L2 reading comprehension and L1 reading comprehension. The outcome of this analysis revealed a significant effect of language difference, thus if the two languages belong to the same group (i.e., Indo-European or non-Indo-European) L2 reading comprehension is facilitated.

In the meta-analysis conducted by Jeon and Yamashita (2014), working memory was not among the high-evidence correlates of reading comprehension. This result may be surprising since, as we have seen in the previous chapter, working memory and executive control functions are fundamental to control and integrate all the processes involved during reading. However, as reported in Grabe and Yamashita (2022), the studies conducted to explore reading comprehension that included also measures of working memory did not give univocal results. In fact, some investigations found a correlation between working memory and reading comprehension (Arrington et al., 2014; Follmer, 2018; Shin, 2020) whereas others did not find any correlation or only a minimal one (Currie & Cain, 2015; Peng et al., 2018).

### *3.1.2 Melby-Lervåg & Lervåg (2014), “Reading comprehension and its underlying components in second-language learners: a meta-analysis of studies comparing first- and second-language learners”*

To conduct this meta-analysis, Melby-Lervåg and Lervåg included 86 studies that compared L1 and L2 reading comprehension to understand what the strengths and the weaknesses of L2 learners during comprehension tasks are, and to identify what factors contribute to achieving good comprehension skills in the two populations. The scholars based their investigation on the assumption that reading comprehension is obtained thanks to phonological awareness, decoding abilities, and general language comprehension skills. This last component is the result of the combination of vocabulary knowledge and syntactic parsing abilities and it instantiate in the ability to extract meaning from words and sentences. Thus,

the foundation of this meta-analysis is laid on the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) with the addition of phonological awareness as a further factor that could explain reading comprehension skills.

As we have seen in the discussion of the component skills of reading, in order to explain reading comprehension it is important to distinguish between lower- and higher-level processes. Moreover, it is crucial to understand whether readers manage to automatise the former processes because when these require little effort, more cognitive resources will be available to create an appropriate representation of the content of the text they are reading (Grabe & Yamashita, 2022; Lervåg & Aukrust, 2010). Both phonological awareness and decoding abilities belong to the lower-level processes that students need to master early on during learning to read.

Melby-Lervåg and Lervåg (2014) considered three theoretical accounts to establish what moderators should have been included in their meta-analysis. In particular, they considered the influence of the learners' socio-economic background, the distance between L1 and L2, and L1 proficiency. As SES is considered, they referred to Cummins (1979) and to the hypothesis that children who come from higher SES backgrounds are more likely to have the opportunity to practice language that is context-independent more often, also when they are at home. This claim has been often corroborated by evidence showing that learners with lower SES background are indeed less exposed to experiences that would contribute to the development of their L2 language skills (Hoff, 2006; Mol & Bus, 2011). Distance between L1 and L2 was the second theoretical claim that considered. Melby-Lervåg and Lervåg referred in particular to how L2 phonology, syntax, and semantics could be influenced by the learners' phonological, syntactic, and semantic knowledge in their L1. It is assumed that if L1 and L2 are not distant, L1 knowledge in these fields could facilitate the development of fluent reading comprehension skills in L2 (Connor, 1996; Odlin, 1989). As reported by another meta-analysis conducted by Melby-Lervåg and Lervåg (2011), in fact, L2 learners can benefit from cross-linguistic transfer when it comes to phonological awareness and decoding skills. On the other hand, the transfer recorded in language comprehension skills is smaller.

Finally, the third claim is based on Porter's (1990) hypothesis that if learners dedicate too much time learning their L1, they will deprive themselves of exposure to the L2. According to Porter, this would have a negative impact on the development of their L2 literacy.

Melby-Lervåg and Lervåg (2014) included in this analysis also they type of test used to investigate reading comprehension skills. As shown also by the meta-analysis conducted by Lesaux, Koda, Siegel, and Shanahan (2006), in fact, L2ers' performances in reading comprehension could be explained either by "contextual" or "individual" differences. Contextual differences refer to factors that learners cannot control, such as their socio-economic status or the type of test they are administered, whereas individual differences include types of knowledge that they can work on and develop, such as vocabulary or background knowledge. The influence of the type of test used to investigate reading comprehension should not underestimated. As argued by Keenan, Betjeman, and Olson (2008), different kinds of questions require different skills. For instance, answering to cloze tests, in which students are asked to fill in blank spaces with the appropriate word, decoding skills are particularly important, whereas answering to open-ended questions will entail the use of language comprehension skills. Furthermore, the length of the comprehension passage is also a crucial aspect that should be considered during testing because students do not need sophisticated skills in building the situation model of the text when they face shorter texts or isolated sentences.

Based on these claims and results, Melby-Lervåg and Lervåg (2014) included eleven moderators in their meta-analysis, namely (i) age of the participants; (ii) socio-economic status; (iii) non-verbal intelligence; (iv) whether the language spoken at home was spoken only by one parent or both; (v) the language of instruction, thus whether instruction happened exclusively in L2 or also in L1; (vi) the difference between L1 and L2, with particular reference to the language family and whether both languages were Indo-European or L1 was non-Indo-European; (vii) L1-L2 script systems, i.e., alphabetic or not; (viii) the consistency of L1 orthography, thus whether it displayed a transparent or non-transparent orthography; (ix) the type of tests used to assess the participants' abilities; (x) the location where the studies were conducted; and (xi) a measure of



the methodological quality of the studies included in the meta-analysis. They organised their analysis into three main questions investigating what the group differences between L1 and L2 learners that are recorded in these studies and how, and what the influence of the selected moderators is on the development of language comprehension, and phonological awareness and decoding abilities. The outcomes confirmed that L2 learners tend to achieve lower scores in reading comprehension tasks than their L1 peers. In line with the authors' expectations based on the Simple View of Reading, both decoding and language comprehension skills were fundamental factors determining reading comprehension scores. In particular, language comprehension skills became increasingly important in older participants. These results suggest that older readers have automatised decoding skills and rely more on higher-level processes, vocabulary, and background knowledge to create the model of the text they are reading and achieving comprehension. This result is in line with the findings obtained by Vauras, Kinnunen, & Kuusela (1994). Their analysis of text processing skills, in fact, showed how younger readers rely on a linear processing of the text and it is only later, when they become more fluent readers, that they manage to use higher-level processes more efficiently. Another factor that moderated the differences between L1 and L2 learners reading comprehension skills was the type of test used. In fact, L2 learners displayed more difficulties than their L1 peers when they had to answer to open-ended questions or when these questions referred to longer passages rather than isolated sentences. Furthermore, the comparison of L1 and L2 learners' decoding skills revealed that L2 learners performed slightly worse than their native peers and that there was no difference between group when phonological awareness was considered. The authors highlighted also that the groups differed considerably in language comprehension skills. When considering socio-economic status as a moderating factor in the analysis of language comprehension skills, Melby-Lervåg and Lervåg found that a lower SES had a negative effect on the development of language comprehension skills. Socio-economic status, in fact, is often a proxy for access to decontextualised language and activities that can enhance learners' language comprehension skills (Cummins, 1979; Uccelli et al., 2015). Interestingly, however, SES did not have a moderating effect in reading comprehension skills. Finally, no

moderating effect was found for instructional language and language type in the development of L1 and L2 learners' language comprehension skills.

To sum up, the results of this meta-analysis showed that L2 learners tend to obtain lower scores both decoding and language comprehension skills and this affect their reading comprehension achievements. Moreover, L2 learners encounter more difficulties when they face open-ended questions or have to build comprehension of longer passages. The moderating effect found for socio-economic status suggest that the gap registered in these tasks is amplified when L2 learners do not get enough access to opportunities in which they can practice registers of language that are not context-bound.

### *3.1.3 Kovelman, Baker, & Petitto (2008), "Age of first bilingual language exposure as a new window into bilingual reading development"*

Another factor that has an influence on L2 reading abilities is age of first exposure. A study developed by Kovelman, Baker, and Petitto (2008) investigated the effect of age of first bilingual language exposure on bilingual reading development and they focused both on decoding abilities and on text comprehension skills. This investigation was conducted on students who were between 7 and 9 years old and spoke English and Spanish. The participants were divided into four groups of bilinguals and one control group of monolingual English speakers. Bilingual speakers were grouped according to their age of first exposure to Spanish as follows: (i) Spanish-English speaking children with an early age of first of exposure (between 0 and 3 years of age), (ii) children who spoke Spanish at home and were exposed to English when they were 3 or 4 years old, (iii) children who spoke Spanish at home and had a late exposure to English (between 5 and 6 years of age), and (iv) English speaking children who attended bilingual school and were exposed to Spanish.

Participants were administered phonological awareness (initial phoneme deletion, final phoneme deletion, and phoneme segmentation) and reading tasks (regular words, irregular words, pseudo words reading and passage comprehension) in both their languages. Moreover, their language competence in English and Spanish was tested with the LCEP task (Language Competence Expressive

Proficiency). The outcomes of the evaluation showed that the age of first exposure had a significant impact on the reading performances in both languages. More specifically, children who had an earlier bilingual exposure performed better than those who were exposed to the L2 later. However, the outcomes of the phonological awareness tasks showed that age of first exposure had a significant effect only on English tasks. The comparison between the different bilingual groups highlighted that bilingual children who were exposed to both languages from between 0 and 3 years of age performed significantly better than their peers who were first exposed to the language at a later age. Their performance in English, in fact, was equal to that of the monolingual peers in reading tasks. The same pattern of results has been found also for passage comprehension: bilingual children with early age of exposure performed significantly better than the other bilingual groups (Kovelman et al., 2008). Nevertheless, in this task their performance was not as good as that of their monolingual peers. To sum up, bilingual children obtained lower scores than monolinguals in reading comprehension, with early bilinguals performing better than late bilinguals. Moreover, Kovelman et al. (2008) wanted to test to what extent the family socio-economic status (SES) could affect the maturational factors, that is, the children's biological readiness for reading. Once again, early bilinguals coming from low socio-economic status families performed better than late bilinguals who also had a low socioeconomic status, suggesting that early exposure to the second language can mitigate the negative impact of low SES on reading. This finding corroborates the hypothesis that early language exposure is an important predictor in reading success in that language. Finally, Kovelman et al. (2008) found a strong relationship between the cumulative scores of bilingualism (LCEP) and reading performances. For this reason, they proposed to consider language competence in general rather than just vocabulary knowledge as predictor for reading.

### **3.2 *Transparent orthography***

A great number of the investigations that explore reading comprehension and its constituents assume the Simple View of Reading as theoretical framework.

Thus, as described in chapter 2 about reading, scholars focused on the roles of decoding abilities and listening comprehension skills in the development of reading comprehension. Several attempts were directed to verify whether the formula proposed by Gough & Tunmer (1986), i.e., reading comprehension is the product of decoding and listening comprehension skills, could be applied also to comprehension in a second language. As it emerged from the meta-analysis carried out by Melby-Lervåg and Lervåg (2014), both factors are indeed fundamental to achieve reading comprehension and, more specifically, the importance of listening comprehension abilities increases with age, as readers become more expert at decoding. However, the studies presented in the previous section, focus on context in which L2 reading comprehension in English was investigated. English is a language that display a non-transparent orthography and it is pivotal to explore also reading comprehension in languages with transparent orthography. In fact, in this case, the importance of the role played by decoding could be different since the grapheme-to-phoneme mapping is more straightforward. Moreover, as Share stresses (2008), theoretical models and educational practices developed from findings on English should not be translated into universal claims, since, as he defines it, English displays an “outlier” orthography.

### *3.2.1 Verhoeven & van Leeuwe (2012), “The simple view of second language reading throughout the primary grades”*

This study conducted by Verhoeven and van Leeuwe aimed to explore whether the Simple View of Reading could also be applied to L2 learners of languages with transparent orthography. In particular, the authors focused on Dutch as a second language and they included a total of 1687 primary school children from grade 1 to 6.

As mentioned before, the outcomes of the meta-analysis conducted by Melby-Lervåg and Lervåg (2014) suggest that the Simple View of Reading holds for both L1 and L2 learners.

Since the automatization of decoding skills allows readers to keep more cognitive resources free for higher-level processes (National Reading Panel, 2000; Perfetti, 1998), it is fundamental to monitor the development of these skills in both L1 and

L2 learners to make sure that the difficulties in reading comprehension do not originate at the decoding level. Previous investigations showed that L1 and L2 learners tend to develop phonological and orthographic skills in a similar way (Verhoeven, 2010; Siegel, 2003). Thus, this result would suggest that L2 readers encounter more difficulties when it comes to develop higher oral language proficiency and language comprehension skills (Geneese, Lindholm-Leary, Saunders, & Christian, 2006). In fact, the most marked differences in language competence between L1 and L2 learners have been recorded in vocabulary knowledge. As argued by Vermeer (2001), L2 learners do not only have smaller vocabulary, but, as a consequence, their associative semantic networks of words are also smaller and less efficient. On this basis, Verhoeven (2000) concluded that smaller vocabulary in L2 can hinder the development of good reading comprehension skills.

Given these premises, Verhoeven and van Leeuwe (2012) examined what is the contribution of word decoding and language comprehension skills in determining reading comprehension scores throughout all grades of primary school. The research questions of this study were three. First of all, the authors wanted to verify L2 learners' skills in decoding, listening comprehension, and reading comprehension skills. They hypothesised that L2 learners would lag behind in the two latter domains, but the differences in decoding would not be as marked. Moreover, Verhoeven and van Leeuwe were seeking to find further evidence that the Simple View of Reading would apply to both L1 and L2 learners. Finally, the last research question aimed to verify how the importance of decoding and listening comprehension skills in determining reading comprehension skills varied throughout primary school grades. The authors hypothesised that the reading comprehension scores of the students attending upper grades would be better explained by the students' listening comprehension skills rather than by their decoding skills.

As mentioned above, the participants were primary school students attending grades from 1<sup>st</sup> to 6<sup>th</sup>. Among them, 1293 students were L1 Dutch learners and the remaining 394 were learning Dutch as L2. Two thirds of group of bilingual speakers was constituted by children with Moroccan or Turkish heritage. The

remaining one third included participants whose families came from former Dutch colonies. The participants mostly came from families with lower socio-economic background. During 1<sup>st</sup>, 3<sup>rd</sup>, and 5<sup>th</sup> grade, the experimenters tested the students' decoding and listening comprehension skills. Reading comprehension was assessed during 2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup> grade. The task for the assessment of decoding abilities consisted of three lists of words that children were asked to read as quickly and precisely as they could. This task was administered individually out of the classroom whereas listening and reading comprehension abilities were assessed to the whole classroom together. During the listening comprehension task, the experimenter played some audiotaped short stories in the classroom and then read the comprehension questions to the students. The participants answered on a booklet they were given and could not check the written version of the text at any moment. Finally, the reading comprehension task consisted in two standardised tests that were followed by five questions each. The first and easier reading comprehension task was administered to 2<sup>nd</sup> graders whereas the second and more complex test was used for 4<sup>th</sup> and 6<sup>th</sup> graders.

The outcomes of this study were interpreted as evidence in support of the Simple View of Reading also in L2 reading. All students improved their skills in all the three domains investigated, i.e., decoding skills, listening and reading comprehension. When the two groups are compared, it should be highlighted that the differences recorded in decoding skills tend to disappear when students reach upper grades. L2 learners' skills in listening and reading comprehension also improve while they progress in primary school, but their scores remained significantly lower with respect to the ones achieved by their native peers. Finally, even if listening comprehension was a fundamental source to determine reading comprehension in both groups, it appeared that the relationship between these two domains is much stronger for L1 learners, whereas for L2 learners' oral language proficiency seemed to be more important, as it was found also in a previous investigation conducted by Droop and Verhoeven (2003).

### 3.2.2 Bonifacci & Tobia (2017), “The simple view of reading in bilingual language minority children acquiring a highly transparent second language”

Reading comprehension in L2 Italian is a topic that has not been thoroughly explored yet and the studies investigating it are few. An important step in the development of this field was achieved with a study conducted by Bonifacci and Tobia (2017) that included bilingual language minority children. The aim of the authors was to verify what the roles of reading speed, reading accuracy, and listening comprehension were in determining reading comprehension scores in a language with highly transparent orthography. In a previous study conducted by Tobia and Bonifacci (2015) on Italian primary school students from 1<sup>st</sup> to 5<sup>th</sup> grade, the authors found that in a language as Italian with transparent orthography, oral comprehension skills were the main predictor of reading comprehension skills. As it can be inferred by the hypothesized predictors, i.e., reading speed and accuracy, and listening comprehension, the reading model that Bonifacci and Tobia assumed was the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990).

The participants to this study were 260 minority language bilingual students of Italian who attended primary school. They were divided into two groups according to the grade they were in. The first group included 95 students from 1<sup>st</sup> and 2<sup>nd</sup> grade, whereas the second one was made of 165 students from 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade. This distinction allowed the researchers to explore the development of reading abilities both in children who are learning to read and in those who are starting to use reading as a means to learn. During this study, the ALCE battery (*Assessment Lettura e Comprensione in età evolutiva* – Assessment of Reading and Comprehension skills in Developmental Age, Bonifacci, Tobia, Lami, & Snowling, 2014) of tests was used for the assessment of all the reading abilities. This battery included five tasks:

- i. Word reading;
- ii. Non-word reading;
- iii. Passage reading

- iv. Reading comprehension
- v. Listening comprehension

From the first three tasks, the authors extracted both accuracy and speed (syllables per second). Moreover, the same texts used for passage reading were also used to assess reading comprehension. The texts displayed increasing difficulty (Dell'Orletta, Montemagni, & Venturi, 2011). Each participants read one narrative and one descriptive text out loud and then answered to 10 open-ended questions per text. Half of the questions investigated their ability to extract literal information contained in the text, whereas the other half required the use of higher-level processing, such as inferencing. Hence, both local and global comprehension of the text was examined (Kintsch & Rowson, 2005). During the reading comprehension task, students were allowed to check the texts as many times as necessary. Finally, the listening comprehension task included 5 narrative passages that were read out loud by the experimenter. The texts increased in both length and difficulty (Dell'Orletta, Montemagni, & Venturi, 2011). Each text was followed by 10 open-ended questions and, as for the reading comprehension task, half of the questions investigated local comprehension and the other half global comprehension.

The results showed that listening comprehension was the main predictor of reading comprehension skills. Reading accuracy, on the other hand, significantly predicted reading only in the first group that included younger children. These findings are in line with the conclusion drawn by Tobia and Bonifacci (2015) about the predominant role of oral language comprehension in the development of reading comprehension skills in a language, as Italian, that displays a highly transparent orthography. Moreover, it is interesting to mention that the authors did not find an effect of reading speed in both groups. As they argue, the role of reading speed as a predictor of reading comprehension is a matter of debate in the studies that focus on Italian and discordant pieces of evidence have been collected in different studies (Carretti & Zamperlin, 2010; Tobia & Bonifacci, 2015). However, it should be mentioned that this result may be influenced by the measure used to assess reading speed. In fact, reading speed was not only calculated using the scores of syllables per second obtained in the word and non-word reading task, but it also included the



scores the passage reading task that was followed by comprehension questions. Thus, during this last test, participants were aware that they had to also remember the content of the text and, consequently, their final reading speed scores do not only reflect their automatic decoding abilities. Moreover, the choice of measuring decoding abilities also with a task that was comprehension-oriented has likely determined the results obtained for reading accuracy as well. The fact that the authors found that the importance of decoding abilities, i.e., reading speed and accuracy, decrease with age corroborates the outcomes of the longitudinal study conducted by Verhoeven and van Leeuwe (2012).

Finally, Bonifacci and Tobia also discussed the importance of vocabulary knowledge in reading accuracy in Italian. As they argue, in line with Bellocchi, Bonifacci, and Burani (2016), the size of the L2 vocabulary in language minority children determines their sensitivity to distributional properties of the Italian language. Specifically, if L2 speakers' vocabulary knowledge is limited, they will tend to make more errors during reading and, as a consequence, they may encounter more difficulties during reading comprehension.

### *3.2.3 Bellocchi, Tobia, Bonifacci (2017), "Predictors of reading comprehension abilities in bilingual and monolingual children: a longitudinal study"*

Bellocchi, Tobia, and Bonifacci (2017) conducted a longitudinal study with L1 and L2 Italian primary school students to explore in more details the predictors of reading development for both populations. The aim of this study was to better comprehend how learning to read in a first and in a second language differ from each other at the earliest stages of reading acquisition. In order to do so, they involved a total of 86 students and followed their learning to reading development from the beginning of 1<sup>st</sup> grade until the end of 2<sup>nd</sup> grade. The participants to this study were 86 and were divided into two groups, namely: 30 bilingual and 56 monolingual students.

In literature we find research studies that suggest that L1 and L2 reading rely on quite similar processes and sets of skills (August & Shanahan, 2006). A further pivotal aspect that determines L2 reading success is also oral language

proficiency, which may be limited in bilingual students and, consequently, may also hinder the achievement of appropriate reading comprehension skills (Bellocchi, Tobia, & Bonifacci, 2017).

The authors focused on the following six predictors of reading abilities:

- i. Phonological awareness;
- ii. Letter knowledge;
- iii. Pseudoword repetition;
- iv. Morphosyntactic comprehension;
- v. Lexical knowledge;
- vi. Rapid and automatic naming.

As previously argued by Tobia & Marzocchi (2014), phonological awareness, letter knowledge, and rapid and automatic naming (RAN) significantly predict reading achievement in young children attending 1<sup>st</sup> and 2<sup>nd</sup> grade, those the pupils who are still learning to read. Moreover, vocabulary knowledge and skills linked to working memory, such as phonological short memory, contribute significantly to reading success also among students attending 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade. Among these predictors, morphosyntactic comprehension was the least investigated in L2 reading contexts. However, a study conducted by Verhoeven (1990) showed that by the end of 2<sup>nd</sup> grade, morphosyntactic comprehension is a predictor of reading comprehension abilities in L2 learners. Since Bellocchi, Tobia, and Bonifacci (2017) use the Simple View of Reading to explain how reading comprehension is achieved, decoding abilities, i.e., reading speed and accuracy, and comprehension skills were also tested. The authors focused on the roles of the six predictors in the development of decoding and comprehension skills. In particular, phonological awareness, letter knowledge, pseudoword repetition, and RAN were analysed as potential predictors of decoding, vocabulary and morphosyntactic comprehension were expected to predict comprehension.

All the participants were administered also the non-verbal intelligence task taken from the Kaufman Brief Intelligence Test-2 (Kaufman & Kaufman, 2004; Italian version Bonifacci & Nori, 2016) to ensure that they had similar cognitive

abilities. Vocabulary knowledge was assessed using an experimental and, furthermore, a standardised task for L2 receptive vocabulary was also used (BaBIL test, Contento et al., 2013). Data concerning RAN were collected using the test of rapid naming and visual search for colours, images, and numbers (De Luca, Di Filippo, Judica, Spinelli, & Zoccolotti, 2005). The test investigating letter knowledge was selected from the Developmental Dyslexia and Dysorthographia Assessment Battery (Sartori, Job, & Tressoldi, 2007), whereas phonological awareness was tested through a syllabic blending task included in the Tests of Prerequisites for the Diagnosis of Difficulties in Reading and Writing (Cornoldi, Miato, Molin, & Poli, 2009). Furthermore, morphosyntactic comprehension and pseudoword repetition were measured with two tasks selected from the Test for the Neuropsychological Assessment of 5- to 11-year-old children (Bisacchi, Cendron, Gugliotta, Tressoldi, & Vio, 2005). In particular, morphosyntactic abilities were tested using a shorter version of the TROG (Test for the Reception of Grammar, Bishop 1989, Italian version: Suraniti et al., 2009). Finally, decoding and reading comprehension abilities were also assessed. Decoding was tested calculating syllables per second and accuracy in reading words and non-words. This task was taken from the Developmental Dyslexia and Dysorthography Assessment Battery (Sartori et al. 2007). The task for the evaluation of reading comprehension abilities consisted in a passage reading task included in the ALCE battery (Bonifacci, Tobia, Lami, & Snowling, 2014). The selected text was narrative, and, during this task, the examiner also kept track of reading speed and errors.

The outcomes of this study showed that L1 and L2 learners of Italian rely on different predictors for the development of reading abilities. First of all, bilingual students struggled more than their monolingual peers during the passage reading task. In particular, they tended to make more mistakes and were also slower. As the Bellocchi et al. (2016) argue, this result may be the consequence of their lower vocabulary size and morphosyntactic knowledge.

When we consider the roles played by the predictors of decoding abilities, in line with the findings of previous investigations and with the expectations of the authors, phonological awareness, letter knowledge and rapid and automatic naming significantly predicted reading speed and accuracy in monolingual children.

However, these predictors were not important for L2 learners. In fact, for bilinguals, reading speed was predicted by rapid and automatic and, only marginally, by vocabulary, whereas reading accuracy was predicted by pseudowords repetition, i.e. phonological short memory. Interestingly, the group comparison about pseudoword repetition did not reveal a significant difference between monolingual and bilingual participants. The authors argue that L2 learners would use more phonological short memory to compensate for their smaller vocabulary knowledge. As mentioned, for both groups, rapid and automatic naming is a predictor only of reading speed, but it does not have an effect on reading accuracy. As Bellocchi et al. (2016) remark, this result is in line with other studies that focused on languages with transparent orthography. When the grapheme-to-phoneme mapping is straightforward, in fact, reading fluency is mostly explained by reading speed because, in general, readers tend to make few decoding mistakes (Moll et al., 2014).

Finally, also the predictors of reading comprehension differed between groups. Monolingual students rely mostly on letter knowledge and vocabulary. On the other hand, L2 learners' reading comprehension skills were predicted only by their morphosyntactic knowledge, as it was previously found also by Verhoeven (1990). The authors highlight the importance of both morphosyntactic knowledge and listening comprehension skills for the achievement and good reading comprehension abilities. Moreover, as they argue, the fact that L1 learners' morphosyntactic knowledge was not found as a predictor of reading comprehension may be due to the fact that, if they follow a typical cognitive development, they manage to develop good morphosyntactic skills early on. As a consequence, individual variations in vocabulary knowledge or decoding abilities will play a more important role in determining the difference in reading comprehension skills among monolingual students.

In conclusion, this study provides fundamental insights on how monolingual and minority language bilinguals build their reading abilities. Crucially, it shows that these two populations follow different developments and rely on different predictors. In particular, the authors shed light on how L2 learners' smaller vocabulary and morphosyntactic abilities may limit bilinguals' reading comprehension achievements.

### ***3.3 Is the Simple View of Reading sufficient to describe the components of reading comprehension and its development?***

There is a recurrent observation in the description of the previous studies: the influence of vocabulary knowledge on the development of reading comprehension skills. More specifically, in literature we find frequent mentions to the fact that L2 learners' limited vocabulary knowledge constitutes an obstacle during reading comprehension. As reported also by Bialystok (2009), it is very likely that the performance gap recorded between monolinguals and bilinguals can be explained with the restricted vocabulary knowledge. Crucially, as she adds, this holds true also for highly proficient bilinguals. Developing a wide vocabulary is indeed a complex task for learners. Snow and Kim (2007) argue that it is the most complicated stage in the development of proper language comprehension skills. Furthermore, another study conducted by Lervåg and Aukrust (2010) highlights the fundamental role of vocabulary size in determining group differences in reading comprehension between L1 and L2 learners. They observed that vocabulary is often recognised as a predictor of reading comprehension and, in many cases, it also influences reading accuracy even in languages with a transparent orthography, as it was also found by Bellocchi et al. (2016) for the monolingual participants. Thus, restricted vocabulary knowledge does not only hinder reading comprehension, but, at an earlier stage, also reading abilities because readers with poor vocabulary tend to make more errors when they encounter words they do not know or that are irregular or less-frequent (Perfetti 2007; Nation & Snowling, 1998).

Despite all this evidence about the importance of this factor during all stages of reading development, the model known as the Simple View of Reading (Gough & Tunmer, 1986) either segregates vocabulary as simply one of the components of listening comprehension or use it as a proxy for linguistic comprehension (Muijselaar & de Jong, 2015). Even if it is certainly true that lexical knowledge is a fundamental part of listening comprehension, as the results of the studies mentioned previously also show, on one hand, it may be considered simplistic to look at it only as a piece of knowledge in a box called "oral language

comprehension”, and, on the other hand, it seems generalist to use it to substitute linguistic comprehension entirely.

Listening comprehension incorporates several components which are used also during reading comprehension (Florit, Roch, & Levorato, 2013; Kendeou, Bohn-Gettler, White, & van den Broek, 2008). Among these components we can include phonological awareness and the ability to discriminate words during the speech continuum, morphosyntactic knowledge, pragmatic knowledge, working memory, inferencing, and executive control. As remarked in a study published by Wolf, Muijselaar, Boonstra, and de Bree (2019), we should not assume that reading and listening comprehension are interchangeable skills that belong completely to the same domain. Thus, all these processes and vocabulary knowledge should be considered and measured as sets of skills that can be connected to each other and employed to achieve reading or listening comprehension, or both.

### *3.3.1 Wolf et al. (2019), “The relationship between reading and listening comprehension: shared and modality specific components”*

This study was developed with the idea of exploring what sets of skills and knowledge are shared between reading and listening comprehension in order to understand how to adapt future educational practices. In fact, as the authors point out, the use of the audio-visual channel to gather information is becoming increasingly popular, especially among younger people (Rideout, Foehr, Roberts, 2010). Consequently, the potential of audio-visual materials used in classroom should be investigated more carefully to understand better the skills and processes involved during comprehension of these materials and, crucially, how this may have an impact also on the development of reading comprehension abilities.

In literature, reading and listening comprehension are often considered as the two sides of the same coin as if comprehension skills were completely domain general (Gernsbacher, Varner, & Faust 1990). The authors argue that theories as the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) are the result of the idea that modality does not influence comprehension skills. In such theories, in fact, listening comprehension is used as a synonym of general linguistic comprehension. There is no doubt that reading and listening comprehension are

linked to one another and this has been shown by several studies concerning both opaque and transparent languages (Cain, Oakhill, & Bryant, 2000; van den Broek, Kendeou, & Rapp, 2009; Verhoeven & van Leeuwe, 2008; Florit & Cain, 2011). However, it should be reminded that the extent to which these two comprehension processes are connected can change in relation to the tasks used to measure these abilities. If both modalities of comprehension are investigated with a similar task, they will seem more strictly connected, whereas if the test is different, the correlation will be lower (Diakidoy et al., 2005). These results indicate that the processes activated by specific types of tasks have a great impact on the resources we employ and how we manage to construct comprehension both from written and oral inputs. As Wolf et al. (2019) point out in their study, it is pivotal to explore the skills that allow us to build up comprehension in both modalities in order to understand better what processes are shared and which ones are specific to the different modalities.

The authors included word reading fluency, listening comprehension, and vocabulary as predictors or contributors of reading comprehension. Interestingly, they highlight a discrepancy in the results gathered from previous studies that investigated the contributions of vocabulary and listening comprehension to reading comprehension. In particular, there is evidence indicating that, when listening comprehension skills are controlled, vocabulary can have an additional influence on reading comprehension skills (Foorman, Herrera, Petscher, Mitchell, & Truckenmiller, 2015; Tunmer & Chapman, 2012), but other studies did not find the same effect (de Jong & van der Leij, 2002). As Wolf et al. (2019) suggest, these contrasting pieces of evidence show that researchers should be cautious using vocabulary and listening comprehension interchangeably. Moreover, during this study, the authors include also short-term memory, working memory, and updating as additional skills that contribute to reading comprehension abilities. As listening comprehension is considered, once again, vocabulary is considered one of its most important predictors. The contributions of short-term and verbal working memory have also been investigated, but the outcomes are not univocal. Importantly, as described in a study conducted by Currie and Cain (2015), the mediating effect of vocabulary on these types of memory is strong. Furthermore, since some listening

comprehension tasks require visual stimuli, visual memory should also be considered as a potential predictor.

The research questions of this study were three. Wolf and colleagues wanted to examine to what extent reading and listening comprehension overlapped. Moreover, the investigation on the cognitive contributors of the two types of comprehension aimed to shed light on which skills are domain-general and which ones are domain-specific. Finally, the individual contributions to reading comprehension of vocabulary and listening comprehension were analysed.

The outcomes of this study showed that both reading and listening comprehension skills partially explained the comprehension abilities in the other domain. More specifically, listening comprehension explained about 40% of comprehension in the written domain, and reading comprehension explained about 34% of comprehension in the auditory domain. Hence, this suggests that there exists a general underlying comprehension skill that works across modalities. However, the percentages indicate that the modality-specific components at work explain the majority of reading and listening comprehension outcomes. The roles of vocabulary and word reading fluency have been found to be essential for both reading and listening comprehension. These two components, in fact, are used during the construction of situation models. In particular, vocabulary knowledge helps us integrating words and clauses more efficiently when we build up a situation model. Crucially, as Wolf et al. (2019) highlight, in the Simple View of Reading, decoding abilities are thought to be domain-specific, but this finding suggests otherwise, indicating that word reading fluency contributes also to listening comprehension skills. As mentioned above, the contributions of different types of memory were also included in the investigation. The results of the analyses did not find an effect of memory. However, the authors do not exclude that executive functions and memory may still influence comprehension. In fact, they argue that other studies highlighted that the measures used to investigate attentional skills may not represent the exact same attentional skills required during comprehension (Burgess et al., 2006; Wallisch, Little, Dean, & Dunn, 2017). An important conclusion that Wolf et al. (2019) remark is that neither vocabulary nor listening comprehension should be considered as unique proxy for language comprehension. Both components



partially explain comprehension skills, hence they should be considered in relation to the other sets of skills and executive functions that contribute to the development of general linguistic reading comprehension.

When we consider comprehension skills in the school context, it is fundamental to delineate a description of its components that is as detailed as possible. One of the difficulties encountered in classrooms, especially when reading comprehension is examined, is understanding what the obstacles that limit good achievements are (Lorenzi, 2019). If the models used to design experimental studies that investigate reading comprehension abilities in students simplify the complexity of all the processes involved in this task, it will be more complicated to gather reliable information that taps precisely into the sources from which difficulties arise. As a consequence, it will be even more complicated to develop efficient educational strategies that can adapt to the necessities of the different students. Furthermore, understanding which skills and processes are shared and which ones are specific to reading or listening comprehension brings another important contribution to the creation of teaching activities that will help students overcoming specific comprehension obstacles. As Mattozzi (2014) argues, the importance of developing appropriate linguistic comprehension abilities goes beyond the academic purposes because these skills are fundamental to understand the world and can be used in every-day life.

### **Summary of the chapter**

Chapter 3 was dedicated to understanding what the predictors of reading comprehension in a L2 are and, to do so, we summarised the results of seven studies. First of all, we considered two meta-analyses (Jeon & Yamashita, 2014; Melby-Lervåg and Lervåg, 2014). The outcomes of the first study highlighted the importance of L2 decoding, L2 vocabulary, and L2 grammar knowledge to achieve good reading comprehension skills. Moreover, Melby-Lervåg and Lervåg (2014) focused on the role of SES, distance between L1 and L2, and the ways in which reading comprehension is tested. The results showed that SES did not have a moderating effect on reading comprehension abilities. As language distance is considered, they found that cross-linguistic transfer can benefit children in the

development of phonological and decoding skills, but when we consider comprehension, the transfer is smaller. They also underline that considering how reading comprehension is tested is fundamental to better understanding the results, since different types of tasks tap into different sets of skills. Furthermore, it was observed that the role of certain predictors changes considerably as children grow up. More specifically, in the first stages of learning to read, children rely considerably on their decoding abilities, but, as they get older and automatise their word recognition skills, language comprehension abilities will contribute more to explaining their reading comprehension achievements. In the first part of the chapter, we included also a study conducted by Kovelman et al. (2008) that emphasised how early language exposure is an essential predictor of reading success in that language.

In the second part of the chapter, we discussed three studies that investigated reading comprehension and its predictors in languages with a transparent orthography (Verhoeven & van Leeuwe, 2012; Bonifacci & Tobia, 2017; Bellocchi, Tobia, & Bonifacci, 2017). All these studies detected differences between bilingual and monolingual children when we consider which predictors of reading comprehension they rely on. In particular, the monolinguals' performance was mostly explained by listening comprehension abilities and vocabulary knowledge, but bilingual students use also their morphosyntactic knowledge during this activity.

In the last section, we discussed the contribution of Wolf (2019) who remarks that it is crucial to consider that comprehension is only partially domain general, but reading and listening comprehension rely mostly on domain-specific skills.



## 4. SECOND LANGUAGE PROCESSING

This chapter will introduce some pivotal theoretical frameworks that have been proposed and studied in the last decades to explain how L2 learners process their second language. The findings obtained in the studies that explore native and non-native processing often highlight differences in the ways in which L1 and L2 speakers process sentences. Two main accounts have been proposed to explain these differences. The first hypothesis (Shallow Structure Hypothesis, Clahsen & Felser, 2006a; 2006b; 2006c; 2018) assumes that native and non-native processing mechanisms are qualitatively different and, thus, L2 learners rely on different mechanisms and strategies than native speakers. The second account (Fundamental Identity Hypothesis, Hopp, 2007) suggests that differences in working memory load should be considered when describing native and non-native processes. In particular, processing a second language is argued to be more effortful for L2 speakers who need to employ more cognitive resources to this task.

First of all, I will discuss the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018). This account proposes that L1 and L2 processing systems are qualitatively different due to maturational constraints. In other words, late L2 learners, i.e., those who did not acquire L1 and L2 simultaneously, could not rely on the same strategies employed by native speakers because, after the critical period, they are no longer available. The consequence of using qualitatively different processing strategies is that even highly proficient L2 learners may only achieve native-like processing abilities in “local domains”, e.g., agreement between adjacent constituents (Clahsen & Felser, 2006b), but that they do not manage to achieve native-like processing skills in non-local dependencies.

In the second section of this chapter, an alternative view is presented. Computational approaches, such as the Fundamental Identity Hypothesis proposed by Hopp (2007; 2010; 2014), state that there are no maturational constraints limiting the development of L2 processing abilities. Evidence gathered in support of this view highlights the taxing nature of L2 processing. Several investigations that have explored the role of working memory in L2 have shown that non-native patterns are

often the consequence of an overload on cognitive and memory resources (Hopp, 2007; 2010; 2014). Moreover, L2 proficiency and transfer from the L1 are two other factors that can influence processing abilities.

The third part will be dedicated to a discussion of the Input Processing framework, which describes the strategies employed by L2 learners during processing to compensate for the limitations and the overburden of working memory during this task. Among the principles presented by VanPatten in this framework, the Event Probabilities Principle explains how expectations on plausibility can affect the way in which L2 learners process input (VanPatten, 2004; 2015). This principle motivated one of the research questions investigated in our study, in particular, we wanted to assess whether primary school pupils with immigrant background also rely on their expectations on plausibility when they process Italian sentences.

Grammar should be assessed using different tasks to examine both syntactic knowledge or awareness and syntactic parsing. As outlined in Grabe and Yamashita (2022), it is important to distinguish between these two aspects and monitor the students' abilities in both domains because they are two key components of comprehension (Deacon & Kieffer, 2018). To obtain information about syntactic knowledge and syntactic processing, we used two measures, an off-line task (TROG, Test for the Reception of Grammar, Suraniti et al., 2009) and an on-line processing task, the Self-Paced Reading Task (SPRT). In the last section of this chapter, I will introduce this last measure and its characteristics.

#### **4.1 *Shallow Structure Hypothesis***

One of the most influential theories proposed to explain language processing in a second language is the Shallow Structure Hypothesis. This framework was first proposed by Clahsen and Felser (2006a; 2006b; 2006c) to account for the findings of a series of research studies that aimed to explore how L2 learners process language. Most of the studies at the basis of the development of the Shallow Structure Hypothesis focused on the investigation of L2 learners' linguistic and grammar knowledge. In the case of highly proficient L2 learners, if off-line

proficiency measures are used, it could be difficult to capture whether there were differences in the ways in which first and second languages are acquired and used. Hence, in order to delineate more precise theories about language acquisition, it was fundamental to analyse what happens during on-line language processing. Consequently, it became important to study the deeper mechanisms used in real time by language learners when they process information at the word and at the sentence levels.

Between the end of the 1990s and the beginning of the 2000s, several studies addressed questions that explored the nature of language processing in different populations. In particular, scholars were interested in understanding whether there were qualitative differences in the way in which children and adult native speakers processed language and whether L1 and L2 language processing involved different mechanisms and resources. To do so, the real time processing of filler-gap dependencies and the parsing of temporarily ambiguous sentences were investigated in L1 children, L1 adult, and L2 adult populations (Felser, Marinis, & Clahsen, 2003; Felser & Roberts, 2004; Felser, Roberts, Gross, & Marinis, 2003; Papadopoulou & Clahsen, 2003; Segalowitz, 2003; Traxler, 2002; Trueswell, Sekerina, Hill, & Logrip, 1999). These investigations used self-paced listening and self-paced reading tasks in combination with off-line grammatical judgement tasks. The outcomes of these investigations led to interesting conclusions about the nature of language processing abilities in different populations. The differences recorded between children and mature L1 speakers (Felser, Marinis, & Clahsen, 2003; Traxler, 2002; Trueswell, Sekerina, Hill, & Logrip, 1999) were explained with reference to the memory resources available. More precisely, scholars argued that the way in which children and adults process their L1 does not differ from a qualitative point of view, however adults benefit from more extensive working memory resources that can assist them during the processing of more complex sentences, enabling them to integrate several sources of information (e.g. lexical, discourse-level, prosodic, and structural) very quickly, as proposed also by Booth, MacWhinney, & Harasaki (2000). Clahsen, Hadler, & Weyerts (2004) observed that children tend to be slower than adults during sentence processing. Moreover, the investigation of children's processing habits suggests that they employ bottom-

up information greatly and rely on extensively local processing strategies. These findings corroborate the assumptions that their more limited working memory resources and capacity influence the way in which they process language (Adams & Gathercole, 2000), but that the architecture of their language processing mechanism is the same as those used by adult native speakers. Thus, in other words, these findings led scholars to conclude that there is continuity between children and adults' language processing development and that differences are only due to age-related processing limitations.

When L2 learners' processing is considered, there are four main hypotheses that have been proposed to explain the reason why their performance is not like that of adult native speakers. First of all, it has been proposed that L2 learners may display processing difficulties due to limited grammatical knowledge. Another hypothesis considers how transfer from L1 can affect processing in a second language. A third hypothesis suggests that, similarly to children's language processing, it could be affected by limited working memory resources. Finally, the last way to explain why L1 and L2 processing differs contemplates the possibility that, due to maturational changes, adult L2 learners do not manage to use the same memory resources that they employ during L1 processing.

One of the earliest accounts explaining these differences suggested that L2 grammatical acquisition may not be complete (MacWhinney, 1997; Mitchell & Cuetos, 1991) or that L2 learners did not get sufficient exposure to certain linguistic patterns in the target language. Clahsen and Felser's (2006a) aim to examine further the hypothesis that L2 learners do not often achieve a native grammar representation (Bley-Vroman, 1990; Clahsen & Muysken, 1996; Meisel, 1998). Hence, second language learners' non-native processing performance could be the result of their limited or incomplete representation of L2 grammar. Crucially, this would entail that even highly proficient L2 learners who perform at a native level during off-line tasks should display the same non-native processing abilities. However, as reported by Clahsen and Felser (2006c), there are aspects of sentence processing and comprehension in which L2 learners can perform like native speakers (Ojima et al., 2005; Sanders & Neville, 2003; Wartenburger et al., 2003; Weber-Fox & Neville, 1996), L2 learners could reach native-like abilities also during the processing of

certain grammatical relationships that display local dependencies. In particular, Sabourin and Haverkort (2003) found native-like processing in gender concord within the noun phrase, and Ojima and colleagues (2005) highlight that Japanese native-speakers who learnt L2 English managed to process subject-verb agreement the same way as L1 speakers. On the other hand, the investigation of non-local dependencies showed different results. The findings of research studies exploring L2 processing of ambiguous sentences and *wh*-dependencies, in fact, suggest that even highly proficient L2 speakers display non-native abilities when they encounter non-local dependencies (Felser & Roberts, 2007; Love et al., 2003; Marinis et al., 2005; Papadopoulou & Clahsen, 2003). These studies used different methods that included cross-modal picture priming tasks, listening sentence comprehension task, and self-paced reading tasks. From the analysis of reading times, the authors detected different behaviour between native speakers and L2 learners. For instance, Marinis et al. (2005) investigated how four groups of L2 learners of English, whose native languages were Chinese, Japanese, German, and Greek, processed sentences with long-distant *wh*-dependencies. The self-paced reading task experiment included four sentence conditions combining the different scenarios of *wh*-extraction, as shown by the examples in (1) below (Marinis et al., 2005, p. 61):

(1)

- a. Extraction across a VP (+ intermediate gap)  
The nurse *who<sub>i</sub>* the doctor argued *e<sub>i</sub>'* that the rude patient had angered *e<sub>i</sub>* is refusing to work late.
- b. Extraction across an NP (– intermediate gap)  
The nurse *who<sub>i</sub>* the doctor's argument about the rude patient had angered *e<sub>i</sub>* is refusing to work late.
- c. Non-extraction, local subject-verb integration (VP)  
The nurse thought the doctor argued that the rude patient had angered the staff at the hospital.
- d. Non-extraction, nonlocal subject-verb integration (NP)  
The nurse thought the doctor's argument about the rude patient had angered the staff at the hospital.



The analysis of reading times of items like (1a) and (1c) focused on the area displaying the complementizer *that*. In the extraction condition (1a) *that* should trigger the reactivation of *who*, whereas in the non-extraction condition it only marks the beginning of the embedded clause. The reactivation of *who* was expected to be more demanding during processing, if correctly perceived, and, thus, longer reading times should have been registered in the area displaying it. The outcomes showed that English native speakers indeed showed longer reading times in this area as they successfully extracted the *wh*- element. On the other hand, this difference in reading times between the extraction and non-extraction condition was not recorded in any of the L2 groups indicating that their processing behaviour was different than that adopted by native speakers.

Furthermore, knowledge of our mother tongue influences certain domains of L2 processing. For instance, as Clahsen and Felser (2006c) describe, there can be L1 transfer in the phonological and orthographic domains as well as for lexical and morphological properties (Frenck-Mestre & Pynte, 1997; Hernandez et al., 2005; Marian & Spivey, 2003; Scheutz & Eberhard, 2004; Tan et al., 2003; Weber & Cutler, 2003). However, these studies suggest that the first language does not influence the L2 in the processing of non-local dependencies. In other words, L1 transfer does not explain L2 learners' non-native processing abilities in this domain. As suggested by Segalowitz and Hulstijn (2005), the fact that L2 learners do not seem to achieve automatic processing of non-local dependencies could be caused by heavier cognitive load that these complex sentences require.

The third hypothesis that was formulated assumed that L2 learners' non-native processing abilities could be explained as due to more limited working memory resources. More specifically, Ardila (2003) suggested that the recognition of L2 words and complex grammatical structure would overload working memory and, consequently, L2 learners often do not manage to achieve the automatization of these processing abilities. Research studies exploring this hypothesis, however, did not bring univocal outcomes and, thus, it was not possible to conclude whether L2 learners' non-native processing of non-local dependencies is the consequence of a strain on working memory or not (Chee et al., 2004; Perani, 2005; Juffs, 2004).

Lastly, the fourth hypothesis proposed by scholars also concerns memory, but it considers the effect of certain maturational constraints in the use of different memory systems. Importantly, L2 learners' processing differs from the way in which L1 children process language. In fact, unlike children, L2 learners tend to rely on non-structural information when they parse ambiguous sentences (Felser, Roberts, Gross, & Marinis, 2003; Papadopoulou & Clahsen, 2003) and they seem to fail to use prosodic cues efficiently (Akker & Cutler, 2003). Moreover, as reported by Clahsen and Felser (2006a), some studies that used ERPs highlighted a lack of automaticity in some aspects of L2 processing, especially when learners parse ambiguous sentences (Hahne, 2001; Hahne & Friederici, 2001; McLaughlin, 1999; Segalowitz, 2003). Several authors have suggested that factors such as age of acquisition could be among the reasons affecting L2 learners' processing performance (Frenck-Mestre, 2002; Hahne & Friederici, 2001; Weber-Fox & Neville, 1996). More specifically, it was proposed that, rather than assuming working memory limitations, L2 learners employed the two separate memory pathways that assist us during language processing, i.e., procedural and declarative memory, differently from native speakers. As proposed by Paradis (1994; 1997; 2004), we can distinguish between these two different types of memory that allow speakers to represent, process, and store language. Procedural memory collects all the speakers' implicit knowledge about language, whereas the declarative memory is the storage of explicitly learnt knowledge. On this basis, Ullman (2001; 2015) argued that the reason why L2 learners' processing differ from native processing could be due to the fact that they have reduced availability of the procedural memory system. According to this proposal, L2 learners have a different way to represent and process grammar in their brain. Clahsen and Felser (2006a) argue that the hypothesis proposed by Ullman and Paradis is not explicit enough regarding how L2 learners would be "more dependent upon declarative memory" due to the fact that "procedural memory is less available" to them (p. 30). Age of acquisition was considered as a factor that could influence the way in which L2 learners manage to use procedural and declarative memory. It was hypothesised that there could be a critical period after which procedural memory would become less available for L2 learners. This proposal resonates well with the widely discussed question of

whether there is a Critical Period in L2 acquisition, but none of these has been unequivocally accepted (Newport et al., 2001).

Given the results of research studies highlighting processing differences between native and non-native speakers and the fact that the account proposed by Ullman (2001; 2015) and Paradis (1994; 1997; 2004) did not provide an exhaustive explanation about the way in which L2 learners process language, Clahsen and Felser (2006a; 2006b; 2006c) developed a proposal known as the Shallow Structure Hypothesis. As shown in Felser et al. (2003) and Papadopoulou and Clahsen (2003), during sentence processing of ambiguous sentences, adult second language learners tend to resort to lexical, semantic, and pragmatic information in the same way as native speakers do, but they do not seem to employ syntactic information as automatically and efficiently as L1 speakers do. It is important to remark that this does not mean that they do not manage to access that information at all, but that they tend to use structure-based parsing in the cases in which there are not lexical cues available. The limited access and usage of deep syntactic information led Clahsen and Felser to propose that L2 learners tend to process language in a shallower way.

Further investigations were carried out to understand in more detail what domains are affected by a shallower processing in L2 learners. Clahsen and colleagues explored in particular the processing of morphology and noticed that L2 learners tend to rely on whole-form lexical storage rather than decomposing words into their smaller units (Silva & Clahsen, 2008 Clahsen & Neubauer, 2010; Neubauer & Clahsen, 2009). Clahsen and Felser (2018) reflected about the ways in which the Shallow Structure Hypothesis has been studied in the years that followed its proposal and noticed how their theory has often been misinterpreted as a deficit hypothesis or how it was oversimplified with statements claiming that L2 learners do not manage to create syntactic representations (Dekydspotter, Miller, Schaefer, Change, & Kim, 2010). Thus, it is fundamental to clarify that their hypothesis accounts for a prominent sensitivity of L2 learners towards the use of non-syntactic, shallower information during processing. Crucially, this does not exclude that, under certain circumstances, they manage to achieve native-like processing abilities or that they can only employ lexical cues or pragmatic knowledge. Moreover, as

the authors added (2018), even if shallow processing predominates in L2 learners, the outcomes of some L1 studies showed that it can also be detected in native speakers (Ferreira & Patson, 2007; Karimi & Ferreira, 2016).

#### **4.2 *A computational approach: Fundamental Identity Hypothesis***

A different approach to describing how processing in a second language takes place is to consider the capacity of working memory, the load on cognitive resources, and how they can affect the attainment of native-like processing abilities. The findings of both behavioural and ERPs studies show that there is a great variability in the ways in which non-native speakers manage to process L2. Evidence was found in support of both approaches that consider L1 and L2 processing qualitatively different, as we have seen in the previous section of this chapter (Clahsen & Felser, 2006a; 2006b; 2006c; 2018), and those that explain the differences between native speakers and L2 learners with reference to working memory (Foucart & Frenck-Mestre, 2012; Hopp 2007; 2010; 2014). The variability in the results and, thus, the difficulty to clearly establish whether there is a qualitative difference between native and non-native processing abilities can be explained considering the individual differences between L2 learners. Among the factors that may influence the way in which learners process a second language we find the distance between L1 and L2 (Tokowicz & MacWhinney, 2005), the age of acquisition and the learners' proficiency in the L2 (Foucart & Frenck-Mestre, 2012), and the environment in which L2 acquisition takes place (i.e., whether learners are in an immersive context or not, Dowens, Vergara, Barber & Carreiras, 2010).

However, as summarised by Rossi and Prystauka (2019), evidence coming from neural studies seem to suggest that even late L2 learners can achieve native-like processing abilities. In particular, some L2 learners who are immersed in a context where their L2 is widely spoken for long periods of time show a neural signature which is similar to that of native speakers during processing of morphosyntactic features of their L2 (Dowens et al., 2010; Foucart & Frenck-Mestre, 2012; Rossi et al., 2014; Tokowicz & MacWhinney, 2005). Interestingly,

as reported by Fourcart & Frenck-Mestre (2012), this holds true also during the processing of syntactic structures that are only found in the L2, hence structures for which learners cannot benefit from L1 transfer. Crucially, these studies included adult L2 learners and, as a consequence, these findings corroborate the theories that focus on L2 performance and hypothesise that differences in processing abilities can be the result of quantitatively different ways of computing the L2 (Hopp, 2007; 2010; 2014). Moreover, these outcomes are in contrast with the idea that there exists a critical period in second language acquisition and that L2 learners tend to rely on shallower information than syntactic parsing during processing, as proposed by the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018).

Although there is evidence demonstrating that L2 learners can indeed process their second language with native-like abilities, this processing performance is not always achieved. Hence, it is pivotal to provide an explanation to those cases in which L2 learners behave differently than native speakers. As mentioned previously, several scholars propose that native and non-native processing may vary in how effortful they are for working memory and cognitive resources (Hopp, 2007; 2010; 2014; Sagarra & Herschenson, 2010). A study conducted by Foucart and Frenck-Mestre (2012) investigated on-line processing of an uninterpretable feature such as gender in French with English native speakers who were learning French as a second language. According to the Failed Functional Features Hypothesis (FFFH) proposed by Hawkins and collaborators (Hawkins, 1998; 2001; Hawkins & Chan, 1997; Hawkins & Franceschina, 2004), late L2 learners can only acquire new interpretable features in their second language, but, once they passed the critical period, they should no longer be able to acquire uninterpretable features. If the FFFH describes correctly how L2 learners of French acquire abstract grammatical features, then they should not display a native-like sensitivity to gender agreement violations. The results of the eye-tracking task highlighted that native speakers and L2 learners of French displayed very similar patterns, showing that L2 learners were sensitive to gender agreement violations also when the violation occurred outside the boundaries of the DP, thus in a non-local context. This finding is in clear contrast also with the predictions formulated by the Shallow Structure Hypothesis according to which native-like processing for

L2 learners can be achieved only at the local level. As the authors argue, the patterns they recorded corroborate the “Full Transfer Full Access” model (Schwartz & Sprouse, 1996; White, 1989; 2003). This framework describes L2 processing as being only at first characterised by the transfer of L1 grammatical feature. During later stages of acquisition, in fact, L2 learners can achieve full access to the acquisition of L2 grammatical features. However, the results of the experimental task used to examine processing through ERPs show a different pattern for native and non-native speakers. Crucially, during this task, the participants could not control reading times themselves or read certain passages again, as it would be possible to do during an eye-tracking study. To explain this result, Foucart and Frenck-Mestre (2012) argue that the processing non-local dependencies can be less efficient in L2 learners when the task requires a considerable load on working memory.

Several investigations explored the role of working memory during language processing. Previous investigations that considered L1 processing and comprehension revealed the importance of working memory to operate a wide range of cognitive processes. For instance, as shown by Daneman and Merikle (1996), and Engle (2002), problem solving skills, reasoning, abstracting, and the ability to plan can be performed thanks to working memory. Second language processing requires an extensive use of working memory as well, especially during the first stages of acquisition. To understand better how working memory can contribute during L2 processing, Linck, Osthus, Koeth, and Bunting (2014) conducted a meta-analysis that included data from 79 studies, and they found that working memory has a positive influence both on processing abilities and on proficiency (Abutalebi & Green, 2008; Hernandez & Meschyan, 2006). However, there are still some aspects that need further investigation since the findings gathered from several studies are not uncontroversial when it comes to understanding the magnitude of its effect and whether is it the executive control or the short-term storage that support learners during L2 processing (Juffs & Harrington, 2011; Williams, 2011). As we mentioned, L2 processing is particularly demanding at the earliest stages of second language acquisition and requires greater working memory capacity to less proficient learners to efficiently combine

perceptual processing, syntactic parsing, and listening comprehension (Satori, 2021). Earlier studies remarked the importance of working memory to achieve language comprehension. More specifically, a larger capacity, assessed with simple span tasks, facilitates the acquisition of new vocabulary both in first and second language (Atkins & Baddeley, 1998; Daneman & Hannon, 2007; Engle, 2001). Linck et al. (2014) meta-analysis suggests that the executive control system plays a central role for the development of good L2 processing abilities and proficiency. The outcomes of the meta-analysis conducted by Linck et al. (2014), in fact, show that this component of working memory seems to be fundamental not only to keep active representations of the words in the short-term memory store, as it was argued also by Hernandez & Meschyan (2006), but also to cope with conflicting representations that can arise from language competition. It is not surprising that the executive control system needs to be widely engaged by second language learners. Several studies concluded that bilingual speakers always maintain the coactivation of both languages (for lexical access, see: Blumenfeld & Marian, 2007; Dijkstra, 2005; Kroll, Bobb, and Wodniecka, 2006; Kroll, Gullifer, & Rossi, 2013; for grammatical coactivation, see: Dussias & Sagarra, 2007). Hence, L2 processing is cognitively more demanding because the first and second language have to be controlled and monitored while they compete for selection (Rossi & Prystauka, 2019). Another important aspect to understand the role of working memory during L2 processing is to determine what is the direction of this relationship. More specifically: is great executive control capacity influencing positively second language processing abilities and proficiency or is it the other way around? Evidence has been found in support of both accounts. The studies suggesting that being bilingual gives an advantage in the development of enhanced executive functions included individuals who have been exposed to two languages since birth or, at least, in the first years (for a review: Bialystok, 2010). Other studies highlight how individual differences in working memory capacity can determine performances in a second language (Cowan, 2005; Daneman & Merikle, 1996; Engle, 2001). Crucially, some studies suggest that executive control processes can be trained (Harrison et al., 2013; Novick et al., 2013), and this can benefit both other similar performances connected to working memory, and language processing

tasks that require the use of executive control (Linck et al., 2014). To sum up, the literature shows that working memory is a fundamental component in determining language processing both in first and second language. More specifically, large working memory capacity and enhanced executive control support learners in monitoring tasks and can accelerate the resolution of interferences when the representations of the two coactivated languages are competing.

The theoretical frameworks arguing that native and non-native processes are not qualitatively different suggest that the variance recorded between L1 and L2 processing is due to computational or capacity differences. Hopp (2007) proposed the Fundamental Identity framework, according to which when L2 learners do not achieve native-like processing, it is due to performance factors rather than to biological constraints linked to a critical period of acquisition. Since Hopp does not consider age of acquisition as a factor that could compromise processing achievements in a second language, the Fundamental Identity framework claims also that L1 and L2 processing happen following the same pathway and, under specific circumstances, L2 learners can perform in a native-like manner. In a study conducted to investigate native and non-native performances in L2 German inflection with speakers whose native languages were English, Dutch, and Russian, Hopp (2010) observed that the L2 participants who did not process inflection like their native peers were influenced by L1 transfer. Thus, as he argues, the only difference between the two populations is that some L2 learners can rely on a less efficient computational system. These results are in line with the findings obtained by Franceschina (2005) and Hawkins (2001) who detected fewer difficulties during L2 inflectional processing when first and second language shared similar inflectional characteristics, for instance in gender marking. In line with Hoover and Dwivedi (1998), Segalowitz (2003), and Service, Simola, Metsanheimo, and Maury (2002), Hopp (2010) argues that L2 learners' reduced automaticity and lower working memory resources can affect second language processing, which, as mentioned earlier, require greater cognitive resources in order to control competition due to the coactivation of two languages. Lexical access is among the processes that have been shown to be slower and less automatic in L2 learners (Coderre, Van Heuven, & Conklin, 2011) because the routes of activation of L2



lexicon are used less frequently. Slower access to certain processing routines and the fact that they may be kept active for shorter periods affect processing and make it less efficient (Dekydtspotter, Schwarz, & Sprouse, 2006; Hopp, 2015; McDonald & Roussel, 2010). Furthermore, as Hopp observes, another piece of evidence that the different load on working memory could be the cause of non-native processing in L2 learners is that even L1 speakers can display non-native patterns when the cognitive demands of the task are increased (Dick et al., 2003; Hopp, 2010; Schlesewky & Frisch, 2003). He also remarks that, consequently, recording non-native behaviour during processing in L2 learners might not be the result of limited grammar knowledge in the target language: the way they process L2, in fact, is the same as the one used by native speakers, but L2 learners' load on working memory is heavier and more demanding. In a subsequent study, Hopp (2014) investigated L2 processing of ambiguous relative clauses and the results he obtained further corroborate his hypothesis about the computational requirements for L2 learners. The analysis of the participants' eye movements revealed that when they were matched for working memory capacity, there were no differences between native and non-native speakers, supporting the continuity approaches according to which L2 processing has the same nature of L1 processing, as it happens for L1 children and adults.

Furthermore, a study conducted by Trenkic, Mirkovic, and Altmann (2013) brought evidence that L2 learners can achieve native-like comprehension skills in real time processing of constructions that are unique to the L2 even when they still display difficulties during their production. This investigation involved L2 learners of English who spoke Mandarin as mother-tongue and used a visual-world eye-tracking task. During the experiment, the participants were shown pictures in which a human character and six objects, half of which were containers, were depicted. They would hear a sentence stating that the human character was going to place one of the objects in one of the containers and they were asked to click the position where this object would end up. Two of the three container objects presented in the picture were identical: in one condition they could both be the target objects, whereas in the other condition one object was depicted open and the other closed, hence only the open one could be the target. The auditory stimuli alternated the

articles *the* and *a* to suggest which container should be selected. The aim was to explore how the participants processed articles, a feature that is not present in Mandarin. The authors argue that these findings are in line with the Competition Model (MacWhinney, 1987, 2005). More specifically, as proposed by MacWhinney, L2 speakers can achieve native-like processing of morphological cues when this grammatical category is not instantiated in a different way in their L1, thus, when it is not possible to have L1 transfer. Since the participants encountered some difficulties during the production of articles, Trenkic et al. (2013) concluded that non-native like production does not necessarily reflect poor L2 grammar knowledge or representation, but it may be influenced by structural competition from the L2 learners' first language (Trenkic 2009; Trenkic & Pongpairoj, 2013).

To sum up, computational approaches state that native and non-native speakers process language following the same pathways, and that the factors influencing L2 learners' processing are not biological and due to the critical period. These frameworks focus on the role of working memory and on its capacity because, as observed in the studies mentioned previously, L2 processing calls for more memory resources. Since these processes are more taxing, the differences recorded between native and non-native speakers mirror quantitative differences in working memory load.

### **4.3 *Input Processing***

In the introduction of this chapter, we mentioned the fundamental difference between syntactic processing and syntactic awareness or knowledge (Grabe & Yamashita, 2022). As remarked by VanPatten (2004), when we process language, we do not merely “perceive” or “notice” an input. These terms, in fact, only partially describe what happens during processing. Being aware of the input we hear or read is just a starting point that will allow us to analyse language in order to make “a connection between form and meaning” (p.6). Since processing is an action that is performed in real time during comprehension, it is constrained by working memory limitations (Just & Carpenter, 1992). As described in the previous section, working

memory is often overburdened during L2 processing and this factor added to its inherent capacity limitations leads second language learners to adopt certain strategies. In his works, VanPatten (1996; 2004; 2014) describes these strategies and refines their definitions through principles and subprinciples.

As described by Clahsen and Felser's Shallow Structure Hypothesis (2006a, 2006b, 2006c, 2018), learners of a second language tend to prioritise the extraction of meaning from the sentences they encounter and sometimes they do not allocate enough resources to the analysis of their syntactic form. However, unlike what is claimed by the SSH, second language learners do not prioritise meaning over form because of maturational constraints that prevent them from accessing deeper syntactic information. In line with computational approaches, VanPatten argues that these strategies are developed because of the constraints on working memory. In order to do so, when learners process input in their L2, they rely more on the information contained in content words rather than that carried by grammatical elements, such as inflection on verbs and nouns. This preference is found also during the processing of auditory stimuli in which prosodic cues, such as prominent stress on content words, favour more focus on content words rather than on grammatical items. Also, in the cases in which certain information is presented both in a content word and in a grammatical item, L2 learners prioritise the processing of the content word. For instance, in a sentence like *Yesterday I went to the library*, the idea that this action took place in the past is redundantly presented both in *yesterday* and in *went*. According to VanPatten (2004; 2014), when L2 learners encounter a sentence like this, they will extract the meaning of 'pastness' from *yesterday* rather than from the past tense of the verb *to go*.

However, VanPatten remarks that L2 learners do not ignore the grammatical items that carry syntactic information, but they prefer to resort to the lexical ones, especially during the first stages of L2 acquisition when processing and comprehension are more effortful. Crucially, the processing of grammatical items carrying semantic information is not impaired in L2 learners who, in fact, manage to extract information from them successfully when that piece of information is not redundant in the sentence. Once again, constraints on working memory and the limitation of available cognitive resources guide L2 learners' processing strategies.

Second language learners, in fact, adopt these selective strategies to avoid draining their available processing resources. More proficient L2 learners manage to automatise certain processing routines and, consequently, they manage to have more cognitive resources available.

Another factor that influences processing in L2 learners is the position of words in the sentence. VanPatten argues that during processing, in fact, L2 learners will dedicate more resources to the items placed in the initial position and, as the sentence proceeds, fewer and fewer resources will remain available for the words that occupy the final position.

As found in VanPatten (2004), the strategies presented above are summarised in one principle and six subprinciples stated as follows (p. 14):

**Principle 1. The Primacy of Meaning Principle.**

Learners process input for meaning before they process it for form.

**Principle 1a. The Primacy of Content Words Principle.**

Learners process content words in the input before anything else.

**Principle 1b. The Lexical Preference Principle.**

Learners will tend to rely on lexical items as opposed to grammatical form to get meaning when both encode the same semantic information.

**Principle 1c. The Preference for Non-redundancy Principle.**

Learners are more likely to process nonredundant meaningful grammatical form before they process redundant meaningful forms.

**Principle 1d. The Meaning-Before-Nonmeaning Principle.**

Learners are more likely to process meaningful grammatical forms before non-meaningful forms irrespective of redundancy.

**Principle 1e. The Availability of Resources Principle.**

For learners to process either redundant meaningful grammatical forms or nonmeaningful forms, the processing of overall sentential meaning must not drain available processing resources.

**Principle 1f. The Sentence Location Principle.**

Learners tend to process items in sentence initial position before those in final position and those in medial position.

Furthermore, VanPatten (2004; 2014) discusses how L2 learners are guided by the frequency with which they find specific associations between position and semantic roles assigned to phrasal elements. Since in the majority of the sentences we hear and produce in SVO or SOV languages, the subject corresponds to the agent of the sentence, he claims that L2 learners tend to generalise the association between the first noun of the sentence and the agent and, consequently, they assign the role of agent to the first element, either noun or pronoun, of the sentence. However, thanks to their knowledge about lexical semantics, they manage to control for misinterpretations when they assign  $\theta$ -roles. For instance, when the patient is an inanimate object, it is more straightforward to understand what element in the sentence is the agent.

Sometimes, the actions described in the sentence are more likely to be performed by a character than the other. As exemplified in VanPatten (2014, p. 121), when we encounter the verb *to scold* accompanied by *child* and *parent*, we create expectations about who the agent will be, since it is more likely that it is the parent who scolds the child. Moreover, before assigning the role of agent to the first noun of the sentence, L2 learners will pay attention to the preceding context, when it is made available to them. Hence, following the logic of the “Sentence Location Principle”, L2 learners will process the context information presented before the sentence and, in that case, they will avoid over-relying on the association between first noun and agent.

These other principles are summarised as follows (VanPatten, 2004, p. 18):

**P2. The First Noun Principle.**

Learners tend to process the first noun or pronoun they encounter in a sentence as the subject/agent.

**P2a. The Lexical Semantics Principle.**

Learners may rely on lexical semantics, where possible, instead of word order to interpret sentences.

**P2b. The Event Probabilities Principle.**

Learners may rely on event probabilities, where possible, instead of word order to interpret sentences.

### **P2c. The Contextual Constraint Principle.**

Learners may rely less on the First Noun Principle if preceding context constrains the possible interpretation of a clause or sentence.

To conclude, as remarked by VanPatten (2004; 2014), Input Processing is not an attempt to create a model of how second language acquisition happens and evolves. Its sole purpose is to describe the strategies adopted by L2 learners during processing to overcome the difficulties generated by working memory constraints. This account shares commonalities with both theories presented in the previous sections of this chapter because, in line with computational approaches, it considers the central role played by working memory and cognitive resources during processing. Furthermore, it also recognises that L2 learners often do not reach deep structural information, but they prefer to rely on lexical semantics and the extraction of meaning from content words.

#### ***4.4 The Self-Paced Reading Task to investigate on-line processing***

Since the 1970s, the Self-Paced Reading Task has been widely used in psycholinguistics research as a measure to investigate on-line language comprehension processes in a simple and non-invasive way (Mitchell & Green, 1978). The SPRT allows researchers to explore processing both at the sentence level and above the sentence level. However, it is only since the 1990s (Juff & Harrington, 1995) that this method also has been applied to the study of language processing in second language acquisition (SLA). From a theoretical perspective, the examination of on-line language processing allowed linguists to observe more precisely the underlying grammatical competences in native and non-native populations and, thus, address questions related to the access to Universal Grammar in SLA (Jegersky, 2014).

During this task, subjects are presented with series of isolated sentences that appear on a computer screen one at a time. The sentences are divided into smaller chunks, which are shown on the screen when the participants press a button on the keyboard, so that they can move to the following areas and proceed reading. Every time a button press occurs, reading times for that segment are recorded.

There are different ways of setting up a SPRT according to how sentences are shown on the screen. More specifically, words can be displayed either in a *cumulative* or *non-cumulative way*, and in a *centred* or *linear* way. If a *cumulative* display is chosen, once a segment has been shown, it remains available on the screen and the following ones are added. This method creates a very natural reading environment; however, it should be considered that having the possibility to re-access the previous segments might create distractions that will affect the reliability of the reading times related to the following segments. For instance, subjects might tend to reveal more segments at the same time and then read the whole sentence at once (Ferreira & Henderson, 1990; Just et al., 1982). With a *non-cumulative* display, however, the text of the previous areas is hidden at every button press. In this case, the segments which have already been read might either disappear or be masked. In the first scenario, we would have a *centred* display, which is often avoided because it does not resemble normal reading closely enough. Hence, the *non-cumulative* and *linear* combination is the most commonly adopted technique during the development of SPRT experiments. This combination is also referred to as the *moving window* technique and the result obtained is that at every button press, the segments that have already been read are masked, for instance using hashtags, and the new segments in letters appear moving from left to right, as it would happen during natural reading in Western languages.

An important aspect of the development of a SPRT is balancing the number of experimental items and fillers. The indications found in literature suggest that the fillers should be at least as many as the experimental stimuli (Jegersky, 2014). Using such ratio, in fact, will prevent the participants to understand the aim of the task and direct their attention only to certain items. Moreover, the experimenters need to ensure that the participants are paying attention throughout the whole task. One way to do so is to add brief comprehension questions, usually yes/no or true/false, as attention check-points. Crucially, as highlighted by Jegersky (2014) these questions should investigate the content of the sentence, but they should not be aimed at verifying only whether the structure or phenomenon investigated were comprehended correctly.

Before analysing the data extracted from a SPRT, outliers should be detected and trimmed or winsorised (Jegersky, 2014). There are several ways to deal with outlier detection. First of all, it is important to detect the so-called extreme outliers. In order to do so, the experimenters should establish a lower- and a upper cut-off value that will exclude all unintentional bottom press or longer reading times where external factors may have distracted the participants. Moreover, scholars check for outliers in their data also using standard deviation-based boundaries. However, as suggested by Nicklin and Plonsky (2020), it is possible to avoid this process by log-transforming reading times.

### **Summary of the chapter**

When we consider second language processing, there are two main accounts that aim to explain the differences registered between native and non-native speakers. In this chapter, we presented the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c) and the Fundamental Identity Hypothesis (Hopp, 2007; 2010; 2014). The first of these approaches assumes that native and non-native language processing are qualitatively different, thus, L2 processing would rely on different mechanisms and strategies. Ultimately, this means that even highly proficient L2 speakers do not manage to develop native-like processing abilities. The opposing view that was presented in the chapter is known as Fundamental Identity Hypothesis. According to this account, there are no maturational constraints that make non-native and native processing qualitatively different. As Hopp argues, in fact, the performances change because of the load on working memory and there are no biological limitations that can impede a L2 learner to develop native.

Furthermore, we discussed the Input Processing framework (VanPatten, 2004; 2014). Unlike the Shallow Structure Hypothesis and the Fundamental Identity Hypothesis, the Input Processing does not aim to explain the nature of processing, but to describe the strategies that non-native speakers employ during L2 processing. In particular, we focused on one of the principles proposed by VanPatten, the so-called Event Probabilities Principle because it was used in the development of one of the research questions about processing of this study.



Lastly, the final part of this chapter was dedicated to the importance of assessing grammar in different ways. As suggested by Grabe and Yamashita (2022), in fact, it is fundamental to verify both the off-line and the on-line grammar knowledge of the participants. More specifically, they distinguish between syntactic knowledge and processing. Therefore, one section was dedicated to the Self-Paced Reading Task, the measure we used to investigate the syntactic processing abilities of the participants to this study.

## 5. RESEARCH QUESTIONS

This research project aims to explore what obstacles minority language bilingual students encounter when they face reading comprehension tasks. As shown in chapter 1, the results of the recent national evaluations (INVALSI) highlighted that there is a gap between the performance of Italian monolingual native speakers and L2 Italian students when we consider the tests that require more advanced language competences and comprehension skills (Rapporto INVALSI, 2019; Giberti & Viale, 2017; Viale, 2019).

The research questions that we addressed belong to two categories. First of all, we considered reading comprehension and a set of linguistic and non-linguistic abilities that have been identified as its potential predictors. Furthermore, we focused on local processing of complex grammar structures to understand whether there are differences in the way bilingual and monolingual students process Italian.

### 5.1 *Reading comprehension*

#### **RQ1: Are there differences in reading comprehension and its predictors between native and second-generation immigrant students?**

Based on previous studies, we tested a series of potential predictors of reading comprehension, i.e., general cognitive abilities, decoding skills, receptive vocabulary knowledge, and receptive grammar knowledge, and investigated the participants' abilities in these domains using standardised tasks.

As seen in chapter 2, the Component Skills Approach (Grabe & Yamashita, 2022) describes reading as a highly complex activity that is achieved by orchestrating a series of subskills. The processes involved during reading can be divided into two categories, namely lower- and higher-level processes. The set of skills we identified as potential predictors of reading comprehension belong to the former type of processes. Decoding skills are fundamental to achieve automatic word recognition, vocabulary knowledge is strongly connected to the ability to reconstruct word-to-sentence and word-to-text meaning, and grammar knowledge

belongs to the skills that allow us to parse syntax. Among these abilities, we also included general cognitive abilities because they are fundamental to enabling readers to perform and control all these processes simultaneously.

**RQ2: What are the best predictors of reading comprehension in monolingual and minority language bilingual students?**

The second research question investigating reading comprehension aimed to determine on which abilities bilingual and monolingual students rely the most. Identifying a hierarchy of best predictors is fundamental to understanding which didactic activities should be prioritised to enhance reading comprehension skills. The target participants to this study attended 4<sup>th</sup> and 5<sup>th</sup> grade of primary school, that is, the point in their school experience at which that students switch from “learning to read” to “reading to learn” (Byrnes & Wasik, 2009). Consequently, it is crucial that they receive proper support in the development of their reading comprehension skills because these skills will be fundamental also to the study of other school subjects.

## **5.2 *Language processing***

**RQ1: Are there differences between native and minority language bilingual students during language processing?**

In chapter 4, we discussed the main hypotheses that describe non-native language processing. According to the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018), non-native processing is qualitatively different than native processing and, more specifically, L2 learners tend to rely more on shallower lexical or pragmatic information rather than on the deep syntactic relations between the constituents. Hopp’s Fundamental Identity Hypothesis (Hopp, 2007) presents a contrasting view on non-native processing and does not detect qualitatively differences in the ways in which L1 and L2 are processed. As discussed in chapter 4, he claims that L2 processing requires more working memory and cognitive resources than L1 processing. This extra strain on cognitive control

mechanisms is due to the fact that L2 learners have to monitor the simultaneous coactivation of the two languages.

Crucially, these hypotheses were formulated using data from adult L2 learners, but it is not clear how minority language bilingual children process their societal language. Shedding light on language processing in this population would help us better understand what didactic activities would be better suited to support bilingual students during their education.

**RQ2: Do minority language bilinguals manage to process morphological cues in the same way during reading?**

When the local level of language comprehension is taken into consideration, it is fundamental to understand how L2 pupils process sentences in Italian and, in particular, what linguistic cues they manage to exploit and access more readily. According to the Shallow Structure Hypothesis, L2 learners do not always manage to rely on the same type of information as native speakers during L2 processing. We developed a Self-Paced Reading Task to investigate how both minority language bilingual and monolingual children process morphological information that can help them during the interpretation of sentences displaying complex grammar structures such as object relative clauses and passive voice.

**RQ3: Do minority language bilingual students rely more than monolinguals on pragmatic information than on syntactic relations while processing Italian sentences?**

The Event Probabilities Principles contained in the Input Processing Hypothesis (VanPatten, 2004; 2014) states that, given a verb and two potential arguments, L2 learners tend to rely more on the probabilities that an event takes place rather than on the syntactic relations between the constituents. We want to investigate whether minority language bilingual students are more affected by pragmatic information, such as event probabilities, or whether they manage to effectively parse the syntactic information contained in the sentences in a native-like way.

**RQ4: Do minority language bilingual students process semantic violations in the same way as monolinguals?**

The last research question we aim to investigate focuses on the processing of semantic violations. As claimed by both the Shallow Structure Hypothesis and the Lexical Preference Principle (Input Processing), L2 learners are particularly sensitive to lexical and semantic information during second language processing, thus we hypothesised that they would manage to automatise the processing of semantic information earlier on. This research question aimed to constitute a baseline in which both minority language bilingual and monolingual students would behave similarly during processing.

## 6. OUR STUDY

In this chapter, the experimental design of the current study will be described. In the first section, I will present the participants and explain how they were recruited and the inclusion criteria adopted. The participants were divided into two groups, monolingual and bilingual, as will be illustrated in the next section. Moreover, in the section dedicated to the bilingual group, I will define first- and second-generation immigrants and elaborate on the student population in Italian primary schools and, more specifically, in the schools that took part in the project. Finally, before discussing the selection and development of the tasks that were administered, a short section will be dedicated to the description of the time and the modality of testing in compliance with the Covid-19 regulations in force due to the Sars-CoV-2 pandemic.

Subsequently, I will describe all the tasks that were administered, explain what they investigate, and how they were relevant to the study of reading comprehension abilities. First of all, I will describe the standardised reading comprehension tasks that were administered. Subsequently, I will present the standardised tasks that investigated the potential predictors of reading comprehension (i.e., general cognitive abilities, decoding skills, receptive vocabulary, and receptive grammar). Finally, I will illustrate the three Self-Paced Reading Tasks that were specifically designed to investigate on-line language processing abilities.

Our study also included two pedagogical interventions, one dedicated to a local aspect of language processing, i.e., passive voice, and the second one dedicated to a global aspect of language processing, i.e., the ability to make inferences. According to their availability, some of the classes took part in the intervention during the last month of data collection.

As the research project involved participants who attended primary school, the proposal was forwarded to the Ethics Committee of the department of Human Sciences of the University of Verona for its approval before data collection could

be carried out in schools. The Committee declared that the project met the requirements and, thus, could be approved.

## **6.1 Participants**

### *6.1.1 Groups*

In total, the participants of this study were 157 students who were between 9.0 and 12.6 years old ( $M = 10.2$ ;  $SD = 0.6$ ), 74 of them were in 4<sup>th</sup> grade and 86 were in 5<sup>th</sup>. However, as it will be discussed in the section about the inclusion criteria, some of the children had to be excluded during the data analysis and the remaining participants were reduced to 109 students.

The participants were divided into a monolingual and a bilingual group. The monolingual group included 48 students, whose age was between 9.3 and 12.6 years old ( $M = 10.43$ ;  $SD = 0.56$ ). The bilingual group included 97 students who were born in Italy to foreign parents, or to one foreign and one Italian parent, or who were born abroad and then moved to Italy before starting primary school. These students were between 9.0 and 11.8 years old ( $M = 10.24$ ;  $SD = 0.56$ ). The vast majority of the children who belonged to the bilingual group (94%) were second generation immigrants and attended kindergarten in Italy.

Detailed information about their multilingual profile was collected by means of a questionnaire which was administered to the parents. For this purpose, we selected the Multilingual Language Exposure Questionnaire developed by Vender, Garraffa, and Sorace (2016). The questionnaire administered to the parents was the Italian adaptation of the Utrecht Bilingual Language Exposure Calculator (UBILEC, Unsworth, Argyri, Cornips, Hulk, Sorace, & Tsimpli, 2012; Italian version: Vender, Garraffa, Sorace, & Guasti, 2016). The questionnaire allowed us to collect detailed information about the languages used by pupils at home with parents and siblings both during the school year and during summer holidays. Parents were asked to provide some biographical information about themselves and about their children in order to create a picture about the language habits of the family. Moreover, they were also asked to evaluate their own and their children's

proficiency both in their mother tongue and in Italian. The children's language abilities were evaluated in the four language skills (i.e., speaking, listening, reading, and writing) in the heritage language spoken at home and to quantify in percentage the use of Italian or other languages during their interactions with the children during their life span. A specific section was dedicated to the extra-scholastic activities attended by children. In this section, parents were asked to provide information about how much time the children spent doing a certain activity and what languages were spoken during that time. Here, there were also questions regarding the time spent using a computer, watching TV, and reading. All these pieces of information contributed to determine the Cumulative Length of Exposure. However, since these data were collected during the pandemic and most of the extra-scholastic activities were stopped, this information was not truly indicative of the exposure that these children had to the Italian language. Therefore, we decided not to consider the Cumulative Length of Exposure during the data analysis, and to include only the Traditional Length of Exposure, an index that is calculated subtracting the age of first exposure from the age of the participants.

The heritage languages spoken by the bilingual participants were Sinhala (22), Arabic (20), Romanian (18), Moldovan (7), Albanian (6), English (5), Spanish (5), Chinese (4), Punjabi (3), Russian (3), Hungarian (2), Brazilian Portuguese (1), French (1), Polish (1), Thai (1), and Ukrainian (1). Moreover, among all the participants, 19 children were also exposed to other languages at home; third languages were Armenian, Bini, English, French, Igbo Moldovan, Russian, and English.

The participants were also divided into three groups according to the pedagogical intervention they took part in at the end of data collection phase. Since the activities for the interventions were carried out during regular school time, whole classes and not individual participants were assigned to either one of the experimental groups or the control one. As will be discussed in more detail in chapter 9, two different kinds of pedagogical intervention were organised and carried out in the classes, and they focused either on a local or on a global level of language processing. However, due to Covid-19 restrictions, the pedagogical



intervention had to be reduced from 10 to 4 meetings. As a consequence, we could not include a post-test phase to evaluate the efficiency of the activities carried out.

Two 4<sup>th</sup> grade and one 5<sup>th</sup> grade classes were assigned to the intervention focusing on passive voice, i.e., a local aspect of language comprehension. The two remaining 4<sup>th</sup> grade classes took part in an intervention which aimed at enhancing their ability to make inferences, i.e., a global aspect of language comprehension. Finally, the remaining four 5<sup>th</sup> grade classes constituted the control group. The initial idea was to have three classes per group and a more homogeneous distribution of grades to the different interventions, but this solution was not possible due to how the Covid-19 pandemic influenced the didactic activities during the school year. Nevertheless, two of the classes that belonged to the control group took part in a partial intervention. The meetings took place only after the administration of the second reading comprehension task. In agreement with the teachers who coordinated the classes, we organised only two meetings in which the students worked on their ability to make inferences.

### *6.1.2 Recruitment*

In order to recruit the participants for our study, the research project was presented to the headmaster of the Istituto Comprensivo VR12 “Golosine” who authorised us to carry out the experimental phase of the study in grade-4 and grade-5 of the three primary schools in the neighbourhood Golosine. Once the headmaster had approved the project proposal, an on-line meeting with the teachers was organised to introduce them to the project and explain when the different phases of the data collection and the pedagogical intervention were planned. The research project was then presented also to the parents of the students by means of a short video that was published on the website of the Istituto Comprensivo VR12 “Golosine”. The video was an effective way to summarise the aims of the study, its structure, and its relevance for improving pedagogical strategies for training reading comprehension abilities in multilingual classrooms.

The IC VR 12 was identified as an ideal partner for our research on reading comprehension in L2 Italian, because the Golosine suburb where it is located is a

multi-ethnic and multicultural neighbourhood. As a consequence, the pool of potential participants included a high number of bilingual students. Moreover, since the study also included a phase of pedagogical intervention with the aim to develop new and more effective teaching strategies for multilingual classes, the primary schools of this area could immediately benefit from this collaboration.

Our specific target was second-generation pupils, and therefore during analyses only those data will be considered. However, to avoid potential discriminations, the students who were first generation immigrant were also included during data collection. Students with special needs were also involved during the activities. However, since their developmental profiles did not correspond to the ones we aimed to investigate, the data collected from these students were excluded from the analysis as well. An authorisation form was given to the parents of all the children attending 4<sup>th</sup> or 5<sup>th</sup> grade in the primary schools “D’Azeglio”, “Dei Ciliegi”, and “Lenotti”. The consent form also included a letter to the parents explaining that the tasks were going to be presented as playful activities to avoid creating a stressful environment, and that the children could ask to interrupt the activities at any time if they felt tired or uncomfortable. Moreover, the letter guaranteed that all the data collected was going to be anonymised and that pupils’ performance in the tasks would not contribute to official school grades.

The majority of the students in 4<sup>th</sup> and 5<sup>th</sup> grade were allowed to take part in the project, which thus had a total of 160 participants, divided into nine classes, i.e., five 4<sup>th</sup> grade and five 5<sup>th</sup> grade groups. One class did not participate in the project due to some organisational issues. However, not all the participants completed the tasks during data collection and, as mentioned above, some of them could not be included in the analysis of the data because they displayed atypical patterns of development. In the following section, I will examine the inclusion criteria of the study in more detail and explain the reasons why data collected from some of the students will not be included in the analysis.

### 6.1.3 *Inclusion criteria*

As mentioned previously, the target participants of this study were primary school students attending grade 4 and grade 5. The reason for choosing to focus only on these grades is to be found in the development of decoding reading abilities. As argued by Byrnes and Wasik (2009), during the first three years of primary school, children are still developing decoding abilities and learning how to automatise the recognition of grapheme and their translation into phonemes. After this phase, during 4<sup>th</sup> and 5<sup>th</sup> grade, children are supposed to start using reading as a tool to study and access the contents of school subjects. In other words, at this stage of their education, children switch from “learning to read” to “reading to learn”. Monitoring how effectively students at this age manage to extract and connect information in the texts, and which strategies they employ during reading comprehension tasks is pivotal to make sure that they can successfully progress in their education with the appropriate tools to face more challenging texts.

Another fundamental feature that our study aims to investigate is how young speakers of L2 Italian manage to represent and process Italian, and how this can affect their reading comprehension abilities. To do so, we decided to focus primarily on the most representative group of L2 Italian students in Italian schools, hence second-generation immigrants. With this term, we refer to all those children who were born in Italy from foreign parents (on the sociological definition of ‘second-generation immigrants’, see Crul & Vermeulen, 2003; Crul, Lelie, & Schneider, 2012). Moreover, we decided that students who were born abroad but entirely educated in the Italian school system were also going to be included in the study.

As presented in chapter 1, the number of students with immigrant backgrounds in Italian schools has been increasing in recent years and, according to the national report published by the MIUR (Ministero dell’Istruzione, Università e Ricerca - Italian Ministry of Education, Universities and Research, 2021), in the school year 2019/2020, they constituted 10.3% of the student population in Italy. The majority of these students are second-generation immigrants; thus, they have been exposed to Italian since the earliest stages of their childhood and began their

education in Italy, either in nursery school or preschool. Hence, second-generation immigrant students are exposed to a vast amount of input in Italian, and they often have developed literacy only in their L2. Consequently, their societal language is likely to become their dominant language. However, even if their exposure to Italian can be quantitatively high, home literacy practices in both heritage and societal language are strictly connected to the parents' proficiency in these languages (Quiroz et al., 2010) which can also affect the exposure that language minority children receive in formal or more technical language varieties. Consequently, at the early stages of their education, they may still encounter more difficulties than their monolingual peers, especially when more complicated varieties of Italian, i.e., *Italstudio*, are considered.

Among the students who participated, there were also 7 children who had only recently arrived in Italy. Their proficiency in Italian varied considerably and they were all also attending specific classes of L2 Italian separately from the rest of their class. Among first-generation immigrant students, eight were also newly arrived, thus they were not included in the statistical analysis, with the exception of subject 142, who began her education in Italy and, therefore, corresponded to the inclusion criteria we established. Nevertheless, first generation immigrant students who had their parents' consent also took part to the data collection with their peers to avoid making them feel excluded. However, their data were not analysed. When their proficiency in Italian was very low, we only administered part of the tasks in order to avoid creating a stressful environment for them and unnecessarily prolonging the duration of the experimental sessions.

As mentioned before, the focus of the study was on typically developing children. Students whose development was atypical and whose parents had nonetheless consented to let their children participate in the study, were still included during the data collection phase but not in the statistical analysis. Among the students, some were diagnosed with developmental dyslexia, and some had slow reading times in the word and nonword reading task. More specifically, following Zoccolotti et al. (2005) recommendations, when the raw score was two or more standard deviations below the mean value in at least four out of the six categories included in the test, participants were considered as having decoding difficulties

that may correspond to dyslexia. This was the case of 13 children, whose decoding difficulties might have affected their performance both in the Self-Paced Reading Tasks and the reading comprehension activities.

Five participants had Special Educational Needs and were following a parallel school programme specifically tailored to respond to their difficulties. As mentioned above, these students had the chance to take part in at least to some of the activities of the experimental sessions, but often did not complete all tasks. In particular, the SPRTs sometimes was too complicated, demanding, and long for them, thus they were told they could stop it at any moment when they did not like it anymore. Moreover, 24 participants could not be included in the data analysis since they did not fill in the questionnaire and thus it was not possible to calculate their Traditional Length of Exposure index. Finally, one participant was also excluded from the statistical analyses because he repeated two years during primary school, hence he was two years older than the others.

## **6.2 Procedure and Covid-19 measures**

All the students took part in two individual experimental sessions which lasted 45-55 minutes. Since data collection took place during school time, at least a couple of weeks occurred between the two meetings to avoid that the students missed two classes in a short period of time.

I carried out most of the data collection by myself, with the exception of the month of April during which a master's student of the LM-39 in Linguistics helped administer the tasks. Before joining data collection, the master's student attended three meetings during which he was introduced to the theoretical background of the study and to the tasks proposed to the participants.

In order to make the participants feel more comfortable, experimenters and participants started by introducing themselves to each other and chatting a little bit about school subjects, books, or sports they liked and the languages they spoke. Afterwards, the students heard a short presentation of the project and of the tasks they were going to take part in during the session. In particular, they were told that they were going to take part in a study about reading comprehension and that they

were going to participate in different activities related to the Italian language and reading. The experimenters never referred to the tasks with the term “test” to avoid making the children feel stressed. Moreover, all the participants were reassured that their performance during these activities were not going to be graded and that they would not affect their school marks. The experimenters took note of how the session developed to monitor whether there were tasks that were more complicated than others, whether any external interruptions occurred, or whether the participants asked to have a break.

The first session included three standardized preliminary tasks and one Self-Paced Reading Task. More specifically, the first activity presented to the students was the Raven’s Colored Progressive Matrices test (*CPM*) to measure their non-verbal intelligence. After that, the participants were administered a word and non-word reading task (Zoccolotti, De Luca, Di Filippo, & Spinelli, 2005) to detect whether they experienced decoding difficulties. The Italian version of the Peabody Picture Vocabulary Test (*PPVT*, Stella, Pizzioli, & Tressoldi, 2000) was administered to estimate the children’s receptive vocabulary and, at the end of the session, they completed the SPRT that investigated the on-line processing of morphological cues.

The second session consisted of two SPRTs and one more standardized preliminary task. The students began with the SPRT that investigated how the plausibility of a context influences the correct interpretation of a sentence. Afterwards, to give them a break from staring at the computer screen, the Italian version of the Test for Reception of Grammar (*TROG*, Suraniti, Ferri, & Neri, 2009) was administered. Finally, the session concluded with the third and last SPRT that focuses on lexical access. Breaks were offered between the administration of the different tasks. Moreover, children were encouraged to take a break half-way through each of the SPRTs or when they felt like they needed a rest.

During the two experimental sessions, a tablet and laptops were used. The children used the tablet to see the items of the Raven’s *CPM* test, the *PPVT*, and *TROG*. As far as the word and non-word reading tasks are concerned, they read the lists of items from paper and, finally, they completed the SPRTs on a laptop computer. All the sessions took place in a quiet room of the school.

Since the main focus of the study was to assess reading comprehension, all the participants concluded the experimental phase by taking two text comprehension tasks which were selected from the standardised “*Prove MT – classi 3-4-5 primaria*” which have been developed for children attending Grade 3-4-5 of the primary school (Cornoldi et al., 2017). In this case, the administration of the tasks was not done individually, but texts were presented to the whole class by their teachers during a regular lesson. Participants completed the first comprehension task during the last weeks of data collection, whereas the second one was administered in the last days of school, when the experimental groups had already taken part in and completed the pedagogical intervention.

Due to the Sars-CoV-2 pandemic, there were strict guidelines that had to be followed during testing. First of all, students and experimenters were required to always wear a facemask. More specifically, the experimenters had to wear a disposable FFP-2 facemask, whereas children could wear either a disposable surgical or reusable cloth masks. Tables and chairs in the rooms were placed in a way that ensured at least 1 metre of distance between people. The children were offered sanitizing gel as soon as they entered the room, and, finally, all surfaces and the electronic devices were sanitized with a disinfectant spray at the beginning and at the end of each individual session. The pandemic influenced the way in which data collection was carried out. This had consequences also on the pedagogical intervention that, initially, was supposed to be longer, but had to be adapted to only four meetings.

### **6.3 Reading comprehension: Prove MT**

To investigate children’s reading comprehension skills, we selected a standardised measure, namely *Prove MT – classi 3-4-5 primaria* (“MT tasks – grades 3, 4, 5 primary school”, Cornoldi et al., 2017) and, in particular, the texts called *Indagine approfondita* (“detailed investigations”). The materials proposed in the *Prove MT* are organised per grade and they aim to assess students’ abilities to analyse texts, reflect about their content. Moreover, the materials included in the

manuals also contain exercises aimed to promote the development of effective strategies to improve reading comprehension.

Differently from the previous tasks, the administration of the reading comprehension tasks was not carried out in individual sessions. Participants were presented with these tests in class, during a regular school lesson. The texts contained between 300 and 400 words, and students could read them at their own pace. After that, they answered 14 multiple choice questions (with four options) that addressed different aspects of comprehension that will be presented below. During the test, students could check the text multiple times while answering the questions. The children were administered two tests of the *Indagine approfondita* for the grade they were attending. We chose the texts included in this section of the *Prove MT* because they included more questions that addressed several aspects of comprehension, as it will be described in more detail below. The students completed the first task during the first part of data collection, when individual sessions were also taking place, and the second one during the last days of the school year, after receiving the pedagogical intervention.

A total of four texts of the *Prove MT* were used to assess the reading comprehension skills of the participants. The texts developed for students attending 4<sup>th</sup> grade were *Voglia di giocare* (“The will to play”) *Il Panda* (“The Panda”), whereas 5<sup>th</sup> graders were presented with the texts *Omar e Hamed* and *L’orso bianco* (“The polar bear”). We decided to use both texts included in the *Indagine approfondita* (“thorough investigation”) in order to assess the students’ comprehension abilities of texts of different genres. The first text for each grade belonged to the narrative genre, whereas the second ones were descriptive/explanatory texts. The tests called *Il panda* and *L’orso bianco* contained a lexicon that was more specialised, thus the variety used was closer to *Italstudio*. The children found these last texts more difficult than the previous ones. The selected texts and the questions have been reported in Appendix C.

In the following table (6.1) I summarise the competences and abilities that were investigated by each question of all the four texts that were administered, before I provide the translation of the definition that Cornoldi and colleagues (2017) give for each specific ability.



Table 6.1: competences investigated in the texts of the *Indagine approfondita (Prove MT)*.

	1	2	3	4	5	6	7
<i>Voglia di Giocare</i>	PLT	IL	IS	SL	FLESS	EI	FS
<i>Il Panda</i>	IL	EI-FLESS	SS	FLESS	IL	E	PLT
<i>Omar e Hamed</i>	PLT	IL	FS	FLESS-SL	IS	PLT	SS
<i>L'Orso Bianco</i>	FLESS	SS	FLESS	PLT	FLESS-IL	IS	FLESS
	8	9	10	11	12	13	14
<i>Voglia di Giocare</i>	IS	FLESS	SS	FS	FS	IS	GT
<i>Il Panda</i>	FLESS	FLESS	EI	IS	IS	GT	SENS
<i>Omar e Hamed</i>	FLESS	FLESS	FS	GT	EI	IS	SENS
<i>L'Orso Bianco</i>	FLESS	SL	SL	EI	IL	FS	FS

**PLT** (*personaggi, luoghi, tempo* – characters, places, time): being able to identify the characters of the story, their roles, the places where the story unfolds, and its time and duration.

**FS** (*fatti, sequenze* – facts, sequences): being able to distinguish actions and events, recognising the inner reactions of a character, understanding what that character might think or feel with respect to the situations described in the text.

**SS** (*struttura sintattica del periodo* – syntactic structure of the period): being able to identify the syntactic structures contained in the sentence.

**IL** (*inferenza lessicale* – lexical inference): being able to infer the meaning of words thanks to the context and one's previous knowledge.

**IS** (*inferenza semantica* – semantic inference): being able to use one's prior knowledge or the context to infer details that are not explicitly mentioned in the text.

**COLL** (*fare collegamenti* – connecting): being able to connect elements of the text that might be far from each other in the text but that refer to the same objects, characters or situations.

**SL** (*significato letterale* – literal meaning): being able to repeat or elaborate on a concept with different words.

**FLESS** (*flessibilità* – flexibility): being able to use the information contained in the text to perform different tasks.

**GT** (*gerarchia del testo* – textual hierarchy): being able to assign different importance to the elements of the text and organize them hierarchically.

**SENS** (*sensibilità al testo* – sensitivity to the text): being able to identify the different parts of the text and to recognise the structural schemes of different texts using the hints presented in the text

**MM** (*modelli mentali* – mental models): being able to extract the most relevant pieces of information from the text, connect them with one's prior knowledge to achieve a complete and coherent representation of the content of the text.

**EI** (*errori e incongruenze* – errors and incongruences): being able to detect incoherent passages using the information contained in the text, to reconsider previous interpretations about the content of the text, and to formulate new hypotheses about its interpretations.

The results of the *Prove MT* were standardised in z-scores using the normative data provided in the textbook presenting the tests and considering the child's total score in the two tests.

#### **6.4 Linguistic and non-linguistic measures**

As shown in the previous subsection, before assessing the participants' language processing abilities by means of the SPRT, four preliminary standardised tasks were administered with the intention of testing the skills on general cognitive and language tasks. The administration of these standardised tasks was essential to investigate the role played by these abilities as predictors of reading comprehension. Moreover, the outcomes of the preliminary tasks will show to what extent the group of participants could be characterised as homogeneous and, thus, whether their performances in the other experiments can be compared. At this stage, it is of fundamental importance to adopt measures that are standardised in order to compare the scores of the participants to those provided by the normative data of national evaluations.

As mentioned in section 6.2, we assessed the students' linguistic and non-linguistic abilities. To do so, we selected the Raven's Colored Progressive Matrices test (*CPM*, Belacchi et al., 2008) to evaluate the students' general intelligence, the *Prova di lettura di parole e non parole* (Zoccolotti et al., 2005) to assess the children's decoding abilities, the Italian version of the Peabody Picture Vocabulary Test (*PPVT*, Stella et al., 2000) was used to measure receptive vocabulary, and the Test for Reception of Grammar (*TROG-2*, Suraniti et al., 2009) was chosen to examine receptive grammar knowledge. In this section, I will describe the structure, the aims, and the method of administration of each of these tasks.

#### 6.4.1 *Non-verbal Intelligence: Raven's Colored Progressive Matrices*

The Raven's Colored Progressive Matrices (*CPM* hereafter) is a task developed by John C. Raven in 1947 and is one of the most commonly used measures to assess non-verbal intelligence. The series of *CPM* that were developed for children from 5 to 11 years old consist of 36 stimuli which are divided into 3 series of 12 stimuli each (i.e., A, AB, and B). The validity of this task is acknowledged both because of the way in which non-verbal problem-solving situations and logical reasoning abilities are tested, and also by the fact that it is accepted as a cultural and language free measure. Moreover, the administration of the Raven's test is simple, which makes it ideal to use with children (Belacchi et al., 2008).

The stimuli present rectangular and coloured images with a blank space. Below each stimulus there are six different smaller figures that display a pattern similar to the one of the main illustrations. Only one of the alternatives completes the target image perfectly, and the participants are assigned one point every time they choose the correct option.

Each sequence investigates different logic skills. In the first series, the recognition of identity is assessed, in the second one, children's ability to perceive symmetry is tested, and, finally, the third sequence measures the participants' conceptual thinking capacity. The difficulty of stimuli and series increases from

sequence to sequence, but the colours help keep the children's attention and make the task more pleasant, especially for very young participants.

The CPM was administered individually using a tablet. Students were presented with item A<sub>1</sub>, and the experimenter introduced the task saying that they were going to see a series of coloured images that had a missing part and they had to find which of the six options below completed the bigger image perfectly. If the answer to the first item was not correct, the experimenter would give the participant feedback on their choice and explain the problem another time to try and make them re-analyse the options in order to find the correct missing part. During the task, the participants would look at the matrices on the screen of the tablet, point at the tile they selected, and then proceed to the following item. The experimenter kept track of the answers on a laptop and did not give any other feedback about the correctness of the answers. The participants were assigned one point for each correct answer. I refer the reader to the Italian standardisation (Belacchi et al., 2008) for the computation of both percentile and z-scores.

#### 6.4.2 *Reading Abilities: decoding words and non-words*

Before studying reading comprehension, it is crucial to verify that possible obstacles encountered by pupils do not arise from decoding difficulties and reading disorders such as developmental dyslexia. Assessing whether participants have a typical development in reading abilities, in fact, helps distinguishing between “struggling readers” and “poor comprehenders” (Cain & Oakhill, 1999).

In order to investigate the children's decoding abilities during reading, we administered two tasks selected from the *Prova di lettura di parole e non-parole* that were developed to recognise potential difficulties in the translation of graphemes into phonemes (Zoccolotti et al., 2005). The selected task consisted of two lists of non-words and four lists of words. Each one of the six lists contained 30 items.

At the beginning of the task, the experimenter introduced the activity to the participants explaining that they were going to read aloud some words trying to be as fast and as accurate as possible. Moreover, they were told that the stimuli of the

first three lists were invented words, so they did not really exist in Italian. Each list was printed on paper and showed to the participants only when they were ready to start reading. While the student was reading, the experimenter kept track of the time using a stopwatch and marked on the scoresheet the errors made by the reader. Children were first presented with the non-words trial sheet and read it to get accustomed to the task. Once all the non-words had been read, the participants received the words trial sheet. The items in the word lists were divided according to two features, namely length and frequency. The remaining lists, thus, included: (i) short and frequent words, (ii) long and frequent words, (iii) short and non-frequent words, and (iv) long and non-frequent words.

Controlling for frequency is crucial as Burani, Marcolini, and Stella (2002) show a clear effect of frequency on reading speed can already be observed in pupils attending 3<sup>rd</sup> grade. Moreover, as far as Italian is concerned, length also has an effect on reading speed that can be recognised even in the adult population, although the influence is not as strong as the one detected in children (Barca, Burani, Arduino, 2002; Bates, Burani, D'Amico, & Barca, 2001). When we consider the student populations, as it is shown by Zoccolotti and colleagues (2005), the effect of word length on reading speed becomes progressively smaller with age. However, in those cases in which a reading disorder is diagnosed, word length affects the reading performance considerably (Judica, De Luca, Spinelli, & Zoccolotti, 2002; Zoccolotti, De Luca, Di Pace, Gasperini, Judica, & Spinelli, 2005).

After the administration of the task, the z-scores for speed and accuracy were calculated to verify whether there were participants that should be excluded due to reading decoding difficulties. As suggested in the guidelines of the *Prova di lettura di parole e non-parole*, participants whose performances were more than 2 *SD* below the average reported by Zoccolotti and colleagues (2005) for the correspondent grade were considered poor readers and were not included in the final analysis of the data (see 6.1.3 “Inclusion criteria”).

#### 6.4.3 *Receptive vocabulary: Peabody Pictures Vocabulary Test*

The participants' vocabulary knowledge was assessed using the Italian adaptation of the American Peabody Picture Vocabulary Test (Stella, Pizzioli, & Tressoldi, 2000). Thanks to this test it is possible to estimate the children's receptive vocabulary of standard Italian. The performance at this task, in fact, can be influenced by different factors, such as the cultural environment to which students are exposed, and it varies considerably over time, since children are constantly exposed to new words in their every-day life (Bialystok, Luk, Kwan, 2005). However, even if the PPVT does not provide a static picture of the verbal competences of the participants, it is important to include it among the preliminary tasks because it allows us to have a clearer picture of their proficiency in Italian.

The PPVT consists of 175 tables with four numbered black and white pictures. The target word for each table corresponds to one of the pictures and the others are distractors. The experimenter reads aloud the target word to the participant who will point to or will say the number of the picture they consider correct. The starting point of the PPVT changes according to the age of the subject. The items, in fact, are ordered according to their age-specific complexity in order to avoid making the task too easy or too difficult for the subjects (Dunn & Dunn, 1981). At the end of the session, the raw score can be calculated by subtracting the number of errors from the ceiling. Finally, by matching the raw score to the age of the subject in the standardized tables of conversion, the vocabulary score can be obtained.

#### 6.4.4 *Receptive Grammar: TROG-2*

To evaluate the participants' knowledge of grammatical structures, we administered the Test for the Reception of Grammar (Bishop, 2003; Italian adaptation: Suraniti, Ferri, & Neri, 2009). Thanks to this task it is possible to examine pupils' performances both from a quantitative and a qualitative point of view. The outcomes, in fact, allow us to compare the performance of a subject with

respect to the mean scores of the peers of his age and, furthermore, we can also determine difficulties related to specific structures.

The administration of this task is similar to that of the PPVT: subjects are shown up to 80 tables containing four images. Each table corresponds to a target sentence that the experimenter reads aloud to the participant who will indicate the correct image among the four alternatives. The items are divided into 20 blocks of four sentences that display several grammar structures which become increasingly more difficult. Each subject does not have to be presented with all the items since age-specific starting points are suggested in the guidelines of TROG. According to the original guidelines (Bishop, 1982), to pass a block, the subject had to answer correctly to all four items. On the other hand, Suraniti et al. (2009) proposed a different scoring method in which a block is considered failed with two or more mistakes. For this study, we adopted the method suggested by Suraniti and colleagues. We also kept track of the number of blocks where the participants answered correctly to all the items, thus, at the end of the administration we obtained two raw scores for each child: one referred to total amount of correct answers and the other one to the number of blocks without any mistakes. Lastly, following the guidelines for the transformation of scores provided by Suraniti et al. (2009), the raw scores by item were standardised in percentile scores.

## **6.5 *Self-Paced Reading Tasks***

In this section, I will present the experimental tasks that have been developed to assess the participants' on-line processing abilities of specific structures according to three conditions that allow us to delineate a picture of the L2 students' grammar knowledge and representation of Italian. I will describe the design of the three SPRTs that were administered to the participants and provide examples for each condition that was investigated.

### 6.5.1 Development of the experiments and administration

The SPRTs that were presented to the participants of this study were developed following the *linear, moving window* display. The adoption of this alternative was preferred because it recreated the most natural reading environment while allowing children to focus only on one segment at a time.

At the beginning of each sentence, there was a cue, hence a fixation dot that was placed on the left of the screen where the first segment would then appear. Normally, the fixation dot should disappear automatically, but in this case, it had to be removed by a button press, just like any other segment of the sentences. This choice was motivated by the young age of the participants. Removing the fixation dot by pressing a key, in fact, allowed them to regain focus and to make sure that there were reliable reading times in correspondence of the first area.

Every SPRTs displayed two lists that contained the same number of items that we created for this study (64). Half of the stimuli of each list were experimental items and the other half consisted of filler sentences. The experimental items displayed four types of grammatical constructions, i.e., object relative clauses and passive voice, whereas subject relative clauses and simple SVO sentences were fillers. As mentioned in chapter 1, we included object relative clauses and sentences displaying passive voice because of their complexity. Moreover, they are mostly found in textbooks, thus they belong to the *Italstudio* register. Subject relative clauses and SVO sentences constituted the filler structures of the tasks. As will be described in the following section, we manipulated the sentences to investigate how morphological, pragmatic, and semantic information is perceived and processed during reading.

We followed the recommendation about the numbers of items that should be included in a SPRT (Jegersky, 2014), and created 16 items for each structure: 8 items displayed a base condition and 8 items displayed the manipulation we aimed to investigate. The items that in List A presented the base condition, displayed the manipulated condition in List B and vice versa. Participants were randomly assigned to one of the lists. As suggested in literature, the number of stimuli per condition should be between eight and twelve (Jegersky, 2014). Moreover, the task



should include the same number of target stimuli and fillers. Thus, in our tasks, we used the minimum number of stimuli per conditions recommended. Once again, this was motivated by the young age of the children. The total amount of stimuli, in fact, was quite high for children and we wanted to avoid presenting them with too long tasks that could become too tiring and boring.

All the stimuli within each grammatical structure were built using the same structure and using only the simple present tense. Moreover, each experimental structure and its correspondent filler were built following a word order that was as similar as possible. The words used for the development of these sentences were controlled by frequency using the CoLFIS (*Corpus e Lessico di Frequenza dell'Italiano Scritto*, “Corpus and Frequency Lexicon of Written Italian”, Bertinetto, Burani, Laudanna, Marconi, Ratti, Rolando, & Thornton, 2005). More specifically, we used only words that had an absolute frequency logarithm higher than 1.00. We wanted to include only words that were highly recognisable by children in order to avoid difficulties during processing that were not caused by the grammatical structures investigated. In the paragraphs below, I will describe what elements composed each type of stimuli, how many words they contained, and how they were divided into segments for the task providing one example per grammatical structure. A more detailed description of how the items of the different conditions were created will be provided in their dedicated sections (see 6.5.2 “Conditions investigated”).

**Subject relative clauses.** All subject relative clauses contained eight words and displayed a DP, the relative pronoun, the verb of the subordinate clause, another DP, and the verb of the main clause, which was always the verb *to be* in the 3<sup>rd</sup> person singular followed by an adjective. The sentences were divided into five segments, as shown in the following example:

(1)

1	2	3	4	5
La bambina	che	disturba	la compagna	è vivace
<i>The girl</i>	<i>that</i>	<i>disturbs</i>	<i>the classmate</i>	<i>is lively</i>

**Object relative clauses.** All object relative clauses mirrored the composition of subject relative clauses as much as possible, thus, the only difference was the position of the verb of the subordinate clause, which was displayed in the 4<sup>th</sup> segment and not in the 3<sup>rd</sup> one. The order was: DP, relative pronoun, DP, verb of the subordinate clause, verb *to be* and adjective. As for subject relative clauses, the sentence was divided into five segments:

(2)

1	2	3	4	5
Il pasticcere	che	il cliente	ringrazia	è soddisfatto
<i>The pastry chef</i>	<i>that</i>	<i>the costumer</i>	<i>thanks</i>	<i>is satisfied</i>

**Passive voice.** Differently from the stimuli containing relative clauses, the sentences displaying the passive voice were divided into four segments. The first one contained a DP, the second one showed the verb cluster made of the auxiliary verb *venire* and another verb, the third segment displayed the PP with the agent of the action described, and lastly there was another adjunct PP. All sentences contained either eight or nine words. The only possible variation occurred in the last segment where, in some cases, there was also an article between the preposition and the noun:

(3)

1	2	3	4
Il fiorista	viene aiutato	dal postino	nel negozio
<i>The florist</i>	<i>is helped</i>	<i>by the postman</i>	<i>in the shop</i>

**SVO.** Since the SVO stimuli served as fillers for the passive voice, they were also divided into four segments and displayed the same construction. The only difference occurred in the verb because, in this case, the verb was in the base form without auxiliary. All items included 7 or 8 words. As for the stimuli with the passive voice, variation could only potentially occur in the last segment and depended on the presence or absence of an article between preposition and noun:

(4)

1	2	3	4
Il calciatore	applaude	il compagno	dopo il gol
<i>The football player</i>	<i>applauds</i>	<i>the teammate</i>	<i>after the goal</i>

Because the risk that researchers encounter when they administer a SPRT is that participants stop paying attention to what they read and just press the buttons as fast as possible to reach the end of the sentence, distractor questions are added after some or all of the items, to ensure that the participants' attention is engaged from the beginning to the end. We preferred to have a comprehension question after every item. There were two main reasons for this choice. First of all, by adding a question after every stimulus, instead of only after the target items, we did not give any hint about which phenomena were investigated during the task. Furthermore, the outcomes of the answers to these questions allowed us to monitor the participants' attention during the task. To avoid making the distractors too demanding, there were only yes/no questions that could investigate either the correct interpretation of the sentence, i.e., "Does the tourist help the baker?" or that simply asked the participant to remember information that was mentioned in the stimulus, i.e., "Was the tourist in the square?". As shown by these two examples, not all questions directly investigated the correct interpretation of the grammatical structure. Once again, we decided to include different types of questions to avoid disclosing the goal of the task to the participants.

The three SPRTs were developed using OpenSesame, a software that allowed us to automatically collect data about the reading times for each area of the sentence and the scores for accuracy from the answers to the control questions. Each task had a duration that varied between 12 and 20 minutes, depending on the reading speed of the participants and whether they wanted to take a break halfway through the task. The items were manually randomised to avoid that the sentences displaying the same condition or structure occurred too many times in a row.

Before the administration of the task, the students were told they were going to be presented with an activity about reading comprehension during which they were going to read some sentences and answer to a yes/no question after each sentence. After that, the experimenter added that the peculiarity of the activity was

that the sentences were divided into smaller parts; they could read only one part at a time, and they had to press the “M” button on the keyboard to move further. The children were encouraged to read at their natural pace, but they were also reminded that it was not possible to move backwards, thus they should not press “M” so fast that they did not have time enough to read the sentence. Moreover, they were reassured that both sentences and questions were quite short, so they did not need to spend too much time on each segment to memorise it. Finally, a short video demonstrating a simulation of the task was shown to the students before playing it on OpenSesame. As this activity might be more tiring and demanding for some students, they were also reminded during the instructions that they could take a break halfway through the task or when they felt they needed to rest. When the items were displayed, the participants could only see the words and the hashtags, and no other information was on the screen to avoid distractions, as exemplified below in (5).

(5)

Il calciatore ##### ## ##### ##### ## ###  
 ## ##### applaude ## ##### ##### ## ###  
 ## ##### ##### il compagno ##### ## ###  
 ## ##### ##### ## ##### dopo il gol

However, above each question, they could see the number corresponding to the item they were at, thus they always knew how far they were through the task. As I mentioned above, the total number of items was 64 so, during the instructions, the experimenter suggested they could take a break when they reached question number 32, but that they could also take a break at other times, if they needed to. Moreover, if they felt the activity was too difficult or tiring, they were also told they could ask to interrupt it. Many students did not even feel they needed a break and just continued until the end of the stimuli. In few cases, however, they asked to stop twice. Only in two cases (subjects 55 and 116), the participants asked to interrupt the task because looking at the screen to read was too tiring for their eyes. Furthermore, some subjects completed only some of the three SPRTs.

### 6.5.2 *Conditions investigated*

In this section, I will present in more detail the conditions and the items that were created for the SPRTs with reference to the literature and the questions they investigated.

#### *Morphological condition*

The first SPRT that was administered to the participants aimed to investigate if both monolingual and bilingual students processed morphological information automatically during reading. According to the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018), in fact, L2 speakers would not display the same deep implicit grammar representation as native speakers and, thus, they might not manage to exploit the morphosyntactic information contained automatically as their peers do. Starting from these premises, our goal was to investigate whether both groups of students could efficiently process morphological information that would facilitate the correct sentence interpretation. To ensure this, half of the items of the SPRT contained a morphological cue that helped assigning the correct roles to the characters involved in the actions described by the sentences.

The verbs used to develop the items were all transitive verbs describing reversible actions. We selected these verbs because they allowed us to make use of subject and object arguments that could be assigned either the role of agent or of patient. All the items that belonged to this experiment had two versions, one was called the “base” (B) and the other one was the “morphological” (M) condition. In the latter version, the second DP of the sentence, thus the embedded subject of the relative clause, was presented in the plural form, whereas in the former version, both DPs were singular. This manipulation allowed us to verify whether students managed to rely on morphological cues, when they are available, in order to interpret the sentence and assign the roles to the DPs correctly, since the number mismatch provides useful information to disambiguate the meaning of the sentence. Moreover, to observe the role of morphological clues in sentence processing (and on pupils’ ability to assign syntactic roles), we needed to control for pragmatic clues

which could favour a specific interpretation. For this reason, we have carefully controlled that the referents of the subject and object DPs had the same probability of performing the action expressed by the reversible verb. This way, the students could not infer who was the agent using non-morphological information. The control of this aspect was fundamental to make sure that subjects were relying on the morphological cues and not on other kind of information when they interpreted the sentences. The following examples show one item per structure in its two versions:

(6) **Subject relative clause**

B. La bambina che disturba **la compagna** è vivace.

*The girl that disturbs the classmate is lively.*

M. La bambina che disturba **le compagne** è vivace

*The girl that disturbs the classmates is lively.*

(7) **Object relative clause**

B. Il pasticcere che **il cliente ringrazia** è soddisfatto.

*The pastry chef that the client thanks is satisfied.*

M. Il pasticcere che **i clienti ringraziano** è soddisfatto.

*The pastry chef that the clients thank is satisfied.*

(8) **Passive voice**

B. Il fiorista viene aiutato **dal postino** nel negozio

*The florist is helped by the postman in the shop.*

M. Il fiorista viene aiutato **dai postini** nel negozio.

*The florist is helped by the postmen in the shop.*

(9) **SVO**

B. Il calciatore applaude **il compagno** dopo il gol.

*The football player applauds the teammate after the goal.*

M. Il calciatore applaude **i compagni** dopo il gol.

*The football player applauds the teammates after the goal.*

Every item was presented only once either in list A or B, which means that each student could read only one of the two versions, according to the list they were randomly assigned to.

Let us take a closer look at the items. When we consider object relative clauses, which was one of the target grammatical structures that we investigated, we can see that the plural form used in condition M (*Il pasticcere che i clienti ringraziano è soddisfatto*) works as a disambiguating cue and helps understand who is performing the action of thanking and who is thanked. On the other hand, a sentence like *Il pasticcere che il cliente ringrazia è soddisfatto*, where both DPs display the same number feature, could be more easily mis-interpreted as an SOV construction in which the pastry chef is both satisfied and the one thanking the client (Volpato, 2010). The outcomes of a study conducted by Utzeri (2006) showed that children encounter difficulties when they had to interpret object relative clauses. In order to overcome the ambiguity created by the presence of two singular DPs, Italian speakers seem to have developed a higher sensitivity to the morphological cues expressing number (Bates et al., 1999). The analysis of the reading times in the area following the first occurrence of the plural, i.e., segment 4 of the sentence, will reveal if children were sensitive to the importance of the plural morphological cue and the following predictions are put forward:

- If the morphological cue is successfully detected, the corresponding reading times should be longer than in the base condition. Area 4 in object relative clauses corresponds to the place where readers are expected to notice a perspective shift to interpret the sentence correctly (MacWhinney, 1982).
- If the morphological information is used by the participants, they should also be more accurate when they answer the distractor questions related to condition M.

The morphological cue that contains the number feature is also expected to facilitate the interpretation of the sentences displaying the passive voice. In this case, in fact, the agreement between the subject and the verb will simplify the assignment of the  $\theta$ -roles to the characters referred to by the DPs.

Finally, subject relative clauses and SVO sentences should not display any difference between groups nor between conditions because in these structures, the morphological cue is not relevant to the correct interpretation of the sentence. Moreover, the higher frequency with which students hear, read, and produce these two structures makes them less demanding in terms of processing costs for both groups. On the other hand, since object relative clauses and sentences with the passive voice are less frequently produced, especially by L2 speakers (on the production of the passive voice in L2 Italian learners, see Franciotti, 2016) and they are encountered mostly in texts that require a higher proficiency in the academic variety of language (on CALP, see Cummins, 1979; 2001). Hence, because of these characteristics, they should be more cognitively demanding during processing.

#### *Pragmatic condition*

The second SPRT that was administered to the participants focused on a different aspect of language that may influence L2 language comprehension, namely the role of event probability during the interpretation of sentences. As we discussed in chapter 4 about L2 processing, VanPatten's Input Processing Hypothesis argues that during L2 processing, learners tend to rely on content words to a larger extent than L1 speakers and, thus, the semantic and pragmatic information is processed more readily than syntactic information. Van Patten proposes two principles of L2 processing, namely The Primacy of Meaning and The First-Noun Principle. In the latter, VanPatten analyses the so-called Even Probability Principle, thus how the probability that an event will happen may influence sentence processing and interpretation.

To investigate how event probability affects the processing of Italian by bilingual children, we developed a SPRT that had the same structure as the one previously described, but in which one character was more likely to be the agent of the action described. The base condition (B) displayed a sentence in which the more-likely agent actually received the  $\theta$ -role of agent. On the other hand, in the manipulated condition (P), the participants encountered a pragmatically implausible situation in which the character that was more likely to be the patient of the action was the agent, as we can see in the following examples:



**(10) Subject relative clause**

B. La signora che rimprovera la bambina è severa.

*The lady that reprimands the girl is stern.*

P. La bambina che rimprovera la signora è severa.

*The girl that reprimands the lady is stern.*

**(11) Object relative clause**

B. La ragazza che il pirata spaventa è impaurita.

*The girl that the pirate scares is satisfied.*

P. Il pirata che la ragazza spaventa è impaurito.

*The pirate that the girl scares is terrified.*

**(12) Passive voice**

B. Il signore viene spruzzato dall'elefante allo zoo.

*The man is sprayed by the elephant at the zoo.*

P. L'elefante viene spruzzato dal signore allo zoo.

*The elephant is sprayed by the man at the zoo.*

**(13) SVO**

B. Il preside chiama il ragazzo nell'ufficio.

*The headmaster calls the boy to the office.*

P. Il ragazzo chiama il preside nell'ufficio.

*The boy calls the headmaster to the office.*

The “pragmatic” (P) condition should be more demanding in terms of processing with respect to the base condition, especially for the bilingual participants. However, the expectation is to find an even stronger interference of the Event Probability Principle in the object relative clauses and in the sentences with the passive voice. In these cases, in fact, given VanPatten’s claims (2004; 2014), bilingual students might resort to “what is more likely to happen” as a strategy for interpreting the sentences instead of managing to automatically process the hierarchical relations between the constituents that are expressed in the syntax.

Given this premises, we expect to observe that:

- Accuracy will be higher in the base condition than in the pragmatic manipulation.
- The distracting effect of the violation of event probabilities will be particularly strong for the stimuli presenting the passive voice, due to the influence of the First Noun Principle (learners may be prone to rely on the correspondence between subject and agent that is frequently found in language productions).
- Reading times in condition P should result in longer reading times in the areas where the implausibility appears.

#### *Semantic condition*

Finally, the third SPRT that was administered as a sort of baseline and we do not expect to observe significant difference between L1 and L2 children. As it was mentioned before, when we take the Primacy of Meaning Principle (VanPatten, 2014) into consideration, we find that during L2 processing, speakers rely more than native speakers on semantic cues than on its syntactic structure of the sentence. Based on the fact that lexical items are more readily processed, we created an experiment to test the participants' ability to detect a semantic violation in the sentences. For this SPRT, we selected transitive verbs that select specific kinds of semantic arguments for the lexical item of the second DP. In the base condition (B), the lexical expectation is met, whereas in the manipulated condition (V) the second element occupying the second DP creates a semantic incongruence. Here are some examples for each structure investigated:

#### **(14) Subject relative clause**

B. Il pittore che dipinge il quadro è talentuoso.

*The painter that paints the picture is talented.*

V. Il pittore che dipinge il computer è talentuoso.

*The painter that paints the computer is talented.*

(15) **Object relative clause**

B. La cartolina che il bambino spedisce è colorata.

*The postcard that the child sends is colourful.*

V. La cartolina che il righello spedisce è colorata.

*The postcard that the ruler sends is colourful.*

(16) **Passive voice**

B. Il paesaggio viene ammirato **dal fotografo** al tramonto.

*The view is admired by the photographer at sunset.*

V. Il paesaggio viene ammirato **dal pennarello** al tramonto.

*The view is admired by the marker at sunset.*

(17) **SVO**

B. La commessa veste il manichino in negozio.

*The shop assistant dresses up the mannequin in the shop.*

V. La commessa veste il bicchiere in negozio.

*The shop assistant dresses up the glass in the shop.*

The predictions regarding this SPRT are the following:

- Both monolingual and bilingual students are expected to have a similar processing performance because both groups should have already mastered the ability of predicting the semantic field of the internal argument of the verb thanks to the semantic information that they already processed in the first part of the sentence.
- Accuracy should be similar in both conditions for all structures and an effect of condition should not be detected.
- Both groups are expected to display longer reading times in the areas of the sentences containing the semantically incongruent element.

Having provided an overview of the tasks that were administered in the study, let us take another look at the overarching research questions, first presented

in chapter 5, before we move on to present and discuss the results of the different tasks:

Reading comprehension:

- RQ1: Are there differences in reading comprehension and its predictors between native and second-generation immigrant students?
- RQ2: What are the best predictors of reading comprehension in monolingual and minority language bilingual students?

Language processing:

- RQ1: Are there differences between native and minority language bilingual students during language processing?
- RQ2: Do minority language bilinguals manage to process morphological cues in the same way during reading?
- RQ3: Do minority language bilingual students rely more on pragmatic or semantic information than on syntactic relations while processing Italian sentences?
- RQ4: Do minority language bilingual students process semantic violations in the same way as monolinguals?



## **7. READING COMPREHENSION AND ITS PREDICTORS: RESULTS AND DISCUSSION**

This chapter is dedicated to the presentation and the discussion of the results of the statistical analyses performed to investigate the participants' performances in reading comprehension and other tasks assessing their linguistic and non-linguistic abilities selected as predictors of reading comprehension.

In the first part of the chapter, I will discuss the outcomes regarding the tasks used to assess the participants' competences in the potential predictors of reading comprehension. Both descriptive statistics and linear regressions were used to analyse the groups' performances and see whether there were significant differences between bilingual and monolingual students.

The second section focuses on the results of tests used to study reading comprehension abilities. The same analyses were used to examine the outcomes of these tests and compare the performances of the two groups.

Furthermore, with a series of linear regressions we investigated the relationship between the potential predictors described in the first section and reading comprehension scores. During this phase, we analysed the data considering all the participants together and the two language groups separated in order to verify whether certain predictors played different roles for bilingual and monolingual students.

In order to investigate these differences further, we also ran three Random Forest analyses. We used this model to establish a hierarchy between the predictors assessed and, thus, get a clear picture of what factors are the best predictors of reading comprehension. The results of this analysis are particularly important because of the implications they can have on education. In fact, identifying which predictors play important roles during reading comprehension can help educators tailor their didactic activities towards the development and practice of more efficient strategies that the students can employ when they face reading comprehension tasks.

The findings are discussed in light of the Reading Framework System (Perfetti & Stafura, 2014) and the Component Skills Approach (Grabe & Yamashita, 2022). Moreover, implications for pedagogical activities are also presented. In particular, we discuss how the creation of activities and exercises that stimulate the development of metalinguistic awareness would support all students, and especially minority language children, in building up implicit language competences that can contribute to improving their reading comprehension abilities. The development and enhancement of the students' ability to reflect about language and achieve implicit language competences would contribute to reducing the cognitive resources that bilingual students need to employ during lower-level reading processes. As a consequence, they will have more resources available for higher-level processes and, thus, strengthen their ability to create efficient text-representation and situation models, make inferences, and monitor their performance during reading comprehension tasks.

### ***7.1 Linguistic and non-linguistic abilities***

As described in the chapter 6 “Our study”, the participants were administered four standardised tasks to assess their general language and non-verbal abilities. These tasks consisted of the Raven's Colored Progressive Matrices (Belacchi et al., 2008) which was used as a measure of non-verbal intelligence, the Prove di lettura di parole e non parole (“Word and non-word reading test” Zoccolotti, 2005), included to assess decoding abilities, the Peabody Picture Vocabulary Test (PPVT, Stella et al., 2000) which evaluates receptive vocabulary in Italian, and, finally, the Test for the Reception of Grammar (TROG, Suraniti et al., 2009), used to estimate grammar knowledge and oral comprehension of Italian. The tables below summarise the results of the descriptive analyses of non-verbal intelligence, receptive vocabulary, and receptive grammar. All the analyses were performed using R (R Core Team, 2022, version 4.2.1).

First of all, I will present the descriptive statistics of the results obtained by the participants at the tasks assessing the predictors of reading comprehension

mentioned above. After that, I will report the outcomes of the linear regressions used to compare group performances.

**General cognitive abilities.** The following table (7.1) shows the scores on the task measuring general cognitive abilities dividing the participants both by group and by the grade they attended. Moreover, the column reporting the cumulative scores refers to the mean scores and SD of bilingual and monolingual students regardless of the grade they attended. The results are presented after being standardised in z-scores, which were obtained using the national scores for the specific age groups presented in the manual of the task (Belacchi et al., 2008).

*Table 7.1 – General cognitive abilities: mean and standard deviation of z-scores.*

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>Cognitive</b>						
<b>abilities</b>	1.08	1.25	1.12	0.96	1.09	1.06
Mean	(0.59)	(0.57)	(0.41)	(0.61)	(0.53)	(0.61)
(SD)						

**Decoding abilities.** Both reading speed and reading accuracy were assessed to measure decoding abilities. The standardised measure selected for this purpose included six lists of items that the students were asked to read aloud as quickly and accurately as possible. As shown below, the tasks included: (i) short non-words (SNW), (ii) long non-words (LNW), (iii) short high-frequency words (SHW), (iv) long high-frequency words (LHW), (v) short low-frequency words (SLW), and (vi) long low-frequency words (LLW). The results reported below in table 7.2.1 are the mean and standard deviation of z-scores for reading speed. The z-scores were calculated using the normative data included in Zoccolotti et al. (2005).



Table 7.2.1 - Decoding speed: mean and standard deviation of z-scores.

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>SNW</b>						
Mean	0.91	0.91	0.56	0.74	0.78	0.80
(SD)	(0.87)	(0.82)	(0.70)	(0.88)	(0.82)	(0.86)
<b>LWN</b>						
Mean	0.63	0.47	0.44	0.59	0.56	0.55
(SD)	(1.20)	(1.08)	(0.60)	(0.75)	(1.00)	(0.87)
<b>SHW</b>						
Mean	1.72	1.58	1.12	1.28	1.48	1.39
(SD)	(0.80)	(0.89)	(0.59)	(0.90)	(0.76)	(0.90)
<b>LHW</b>						
Mean	0.95	0.91	0.50	0.89	0.77	0.90
(SD)	(0.83)	(0.92)	(0.52)	(0.59)	(0.75)	(0.72)
<b>SLW</b>						
Mean	1.10	1.00	0.86	1.01	1.00	0.78
(SD)	(1.05)	(0.90)	(0.66)	(0.87)	(0.92)	(0.87)
<b>LLW</b>						
Mean	0.70	0.74	0.29	0.81	0.54	0.78
(SD)	(1.02)	(1.04)	(0.67)	(1.01)	(0.92)	(1.01)

Furthermore, table 7.2.2 shows the descriptive analysis of z-scores for decoding accuracy. As for decoding speed, the individual scores of the participants were standardized using the normative data presented in Zoccolotti et al. (2005).

Table 7.2.2 - Decoding accuracy: mean and standard deviation of z-scores.

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>SNW</b>						
Mean	-0.44	-0.61	-0.68	-0.52	-0.54	-0.55
(SD)	(0.41)	(0.24)	(0.43)	(1.11)	(0.43)	(0.90)

<b>LWN</b>						
Mean	-0.85	-0.91	-1.09	-0.71	-0.95	-0.78
(SD)	(0.72)	(0.64)	(0.60)	(0.75)	(0.75)	(1.03)
<b>SHW</b>						
Mean	-0.57	-0.49	-0.42	-0.21	-0.50	-0.31
(SD)	(0.24)	(0.48)	(0.67)	(1.00)	(0.46)	(0.85)
<b>LHW</b>						
Mean	-0.54	-0.71	-0.51	-0.45	-0.53	-0.54
(SD)	(0.69)	(0.67)	(0.39)	(0.42)	(0.58)	(0.53)
<b>SLW</b>						
Mean	-0.74	-0.83	-0.85	-0.39	-0.78	-0.54
(SD)	(0.44)	(0.90)	(0.50)	(0.96)	(0.47)	(0.83)
<b>LLW</b>						
Mean	-0.90	-1.11	-1.25	-1.20	-1.03	-1.17
(SD)	(0.55)	(0.42)	(0.73)	(0.90)	(0.64)	(0.76)

**Receptive vocabulary.** Mean scores and standard deviation of the vocabulary scores are presented in table 7.3 below. The results concerning the receptive vocabulary task were obtained by matching the raw scores with the age group of the participants, following the tables presented in the guidelines for the administration of the task (Stella et al. 2000).

*Table 7.3 - Receptive vocabulary: mean and standard deviation scores.*

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>Receptive vocabulary</b>	99.62	108.53	91.79	106.58	96.54	107.27
Mean (SD)	(16.18)	(12.43)	(16.78)	(11.35)	(16.73)	(11.65)

**Receptive grammar.** As mentioned in chapter 6, section 3.4 about TROG, we obtained three scores for this task. Table 7.4 presents mean and standard deviation scores of raw scores by item, by block, and the percentile by item.

Table 7.4 - Receptive grammar: mean and standard deviations of scores by item, by block, and percentile by item.

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>Item</b>						
Mean	73.05	73.12	73.54	74.42	73.25	73.96
(SD)	(3.09)	(5.90)	(3.58)	(4.05)	(3.27)	(4.77)
<b>Block</b>						
Mean	15.54	15.65	16.08	16.06	15.75	15.92
(SD)	(2.14)	(3.32)	(2.34)	(2.70)	(2.22)	(2.90)
<b>Percentile</b>						
Mean	57.03	61.18	57.83	57.03	57.34	58.5
(SD)	25.04	31.05	27.50	29.89	(25.81)	(30.03)

In order to determine whether there were differences between groups in their general abilities, we used R (R Core Team, 2022, version 4.2.1) and the *stats* package to perform a series of linear regression models that included the group (bilingual or monolingual) as fixed effect and the task as dependent variable. The following tables (7.5; 7.6.1; 7.6.2; 7.7; 7.8) summarise the outcomes of the linear regressions performed to compare group performances.

**General cognitive abilities.** The results of the linear regression used to compare group performances at the *Raven's Colored Progressive Matrices* task (table 5) show that there were no significant differences between groups ( $\beta = -0.04$ ,  $SE = 0.11$ ,  $p = .73$ ), suggesting that both bilingual and monolingual participants have similar general cognitive abilities.

Table 7.5 – General cognitive abilities: linear regression.

Task	Estimate	SE	<i>t</i>	<i>p</i>
<b>General cognitive abilities</b>	-0.04	0.11	-0.35	0.73

**Decoding abilities.** Tables 7.6.1 and 7.6.2 present the results of the linear regression models comparing bilingual and monolinguals children's performances

during decoding. As shown in table 7.6.1 bilingual and monolingual participants had similar abilities in decoding speed. In fact, no group effect was found for nonwords (short:  $p = .89$ ; long:  $p = .97$ ) nor words (short high frequency:  $p = .55$ ; long high frequency:  $p = .39$ ; short low frequency:  $p = .99$ ; long low frequency:  $p = .19$ ).

Table 7.6.1 – Decoding speed: linear regression.

<b>Task</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>SNW</b>	0.02	0.16	0.14	0.89
<b>LNW</b>	-0.01	0.18	-0.04	0.97
<b>SHW</b>	-0.10	0.16	-0.60	0.55
<b>LHW</b>	0.12	0.14	0.87	0.39
<b>SLW</b>	0.00	0.17	0.01	0.99
<b>LLW</b>	0.24	0.19	1.31	0.19

Furthermore, table 7.6.2 shows that the two groups had homogeneous skills also at decoding accuracy. As was found for decoding speed, there was no group effect for neither non-words (short:  $p = .93$ ; long:  $p = .34$ ) nor words (short high frequency:  $p = .12$ ; long high frequency:  $p = .90$ ; long low frequency:  $p = .32$ ). Only accuracy of short words with low frequency showed a marginally significant difference ( $p = 0 .06$ ).

Table 7.6.2 – Decoding accuracy: linear regression.

<b>Task</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>SNW</b>	-0.01	0.13	-0.09	0.93
<b>LNW</b>	0.16	0.17	0.96	0.34
<b>SHW</b>	0.20	0.13	1.6	0.12
<b>LHW</b>	-0.01	0.11	-0.13	0.90
<b>SLW</b>	0.24	0.13	1.90	0.06
<b>LLW</b>	-0.13	0.13	-1.001	0.32

**Receptive vocabulary.** Table 7.7 shows the results of the linear regression used to compare how the two groups performed at the Peabody Picture Vocabulary Test (Stella et al. 2000). In this case, the regression was statistically significant ( $R^2 = .12$ ,  $F(1, 107) = 14.28$ ,  $p < .001$ ), and it was found that monolingual children obtained significantly higher scores than their bilingual peers ( $\beta = 10.73$ ,  $p < .001$ ). This result is not surprising since bilingual students juggle two languages (Bialystok, Luk, & Kwan, 2005), and their exposure to Italian may be more limited if we compare it to that of the native participants.

*Table 7.7 – Receptive vocabulary: linear regression.*

<b>Task</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>Receptive vocabulary</b>	10.73	2.84	3.78	< .001

**Receptive grammar.** Lastly, the participants' grammar knowledge was compared. The linear regression included the percentile scores by item as dependent variable. Similarly to what we found for non-verbal intelligence and decoding abilities, the performance of both groups was homogeneous, and we did not find a group effect ( $p = .83$ ), as shown in table 7.8.

*Table 7.8 – Receptive grammar: linear regression.*

<b>Task</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>Percentile</b>	1.16	5.35	0.22	0.83

*7.1.1 Discussion of descriptive analyses and linear regressions investigating the students' performances in linguistic and non-linguistic abilities*

In order to proceed with the investigation of how these predictors intertwine and contribute to the achievement of appropriate reading comprehension skills, it was fundamental to verify that the obstacles encountered by bilingual students are not caused by difficulties related to the grapheme-phoneme mapping. Our results show that the two groups had very similar performances in both the non-verbal intelligence task and in the word and non-word reading task. These findings suggest

that both bilingual and monolingual children approach reading comprehension tasks with the same cognitive abilities and the same decoding skills. Moreover, all the participants obtained very similar scores also during the receptive grammar task, showing that their off-line knowledge of Italian grammatical structures was also homogeneous. Finally, as mentioned previously, when vocabulary scores are considered, bilingual students obtained significantly lower scores than their peers. Lower lexical knowledge may constitute an obstacle when recognising words that are used less frequently or that belong to more technical registers. In fact, the marginal difference recorded in the accuracy scores of decoding short low-frequency words may be a consequence of the somewhat more limited vocabulary knowledge observed in bilinguals.

## **7.2            *Reading comprehension tasks***

Two reading comprehension tasks were selected from the standardised *Prove MT* (Cornoldi et al., 2009) and administered to the participants. These tasks were administered to the whole class, at two different times during data collection. Approximately a month passed between the two tests. Not all the students were at school on the days that the testing was done, and thus, they were unable to do both tasks. Since the two texts belong to different genres (narrative and descriptive), a combination of the scores in the two tasks should ideally have been considered. The following tables (7.9 and 7.10) will report the results of the descriptive statistics and linear regressions performed on the two tasks individually (MT1 and MT2) and taken together (MT Complete). However, for further analyses on reading comprehension and its predictors, we decided to select only the first text as measure for reading comprehension in order to keep the scores from as many subjects as possible. Among the 109 participants, in fact, only five were absent during the first task, whereas 20 missed the second one.

The scores from each participant were standardised in z-scores using the normative data reported in Cornoldi et al. (2009). The results summarised in table 7.9 show that students overall achieved lower scores during the second reading comprehension task. This outcome may seem surprising, but the normative data

presented in the manual regarding *Prove MT* show the same pattern, since the second text is more challenging than the first one.

*Table 7.9* – Reading comprehension: mean and standard deviation of z-scores.

Task	Grade 4		Grade 5		Cumulative	
	Bilingual (= 37)	Monolingual (= 17)	Bilingual (= 24)	Monolingual (= 31)	Bilingual (= 61)	Monolingual (= 48)
<b>MT1</b>	-0.13	0.16	-0.69	0.18	-0.36	0.17
Mean (SD)	(1.11)	(0.81)	(0.97)	(0.90)	(1.08)	(0.86)
<b>MT2</b>	-0.31	-0.18	-0.83	0.03	-0.43	-0.06
Mean (SD)	(0.88)	(1.01)	(1.18)	(1.17)	(0.98)	(1.10)
<b>MT</b>						
<b>Complete</b>	-0.26	-0.02	-0.77	0.16	-0.39	0.09
Mean (SD)	(0.97)	(0.84)	(1.04)	(0.99)	(1.00)	(0.93)

Moreover, the results of the reading comprehension task were also compared using a linear regression model to verify whether one group obtained significantly higher scores than the other. As for the previous tasks, we fitted a model including group as fixed effect and the reading comprehension task as dependent variable. The table below (7.10) summarises the outcomes of the regression. In line with the results of the national assessment (INVALSI, 2019; 2021), the bilingual group obtained lower scores during these tasks compared to their monolingual peers. As the first reading comprehension task is considered, the regression was statistically significant ( $R^2 = .07$ ,  $F(1, 102) = 7.66$ ,  $p < .01$ ). Monolingual students achieved significantly higher scores ( $\beta = 0.54$ ,  $p < .01$ ). A similar outcome was obtained considering the two tasks together ( $R^2 = .06$ ,  $F(1, 83) = 5.08$ ,  $p < .05$ ). Once again, monolingual students obtained higher scores than their peers ( $\beta = 0.47$ ,  $p < .05$ ). On the other hand, the effect of group found in the analysis of the second reading comprehension task was only marginally significant ( $p = .09$ ). However, as mentioned, not all of the participants managed to take both tests and, thus, the findings regarding the second reading comprehension task and the two tasks taken together will not be included in the analyses from now on.

Table 7.10 - Reading comprehension: linear regression

Task	Estimate	SE	<i>t</i>	<i>p</i>
MT1	0.54	0.19	2.77	< .01
MT2	0.38	0.22	1.71	0.09
MT complete	0.47	0.21	2.25	< .05

### 7.3 Predictors of reading comprehension

A series of linear regression models were fitted to verify which abilities are good predictors of reading comprehension. Since we had several scores regarding decoding abilities, we ran a matching correlation analysis to verify the strength of association between pairs of variables using the `cor` function of the tidyverse library (Wickham et al., 2019). The outcomes, that are reported below in table 7.11, revealed that many of the predictors are highly correlated with each other. The analysis included general cognitive abilities in z-scores (Raven\_Z), all decoding tests (including both speed and accuracy), and receptive grammar using raw scores by item (TROG\_I) and percentile (TROG\_per).

For this reason, we decided check for the effect of non-verbal abilities, receptive vocabulary, receptive grammar, and decoding abilities separately instead of fitting all predictors in the same model. Thus, reading comprehension scores were modelled as a function of the different predictors<sup>1</sup>. These regressions were first run considering all the participants together, and then looking at the monolingual and bilingual groups as individual subsets. As mentioned above, we decided to consider only the first *Prova MT* task as a measure of reading comprehension with the intent of preserving a higher number of participants.

<sup>1</sup> Traditional length of exposure (TLE) to Italian was also controlled as a potential predictor for bilingual students. The regression was not statistically significant ( $p = .54$ ). As mentioned in chapter 6, TLE is calculated subtracting the age of first exposure to the participants' age at the time of testing. The fact that no effect of length of exposure was found may seem surprising. However, as mentioned already in this dissertation, the bilingual children included in this study are second generation immigrant who were mainly exposed to Italian within their first year of life, thus their length of exposure to the societal language was very similar. Moreover, given the early and increasingly intensive exposure to Italian, the participants of this study should not be considered L2 learners of Italian, but rather language minority bilingual speakers (August & Shanahan, 2006; Bellocchi et al., 2017; Bonifacci & Tobia, 2017).



Table 7.11 - Results correlation analysis between pairs of predictors variables

	<b>Raven_Z</b>	<b>SNW</b>	<b>Err_SNW</b>	<b>LNW</b>	<b>Err_LNW</b>	<b>SHW</b>	<b>Err_SHW</b>	<b>LHW</b>
<b>Raven_Z</b>	1	0.04	-0.11	0.01	-0.18	0.07	-0.12	0.07
<b>SNW</b>	0.04	1	-0.37	0.75	-0.34	0.74	-0.28	0.74
<b>Err_SNW</b>	-0.11	-0.37	1	-0.15	0.64	-0.39	0.55	-0.31
<b>LNW</b>	0.01	0.75	-0.15	1	-0.24	0.6	-0.1	0.69
<b>Err_LNW</b>	-0.18	-0.34	0.64	-0.24	1	-0.36	0.51	-0.33
<b>SHW</b>	0.07	0.74	-0.39	0.6	-0.36	1	-0.34	0.8
<b>Err_SHW</b>	-0.12	-0.28	0.55	-0.1	0.51	-0.34	1	-0.25
<b>LHW</b>	0.07	0.74	-0.31	0.69	-0.33	0.8	-0.25	1
<b>Err_LHW</b>	-0.19	-0.37	0.35	-0.39	0.26	-0.25	0.31	-0.37
<b>SLW</b>	0.08	0.79	-0.4	0.72	-0.44	0.77	-0.26	0.79
<b>Err_SLW</b>	-0.14	-0.25	0.59	-0.22	0.64	-0.26	0.55	-0.24
<b>LLW</b>	0.12	0.79	-0.43	0.77	-0.4	0.73	-0.29	0.82
<b>Err_LLW</b>	-0.18	-0.15	0.56	-0.09	0.68	-0.13	0.45	-0.19
<b>PPVT</b>	0.22	0.05	-0.09	-0.01	-0.11	0.11	-0.02	0.16
<b>TROG_I</b>	0.41	0	-0.16	0.05	-0.14	-0.06	-0.07	0.12
<b>TROG_per</b>	0.41	0.09	-0.17	0.14	-0.21	0.01	-0.11	0.15
	<b>Err_LHW</b>	<b>SLW</b>	<b>Err_SLW</b>	<b>LLW</b>	<b>Err_LLW</b>	<b>PPVT</b>	<b>TROG_I</b>	<b>TROG_per</b>
<b>Raven_Z</b>	-0.19	0.08	-0.14	0.12	-0.18	0.22	0.41	0.41
<b>SNW</b>	-0.37	0.79	-0.25	0.79	-0.15	0.05	0.00	0.09
<b>Err_SNW</b>	0.35	-0.40	0.59	-0.43	0.56	-0.09	-0.16	-0.17
<b>LNW</b>	-0.39	0.72	-0.22	0.77	-0.09	-0.01	0.05	0.14
<b>Err_LNW</b>	0.26	-0.44	0.64	-0.40	0.68	-0.11	-0.14	-0.21
<b>SHW</b>	-0.25	0.77	-0.26	0.73	-0.13	0.11	-0.06	0.01
<b>Err_SHW</b>	0.31	-0.26	0.55	-0.29	0.45	-0.02	-0.07	-0.11
<b>LHW</b>	-0.37	0.79	-0.24	0.82	-0.19	0.16	0.12	0.15
<b>Err_LHW</b>	1.00	-0.28	0.33	-0.38	0.28	0.02	-0.19	-0.21
<b>SLW</b>	-0.28	1.00	-0.32	0.83	-0.26	0.09	0.08	0.13
<b>Err_SLW</b>	0.33	-0.32	1.00	-0.36	0.64	-0.08	-0.22	-0.27
<b>LLW</b>	-0.38	0.83	-0.36	1.00	-0.24	0.23	0.24	0.30
<b>Err_LLW</b>	0.28	-0.26	0.64	-0.24	1.00	-0.07	-0.11	-0.08
<b>PPVT</b>	0.02	0.09	-0.08	0.23	-0.07	1.00	0.42	0.36
<b>TROG_I</b>	-0.19	0.08	-0.22	0.24	-0.11	0.42	1.00	0.86
<b>TROG_per</b>	-0.21	0.13	-0.27	0.30	-0.08	0.36	0.86	1.00

**General cognitive abilities.** Table 7.12 summarises the results of the linear regression models used to investigate the relationship between the scores obtained at the Raven’s task and reading comprehension. When we consider all the participants together, general cognitive abilities do not seem to be a predictor of reading comprehension: ( $p = .13$ ). Similarly, no effect was found for monolingual students ( $p = .70$ ). However, when only bilingual students are included in the model, we obtain a different relation between general cognitive abilities and reading comprehension. The regression was statistically significant ( $R^2 = .11$ ,  $F(1, 54) = 6.51$ ,  $p < .05$ ), and higher scores on the non-verbal intelligence test corresponded to higher scores in reading comprehension ( $\beta = 0.66$ ,  $p < .05$ ). This suggests that more advanced cognitive abilities play an important role for bilinguals when they face complex tasks such as reading comprehension.

*Table 7.12 – General cognitive abilities as predictor of reading comprehension*

<b>Group</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>All</b>	0.27	0.18	1.51	0.13
<b>Bilinguals</b>	0.66	0.26	2.55	< .05
<b>Monolinguals</b>	-0.08	0.21	-0.38	0.70

**Decoding abilities.** As described earlier, the scores on decoding abilities include both speed and accuracy, and they are divided into six parts (i.e., short and long non-words, short and long words with high frequency, and short and long words with low frequency). Tables 7.13.1 and 7.13.2 summarise the results of the linear regressions investigating their role during reading comprehension.

*Table 7.13.1 – Decoding speed as predictor of reading comprehension*

<b>Task</b>	<b>Group</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
	<b>All</b>	-0.04	0.12	-0.30	0.76
<b>SNW</b>	<b>Bilinguals</b>	0.21	0.18	1.16	0.25
	<b>Monolinguals</b>	-0.14	0.15	-0.93	0.36

	<b>All</b>	-0.05	0.11	-0.48	0.63
<b>LNW</b>	<b>Bilinguals</b>	0.01	0.15	0.08	0.94
	<b>Monolinguals</b>	-0.12	0.14	-0.81	0.42
	<b>All</b>	0.04	0.12	0.32	0.75
<b>SHW</b>	<b>Bilinguals</b>	0.14	0.20	0.71	0.48
	<b>Monolinguals</b>	0.00	0.14	0.01	0.99
	<b>All</b>	0.28	0.14	2.06	< .05
<b>LHW</b>	<b>Bilinguals</b>	0.42	0.19	2.17	< .05
	<b>Monolinguals</b>	0.06	0.18	0.34	0.74
	<b>All</b>	0.08	0.11	0.67	0.51
<b>SLW</b>	<b>Bilinguals</b>	0.10	0.16	0.59	0.56
	<b>Monolinguals</b>	0.06	0.15	0.44	0.67
	<b>All</b>	0.17	0.10	1.67	0.09
<b>LLW</b>	<b>Bilinguals</b>	0.22	0.15	1.42	0.16
	<b>Monolinguals</b>	0.06	0.13	0.48	0.63

The reading speed for neither short nor long non-words predicted reading comprehension in bilingual and monolingual students. Similarly, the decoding speed of short words with both high and low frequency did not correlate with reading comprehension scores for any of the groups. The model including decoding speed of long words with high frequency was statistically significant for bilingual students ( $R^2 = .08$ ,  $F(1, 54) = 4.73$ ,  $p < .05$ ). Higher z-scores in decoding speed corresponded to higher reading comprehension scores ( $\beta = 0.42$ ,  $p < .05$ ). The same result was also found for all the students together ( $R^2 = .04$ ,  $F(1, 102) = 4.26$ ,  $\beta = 0.28$ ,  $p < .05$ ). However, this correlation did not show significant effects for the monolingual group. Lastly, decoding speed of both short and long words with low frequency was not found to predict reading comprehension.

None of the regressions investigating the relationship between accuracy during decoding and reading comprehension were statistically significant. Hence, in this case, no significant effect was found, as shown in table below.

Table 7.13.2 – Decoding accuracy as predictor of reading comprehension

<b>Task</b>	<b>Group</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>SNW</b>	<b>All</b>	-0.03	0.15	-0.19	0.85
	<b>Bilinguals</b>	0.20	0.33	0.60	0.55
	<b>Monolinguals</b>	-0.09	0.14	-0.61	0.54
<b>LNW</b>	<b>All</b>	-0.73	0.11	-0.65	0.52
	<b>Bilinguals</b>	-0.19	0.19	-0.97	0.33
	<b>Monolinguals</b>	-0.05	0.12	-0.43	0.67
<b>SHW</b>	<b>All</b>	0.19	0.15	1.30	0.20
	<b>Bilinguals</b>	0.24	0.31	0.78	0.44
	<b>Monolinguals</b>	0.10	0.15	0.69	0.49
<b>LHW</b>	<b>All</b>	-0.12	0.18	-0.68	0.50
	<b>Bilinguals</b>	-0.27	0.25	-1.06	0.30
	<b>Monolinguals</b>	0.09	0.24	0.37	0.71
<b>SLW</b>	<b>All</b>	0.01	0.15	0.06	0.95
	<b>Bilinguals</b>	-0.21	0.32	-0.67	0.50
	<b>Monolinguals</b>	-0.16	0.15	-1.07	0.29
<b>LLW</b>	<b>All</b>	-0.07	0.14	-0.49	0.63
	<b>Bilinguals</b>	-0.03	0.22	-0.12	0.91
	<b>Monolinguals</b>	-0.04	0.17	-0.21	0.83

**Receptive vocabulary.** As suggested in the literature (Jeon & Yamashita, 2014), linguistic knowledge in the L2 is among the predictors of successful reading comprehension scores in the second language. In particular, as proposed by Perfetti and Stafura (2014) in the Reading Systems Framework and in the Lexical Quality Hypothesis (Perfetti & Hart, 2002), vocabulary knowledge and the efficient construction of lexical networks of activations are fundamental to allow readers to create appropriate text models and representations and, ultimately, achieve comprehension. In line with the expectations, we found that receptive vocabulary had a significant effect on reading comprehension scores across all groups. The

regression investigating this relationship across all participants was statistically significant ( $R^2 = .19$ ,  $F(1, 102) = 23.18$ ,  $\beta = 0.03$ ,  $p < .001$ ). As we see reported in table 7.13, similar results were obtained also for the bilingual group ( $R^2 = .17$ ,  $F(1, 54) = 10.72$ ,  $\beta = 0.03$ ,  $p < .01$ ) and for the monolingual participants ( $R^2 = .09$ ,  $F(1, 46) = 4.46$ ,  $\beta = 0.02$ ,  $p < .05$ ).

*Table 7.14 – Receptive vocabulary as predictor of reading comprehension*

<b>Group</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>All</b>	0.03	0.01	4.81	< .001
<b>Bilinguals</b>	0.03	0.01	3.27	< .01
<b>Monolinguals</b>	0.02	0.01	2.11	< .05

**Receptive grammar.** Language knowledge was also measured in the receptive grammar task. The regression used to analyse the effect of receptive grammar on reading comprehension was statistically significant for all the participants ( $R^2 = .05$ ,  $F(1, 102) = 5.49$ ,  $\beta = 0.01$ ,  $p < .05$ ) and for bilingual students ( $R^2 = .11$ ,  $F(1, 54) = 6.76$ ,  $\beta = 0.01$ ,  $p < .05$ ). As far as monolingual students are concerned, however, no effect of receptive grammar was found ( $p = .49$ ).

*Table 7.14 – Receptive grammar as predictor of reading comprehension*

<b>Group</b>	<b>Estimate</b>	<b>SE</b>	<b><i>t</i></b>	<b><i>p</i></b>
<b>All</b>	0.01	0.00	2.34	< .05
<b>Bilinguals</b>	0.01	0.01	2.60	< .05
<b>Monolinguals</b>	0.00	0.00	0.70	0.49

### *7.3.1 Discussions of the linear regressions analyses to investigate the predictors of reading comprehension*

The tasks aimed at investigating the linguistic abilities that were selected for this study as potential predictors of reading comprehension (i.e., decoding, receptive vocabulary, and receptive grammar) correspond to the set of skills that

are included as lower-level processes in Grabe's Component Skills Approach (Grabe & Yamashita, 2022). According to Grabe's framework, in fact, automatic word recognition, lexical access, and syntactic parsing are the processes that children need to perform automatically in order to be able to channel more cognitive resources towards the development of text and situation model, and, ultimately, achieve reading comprehension. Thus, if we look at the results obtained by the participants in light of this description of the components of reading, we can argue that bilingual and monolingual participants display the same age-appropriate decoding skills and have achieved both similar grammar knowledge and processing strategies. However, lexical access seems to be the only task during which bilingual students lag behind compared to their peers.

When we consider these linguistic and non-linguistic abilities as potential predictors of reading comprehension, we notice that in certain cases, the results for bilingual and monolingual participants differ. This discrepancy is attested also by Bellocchi, Tobia, and Bonifacci (2017). These scholars, in fact, observed that the predictors of reading comprehension were not the same in bilingual and monolingual students.

The outcomes of the linear regression investigating the correlation between decoding skills and reading comprehension did not show any effect for either group when accuracy was considered. On the other hand, we found an effect of decoding speed during the reading of long words with high frequency for bilingual students and when all the participants are included. The fact that, in general, decoding skills do not appear to be strong predictors of reading comprehension is in line with other findings reported by studies that explored predictors of reading comprehension in a similar population (Bellocchi, Tobia, & Bonifacci, 2017; Bonifacci & Tobia, 2017). The participants of the current study attended 4<sup>th</sup> and 5<sup>th</sup> grade, and at this age, they should have already attained automatic word recognition abilities. As reported in the results, both groups achieved grade appropriate and homogeneous decoding skills, similarly to what is reported in literature (Bellocchi, Tobia, & Bonifacci, 2017; Bonifacci & Tobia, 2017; Verhoeven & van Leeuwe, 2012). Moreover, they were tested in a language with transparent orthography, and, as reported by other scholars, decoding skills tend to play an important role as predictor of reading

comprehension only in younger students (Bellocchi, Tobia, & Bonifacci, 2017; Bonifacci & Tobia, 2017; Carretti & Zamperlin, 2010; Verhoeven & van Leeuwe, 2012). In particular, as Moll et al. (2014) also argued, the fact that the grapheme-to-phoneme mapping is straightforward in languages with transparent orthography explains why reading fluency is more often explained by reading speed rather than reading accuracy. In the case of Italian, as mentioned in chapter 3, the findings about the contribution of reading speed to reading comprehension are not univocal (Carretti & Zamperlin, 2010; Tobia & Bonifacci, 2015). However, the fact that decoding skills do not predict reading comprehension while decoding speed has an effect for the bilingual speakers in this study supports the findings of the previous studies.

Interestingly, the effect of non-linguistic abilities on reading comprehension was not the same between the two groups. Non-verbal intelligence, in fact, was recognized as a predictor of reading comprehension only for bilingual students. Higher cognitive abilities were found to have a positive impact on reading comprehension scores. This finding seems to corroborate the hypothesis that bilingual readers need to employ more cognitive resources during reading. More specifically, this could also be linked to their more limited vocabulary knowledge. As we have seen in the comparison between groups, in fact, bilingual students obtained significantly lower scores at the receptive vocabulary task. If we consider these outcomes in light of the fact that vocabulary knowledge was found to be a predictor of reading comprehension for all the participants, we can infer that bilingual students may encounter more difficulties during reading comprehension because of their poorer vocabulary knowledge. Consequently, this can affect the efficiency and precision with which they manage to develop networks of lexical activation in their working memory. Furthermore, when the networks of activation are incomplete or cannot be created because, for instance, the readers do not recognise the words they read, these processes are more costly in terms of cognitive resources. Hence, bilingual students with higher cognitive abilities have more resources available to compensate for the difficulties linked to limited vocabulary knowledge. To understand the relationship between general cognitive abilities and vocabulary better, we ran a linear regression that included vocabulary as dependent

variable and general cognitive abilities as fixed factor. As done previously, we first conducted this analysis on the whole group of participants, and afterwards on bilingual and monolingual students as separate groups. The results revealed an effect of general cognitive abilities on vocabulary. More specifically, students who obtained higher scores in the CPM Raven's task tended to display a richer vocabulary. The effect was significant when we considered the all the participants together ( $R^2 = .05$ ,  $F(1, 107) = 5.35$ ,  $\beta = 6.05$ ,  $p < .05$ ) and for the bilingual group ( $R^2 = .07$ ,  $F(1, 59) = 4.15$ ,  $\beta = 8.13$ ,  $p < .05$ ). For monolingual students, this effect is only marginally significant ( $R^2 = .06$ ,  $F(1, 46) = 2.96$ ,  $\beta = 4.71$ ,  $p = .09$ ).

These results are also in line with the Reading Systems Framework (Perfetti & Stafura, 2014). In this framework, in fact, word identification and, consequently, the quality of lexical access are not only linked to the knowledge of the orthographic system, but also to underlying cognitive skills that support readers when they have to connect several elements and pieces of information during reading comprehension.

Lastly, the linear regression used to investigate the correlation between receptive grammar and reading comprehension highlighted that grammar knowledge was a predictor for bilingual students, but not for their monolingual peers. Previous studies also found a significant correlation between morphosyntactic knowledge and reading comprehension abilities (Bellocchi, Tobia, & Bonifacci, 2017; Verhoeven, 1990). As argued by Bellocchi, Bonifacci, and Tobia (2017), it is not surprising that native speakers do not display the same pattern because they manage to master quite advanced morphosyntactic skills earlier than their bilingual peers, except in cases of atypical cognitive development.

#### **7.4 *The best predictor: Random Forest analysis***

To investigate the importance of the predictors, we conducted a Random Forest analysis using the package ranger (Wright & Ziegler, 2017). This model allowed us to create a ranking of predictors. In the analysis, we included the raw scores of all the standardised measures used to examine verbal and non-verbal abilities. We decided to use raw scores because tree-based models can be sensitive



to standardisation when the type of model is a regression, thus when the dependent variable is continuous.

The model contained 9 variables as predictors, namely: non-verbal intelligence (Raven\_per), speed and accuracy during decoding of non-words (NWs and NWe), high- and low- frequency real words (HFWs, HFWe, LFWs, and LFWe), receptive vocabulary (PPVT), and receptive grammar (TROG\_It). We reduced the number of decoding variables by grouping together short and long items that belonged to the same frequency category.

As presented previously, we had already run linear regressions to check which linguistic and non-linguistic abilities could be considered predictors of reading comprehension. For the Random Forest, we decided to maintain all the predictor variables, even those that did not show an effect in the linear regressions. This choice was based on the fact that the Random Forest analysis creates several models to compare the interactions between predictors and dependent variable, thus, this method can find interactions that could not be captured by linear regressions.

We ran this analysis three times. As we did when reporting the results of linear regression investigating the predictors of reading comprehension, we first consider all the participants together and, subsequently, examine the predictors for bilingual and monolingual pupils separately.

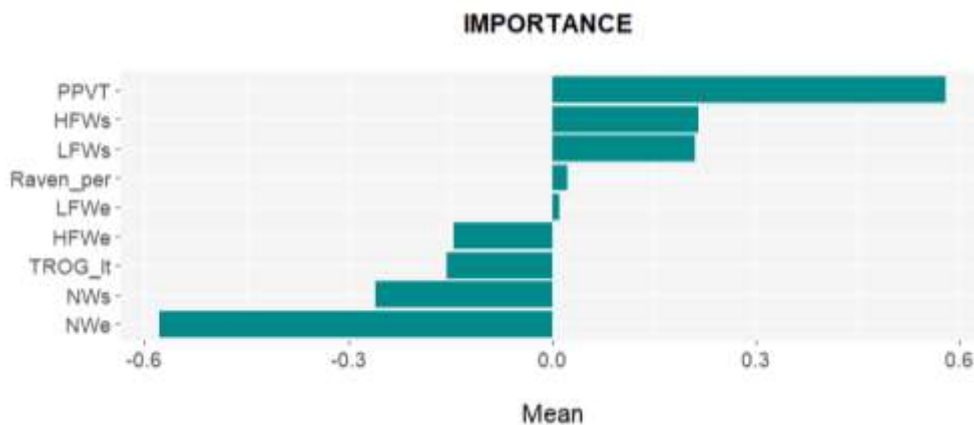
All the Random Forests were fitted considering the raw scores of the first task from *Prove MT* to ensure a higher number of participants. Each forest was created with 10000 trees. We kept the default mtry value, which corresponds to the square root of the number of predictors, thus 3. As suggested in Benhamian et al. (2017), to ensure stability of the ranking, we obtained the variables of importance by averaging the variables of importance of 1000 random forests (Benhamian et al., 2017). The following subsections will describe the outcomes of the three models.

### **All participants.**

The results showed that receptive vocabulary, the decoding speed of high- and low- frequency words, and accuracy during decoding of low frequency words were recognised as the most important predictors of reading comprehension. Graph

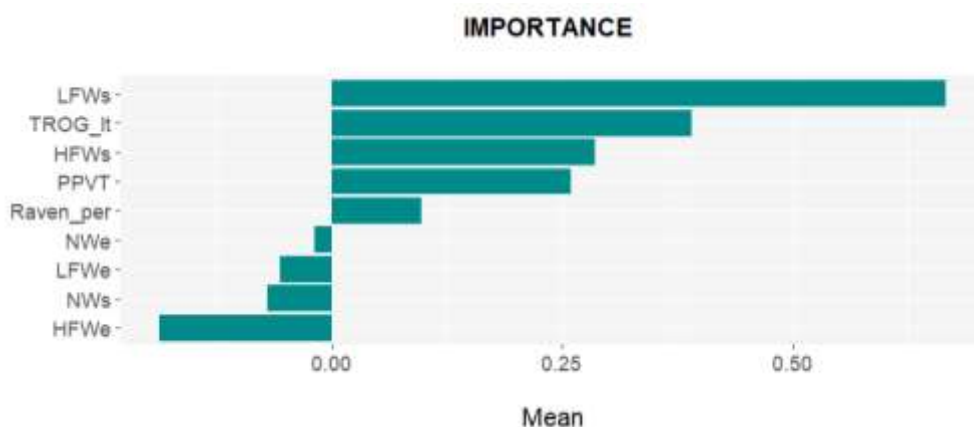
7.1 reports the results of the analysis of variable importance. The variables displaying a negative mean score are those that the model recognised as not important.

*Graph 7.1* – All participants: Impurity corrected variable importance mean of 1000 random forests with 10000 trees.



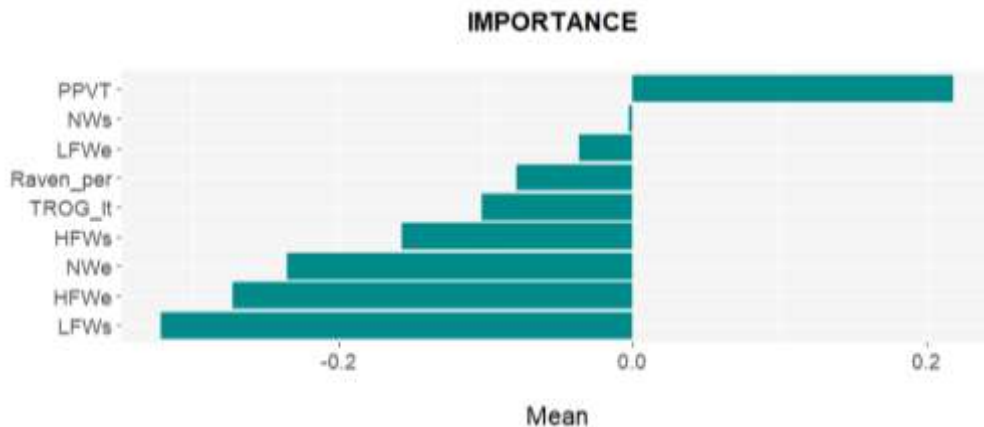
**Bilinguals.** The results obtained when we analysed only bilingual students present a different picture. As described by graph 7.2, more variables were recognised as important for this population. Interestingly, non-verbal intelligence and grammar knowledge were recognised as important factors determining good reading comprehension scores in bilingual students. Moreover, decoding speed of low- and high-frequency words, and vocabulary were also confirmed as important predictors in this group, as it was in the group as a whole.

*Graph 7.2* – Bilingual participants: Impurity corrected variable importance mean of 1000 random forests with 10000 trees.



**Monolinguals.** Interestingly, the random forest performed analysing the data from monolingual students showed that there was only one predictor recognised as important for them, namely vocabulary.

*Graph 2.3 – Monolingual students: Impurity corrected variable importance mean of 1000 random forests with 10000 trees.*



#### *7.4.1 Discussion of the Random Forest analysis: the best predictor*

The results of the Random Forest analysis used to verify which were the best predictors of reading comprehension confirmed the group differences highlighted by the linear regression and allowed us to understand the contribution of the different predictors better. When we consider monolingual students, the analysis revealed that there was only one predictor that contributed to good reading comprehension scores: vocabulary knowledge. As discussed previously, pupils attending 4<sup>th</sup> and 5<sup>th</sup> grade have already automatized their decoding skills and, therefore, it should not be surprising to see that this aspect of reading is no longer considered a significant predictor of reading comprehension. Moreover, this result is in line with the outcomes of studies that investigated reading comprehension predictors in languages with transparent morphology, as discussed in the dedicated chapter (3). Decoding abilities, in fact, are found to be predictors of reading comprehension abilities in younger students, but towards the end of primary school they are no longer found to play an important role (Verhoeven & van Leeuwe, 2012; Bonifacci & Tobia, 2017). Furthermore, grammar knowledge was not recognised

as a predictor of reading comprehension either, as found by Bellocchi, Tobia, and Bonifacci (2017). This outcome should not be surprising since the input received by monolingual children is likely to be richer than that of bilingual children, and it allows them to achieve good implicit grammar knowledge at a young age.

On the other hand, when we look at the results for bilingual pupils, we notice that several processes are identified as important predictors of reading comprehension. Among these, an important role is played also by decoding abilities. More specifically, speed during reading low-frequency words seemed particularly important. We argue that this result should be related to the significant importance of vocabulary knowledge. In fact, a factor that could negatively influence decoding speed of low-frequency words is whether these words already belong to the children's lexicon or not: the more words the readers know, the easier it will be to recognise them and connect them to their meaning. In line with what was mentioned above about decoding abilities in transparent orthographies (Moll et al., 2014), only decoding speed was found to be a significant predictor of reading comprehension. Another important difference between bilingual and monolingual students is that, for the former group, grammar knowledge was found as a significant predictor of reading comprehension. This result was detected also by the linear regression. Morphosyntactic knowledge has been previously recognised as a predictor of reading comprehension for bilingual students (Verhoeven, 1990; Bellocchi, Tobia, & Bonifacci, 2017). Unlike their monolingual peers, in fact, bilingual children may be exposed to more limited Italian input, both in quantity and quality; thus, their exposure and knowledge about more complex grammar structures may be lower or less automatised. If their grammar is less proceduralised, it will be more cognitively effortful when they have to use it during a complex process such as reading comprehension. Lastly, it is not surprising to find that non-verbal intelligence, hence general cognitive abilities, was confirmed to be an important predictor of reading comprehension for bilingual students. As we have seen thus far, in fact, controlling and mastering all these aspects of language knowledge during reading comprehension require several cognitive resources. The differences between the two groups with regard to which predictors are more

important to reading comprehension highlight how this process is more demanding for bilingual students than for monolingual ones.

It is also fundamental to consider the results of the Random Forest that included all the participants together. The outcomes of this analysis revealed that the most important predictor was vocabulary knowledge. Both groups had homogeneous performances in decoding and in grammar knowledge, but bilinguals obtained significantly lower results in the receptive vocabulary task. We argue that, since this is the only significant difference between groups in linguistic abilities, vocabulary plays an important role in explaining the differences we find reflected also in the outcomes of reading comprehension tasks. In line with the claims of the Reading System Frameworks (Stafura & Perfetti, 2014), word knowledge is a pivotal factor for achieving good reading comprehension abilities because it contributes considerably to the construction of the meaning of the text during word-to-text integration. Hence, the outcomes of the random forest analyses confirm the importance of developing advanced vocabulary knowledge to allow readers to create more refined networks of semantic activations that can support them during reading comprehension.

Furthermore, another aspect that should be highlighted is the fact that grammar knowledge is found to be the second most important predictor for bilingual students. As mentioned previously, we did not detect any significant difference between group in the receptive grammar task. However, the task for the reception of grammar is an offline task, thus it did not provide us with detailed information about the way in which students mentally represent grammar. If minority language bilingual students have not developed a less efficient mental representation of grammar, they will need to employ more resources during word-to-text integration. Moreover, this process may also be slowed down further by limited vocabulary knowledge. In this case, bilinguals would find the lower-level processes of reading more demanding than their monolingual peers (see: Component Skills Approach, Grabe & Yamashita, 2022). Crucially, if more resources need to be employed during lower-level processes, fewer resources will be available to perform higher-level processes in bilingual students.

In order to limit these difficulties and reduce the performance gap that is often encountered between native speakers and second-generation immigrants, we believe it would be fundamental to adopt teaching strategies that stimulate students to develop their metalinguistic awareness. In particular, students should be encouraged to reflect about and manipulate language and grammatical structures to *discover* how they work rather than explicitly learn the rules that govern them. As presented in the first chapter, in fact, there is still a large discrepancy between the aims stated by the MIUR guidelines (2012) and what is found in grammar textbooks (Pescarini, 2017). The materials available to teachers often present exercises that examine the students' prescriptive grammar knowledge. As a consequence, developing implicit grammar knowledge becomes more difficult since pupils are not enough stimulated to reflect about the way the Italian language is used. Moreover, teaching methods that aim to develop metalinguistic awareness can also be used to strengthen the higher-level processes involved during reading comprehension, as will be discussed in chapter 9, which is dedicated to the pedagogical intervention developed for the participants to this study.



## **8. SELF-PACED READING TASKS: RESULTS AND DISCUSSION**

As described in chapter 6 when presenting the study, we developed three Self-Paced Reading Tasks to investigate bilingual and monolingual pupils' on-line grammar processing. As presented in the previous chapter about the predictors of reading comprehension, we did not detect a group difference in the students' off-line grammar knowledge (TROG). However, we also wanted to investigate their on-line grammar processing to further examine their grammar abilities. These tasks focused on different aspects of language processing and aimed to explore whether bilingual children adopted the same strategies as their monolingual peers or whether their processing abilities displayed non-native patterns. We analysed reading times to examine language processing in the two groups.

The first of these tasks was developed to explore the participants' on-line ability to successfully extract information contained in morphological cues and that could facilitate the correct interpretation of the sentences. More specifically, we manipulated the number features of the second determiner phrase (DP) of the sentence. This task aimed to verify whether bilingual participants managed to process relevant morphological information in a native-like way.

The second SPRT investigated how event probabilities can affect the correct interpretation of the sentence. For this task, we selected semantically reversible verbs (i.e., to help) and we manipulated the probability of arguments to be interpreted as agents or patients of the sentence. In the manipulated condition, the role of agent was assigned to the character that was expected to be the patient. To process these sentences correctly, students had to process the syntactic relations successfully instead of relying on the event probabilities.

The third and last SPRT was developed to obtain a baseline in which we expected both groups to display similar processing skills. In this task, we investigated the participants' sensitivity to the semantic violation created between the verb and one of its arguments. We hypothesised that both groups would behave similarly because of the primacy given to lexical items and content words during



input processing (VanPatten, 2004; 2014). Considering that these elements and these pieces of information tend to be the first ones that non-native speakers rely on during processing, we expected that the bilingual participants could already process this information automatically and recognise promptly the semantic violations in the items they read.

Before presenting the results obtained for the different Self-Paced Reading Tasks, I will discuss the model used to analyse reading times. In this section, I will also explain how the data has been cleaned and outliers reading times excluded. Furthermore, the outcomes of the three SPRTs will be presented in three different sections. Each of these sections will be divided further into three parts, one for each of the target structures included in the task, i.e., object relative clauses and sentences with passive voice, and one section presenting the outcomes of the analyses on the filler structures, i.e., subject relative clauses and SVO sentences. For each structure, I will present the descriptive analysis of accuracy and reading time, and then report the outcomes of the mixed effect logistic regression for accuracy rates and the linear mixed effect regression for reading times.

## **8.1 *The analysis***

### *8.1.1 Filtering data and outlier detection*

As mentioned in the section dedicated to the development of the three Self-Paced Reading Tasks in chapter 6, we decided to add a short yes or no comprehension question at the end of each item. In the analysis of Self-Paced Reading Tasks, we followed the recommendations found in literature and considered only the items that were correctly comprehended, in other words, the stimuli that received a correct answer during the comprehension question (Jackson, 2010; Jegersky, 2014). These questions were about the content of the sentence they just read and not about the correct interpretation of the structure investigated because their purpose was to make sure that the students were paying attention during the reading task. Consequently, we used the accuracy results at the attention check-points to filter only the reading times of the items that received a correct

answer. Moreover, to ensure that the sentences were truly comprehended, we also deleted the items that displayed reading times below the lower threshold in at least one area. We established this further selective criterion after noticing that some participants who obtained accuracy levels around 60% also displayed very quick reading times, often below 200ms. Correct responses following such reading times are likely to be the consequence of chance rather than successful processing.

We controlled the reading times data-points to check for the presence of outliers. We established 200ms as the lower threshold and 5000ms as the upper threshold. The lower cut-off was set to 200ms because reading times faster than this limit are often the result of unintentional button presses (Jegersky, 2014). Since such rapid reading times are likely to be unintentional, we preferred to exclude all the items that included at least one reading time that was faster than the lower threshold. We decided to keep the same higher limit for both groups of participants, as done in Jackson (2010). Following the suggestions of Nicklin and Plonsky (2020), after detecting extreme outliers, reading times were log-transformed because this transformation prevents the need to detect outliers using SD boundaries and allows us to avoid trimming or winsorizing data any further.

### 8.1.2 Model

To analyse reading times, we performed a linear mixed effect regression model with R (R Core Team, 2022, version 4.2.1) using the *lme4* and *lmerTest* package (Bates, Maelcher, Bolker, & Walker, 2015; Kuznetsova, Brockhoff, & Christensen, 2017). We fitted reading times as a function of group, condition, their interaction, and added receptive vocabulary (PPVT) and receptive grammar (TROG\_per) as covariates, to monitor the effect of grammar knowledge and vocabulary on the performance during processing. The procedures used recently in psycholinguistics suggest fitting a maximal random effect model and to gradually simplify it until the model does not become statistically worse than its maximal structure. Following these guidelines, we fitted a maximal random effect model that included condition in the intercept by subject, and condition, group, and their interaction in the intercept by item. The models were first run with their maximal

random effect structures. When they did not converge, they were gradually simplified until they reached a structure that converged. Unless differently specified, the simplified model for the analysis of reading times included only condition in the intercept by-item. With a likelihood ratio test, we verified that this model was not significantly worse than the one presenting the full random effect structure. Subsequently, receptive vocabulary was excluded from the model after verifying with a likelihood ratio test that it did not improve the model fit. As described in the chapter 6, relative clauses were divided into five regions, whereas SVO sentences and those displaying passive voice construction were divided into four regions. Region 4 was the target area in object relative clauses, whereas in sentences displaying passive voice, we analysed area 3.

Lastly, even though we only considered the reading times of the items that were correctly comprehended, we also conducted an analysis also on the accuracy levels during the tasks. As presented in chapter 6, the two target structures we aimed to investigate with the SPRTs were object relative clauses and passive voice and we focused in particular on the accuracy rates corresponding to these structures. As reported by Jegersky (2014), research studies including processing in a non-native language show that responses to the comprehension questions can reveal effects of delayed processing (Roberts & Felser, 2011; Jegersky, 2012). Since the accuracy measure is a binary variable, we used a mixed effect logistic regression using the *lme4* package (Bates, Maelcher, Bolker, & Walker, 2015). As done for the analysis of reading times, we started by fitting the maximal model that included accuracy as a function of group, condition, and their interaction. Scores for receptive vocabulary and receptive grammar were added as covariates. Moreover, the structure of the random effect fitted condition in the intercept by subject, and condition, group, and their interaction in the intercept by item. Unless differently specified, the model that converged correctly did not include receptive vocabulary as a covariate, since it did not improve the model fit, and in the structure of the random effect we maintained condition in the intercept by-subject, and condition and group in the intercept by-item. Before simplifying the maximal model, we verified that the new model fit was not significantly worse than the maximal one.

## 8.2 *Processing of morphological information*

This Self-Paced Reading Task was developed to examine whether bilingual and monolingual students behaved similarly during the on-line processing of morphological information or if they were displaying non-native strategies. In order to do so, we manipulated the number feature of one constituent of the sentences in order to facilitate its interpretation. In object relative clauses, we manipulated the second DP that appears in the sentence, that is the subject of the relative clause. Furthermore, in sentences displaying passive voice, we manipulated the number feature of the PP, that is the constituent corresponding to the agent of the sentence.

Table 8.1 reports accuracy scores for the questions following the two target structures. Monolingual students obtained higher scores than their bilingual peers. Both groups obtained higher scores in the items displaying the morphological manipulation.

*Table 8.1* – Morphological SPRT: mean values and standard deviation of accuracy.

<b>Condition</b>	<b>Group</b>	<b>Accuracy</b>
<b>Base</b>	<b>Bilingual</b>	0.70 (0.46)
<b>Base</b>	<b>Monolingual</b>	0.77 (0.42)
<b>Morphological</b>	<b>Bilingual</b>	0.80 (0.40)
<b>Morphological</b>	<b>Monolingual</b>	0.86 (0.35)

The model of the mixed effect logistic regression contained only condition in the intercept by item. The outcomes of this analysis revealed a significant effect of group ( $\beta = 0.49$ ,  $SE = 0.19$ ,  $z = 9.97$ ,  $p < .001$ ) and of grammar knowledge ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 5.99$ ,  $p < .001$ ). More specifically, monolingual participants obtained significantly higher scores, and grammar knowledge had a positive effect on accuracy. Furthermore, condition had a marginal effect on accuracy: the items displaying the plural form obtained higher scores ( $\beta = 0.47$ ,  $SE = 0.22$ ,  $z = 1.81$ ,  $p = .07$ ).

The manipulation of the number feature of one constituent of the sentence could provide relevant information to support readers during the correct interpretation of the sentence in the target structures. Object relative clauses and sentences with passive voice were selected because they are more demanding in terms of processing, since they are not frequently encountered, especially by children. However, these structures are part of the linguistic register used in textbooks and, thus, it is fundamental to examine how primary school pupils process and understand them. Accuracy rates showed that monolingual students obtained significantly higher scores than their peers, but both groups achieved better performances when they encountered the stimuli presenting the manipulation of number features. Condition had only a marginal effect on accuracy, but this result suggests that the participants tended to benefit from the presence of the manipulated items during comprehension.

### 8.2.1 Object relative clauses

As mentioned previously, in the SPRT, the manipulation of condition for object relative clauses was obtained by changing the number features of the second DP of the sentence. Thus, the analysis of this structure focuses on region 4 of the sentence. As we can see in the example below (1), this area is occupied by the verb which can be conjugated in the singular or plural form according to the condition.

(1)

	1	2	3	4	5
<b>B.</b>	Il pasticcere	che	il cliente	ringrazia	è soddisfatto
<b>B.</b>	<i>The pastry chef</i>	<i>that</i>	<i>the client</i>	<i>thanks</i>	<i>is satisfied</i>
<b>M.</b>	Il pasticcere	che	i clienti	ringraziano	è soddisfatto
<b>M.</b>	<i>The pastry chef</i>	<i>that</i>	<i>the clients</i>	<i>thank</i>	<i>is satisfied</i>

Extreme outliers were detected and excluded before the analysis. Items that included at least one area with reading times below 200ms were excluded from any analysis. In this case, 1.2% of the observations were eliminated. Furthermore, we

removed the data-points with reading times above 5000ms. Fitting a pareto chart (*dlookr* package, Ryu, 2022), we verified the percentage of missing values in the variables of the dataset. The exclusion of extreme outliers implied the loss of 1.9% of the data in the region of interest (area 4) and 2.5% in the last region of the sentence (area 5). As said before, in the manipulated condition (M), the plural should facilitate the interpretation of the sentence. If, during processing, the richness of the morphological information carried by the plural is efficiently processed, longer reading times will be detected in the area that contains the verb.

The table below (8.2) summarises the descriptive analysis of accuracy rates divided by condition and group.

*Table 8.2* – Morphological SPRT: mean and standard deviation of accuracy rates for object relative clauses.

<b>Condition</b>	<b>Group</b>	<b>Accuracy</b>
<b>Base</b>	<b>Bilingual</b>	0.72 (0.45)
<b>Base</b>	<b>Monolingual</b>	0.76 (0.43)
<b>Morphological</b>	<b>Bilingual</b>	0.82 (0.38)
<b>Morphological</b>	<b>Monolingual</b>	0.90 (0.30)

The random effect structure of the mixed effect logistic regression analysing the participants' accuracy rates revealed that monolingual students were overall more accurate than their bilingual peers ( $\beta = 0.57$ ,  $SE = 0.22$ ,  $z = 2.59$ ,  $p < .01$ ). Grammar knowledge had a positive effect on accuracy ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 1.19$ ,  $p < .001$ ), the students who obtained higher scores during the receptive grammar task were more accurate during the SPRT. For object relative clauses, we did not find an effect of condition on accuracy ( $p = 0.28$ ).

As mentioned above, the analysis of reading times included only data-points from items that received a correct answer in the question following each stimulus and that did not present any reading time below the lower threshold of 200ms in any area. Excluding the items that received a wrong answer at the comprehension question implied trimming 20.9% of the observations.

The graph below (8.1) shows the mean reading times in the five areas of object relative clauses. The scores are divided per group and condition. In correspondence of area 4, i.e., the area of interest for this structure, we can notice a clear difference in reading time for the different conditions, whereas there are not marked differences between groups.

Graph 8.1 – Morphological SPRT: Reading times in object relative clauses.

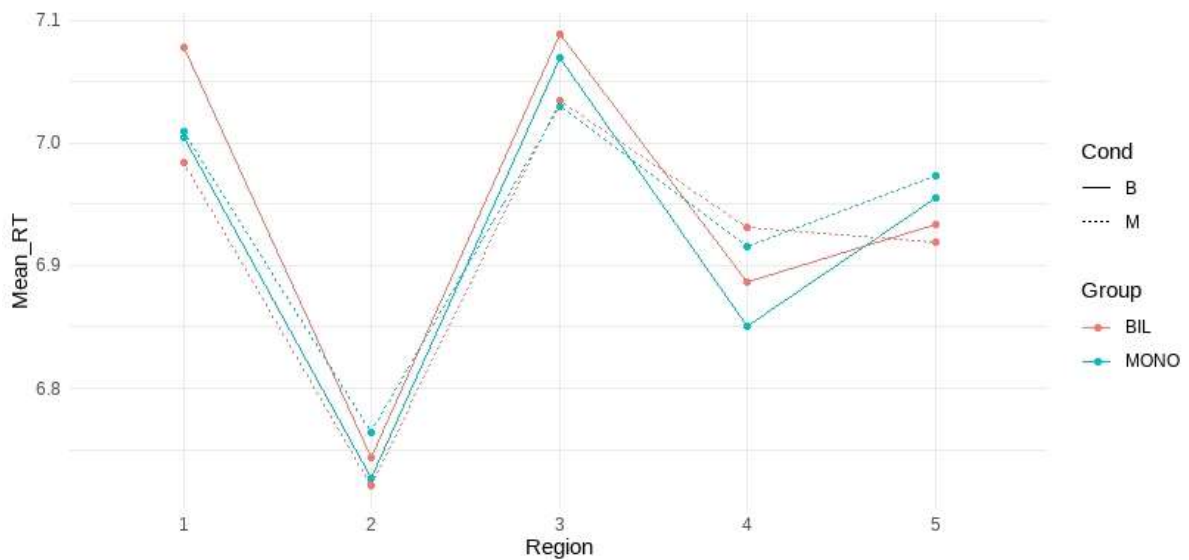


Table (8.3) shows the mean log-transformed reading times in the region of interest and into the last region of the sentence.

Table 8.3 – Morphological SPRT: mean values and standard deviation of log-transformed RTs for object relative clauses.

Condition	Group	Area 4	Area 5
Base	Bilingual	6.89 (0.43)	6.93 (0.53)
Base	Monolingual	6.85 (0.43)	6.95 (0.54)
Morphological	Bilingual	6.93 (0.43)	6.92 (0.55)
Morphological	Monolingual	6.92 (0.44)	6.97 (0.55)

The outcomes of the linear mixed effect regression on reading times in area 4 and 5 are presented in table (8.4). In the region of interest, the results showed a

significant effect of condition ( $\beta = 7.59 \text{ e-}02$ ,  $SE = 2.79 \text{ e-}02$ ,  $t = 2.72$ ,  $p < .05$ ) and longer reading times were registered in the sentences that displayed the plural form. As we can see from the table below (8.4), there was no effect of group, grammar knowledge, nor of the interaction between group and condition.

The analysis of the reading times during on-line processing of object relative clauses revealed that both bilingual and monolingual participants were sensitive to the information provided by the number feature of the second DP of the sentence, thus the subject of the relative clause, and the verb. Since longer reading times in this area would suggest that the richness of the information carried by the plural was perceived, our expectation was to find longer reading times in the target region (area 4), that is the one displaying the verb of the relative clause when the item was presented in the plural form. Moreover, longer times were expected also on the basis of the ‘perspective shift’ which should take place at the boundary between relative clause and main clause, as indicated in MacWhinney (1982). This effect was also found in monolingual adults (King & Just, 1991) using a Reading Span Task, in which participants read sentences in a word-by-word fashion. Thus, at this point of the sentence, in the manipulated condition, the plural provided the participants with essential information to interpret the sentence correctly and more efficiently.

Moreover, we wanted to verify whether both groups were equally sensitive to this morphological cue. An effect of group in the analysis of reading times of area 4 would mean that bilingual and monolingual students did not benefit from morphological clues the same. If only monolingual students showed longer reading times in this region, this result would suggest that only these students could access the deeper morphosyntactic information carried by the plural. As a consequence, this would align with the findings obtained by Clahsen and Felser (Shallow Structure Hypothesis: Clahsen & Felser, 2006a; 2006b; 2006c; 2018) which were interpreted in terms of a qualitative difference between L1 and L2 processing. The absence of a group effect, instead, would indicate that monolinguals’ and bilinguals’ processing happened in the same way.

To recapitulate, the results of the linear mixed effect regression in the region of interest (area 4) showed only an effect of condition and no effect of group. These findings, thus, suggest that bilingual and monolingual students were able to adopt



the same language processing strategies and were sensitive to the morphological information contained in the plural form to interpret the sentence correctly. As shown in table 8.2 reporting mean scores of accuracy rates, in fact, both groups obtained higher scores in the manipulated items. The fact that the sentences displaying the base condition received significantly shorter reading times and that accuracy scores for this condition were lower suggest that the perspective shift was not processed efficiently.

Furthermore, we conducted the same analysis also on the last region of the sentence to check for potential spillover effects. The structure of the random effect for this area included only the intercepts by-subject and by-item. The outcomes did not show any effect. Students with higher grammar knowledge tended to display longer reading time in area 5, but the effect was only marginally significant ( $p = .06$ ).

*Table 8.4 – Morphological SPRT: linear mixed effect regression of log-transformed reading times in areas 4 and 5 in object relative clauses.*

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>4</b>	<b>Monolingual group</b>	-1.80 e-02	4.81 e-02	-0.37	0.71
	<b>Morphological condition</b>	7.59 e-02	2.79 e-02	2.72	< .05
	<b>TROG (percentile)</b>	1.04 e-03	8.88 e-04	1.17	0.25
	<b>Group*Condition</b>	-9.02e-02	3.77 e-02	-0.24	0.81
<b>5</b>	<b>Monolingual group</b>	4.25 e-02	6.28 e-02	0.68	0.50
	<b>Morphological condition</b>	2.19 e-02	2.31 e-02	0.95	0.34
	<b>TROG (percentile)</b>	2.24 e-03	1.16 e-03	1.94	0.06
	<b>Group*Condition</b>	3.91 e-03	4.54 e-02	1.24 e+03	0.93

### 8.2.2 *Passive voice*

The other target grammatical structure was the passive voice. For this structure we manipulated the number feature of the PP containing the agent of the sentence. The analyses of reading times for this structure included area 3 and 4 of

the sentences, hence, the region where the agent was specified and an adjunct phrase, as we can see in the example below in (2).

(2)

	1	2	3	4
<b>B.</b>	Il fiorista	viene aiutato	<b>dal postino</b>	nel negozio
<b>B.</b>	<i>The florist</i>	<i>is helped</i>	<i>by the postman</i>	<i>in the shop</i>
<b>M.</b>	Il fiorista	viene aiutato	<b>dai postini</b>	nel negozio
<b>M.</b>	<i>The florist</i>	<i>is helped</i>	<i>by the postmen</i>	<i>in the shop</i>

As for object relative clauses, we proceeded by detecting and removing the items that presented areas with reading times below 200ms. These items corresponded to 0.7% of the observations. Subsequently, we detected and trimmed also upper extreme outliers, that is all reading times that were longer than 5000ms. With a pareto chart (*dlookr* package, Ryu, 2022), we verified how many data points were lost after the detection of outliers. The percentage of missing values corresponded to 2.5% in region 3 and 2.4% in region 4.

Table (8.5) summarises the mean values of log-transformed reading times in the two areas of the sentences that we analysed divided by group and condition. Bilingual students obtained overall lower scores, but they seemed to particularly benefit from the manipulated condition in which they were more accurate.

Table 8.5 – Morphological SPRT: mean values and standard deviation of accuracy for sentences with passive voice.

Condition	Group	Accuracy
Base	Bilingual	0.68 (0.47)
Base	Monolingual	0.78 (0.41)
Morphological	Bilingual	0.78 (0.42)
Morphological	Monolingual	0.82 (0.39)

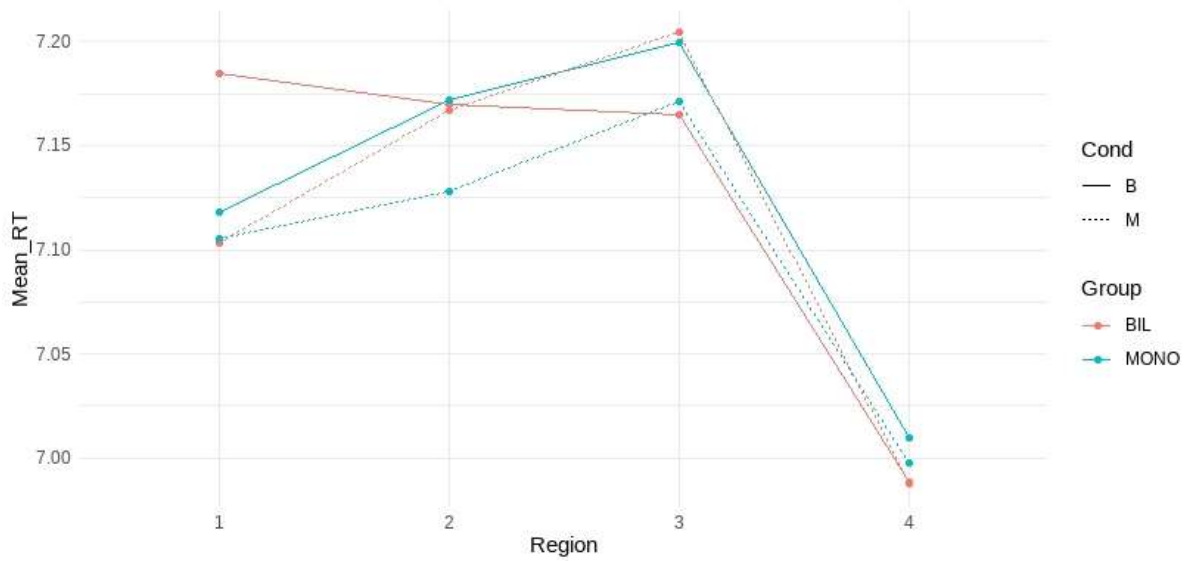
We analysed accuracy performances using a mixed effect logistic regression. The structure of the random effect of the model included condition in both the intercept by-subject and by-item. The results showed a significant effect

of group. As for object relative clauses, monolingual students obtained higher scores in accuracy ( $\beta = 0.43$ ,  $SE = 0.13$ ,  $z = 3.26$ ,  $p < .01$ ) and grammar knowledge also had a positive effect ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 4.65$ ,  $p < .001$ ). Moreover, condition had a marginally significant effect ( $\beta = 0.46$ ,  $SE = 0.25$ ,  $z = 1.79$ ,  $p = .07$ ). More specifically, sentences displaying the plural PP obtained higher accuracy scores.

Passive voice sentences were particularly challenging for the bilingual participants, who obtained 68% of accuracy at the comprehension questions that followed each item. However, they seemed to benefit from the manipulation of the number features because in the condition displaying the plural PP, they were more accurate (78%). We performed an analysis of contrasts using the *emmeans* package in R (Lenth, 2022) on the accuracy data. The results showed that the accuracy differences between groups, with bilinguals achieving lower scores, were significant only in the base condition ( $\beta = -0.63$ ,  $SE = 0.29$ ,  $z = -2.71$ ,  $p < .05$ ), but not in the manipulated condition ( $\beta = -0.25$ ,  $SE = 0.23$ ,  $z = -1.08$ ,  $p = 0.70$ ). When we consider all the participants together, the mixed effect logistic regression highlighted a marginal effect of condition on accuracy: students were more accurate when they encountered sentences with a plural agent. As it was found in object relative clauses, the plural PP had a facilitating effect during processing of passive structures and helped the students disambiguating more efficiently who was the agent and who was the patient in the sentences.

Before analysing reading times, we selected only the items that received a correct answer in the question following each sentence of the task. After this selection, 24.8% of the observations were trimmed. This percentage is higher than the one for object relative clauses. The likely cause of this is that the participants have probably received limited exposure to this structure. In particular, younger pupils had not explicitly studied this structure in class yet. Graph 8.2 shows the plot with the mean reading times per area divided by condition and group. The areas of interest are regions 3 and 4.

Graph 8.2 - Morphological SPRT: Reading times in passive voice.



The mean scores for the two areas that we analysed are presented below in table 8.6.

Table 8.6 – Morphological SPRT: mean values and standard deviation of log-transformed RTs for sentences with passive voice.

Condition	Group	Area 3	Area 4
Base	Bilingual	7.16 (0.50)	6.99 (0.50)
Base	Monolingual	7.20 (0.46)	7.01 (0.53)
Morphological	Bilingual	7.20 (0.49)	6.99 (0.52)
Morphological	Monolingual	7.17 (0.47)	7.00 (0.48)

The outcomes of the linear mixed effect regressions performed on log-transformed reading times of areas 3 and 4 are presented in table 8.7. The analysis of area 3 did not detect any effect. Thus, both groups behaved in the same way during the processing of these sentences and the morphological information contained in the plural agent was not more demanding during processing. However, the outcomes of the analysis on area 4 detected longer reading times for the students who had higher grammar knowledge ( $\beta = 2.20 \text{ e-}03$ ,  $SE = 1.04$ ,  $t = 2.12$ ,  $p < .05$ ),

but no effect of group or condition, nor of their interaction, as it is summarised in the table 8.7 below.

*Table 8.7 – Morphological SPRT: linear mixed effect regression of log-transformed reading times in areas 3 and 4 in sentences with passive voice.*

<b>Area</b>	<b>Condition</b>	<b>Estimate</b>	<b>SE</b>	<b>t</b>	<b>p</b>
<b>3</b>	<b>Monolingual group</b>	6.17 e-03	5.94 e-02	0.10	0.92
	<b>Morphological condition</b>	5.25 e-03	2.60 e-02	0.20	0.84
	<b>TROG (percentile)</b>	1.01 e-03	1.10 e-03	0.92	0.36
	<b>Group*Condition</b>	-3.32 e-02	4.24 e-02	-0.78	0.43
<b>4</b>	<b>Monolingual group</b>	1.54 e-02	5.63 e-02	0.27	0.78
	<b>Morphological condition</b>	-1.23 e-03	2.30 e-02	-0.05	0.96
	<b>TROG (percentile)</b>	2.20 e-03	1.04 e-03	2.12	< .05
	<b>Group*Condition</b>	5.79 e-02	4.60 e-02	1.26	0.21

Despite showing a facilitating effect during comprehension, especially for bilingual students, we did not detect effects of condition in the reading times during processing passive voice sentences. Thus, in this case, the manipulation of the number features could have had a delayed facilitating effect when participants had to answer to the question following the stimuli. As shown by table 8.7, the linear mixed effect regression on reading times in the last two areas of the sentence did not reveal any effect of group nor condition. Both bilingual and monolingual children followed a similar pace when processing passive voice sentences.

Furthermore, we found an effect of grammar knowledge in the last area of the sentence. More specifically, participants who obtained higher scores in the receptive grammar task displayed longer reading times in region 4 of the stimuli. This effect could reflect monitoring processes at the end of the sentence.

### 8.2.3 Filler structures

As mentioned in the section dedicated to the methodology in chapter “Our Study”, subject relative clauses and SVO sentences were included in the Self-Paced Reading Task as fillers. We did not expect to see any difference in the way in which the morphological information carried by the plural was processed in these sentences because it would not contribute to the correct interpretation of the sentences. Nevertheless, we carried out a statistical analysis of the reading time and accuracy after reading comprehension questions for these structures. As for object relative clauses, we considered area 4 as the region of interest when analysing subject relative clauses and conducted the analysis on this area and the following one. As we can see in the example below (3), this is the area in which the plural DP appears. Moreover, area 5 was also analysed to check for potential spillover effects.

(3)

	1	2	3	4	5
<b>B.</b>	La bambina	che	disturba	la compagna	è vivace
<b>B.</b>	<i>The girl</i>	<i>that</i>	<i>disturbs</i>	<i>the classmate</i>	<i>is lively.</i>
<b>M.</b>	La bambina	che	disturba	le compagne	è vivace
<b>M.</b>	<i>The girl</i>	<i>that</i>	<i>disturbs</i>	<i>the classmates</i>	<i>is lively.</i>

Furthermore, the analysis of SVO sentences focused on areas 3 and 4, as done for sentences with passive voice. The examples in (4) show one item in its base and manipulated versions.

(4)

	1	2	3	4
<b>B.</b>	Il calciatore	applaude	il compagno	dopo il gol
<b>B.</b>	<i>The football player</i>	<i>applauds</i>	<i>the teammate</i>	<i>after the goal</i>
<b>M.</b>	Il calciatore	applaude	i compagni	dopo il gol
<b>M.</b>	<i>The football player</i>	<i>applauds</i>	<i>the teammates</i>	<i>after the goal</i>

We detected and excluded the items that included at least one reading time below the lower cut-off point of 200ms. After this procedure, 1.2% of the observations were trimmed in subject relative clauses. After detecting and trimming outliers above 5000ms as well, 1.8% of the observations was lost in area 4 and 2.8% in area 5. As far as SVO sentences are concerned, 0.9% of the observations were lost after deleting the items that displayed at least one area with reading times below 200ms. Moreover, excluding the outlier data-points above 5000ms for this structure resulted in the loss of 2.1% of observations in area 3, and 2.5% in area 4. Table 8.8 reports the mean values of accuracy in the filler structures.

*Table 8.8* – Morphological SPRT: mean values and standard deviation of accuracy for subject relative clauses (SRC) and SVO sentences (SVO).

<b>Condition</b>	<b>Group</b>	<b>Accuracy</b>	<b>Accuracy</b>
		<b>SRC</b>	<b>SVO</b>
<b>Base</b>	<b>Bilingual</b>	0.86 (0.34)	0.81 (0.40)
<b>Base</b>	<b>Monolingual</b>	0.89 (0.32)	0.80 (0.37)
<b>Morphological</b>	<b>Bilingual</b>	0.78 (0.41)	0.84 (0.40)
<b>Morphological</b>	<b>Monolingual</b>	0.87 (0.34)	0.85 (0.36)

As the raw data suggests, the performances were generally more accurate than in the target structures, for both groups. The tables summarising the outcomes of the analyses of accuracy and log-transformed reading times during processing the filler structures can be found in Appendix B.

The mixed effect logistic regression performed to analyse accuracy rates during the processing of subject relative clauses revealed an effect of group: the monolingual participants were more accurate than their bilingual peers ( $\beta = 0.61$ ,  $SE = 0.20$ ,  $z = 3.11$ ,  $p < .01$ ). Moreover, a positive effect of grammar knowledge was also found ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 6.36$ ,  $p < .001$ ).

Table 8.9 – Morphological SPRT: mean values and standard deviation of log-transformed RT in areas 4 and 5 for subject relative clauses.

Condition	Group	Area 4	Area 5
Base	Bilingual	6.97 (0.48)	7.01 (0.56)
Base	Monolingual	6.95 (0.44)	7.01 (0.54)
Morphological	Bilingual	7.04 (0.50)	7.07 (0.55)
Morphological	Monolingual	7.00 (0.47)	7.01 (0.52)

After selecting only the items that were correctly comprehended among subject relative clauses, 16.1% of the observation were excluded from the analysis of reading times. Table (8.9) shows the mean values of log-transformed reading times in the two areas divided by group and condition.

The linear mixed effect regression on log-transformed reading times showed that the plural form contained in area 4 received longer reading times also for subject relative clauses ( $\beta = 5.61$ ,  $SE = 2.56$ ,  $t = 2.19$ ,  $p < .05$ ). As for the other structures, no effect of group nor grammar knowledge was found in the area of interest. When considering the last region of subject relative clauses, we found effect of grammar knowledge on reading times ( $\beta = 2.69$ ,  $SE = 1.12$ ,  $t = 2.40$ ,  $p < .05$ ). More specifically, longer reading times were detected in the last part of the sentence for the participants who obtained higher scores in the receptive grammar task. The outcomes of the mixed effect logistic regression analysing accuracy rates during processing SVO sentences are in line with those obtained for the other structures. Monolingual students were significantly more accurate than their bilingual peers ( $\beta = 0.47$ ,  $SE = 0.20$ ,  $z = 2.39$ ,  $p < .05$ ) and grammar knowledge also had an effect on reading times. More specifically, longer reading times were recorded in subjects who had higher grammar knowledge ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 4.36$ ,  $p < .001$ ).

The exclusion of the items displaying SVO sentences that were not correctly comprehended resulted in the loss of 18.9% of the observations. As for sentences with passive voice, we analysed areas 3 and 4. The table below 8.10 reports the descriptive analysis of log-transformed reading times in areas 3 and 4.



*Table 8.10* – Morphological SPRT: mean values and standard deviation of log-transformed RTs of areas 3 and 4 for SVO sentences.

<b>Condition</b>	<b>Group</b>	<b>Area 3</b>	<b>Area 4</b>
<b>Base</b>	<b>Bilingual</b>	7.01 (0.45)	7.02 (0.51)
<b>Base</b>	<b>Monolingual</b>	6.97 (0.52)	6.96 (0.54)
<b>Morphological</b>	<b>Bilingual</b>	7.05 (0.47)	7.01 (0.53)
<b>Morphological</b>	<b>Monolingual</b>	7.02 (0.49)	6.99 (0.54)

The linear mixed effect regression on log-transformed reading times of areas 3 and 4 did not reveal any effect, as was expected given the simplicity of the structure of SVO sentences.

#### **Summary of the results regarding the target structures**

- The monolingual students obtained higher accuracy scores in both object relative clauses and sentences with the passive voice.
- A marginal effect of condition was found in sentences displaying the passive voice. More specifically, the items with plural agents obtained higher accuracy scores.
- As sentences with passive voice are concerned, we observed that there was a significant difference in accuracy between groups only in the items displaying the base condition, thus the plural in the manipulated condition had a facilitating effect for the bilingual students.
- In object relative clauses, reading times in the target region (area 4) are longer in the manipulated condition. This result suggests that all participants were sensitive to the information provided by the plural, which was helpful to recognise the perspective shift that takes place in object relative clauses (MacWhinney, 1982).
- A marginal effect of grammar knowledge was found in the spillover regions (area 5 in object relative clauses and area 4 in passive voice sentences) in both structures. Participants who had higher grammar knowledge displayed longer reading times. We interpreted this result as the presence of monitoring processes at the end of the sentence.

### 8.3 *Pragmatic implausibility*

According to the Input Processing account developed by VanPatten (2004; 2014), learners of a second language rely on processing strategies which are based on two main principles (i.e., the Primacy of Meaning Principle and the First Noun Principle) and nine subprinciples. As described in more detail in the chapter dedicated to L2 processing, one of these subprinciples is called “Event Probabilities Principle”, and it describes the way in which L2 learners are sometimes prone to rely on the probability that a certain event will take place rather than on the syntactic structure governing the sentence. For instance, when we consider the verb *to scold* and we are given *parent* and *child* as animate elements in the sentence, we may be drawn to assume that the parent scolds the child because the opposite scenario is quite implausible (VanPatten, 2014, p. 121). In order to investigate how monolingual and language minority children process sentences presenting implausible situations, we developed a second Self-Paced Reading Task in which the base condition presented a plausible situation, whereas the manipulated items displayed a less likely scenario. If the bilingual students are more prone to rely on event probabilities, no differences in reading times should be detected between the two conditions.

We expected this manipulation to be particularly challenging in passive voice sentences. In this case, in fact, the First Noun Principle proposed in the Input Processing Hypothesis could also affect the way in which bilingual students interpreted the stimuli. Furthermore, as far as reading times are concerned, we expected to notice longer RTs in correspondence to the element that makes the event described pragmatically implausible. An effect of group would indicate that bilingual and monolingual students are processing the implausible information in different ways.

The table 8.11 reports accuracy scores for the questions following the two target structures. Bilingual students obtained lower scores than their monolingual peers. Both groups obtained lower scores in the items displaying an implausible situation.

Table 8.11 – Plausibility SPRT: mean values and standard deviation of accuracy in object relative clauses and passive voice sentences.

Condition	Group	Accuracy
Base	Bilingual	0.75 (0.43)
Base	Monolingual	0.81 (0.39)
Implausible	Bilingual	0.61 (0.49)
Implausible	Monolingual	0.70 (0.46)

Accuracy in the two experimental structures was also analysed using a mixed effect logistic regression. The results showed that the monolingual group obtained significantly higher scores ( $\beta = 0.43$ ,  $SE = 0.13$ ,  $z = 3.36$ ,  $p < .001$ ). Grammar knowledge was also found to have a positive effect on accuracy ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 4.66$ ,  $p < .001$ ). Lastly, condition had a significant effect on accuracy: the items displaying the implausible situations obtained lower scores ( $\beta = -0.71$ ,  $SE = 0.29$ ,  $z = -2.48$ ,  $p < .05$ ). When we look at the descriptive analysis of the two target structures, we can notice a marked difference both between group and between condition. The implausibility of the manipulated sentences, in fact, seemed to affect both groups in a similar way. However, after checking the contrasts within group and condition, it emerged that the bilingual students experienced more difficulties during the processing of the manipulated condition than their monolingual peers. The bilinguals' accuracy scores in the base condition were significantly higher than those displaying the implausible one ( $\beta = 0.80$ ,  $SE = 0.30$ ,  $t = 2.67$ ,  $p < .05$ ) whereas, despite showing lower scores in the manipulated, the performance of monolingual students in the two conditions did not reveal an effect of condition. In other words, even if both groups obtain lower scores during the processing of manipulated stimuli, the difference was significant only for the bilinguals.

### 8.3.1 OBJECT RELATIVE CLAUSES

The analysis of reading times in object relative clauses focused on the region of interest (i.e., area 4) and the last region of the sentence for potential spillover

effects (i.e., area 5). As we can see in the example below (5), these two regions correspond to the instantiation of the pragmatic implausibility. After detecting and trimming the items that included at least one reading time below 200ms, we excluded 6.7% of the observations. Moreover, we trimmed extreme outliers above 5000ms and controlled for the percentage of missing values using a pareto chart. This process implied the loss of 0.8% of data points area 4 and 0.5% in area 5.

(5)

	1	2	3	4	5
<b>B.</b>	La ragazza	che	il pirata	spaventa	è impaurita
<b>B.</b>	<i>The girl</i>	<i>that</i>	<i>the pirate</i>	<i>scares</i>	<i>is terrified</i>
<b>IMP.</b>	Il pirata	che	la ragazza	spaventa	è impaurita
<b>IMP.</b>	<i>The pirate</i>	<i>that</i>	<i>the girl</i>	<i>scares</i>	<i>is terrified</i>

Table 8.12 shows the descriptive analysis of accuracy rates divided by condition and group during processing object relative clauses.

Table 8.12 – Plausibility SPRT: mean values and standard deviation of accuracy for sentences for object relative clauses.

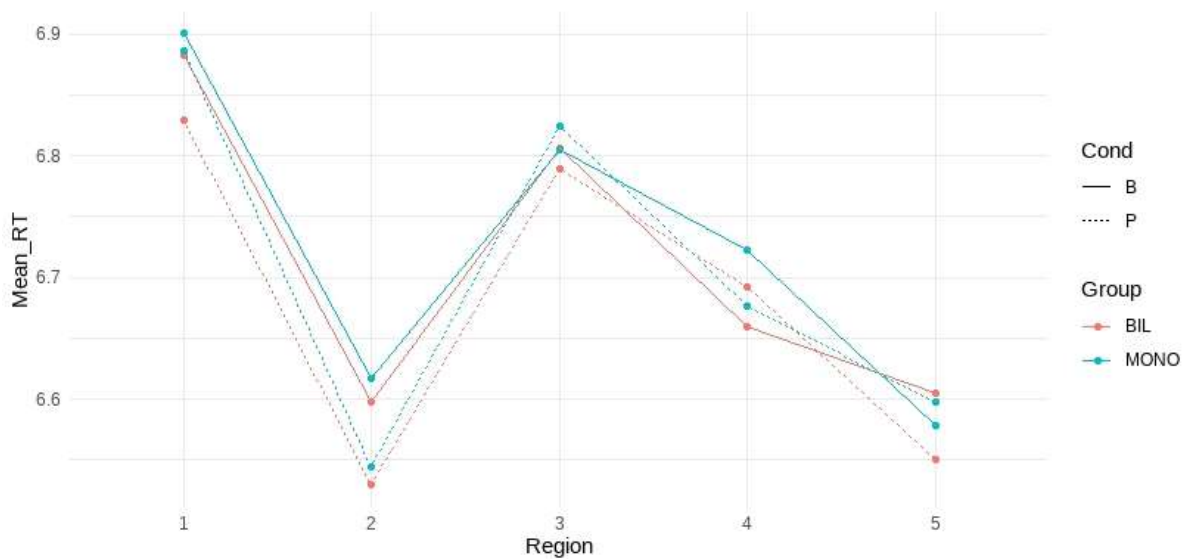
Condition	Group	Accuracy
Base	Bilingual	0.67 (0.48)
Base	Monolingual	0.75 (0.42)
Implausible	Bilingual	0.65 (0.48)
Implausible	Monolingual	0.68 (0.47)

The analysis of accuracy rates was conducted using a mixed effect logistic regression. The structure of the random effect included condition in both the intercept by-subject and by-item. The results showed an effect of group and grammar knowledge. Monolingual pupils were more accurate than their bilingual peers, as it was observed also for the previous Self-Paced Reading Task ( $\beta = 0.31$ ,  $SE = 0.14$ ,  $z = 2.26$ ,  $p < .05$ ). This difference, however, is determined only by the performance in the base condition. The analysis of contrasts, in fact, showed that

there was no significant difference between groups in the condition displaying the implausible situation. Moreover, students with higher grammar knowledge also obtained higher accuracy scores ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 3.39$ ,  $p < .001$ ). As the quite homogeneous scores obtained in base and manipulated items suggest, no effect of condition was detected. The complexity of this structure was confirmed by the low accuracy scores presented in table 8.12. In fact, both groups seemed to find object relative clauses quite demanding.

Before analysing reading scores in area 4 and 5, we selected only the items that were correctly comprehended. This process implied the loss of 36.2% of the data. In the graph below (8.3), we can see reading times divided per condition and group across all regions of object relative clauses.

Graph 8.3 - Plausibility SPRT: reading times in object relative clauses.



Moreover, in table 8.13 the descriptive analysis of read times in these two regions of the sentence is summarised.

*Table 8.13* – Plausibility SPRT: mean values and standard deviation of RT for object relative clauses.

<b>Condition</b>	<b>Group</b>	<b>Area 4</b>	<b>Area 5</b>
<b>Base</b>	<b>Bilingual</b>	6.66 (0.47)	6.61 (0.47)
<b>Base</b>	<b>Monolingual</b>	6.72 (0.47)	6.58 (0.46)
<b>Implausible</b>	<b>Bilingual</b>	6.69 (0.49)	6.55 (0.47)
<b>Implausible</b>	<b>Monolingual</b>	6.68 (0.48)	6.60 (0.49)

The model used to analyse reading times of area 4 of the sentence that converged correctly included the simple structure of the random effect with only the intercepts by-subject and by-item. As reported in the table below (8.14), there was no significant effect of group or condition in this area, but only a marginal effect receptive grammar ( $\beta = 0.00$ ,  $SE = 0.00$ ,  $t = 1.84$ ,  $p = 0.07$ ). Moreover, the interaction between group and condition was also approaching significance ( $\beta = -0.09$ ,  $SE = 0.05$ ,  $t = -1.78$ ,  $p = 0.08$ ). We conducted an analysis the contrasts to investigate further the interaction. The results showed that bilingual students tended to display longer reading times in the manipulated condition with respect to the base one. On the other hand, monolingual students had the opposite tendency. However, none of these contrasts was significant.

When we consider area 5, similarly to what was observed in the previous SPRT, an effect of grammar knowledge was detected at the end of the sentence ( $\beta = 0.00$ ,  $SE = 0.00$ ,  $t = 2.31$ ,  $p < .05$ ). Participants who had higher grammar knowledge tended to display longer reading times in this area. These outcomes on reading times in areas 4 and 5 did not reveal any effect of group nor condition. Thus, both monolingual and bilingual students showed similar reading times, and the implausibility did not slow down readers.

Table 8.14 – Plausibility SPRT: linear mixed effect regression on areas 4 and 5 in object relative clauses.

Area	Condition	Estimate	SE	t	p
4	Monolingual group	0.02	0.06	0.29	0.77
	Implausible condition	0.02	0.03	0.72	0.47
	TROG (percentile)	0.00	0.00	1.84	0.07
	Group*Condition	-0.09	0.05	-1.78	0.08
5	Monolingual group	-0.02	0.06	-0.25	0.80
	Implausible condition	-0.02	0.03	-0.93	0.35
	TROG (percentile)	0.00	0.00	2.31	< .05
	Group*Condition	0.06	0.05	1.26	0.21

The analysis of reading times did not reveal any effect of group in both the regions that were investigated, thus indicating that both groups were following the same processing behaviour. A marginal effect of grammar knowledge was found at the end of the relative clause (area 4). More specifically, the students who obtained higher scores in the receptive grammar task displayed longer reading times in this area. As discussed for the Self-Paced Reading Task investigating morphological processing, longer reading times in this part of the sentence indicate that readers are processing the shift of perspective that characterises this structure. Overall, the findings of the processing of plausible and implausible object relative clauses are in line with those discussed earlier: both groups adopted similar processing behaviours and reading times did not highlight any qualitative difference between the two groups.

### 8.3.2 *Passive voice*

As was done for the items with passive voice of the previous SPRT, the regions we focused on during the statistical analysis were area 3 and 4, hence, as we can see in the example in 6 the PP expressing the agent and the adjunct phrase at the end of the sentence. As shown below, the manipulation consisted in switching

the agent and patient roles of the base sentence in order to have in implausible situation.

Before proceeding with the analysis, we excluded the items that displayed at least one reading time below 200ms. This procedure implied the loss of 13.3% of the observations. After that, we also removed the reading times that were above 5000ms in the two areas investigated. After trimming these outliers, we excluded 0.6% of the observations in area 3 and 0.8% in area 4.

(6)

	1	2	3	4
<b>B.</b>	Il signore	viene spruzzato	dall'elefante	allo zoo
<b>B.</b>	<i>The man</i>	<i>is sprayed</i>	<i>by the elephant</i>	<i>at the zoo</i>
<b>IMP.</b>	L'elefante	viene spruzzato	dal signore	allo zoo
<b>IMP.</b>	<i>The elephant</i>	<i>is sprayed</i>	<i>by the man</i>	<i>at the zoo</i>

The following table 8.15 summarises the descriptive analysis of accuracy rates after reading passive voice sentences.

Table 8.15 – Plausibility SPRT: mean values and standard deviation of accuracy rates in passive voice sentences.

Condition	Group	Accuracy
<b>Base</b>	<b>Bilingual</b>	0.85 (0.36)
<b>Base</b>	<b>Monolingual</b>	0.86 (0.34)
<b>Implausible</b>	<b>Bilingual</b>	0.57 (0.50)
<b>Implausible</b>	<b>Monolingual</b>	0.73 (0.45)

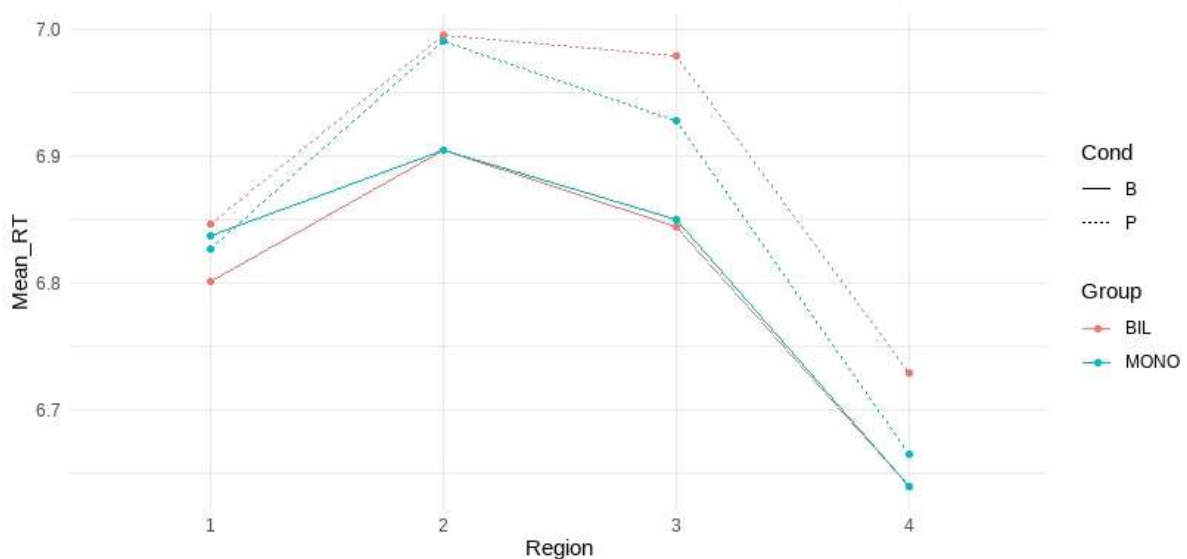
The percentages of accuracy presented in table 8.15 already highlight clear differences in accuracy between groups and conditions. Sentences displaying implausible sentences obtained lower accuracy scores from both bilingual and monolingual students. The accuracy rates were further investigated with a mixed effect logistic regression that highlighted an effect of group ( $\beta = 0.45$ ,  $SE = 0.22$ ,  $z = 2.04$ ,  $p < .05$ ), indicating that monolingual pupils obtained significantly higher



scores than their bilingual peers, and an effect of condition ( $\beta = -1.66$ ,  $SE = 0.39$ ,  $z = -4.24$ ,  $p < .001$ ), that confirms that the items presenting implausible situations received lower scores. Moreover, a positive effect of grammar knowledge was also found ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 4.13$ ,  $p < .001$ ). The interaction did not show a significant effect; thus this suggests that both groups had a similar behaviour in response to the manipulation. The accuracy scores obtained by bilingual students in the implausible condition are low and do not reach 60%, thus they seemed to be particularly affected by the implausible situations. Both group and condition significantly influenced the participants' performances. The analysis of contrasts showed that, even if their performance in the manipulated condition was lower than in the base one, the effect of condition on monolingual students was not significant. On the other hand, the accuracy performance of bilingual students was significantly higher in the base condition ( $\beta = 1.56$ ,  $SE = 0.33$ ,  $t = 4.76$ ,  $p < .0001$ ) than in the manipulated one.

The analysis of reading times in areas 3 and 4 was performed after trimming the items that were not correctly comprehended. The exclusion of these items entailed the loss of 25.5% of observations. Graph 8.4 shows reading times divided by condition and group for passive voice. A clear difference between reading times in the base and manipulated condition can be observed in region 3.

Graph 8.4 - Plausibility SPRT: reading times in passive voice sentences.



Furthermore, table 8.16 shows the descriptive analysis of log-transformed reading times in the two regions of interest divided by condition and group.

Table 8.16 – Plausibility SPRT: mean values of RT for passive voice sentences.

Condition	Group	Area 3	Area 4
Base	Bilingual	6.84 (0.47)	6.64 (0.48)
Base	Monolingual	6.85 (0.45)	6.64 (0.45)
Implausible	Bilingual	6.98 (0.52)	6.73 (0.49)
Implausible	Monolingual	6.93 (0.44)	6.67 (0.50)

The outcomes of the linear mixed effect regression are summarised in table 8.17. The analysis performed on reading times in area 3 showed that the implausible condition received significantly longer reading times ( $\beta = 0.14$ ,  $SE = 0.03$ ,  $t = 3.96$ ,  $p < .001$ ). Moreover, similarly to what was found in the critical region of object relative clauses, the interaction between group and condition was marginally significant ( $\beta = -0.08$ ,  $SE = 0.05$ ,  $t = -1.72$ ,  $p = 0.09$ ). We used the *emmeans* function to disentangle the nature of this interaction. The interaction plot for estimated marginal means showed that both groups tended to have longer reading times in this area when they read stimuli displaying the manipulated condition. However, as the outcomes of the analysis of contrast revealed, the difference between base and implausible condition was significant only for bilingual students ( $\beta = -0.14$ ,  $SE = 0.03$ ,  $t = -3.94$ ,  $p < .01$ ). These outcomes suggest that the effect of the manipulation was stronger in bilingual students than in their monolingual peers.

Longer reading times for the implausible condition were recorded also in area 4, but the effect was only approaching significance ( $\beta = 0.07$ ,  $SE = 0.03$ ,  $t = 1.94$ ,  $p = 0.05$ ). Similarly to what was found in the other conditions, longer reading times in the last area of the sentence were also modulated by grammar knowledge ( $\beta = 0.00$ ,  $SE = 0.00$ ,  $t = 2.12$ ,  $p < .05$ ). No effect of group nor of the interaction between group and condition was recorded.

Table 8.17 – Plausibility SPRT: Linear mixed effect regression on reading times in areas 3 and 4 of passive voice sentences.

Area	Condition	Estimate	SE	t	p
3	Monolingual group	-0.01	0.07	-0.23	0.82
	Implausible condition	0.14	0.03	3.96	< .001
	TROG (percentile)	0.00	0.00	1.68	0.10
	Group*Condition	-0.08	0.05	-1.72	0.09
4	Monolingual group	-0.02	0.06	-0.36	0.72
	Implausible condition	0.07	0.03	1.94	0.05
	TROG (percentile)	0.00	0.00	2.12	< .05
	Group*Condition	-0.06	0.05	-1.22	0.22

The analysis of reading times in the last two areas of the sentence revealed a significant effect of condition and a marginally significant interaction. After analysing the contrasts between groups and conditions, it emerged that, even if both groups showed longer reading times in area 3, where the implausibility appeared, only those of bilingual students were significantly longer than in the base condition. Unlike the other processing outcomes discussed thus far, we found a processing difference between the two groups. It should be reminded that the analysis on reading times was performed only on the items that were correctly comprehended. As a consequence, longer reading times in the area where the manipulation occurred would suggest that the bilingual participants successfully perceived that the expectations about role assignment based on event probabilities were not met, and longer reading times would indicate that it was costly to process that information correctly. Given the drastically low accuracy rates of bilingual students and the fact that they displayed longer reading times in area 3 when they comprehended the sentence, we decided to examine the relationship of accuracy and condition for this group further. More specifically, we aimed to verify whether longer permanence in this area corresponded to successful processing of the implausible information. After selecting only bilingual participants, we fitted a linear mixed effect regression that included log-transformed reading times as a function of condition, accuracy,

and their interaction. The outcomes revealed a significant interaction ( $\beta = 0.17$ ,  $SE = 0.07$ ,  $t = 2.41$ ,  $p < .05$ ) and the interaction-style plot for estimated marginal means showed that when sentences were correctly comprehended, the base condition displayed significantly shorter reading times in area 3 ( $\beta = -0.14$ ,  $SE = 0.03$ ,  $t = -4.12$ ,  $p < .001$ ). On the other hand, when the answer to the question following the stimulus was incorrect reading times in this area tended to be shorter in the manipulated condition than in the base one, although this difference was not statistically significant. The comparison between reading times in the implausible conditions revealed a marginal effect indicating shorter reading times when the answer was incorrect ( $\beta = -0.10$ ,  $SE = 0.04$ ,  $t = -2.40$ ,  $p = 0.08$ ). This effect, even though marginal, suggests that for bilingual students the implausible condition was more costly to process than for their monolingual peers. The same analysis on monolingual students, in fact, did not reveal any significant difference between condition or accuracy. These results suggest that processing the items displaying an implausible situation correctly was more effortful for the bilingual group. This could be the consequence of a less automatised mental grammar representation that required them to employ more resources to overcome the interference of the manipulated condition.

### 8.3.3 *Fillers structures*

As in the previous Self-Paced Reading Task, subject relative clauses and SVO sentences were included as filler stimuli. Since these structures are easier to process, we did not expect to find any effect of condition in reading times. The following examples (7 and 8) report two sentences for each structure, one per condition, to show how subject relative clauses and SVO sentences were manipulated in the implausible condition. In subject relative clauses (7), reading times of areas 4 and 5 were analysed. These areas corresponded to the DP that contained the patient and the final region of the sentence.

(7)

	1	2	3	4	5
<b>B.</b>	La signora	che	rimprovera	la bambina	è severa
<b>B.</b>	<i>The lady</i>	<i>that</i>	<i>reprimands</i>	<i>the girl</i>	<i>is stern</i>
<b>IMP.</b>	La bambina	che	rimprovera	la signora	è severa
<b>IMP.</b>	<i>The girl</i>	<i>that</i>	<i>reprimands</i>	<i>the lady</i>	<i>is stern</i>

The stimuli reported in (8) show SVO sentences. In this case, as done before, the reading times analysed were those of areas 3 and 4, thus the patient of the sentence and the final region.

(8)

	1	2	3	4
<b>B.</b>	Il preside	chiama	il ragazzo	nell'ufficio
<b>B.</b>	<i>The headmaster</i>	<i>calls</i>	<i>the boy</i>	<i>to the office</i>
<b>IMP.</b>	Il ragazzo	chiama	il preside	nell'ufficio
<b>IMP.</b>	<i>The boy</i>	<i>calls</i>	<i>the headmaster</i>	<i>to the office</i>

Before performing any analysis, we cleaned the data from the items that included at least one reading time below 200ms. This procedure led to the exclusion of 12.5% of the observations in subject relative clauses and 14.3% in SVO sentences. Furthermore, we removed reading times above 5000ms. Trimming these outliers in subject relative clauses reduced the datapoints of area 4 of 0.7% and 0.3% of observations were eliminated from of area 5. As SVO sentences are concerned, the exclusion of extreme outliers entailed the loss of 0.8% data-points in area 3 and 0.6% in area 4. In table 8.18, descriptive analyses about the filler structures are presented.

*Table 8.18* – Plausibility SPRT: mean values and standard deviation of accuracy rates for subject relative clauses and SVO sentences.

<b>Condition</b>	<b>Group</b>	<b>Accuracy SRC</b>	<b>Accuracy SVO</b>
<b>Base</b>	<b>Bilingual</b>	0.91 (0.28)	0.79 (0.40)
<b>Base</b>	<b>Monolingual</b>	0.96 (0.19)	0.87 (0.34)
<b>Implausible</b>	<b>Bilingual</b>	0.58 (0.49)	0.83 (0.38)
<b>Implausible</b>	<b>Monolingual</b>	0.70 (0.46)	0.87 (0.33)

The tables summarising the outcomes of the analyses performed on reading times for filler structures can be found in Appendix B.

The mixed effect logistic regression performed to analyse accuracy rates during the processing of subject relative clauses revealed that participants were less accurate when they encountered stimuli displaying the implausible situation ( $\beta = -2.37$ ,  $SE = 0.50$ ,  $z = -4.77$ ,  $p < .001$ ). Moreover, as found also in previous analyses, monolingual pupils obtained significantly higher scores ( $\beta = 0.81$ ,  $SE = 0.24$ ,  $z = -3.43$ ,  $p < .001$ ) and grammar knowledge had a positive effect on accuracy rates ( $\beta = 0.01$ ,  $SE = 0.00$ ,  $z = 3.67$ ,  $p < .001$ ).

The analyses on reading times were performed only on the items that were correctly comprehended, thus 21.8% of the observations was removed. Table 8.19 reports the descriptive analysis of reading times in areas 4 and 5 of subject relative clauses.

*Table 8.19* – Plausibility SPRT: mean values and standard deviation of log-transformed reading times in areas 4 and 5 of subject relative clauses.

<b>Condition</b>	<b>Group</b>	<b>Area 4</b>	<b>Area 5</b>
<b>Base</b>	<b>Bilingual</b>	6.68 (0.47)	6.55 (0.46)
<b>Base</b>	<b>Monolingual</b>	6.69 (0.44)	6.56 (0.45)
<b>Implausible</b>	<b>Bilingual</b>	6.67 (0.51)	6.55 (0.47)
<b>Implausible</b>	<b>Monolingual</b>	6.74 (0.48)	6.55 (0.41)

Reading times in these areas were then analysed using a linear mixed effect regression. In both areas no effects of group nor condition were detected. However, grammar knowledge had a marginal effect on reading times in area 4 ( $\beta = 2.18 \text{ e-}03$ ,  $\text{SE} = 1.21 \text{ e-}03$ ,  $t = 1.80$ ,  $p = .08$ ). This effect of grammar knowledge was significant in area 5 ( $\beta = 2.36 \text{ e-}03$ ,  $\text{SE} = 1.04 \text{ e-}03$ ,  $t = 2.26$ ,  $p < .05$ ). As observed previously, longer reading times were detected in participants who obtained higher scores in the receptive grammar task. This effect can be interpreted as the reflection of monitoring activity during reading.

When we consider the accuracy rates during the processing of SVO sentences, the results show that there was an effect of group, with monolingual obtaining higher accuracy scores, ( $\beta = 0.48$ ,  $\text{SE} = 0.21$ ,  $z = 2.32$ ,  $p < .05$ ) and a positive effect of grammar knowledge ( $\beta = 0.01$ ,  $\text{SE} = 0.00$ ,  $z = 2.65$ ,  $p < .01$ ) also in SVO sentences. However, for this structure, the effect of condition was not detected.

The analyses on reading times were performed only on the stimuli that were correctly comprehended. Detection and elimination of the items that received an incorrect answer at the question following the sentence entailed a loss of 17% of the data. Table 8.20 shows the descriptive analysis of log-transformed reading times recorded in areas 3 and 4.

*Table 8.20* – Plausibility SPRT: mean values and standard deviation of log-transformed reading times in areas 3 and 4 for SVO sentences.

<b>Condition</b>	<b>Group</b>	<b>Area 3</b>	<b>Area 4</b>
<b>Base</b>	<b>Bilingual</b>	6.71 (0.48)	6.63 (0.47)
<b>Base</b>	<b>Monolingual</b>	6.71 (0.42)	6.65 (0.47)
<b>Implausible</b>	<b>Bilingual</b>	6.70 (0.45)	6.64 (0.48)
<b>Implausible</b>	<b>Monolingual</b>	6.70 (0.46)	6.64 (0.49)

The outcomes of the linear mixed effect regression performed to analyse reading times revealed only an effect of grammar knowledge both in area 3 ( $\beta = 3.31 \text{ e-}02$ ,  $\text{SE} = 1.10 \text{ e-}03$ ,  $t = 3.01$ ,  $p < .01$ ) and in area 4 ( $\beta = 3.24 \text{ e-}03$ ,  $\text{SE} = 1.20 \text{ e-}03$ ,  $t = 2.71$ ,  $p < .01$ ) indicating that participants who had higher reading scores

tended to display longer reading times in these areas. No effect of group nor condition was detected for this structure.

**Summary of the results regarding the target structures:**

- Both groups had quite low accuracy scores. However, monolingual pupils obtained significantly higher scores than their bilingual peers in both structures.
- A negative effect of condition was found only in sentences displaying passive voice, but not in the object relative clauses.
- Accuracy scores were modulated by grammar knowledge.
- We observed a marginal effect of the interaction between group and condition in the target region (area 4) of object relative clauses. The analysis of contrasts revealed that the bilinguals tended to have longer reading times in the items with the implausible condition, whereas the monolinguals showed the opposite tendency. However, this contrast was not significant.
- In sentences with passive voice, a marginally significant interaction was found. More specifically, we found that the bilingual pupils displayed significantly longer reading times in the implausible condition when they had comprehended the sentence correctly. This effect was not found in the monolingual students. We suggest that the bilinguals might have needed longer reading times because of a less automatised grammar representation and, thus, they required more cognitive resources processing the implausibility.
- The analysis of reading times in the last area of the sentences showed an effect of grammar knowledge. As it was observed before, the students with higher grammar knowledge displayed longer reading times. This effect seems to show that the readers were monitoring their comprehension at the end of the sentences.



## 8.4 *Semantic Violation*

The third Self-Paced Reading Task that was administered to the students investigated how they responded to semantic violations during processing. Since the processing of lexical items and semantic information is prioritised in second language learning, as argued both by the Input Processing (VanPatten, 2004; 2014) and the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018), we hypothesised that the recognition of semantic violation would be more easily automatised also by bilingual students. This task was developed as a baseline in which we did not expect to find differences between the two groups of participants in terms of processing. In order to investigate this aspect of language processing, we manipulated one of the two arguments of the verb and used a lexical item that violated the semantic expectations created by the combination between the first argument and the verb of the sentence.

The table 8.21 shows accuracy rates for the questions following the two target structures. Monolingual students obtained higher scores than their bilingual peers. Both groups obtained lower scores in the items displaying the manipulation displaying the semantic violation.

*Table 8.21* – Semantic violation SPRT: mean values and standard deviation of accuracy for object relative clauses and passive voice sentences.

<b>Condition</b>	<b>Group</b>	<b>Accuracy</b>
<b>Base</b>	<b>Bilingual</b>	0.89 (0.32)
<b>Base</b>	<b>Monolingual</b>	0.92 (0.27)
<b>Violation</b>	<b>Bilingual</b>	0.79 (0.41)
<b>Violation</b>	<b>Monolingual</b>	0.88 (0.33)

We analysed accuracy in the two target structures using a mixed effect logistic regression. The outcomes of this analysis revealed significant effects of group, condition and grammar knowledge. As it can be seen also from the descriptive analysis, monolingual students were more accurate in the target structures ( $\beta = 0.61$ ,  $SE = 0.18$ ,  $z = 3.30$ ,  $p < .001$ ). Moreover, participants

encountered more difficulties in the condition displaying the semantic violation where they obtained lower scores ( $\beta = -0.63$ ,  $SE = 0.19$ ,  $z = -3.40$ ,  $p < .001$ ). Finally, the pupils who obtained higher scores in the receptive grammar task were also more accurate during the SPRT ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 6.33$ ,  $p < .001$ ). Overall, the mean values of accuracy scores in the two target structures are higher than those obtained in the previous SPRTs for both groups, suggesting that this task was less demanding than the other two.

#### 8.4.1 Object Relative Clauses

The analysis of object relative clauses did not only focus on areas 4 and 5 of the items, namely where the verb of the relative clauses occurs and the last area of the sentence, but we included also area 3, thus where the semantic violation started, as shown in the example below in (9).

(9)

	1	2	3	4	5
<b>B.</b>	La cartolina	che	il bambino	spedisce	è colorata
<b>B.</b>	<i>The postcard</i>	<i>that</i>	<i>the child</i>	<i>sends</i>	<i>is colourful</i>
<b>V.</b>	La cartolina	che	il righello	spedisce	è colorata
<b>V.</b>	<i>The postcard</i>	<i>that</i>	<i>the ruler</i>	<i>sends</i>	<i>is colourful</i>

Following the same procedures adopted for the analysis of the other SPRTs, we started by detecting and eliminating the items that included reading times below 200ms. After this procedure, 9,4% of the observations were excluded from the analysis. Furthermore, we removed reading times that exceeded 5000ms and, thus, trimmed 1.2% of data-points in area3, 0.1% in area 4, and 0.5% in area 5.

Before proceeding with the analysis of reading times, we investigated accuracy rates. The following table 8.22 presents the descriptive analysis of accuracy rates at the questions that followed every item of the task divided by condition and group.

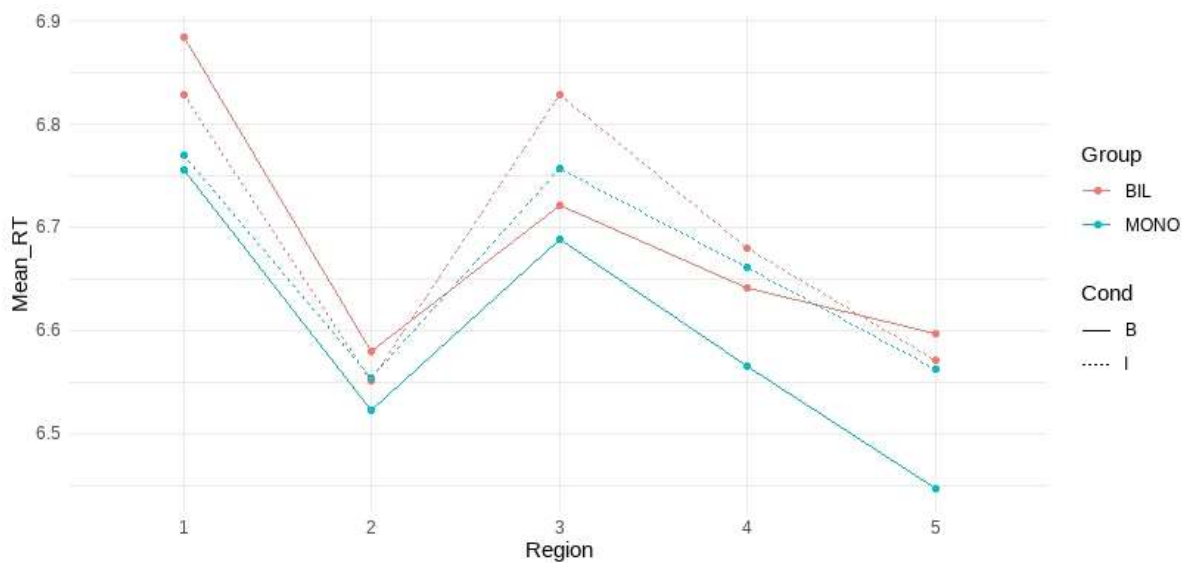
Table 8.22 – Semantic violation SPRT: mean values and standard deviation of accuracy for object relative clauses.

Condition	Group	Accuracy
Base	Bilingual	0.91 (0.29)
Base	Monolingual	0.94 (0.23)
Violation	Bilingual	0.83 (0.38)
Violation	Monolingual	0.90 (0.30)

The mixed effect logistic regression revealed an effect of group ( $\beta = 0.60$ ,  $SE = 0.24$ ,  $z = 2.53$ ,  $p < .05$ ). As it happened in the previous tasks, monolingual students were more accurate than their bilingual peers. Moreover, we also found a positive effect of grammar knowledge ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 4.64$ ,  $p < .001$ ). The condition presenting the semantic violation did not significantly affect accuracy. As recorded before, monolingual pupils tended to be more accurate than their bilingual peers, but there was no effect of condition. Thus, the semantic violation in object relative clauses did not affect the comprehension of the sentences.

The analysis on reading times included only the items that were correctly comprehended; thus, we excluded all the stimuli that received a wrong answer to the question following them. During this procedure we excluded 10.1% of the data.

Graph 8.5 - Semantic violation SPRT: reading times in object relative clauses.



Graph 8.5 shows reading times divided by condition and group across the five regions of object relative clauses. Table 8.23 shows the descriptive analysis of log-transformed reading times in areas 4 and 5.

*Table 8.23 – Semantic violation SPRT: mean values and standard deviation of log-transformed reading times in areas 4 and 5 of object relative clauses.*

<b>Condition</b>	<b>Group</b>	<b>Area 3</b>	<b>Area 4</b>	<b>Area 5</b>
<b>Base</b>	<b>Bilingual</b>	6.72 (0.54)	6.64 (0.46)	6.60 (0.48)
<b>Base</b>	<b>Monolingual</b>	6.69 (0.46)	6.57 (0.38)	6.45 (0.42)
<b>Violation</b>	<b>Bilingual</b>	6.83 (0.60)	6.68 (0.46)	6.57 (0.47)
<b>Violation</b>	<b>Monolingual</b>	6.76 (0.50)	6.66 (0.42)	6.56 (0.48)

Reading times were further investigated using a linear mixed effect regression and the outcomes of this analysis are reported in table 8.24. In area 3, where the DP with the semantic violation appeared, we found an effect of group ( $\beta = 0.09$ ,  $SE = 0.038$ ,  $t = 2.48$ ,  $p < .05$ ). With the analysis of contrasts, we observed that reading times in the base condition were significantly shorter for bilinguals ( $\beta = -0.12$ ,  $SE = 0.04$ ,  $t = -2.78$ ,  $p < .05$ ). The same pattern was observed for monolingual students with a marginally significant effect of condition ( $\beta = -0.08$ ,  $SE = 0.04$ ,  $t = -1.78$ ,  $p = 0.09$ ). The analysis on area 4 revealed again an effect of condition. We detected significantly longer reading times in the condition displaying the semantic violation ( $\beta = 6.15 \text{ e-}02$ ,  $SE = 2.56 \text{ e-}02$ ,  $t = 2.40$ ,  $p < .05$ ). We analysed the contrasts between the reading times in the conditions for the two groups and the outcomes revealed that the effect of the violation remained significant only for monolingual pupils: the base condition showed significantly shorter reading times ( $\beta = -0.08$ ,  $SE = 0.03$ ,  $t = -2.59$ ,  $p < .05$ ). Moreover, an effect of grammar knowledge was also detected in this area. In particular, participants who achieved higher grammar knowledge scores displayed longer reading times ( $\beta = 2.57 \text{ e-}03$ ,  $SE = 9.86 \text{ e-}04$ ,  $t = 2.66$ ,  $p < .01$ ). The model used to analyse reading times in area 5 that converged correctly included only the intercepts by-subject and by-item in the structure of the random effect. Longer reading times in the presence of the semantic violation were recorded also in the last area of the sentence ( $\beta =$

4.85 e-02, SE = 2.21 e-02,  $t = 2.20$ ,  $p < .05$ ). In this area we found a significant effect of the interaction between group and condition. To disentangle this effect, we used the *emmeans* function contained in the *emmeans* package in R. Reading times in the two conditions were analysed within and between group. We observed that bilingual students displayed longer reading times in the base condition with respect to monolinguals. This difference, however, was only marginally significant ( $\beta = 0.14$ , SE = 0.06,  $t = 2.40$ ,  $p = 0.08$ ). When we consider only monolingual pupils, we notice that the reading times in the base condition are significantly shorter than those detected in the condition displaying the semantic violation ( $\beta = -0.13$ , SE = 0.03,  $t = -4.01$ ,  $p < .01$ ).

Table 8.24 – Semantic violation SPRT: linear mixed effect regression on log-transformed reading times in areas 4 and 5 of object relative clauses.

Area	Condition	Estimate	SE	$t$	$p$
3	Monolingual group	-4.82 e-02	7.32 e-02	-0.66	0.51
	Violation condition	9.64 e-02	3.66 e-02	2.63	< .05
	TROG (percentile)	2.87 e-03	1.33 e-03	2.15	< .05
	Group*Condition	-3.95 e-02	4.30 e-02	-0.92	0.36
	Monolingual group	-4.50 e-02	5.32 e-02	-0.85	0.40
4	Violation condition	6.15 e-02	2.56 e-02	2.40	< .05
	TROG (percentile)	2.57 e-03	9.68 e-04	2.66	< .01
	Group*Condition	4.36 e-02	3.68 e-02	1.18	0.24
	Monolingual group	-6.61 e-02	5.63 e-02	-1.17	0.24
5	Violation condition	4.85 e-02	2.21 e-02	2.20	< .05
	TROG (percentile)	7.48 e-02	1.02 e-03	0.73	0.47
	Group*Condition	1.55 e-02	4.18 e-02	3.70	< .001
	Monolingual group	-6.61 e-02	5.63 e-02	-1.17	0.24

We expected to notice longer reading times when participants efficiently processed the semantic violation. The expectations were met in areas 3, 4, and 5, thus suggesting that children successfully noticed that one DP did not semantically match the other DP and the verb of the sentence. If we look at the behaviour of the

two groups, they displayed similar tendencies, but the effect of the violation was longer for monolingual pupils than for bilinguals. After the appearance of the violation, in fact, monolinguals recorded slower reading times for the manipulated condition also in areas 4 and 5. These findings indicate that the semantic violation was initially perceived in a similar way, but then it echoed longer throughout the rest of the sentence only for the native speakers. This effect could indicate that monolingual students managed to employ more cognitive resources for monitoring throughout the whole sentence.

#### 8.4.2 *Passive Voice*

As for the previous SPRTs, the analysis of the items displaying passive voice included area 3 and 4 of the sentences. These regions correspond to the PP that contains the agent of the sentence, where the semantic violation may be displayed, and to an adjunct phrase, as shown in the examples below in (10).

(10)

	1	2	3	4
<b>B.</b>	Il paesaggio	viene ammirato	dal fotografo	al tramonto
<b>B.</b>	<i>The view</i>	<i>is admired</i>	<i>by the photographer</i>	<i>at sunset</i>
<b>V.</b>	Il paesaggio	viene ammirato	dal pennarello	al tramonto
<b>V.</b>	<i>The view</i>	<i>is admired</i>	<i>by the marker</i>	<i>at sunset</i>

Before analysing the accuracy rates during processing passive voice sentences, we excluded the stimuli that included at least one reading time below 200ms. As a consequence, we excluded 8.8% of the observations. Moreover, missing values in the regions of interest after detecting and trimming outliers above 5000ms corresponded to 0.9% in area 3 and 0.6% in area 4.

Table 8.25 summarises the descriptive analyses of accuracy rates divided by condition and group.

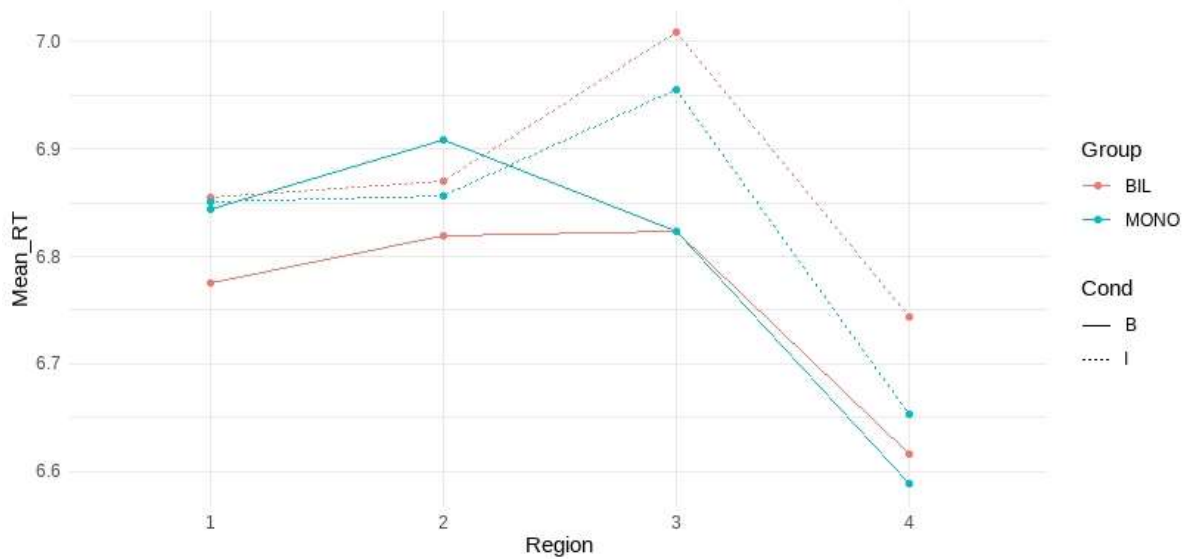
Table 8.25 – Semantic violation SPRT: mean values and standard deviation of accuracy rates for passive voice sentences.

Condition	Group	Accuracy
Base	Bilingual	0.87 (0.34)
Base	Monolingual	0.90 (0.31)
Violation	Bilingual	0.74 (0.44)
Violation	Monolingual	0.85 (0.36)

Accuracy rates were analysed using a mixed effect logistic regression that revealed significant effects of group, condition, and grammar knowledge. In particular, as we have already seen also for the other structures across all SPRTs, monolingual students obtained higher scores ( $\beta = 0.53$ ,  $SE = 0.19$ ,  $z = 2.75$ ,  $p < .01$ ). Moreover, students were significantly less accurate when they encountered sentences displaying semantic violations ( $\beta = -0.72$ ,  $SE = 0.20$ ,  $z = -3.62$ ,  $p < .001$ ). Finally, in line what was observed before, grammar knowledge had a positive effect on accuracy ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 6.00$ ,  $p < .001$ ). As it happened during processing of passive voice sentences in the other SPRTs, monolingual children obtained significantly higher accuracy scores than bilinguals. However, the analysis of contrasts revealed that bilingual students achieved significantly lower scores only in the manipulated condition ( $\beta = -0.71$ ,  $SE = 0.23$ ,  $t = -3.09$ ,  $p < .01$ ), thus when the difficulty of the structure was combined with the influence of the semantic violation and more cognitive resources were required.

The analysis on reading times was performed after excluding the items that were not correctly interpreted. This selection implied the loss of 16.5% of the data. In graph 8.6, reading times divided by condition and group across all regions are represented. As shown below, we can recognise a marked difference between reading times in the different conditions in area 3.

Graph 8.6 - Semantic violation SPRT: reading times in passive voice sentences.



Moreover, in the following table 8.26, the descriptive analysis of log-transformed reading times corresponding to areas 3 and 4 are reported.

Table 8.26 – Semantic violation SPRT: mean values and standard deviation of log-transformed reading times in areas 3 and 4 of passive voice sentences.

Condition	Group	Area 3	Area 4
Base	Bilingual	6.82 (0.51)	6.62 (0.49)
Base	Monolingual	6.82 (0.45)	6.59 (0.45)
Violation	Bilingual	7.01 (0.59)	6.74 (0.50)
Violation	Monolingual	6.96 (0.52)	6.65 (0.46)

The outcomes of the linear mixed effect regression used to investigate reading times are summarised in table 8.27. The results highlight a significant effect of condition. Participants displayed significantly longer reading times in area 3 when they encountered stimuli displaying the semantic violation ( $\beta = 1.61 \text{ e-}0101$ ,  $\text{SE} = 2.58 \text{ e-}02$ ,  $t = 6.23$ ,  $p < .05$ ). Grammar knowledge also influenced reading times ( $\beta = 2.46 \text{ e-}03$ ,  $\text{SE} = 1.24 \text{ e-}03$ ,  $t = 1.98$ ,  $p < .05$ ), the participants who obtained higher scores in the receptive grammar task tended to display longer reading times.



The effect of condition was maintained also in the last region of the sentence. The stimuli displaying the semantic violation, in fact, show significantly longer reading times ( $\beta = 1.02 \text{ e-}01$ ,  $SE = 3.06 \text{ e-}02$ ,  $t = 3.34$ ,  $p < .01$ ). No other effect was found in this area.

Table 8.27 – Semantic violation SPRT: linear mixed effect regression on log-transformed reading times in areas 3 and 4 of passive voice sentences.

Area	Condition	Estimate	SE	t	p
3	Monolingual group	1.37 e-03	6.81 e-02	0.02	0.98
	Violation condition	1.61 e-01	2.58 e-02	6.23	< .001
	TROG (percentile)	2.46 e-03	1.24 e-03	1.98	0.05
	Group*Condition	-2.16 e-02	4.67 e-02	-0.46	0.64
4	Monolingual group	-2.82 e-02	6.03 e-02	-0.47	0.64
	Violation condition	1.02 e-01	3.06 e-02	3.34	< .01
	TROG (percentile)	1.51 e-03	1.10 e-03	1.38	0.17
	Group*Condition	-3.63 e-02	4.43 e-02	-0.82	0.41

When we consider only sentences that were correctly comprehended, there are no longer group differences. Reading times in area 3, as expected, were longer in the manipulated condition than in the base one. The analysis of contrasts confirmed that both bilingual and monolingual students behaved similarly: both groups, in fact, remained significantly longer in area 3 when they found a semantic violation. Moreover, the effect of the violation was maintained also in the last area of the sentence, once again, for both groups.

The findings for sentences with passive structure are in line with the expectations and suggest that this task offered a baseline in which both monolingual native speakers of Italian and language minority children performed in the same way.

### 8.4.3 Filler structures

Subject relative clauses and SVO sentences were used as fillers also in the Self-Paced Reading Task investigating processing in the presence of a semantic violation. As done previously, the areas of interest in the analysis of subject relative clauses are areas 4 and 5 that correspond respectively to the place where the semantic incongruence may occur and to the last part of the sentence, as it can be seen in the example in (11). Moreover, in the analysis of SVO sentences (12), we focused on areas 3 and 4, thus where the DP displaying the semantic violation appears, and the last area of the sentence.

(11)

	1	2	3	4	5
<b>B.</b>	Il pittore	che	dipinge	il quadro	è talentuoso
<b>B.</b>	<i>The painter</i>	<i>that</i>	<i>paints</i>	<i>the picture</i>	<i>is talented</i>
<b>V.</b>	Il pittore	che	dipinge	il computer	è talentuoso
<b>V.</b>	<i>The painter</i>	<i>that</i>	<i>paints</i>	<i>the computer</i>	<i>is talented</i>

(12)

	1	2	3	4
<b>B.</b>	La commessa	veste	il manichino	in negozio
<b>B.</b>	<i>The shop assistant</i>	<i>dresses up</i>	<i>the mannequin</i>	<i>in the shop</i>
<b>V.</b>	La commessa	veste	il bicchiere	in negozio
<b>V.</b>	<i>The shop assistant</i>	<i>dresses up</i>	<i>the glass</i>	<i>in the shop</i>

Before proceeding with the analysis of reading time, we excluded the items in which at least one reading time was below 200ms. This entailed the loss of 8.7% of observations in subject relative clauses, and 8.2% in SVO sentences. Moreover, we trimmed extreme outliers above 5000ms in the two regions of interest. After the detection and the elimination of these datapoints, the missing values in areas 4 corresponded to 0.7% and to 1.2% in area 5 of subject relative clauses. The

observations trimmed in area 3 of SVO sentences were 1%, whereas 0.9% was excluded from area 4.

After cleaning data from outliers, we analysed the accuracy rates in the two filler structures. The descriptive analyses are presented in table 8.28.

*Table 8.28* – Semantic violation SPRT: mean values and standard deviation of accuracy rates for subject relative clauses and SVO sentences.

<b>Condition</b>	<b>Group</b>	<b>Accuracy SRC</b>	<b>Accuracy SVO</b>
<b>Base</b>	<b>Bilingual</b>	0.93 (0.26)	0.92 (0.27)
<b>Base</b>	<b>Monolingual</b>	0.95 (0.21)	0.94 (0.24)
<b>Implausible</b>	<b>Bilingual</b>	0.89 (0.31)	0.84 (0.37)
<b>Implausible</b>	<b>Monolingual</b>	0.94 (0.24)	0.91 (0.29)

Accuracy performance in the filler structures for this SPRT was overall higher compared to the other experimental conditions investigated. The mean scores, in fact, show that participants mostly performed at ceiling. The outcomes of the mixed effect logistic regression performed to investigate accuracy rates in subject relative clauses are reported in Appendix B. The results show only an effect of grammar knowledge: participants who obtained higher scores in the receptive grammar task obtained higher accuracy scores ( $\beta = 0.02$ ,  $SE = 0.00$ ,  $z = 2.79$ ,  $p < .01$ ). Interestingly, no effect of group nor condition was recorded.

Before proceeding with the analysis of reading times, we excluded all the stimuli that were not processed correctly. This selection entailed the loss of 7.4% of the data from subject relative clauses.

The following table 8.29 presents the descriptive analysis of log-transformed reading times divided per group and condition.

Table 8.29 – Semantic violation SPRT: mean values and standard deviation of RT for subject relative clauses.

Condition	Group	Area 4	Area 5
Base	Bilingual	6.61 (0.49)	6.53 (0.52)
Base	Monolingual	6.64 (0.44)	6.48 (0.46)
Violation	Bilingual	6.80 (0.59)	6.67 (0.50)
Violation	Monolingual	6.79 (0.56)	6.66 (0.52)

Reading times were further analysed using a linear mixed effect regression. The tables reporting the outcomes of this analysis are included in Appendix B. The results show only a significant effect of condition. As it happened for the other structures, reading times were longer in the presence of the semantic violation. This effect was observed both in area 4 ( $\beta = 1.56 \text{ e-}01$ ,  $\text{SE} = 3.62 \text{ e-}02$ ,  $t = 4.32$ ,  $p < .001$ ) and in area 5 ( $\beta = 1.56 \text{ e-}01$ ,  $\text{SE} = 1.12 \text{ e-}02$ ,  $t = 7.15$ ,  $p < .001$ ). The model used to analyse reading times in area 5 included the simple structure of the random effect, that included the intercepts by-subject and by-item.

The mixed effect logistic regression performed to analyse accuracy rates in SVO sentences revealed only a marginal effect of group ( $\beta = 0.43$ ,  $\text{SE} = 0.24$ ,  $z = 1.76$   $p = 0.08$ ), monolingual pupils obtained slightly higher scores than bilinguals. Grammar knowledge had a significant positive effect on accuracy and the participants who obtained higher scores in the receptive grammar task were more accurate also during the SPRT ( $\beta = 0.01$ ,  $\text{SE} = 0.00$ ,  $z = 3.58$   $p < .001$ ). Finally, accuracy was significantly lower for the stimuli that displayed the semantic violation ( $\beta = -1.14$ ,  $\text{SE} = 0.39$ ,  $z = -2.92$   $p < .01$ ).

The analysis of reading times was conducted including only the items that were correctly comprehended. Among the items displaying SVO sentences, 10.1% received a wrong answer to the questions following the stimuli and, therefore, these observations were excluded. Table 8.30 reports the descriptive analysis of log-transformed reading times in areas 3 and 4 of SVO sentences.

Table 8.30 – Semantic violation SPRT: mean values and standard deviation of log-transformed reading times for SVO sentences.

Condition	Group	Area 3	Area 4
Base	Bilingual	6.71 (0.51)	6.64 (0.46)
Base	Monolingual	6.73 (0.48)	6.60 (0.44)
Violation	Bilingual	6.83 (0.60)	6.72 (0.51)
Violation	Monolingual	6.80 (0.55)	6.67 (0.46)

As it can be seen in the tables reported in Appendix B, there was a significant effect of condition. Reading times were longer in the items displaying the semantic violation. The effect was detected both in area 3 ( $\beta = 9.11 \text{ e-}02$ ,  $\text{SE} = 4.19 \text{ e-}02$ ,  $t = 2.17$   $p < .05$ ) and area 4 ( $\beta = 7.34 \text{ e-}02$ ,  $\text{SE} = 2.48 \text{ e-}02$ ,  $t = 2.96$   $p < .05$ ). Moreover, the participants who obtained higher scores in the task for receptive grammar tended to display longer reading times. The effect of grammar knowledge was marginally significant in area 3 ( $\beta = 2.26 \text{ e-}03$ ,  $\text{SE} = 1.29 \text{ e-}02$ ,  $t = 1.75$   $p = 0.08$ ) and it reached significance in the final region of the sentence ( $\beta = 2.16 \text{ e-}03$ ,  $\text{SE} = 1.08 \text{ e-}03$ ,  $t = 2.00$   $p < .05$ ).

**Summary of the results regarding the target structures:**

- The monolingual students were more accurate in both structures. However, the analysis of contrasts on the items with the passive voice revealed that the difference between groups was significant only in the condition displaying the semantic violation.
- An effect of condition was found only in the sentences with the passive voice. Participants were significantly less accurate interpreting these items.
- An effect of grammar knowledge was found in both structures: the students with higher grammar knowledge were also more accurate.
- The analysis of object relative clauses also included the reading times in area 3, where the semantic violation appeared. In this region, we detected shorter reading times in the base condition. This difference was significant for the bilingual students, but only marginally significant for the monolinguals.

- Condition was found to have a significant effect in all other regions of interest (areas 4 and 5 in object relative clauses, and areas 3 and 4 in sentences with passive voice). Longer reading times were observed in the condition displaying the semantic violation.
- As found previously, we also detected an effect of grammar knowledge on the reading times. In particular, the participants who had higher grammar knowledge also displayed longer reading times, suggesting that they were monitoring their comprehension.

### **8.5 *Concluding remarks***

Across all three Self-Paced Reading Tasks there are some common outcomes. As reading times are concerned, we did not detect differences between groups. This datum provides an interesting insight on how minority language bilingual children process written Italian. Their processing abilities, thus, align with those of monolingual pupils rather than with what is expected for L2 learners' processing skills according to the literature (Shallow Structure Hypothesis, Clahsen & Felser, 2006a; 2006b; 2006c). However, similar processing abilities were not matched to similar results when accuracy rates are considered. In almost all the tasks, the analysis of accuracy rates revealed a significant effect of group showing that monolingual students were more accurate than their bilingual peers. One possible way to interpret this discrepancy between the outcomes obtained in the analyses of reading times and accuracy is the result of the taxing nature of processing in a non-native language. This could be the consequence of less automatised processing abilities that could not be detected with the TROG since this task does not include a high number of items displaying complex structures, it does not assess on-line processing, and, crucially, reading is not involved during the task.

According to theoretical accounts that propose a quantitative difference between L1 and L2 processing (Hopp, 2010; 2014), the constant competition between all the languages stored in the speakers' brain have consequences on the cognitive load that is required during L2 processing. Thus, the lower accuracy

scores we detected for bilingual speakers could be reflect the higher cognitive effort required to these speakers during processing. An important factor that the mixed effect logistic regression highlighted in the analysis of accuracy rates was off-line grammar knowledge. The percentile scores obtained by students in the receptive grammar task (TROG) were added as a covariate in the model. All the analyses of accuracy across all SPRTs showed a significant effect of off-line grammar knowledge: the students who obtained higher scores in the receptive grammar task tended to be more accurate also during the Self-Paced Reading Task. As remarked previously, no group difference was detected during the TROG, thus the advantages of more developed off-line grammar knowledge could benefit both groups of participants during the SPRTs. Moreover, the analysis of reading times, which was performed only on the stimuli that were correctly comprehended, often revealed that participants who had obtained higher scores during the task investigating receptive grammar displayed longer reading times in the last area of the stimuli. This spillover effect could be the consequence of the readers' monitoring activity. In other words, the correlation between higher grammar knowledge and longer reading times would indicate that the participants were wrapping up the meaning of the sentence they just read.

With the SPRTs, we investigated the processing of two structures that are not frequently found in everyday register and are more often used in textbooks. The low frequency with which these structures are found made the task quite challenging for both groups. When we consider reading times, overall, we argue that, in line with Hopp's claims and the computational approach known as Fundamental Identity Hypothesis (Hopp, 2010; 2014), these findings corroborate the assumption that native and non-native language processing follow the same patterns. In the first SPRT, both groups, in fact, were sensitive to the manipulation of number features that could support them during comprehension and managed to use the morphological cue to correctly interpret the sentences they read. However, answering to the questions following the items seemed to be more challenging for minority language bilingual children. In other words, as suggested by the Fundamental Identity Hypothesis (Hopp, 2010; 2014), non-native processing does not qualitatively differ from native processing, but it requires a higher cognitive

load, as lower accuracy rates reveal. In the SPRT investigating the effect of pragmatic implausibility during processing, we observe the only difference between groups in reading times for the sentences displaying passive voice. This task seemed to be the most demanding, especially for the bilingual students. They recorded longer reading times than their monolingual peers when they encountered the implausible prepositional phrase with the agent of the sentence. This result would suggest that they found the manipulation of the task more challenging during processing. In this case, given the difficulty of the structure, the bilingual students may have relied on Event Probabilities (VanPatten, 2004; 2014) and then they required more cognitive resources to monitor their comprehension when they realised that the role assignment was implausible. This interpretation would suggest that minority language bilingual children might not always manage to create an efficient grammatical representation. The last SPRT that was administered did not reveal differences in terms of processing between the two groups. Both bilingual and monolingual students detected and processed semantic violations in a similar way, thus corroborating Hopp's hypothesis that native and non-native processing do not differ from a qualitative point of view.

To conclude, we observe that there is no group difference when we consider reading times, but there is an effect of group in terms of accuracy and monolingual students obtained higher scores. Bilinguals' lower scores could reflect the taxing nature of processing language in a multilingual mind. Constant language competition and the complexity of these structures required students to allocate several cognitive resources to manage to process the syntactic relationships between constituents correctly while promptly monitor what pieces of information could contribute to the correct interpretation of the sentences (Hopp, 2010; 2014). Since the TROG did not show any group difference, and we argue it may be due to the fact that this task investigates off-line grammar knowledge and it does not specifically focus on complex structures that are not frequently used. At a closer scrutiny, the outcomes of TROG are not incompatible with those obtained from the SPRTs. In fact, we notice that students with higher off-line grammar knowledge obtained higher scores in term of accuracy and displayed longer reading times in the spillover area suggesting that they were monitoring their comprehension. These



findings also have implications on the importance of combining both off-line and on-line measures to explore the students' syntactic knowledge and syntactic processing abilities. In fact, the SPRT gives us more precise information about how on-line processing takes place and we notice that when children do not have the support of pictures, as it happens during the administration of the TROG, and face more time constraints, creating an efficient grammar representation is more challenging. Crucially, this information can contribute to understanding better and addressing the obstacles that minority language bilingual students encounter during their school experience. Thanks to more detailed information about their language processing abilities, it is possible to tailor more efficient pedagogical practices to be used in multilingual classes.

## 9. PEDAGOGICAL INTERVENTIONS

One of the goals of this study was to integrate also the pedagogical aspects related to grammar teaching and the development of reading comprehension skills. Since data collection required considerably more time due to the Covid-19 restrictions, this aspect of the project could not be developed as planned. Originally, we aimed to propose 8-10 meetings in class with students. However, it was only possible to organize four meetings that took place in May 2021. As presented in chapter 6, only part of the students who participated to the data collection were involved during the pedagogical intervention. Most of the groups that attended fifth grade, in fact, did not manage to take part to any or all the meetings of the intervention.

The aspects we aimed to investigate during the intervention were two. First of all, we wanted to test a method of teaching grammar that was not based on the presentation of prescriptive rules, but that encouraged students to reflect about how the Italian language is used. During these meetings, we focused on the passive voice, hence an aspect of local processing. The other intervention aimed to explore the students' abilities to make inferences during reading comprehension. These last teaching activities were meant to assess global aspects of language processing and comprehension.

Since, as mentioned above, we could only have four meetings and the pedagogical part of the project was drastically reduced, I will provide only a qualitative overview of the activities without analysing or discussing the results of the tasks. In the following sections, I will introduce the works on which we based the two types of pedagogical intervention and describe some of the activities used during the meetings.

The intervention took place once a week for four weeks and each meeting lasted about one hour and a half. Teachers were also present during the activities. Three classes agreed to take part to the activities about the passive voice. Two groups were attending fourth grade and the teachers informed me they never talked about this structure before during regular lessons. The third group was attending

fifth grade and for them these activities were meant to recall their previous knowledge about passive voice. The second pedagogical intervention dedicated to enhancing the students' ability to make inferences was administered to the other two groups attending fourth grade.

I carried out the activities myself and gave to each student hand-outs with some exercises or texts, and space where they could take notes about their reflections and intuitions. Since we could not videotape or record the meetings, at the end of each class, the hand-outs were collected to keep track of the progress of each student. During the activities, we used the interactive whiteboard in the classroom to project a PowerPoint presentation with images, examples, or summaries. At the end of each hand-out, children were asked to evaluate the activities and say whether they found them easy or difficult, entertaining or boring. Judgments were expressed with a vote from 1 to 5 using a Likert scale. During the meetings, we alternated moments in which children worked individually to whole-class discussions. Given the distancing measures to prevent Covid-19 infections, children could not work in couples.

### **9.1 *Guiding principles***

The goal of the pedagogical interventions was to experiment a different way of teaching grammar in which the students were actively involved in discovering specific aspects of the language rather than being passive spectators during the lessons. We aimed to make these activities less abstract or based on the memorisation of rules. As discussed by Lo Duca (2018), the development of grammar knowledge is often mistaken for learning to recognise, memorise, and recall grammar rules. However, these exercises do not favour the students' abilities to use and reflect about the language in an efficient way. Therefore, we wanted to encourage the students to think about how certain structures are used or what strategies they were employing to solve comprehension tasks. In order to do so, we followed five main guiding principles (Piccinin & Dal Maso, 2022) to develop the activities that we carried out during the interventions:

- i. Providing context
- ii. Encouraging discovery
- iii. Engaging problem-solving activities
- iv. Make grammar less abstract
- v. Stimulating reflection.

First of all, it was important to provide a meaningful context to begin the activities. This aspect is particularly important to ground the students' reflection on more concrete or useful situations. One way to provide a context is to base the activities on engaging, motivating, and multisensory materials, such as texts or pictures. This strategy will help creating a more stimulating environment that will encourage the students' active participation to the lesson.

Another way to make sure that children are actively involved during the activities is to encourage them to discover aspects of grammar. This can be done guiding them to reflect about the language they use or find in the texts they read. In order to do so, it is important that teachers do not provide them with abstract rules and definitions. Instead, they should adopt an inductive approach (Lo Duca, 2018) and mediate the students' observations asking them question that can make the whole-class discussion progress. At this stage, the students should have the chance to make hypotheses about the phenomena they observe without feeling the pressure of giving the correct answer. Moreover, they should be encouraged to reflect also about the strategies they used and the reasons that led them to a certain conclusion.

A useful strategy is to make the students engage in activities that require problem-solving skills. These activities can be particularly useful when they are presented to the whole-class and not individually. In fact, within a collaborative learning framework, pupils are encouraged to discuss their hypotheses and insights out loud and they have the chance to compare their observations with those made by their peers. Explicit and metalinguistic discussions between children can be beneficial to let their strategies emerge without the pressure of being corrected from the teacher. Therefore, this method is particularly useful to make the students *notice* (Schmidt, 1990) the most effective strategies. Furthermore, engaging in explicit

reflections based on the problem-solving activity help students creating new and efficient metacognitive strategies (Piccinin & Dal Maso, 2022)

Thanks to these methods, it is possible to make grammar teaching less abstract. The activities can become more entertaining because the students will have the chance to work directly on texts or examples that can meet their interests. Moreover, they will discover how language works observing it instead of hearing decontextualised sets of rules that they will be required to memorise and recall. Manipulating language is an effective way of drawing the students' attention to the way in which certain grammar structures work and let the rules emerge from their observations.

Lastly, explicit and metalinguistic reflection should be continuously stimulated during these activities. Peer-to-peer interaction was proven to allow pupils to express and reconsider their intuitions and strategies without the pressure of receiving an evaluation. In order to favour the students' reflections, it is important that teachers try and avoid giving them constant feedback on the correctness of their hypotheses. As argued by Willemsen et al. (2020) an effective way in which teachers can stimulate the students to reflect on language is to return the questions to the whole class instead of providing the correct answer themselves.

## 9.2 *Passive voice*

In the first chapter of this dissertation, we discussed the way in which grammar is taught in primary schools and we referred to the analysis of the national guidelines (*Indicazioni nazionali*, MIUR, 2012) made by Pescarini (2017). In his article, Pescarini remarks how the guidelines published by MIUR fail to create a coherent connection between the premises about the teaching methods that should be used for grammar instructions and the goals that should be achieved through these practices. More specifically, as he points out, the authors of the guidelines advocate for methods that promote reflection on the language, but then, the final goals they list include *learning* explicit grammar forms, automatising orthography rules, and avoiding mistakes. Moreover, the misalignment between premises and goals described in the *Indicazioni nazionali* makes it more complicated for the

authors of textbooks and teachers to have a clear idea of what teaching practices should be used in classroom. Consequently, the materials and the strategies used to teach grammar are frequently developed to achieve normative grammar goals.

Given these premises, it is pivotal to deepen the study of educational methods to understand how metalinguistic awareness can be properly stimulated during activities about grammar. Lo Duca (2018) highlights that the role of teachers of grammar would be to guide pupils while they learn how to call aspects of language that they may already know implicitly, as they use them or hear them every day. In particular, learning grammar should be learning how to notice and observe linguistic data (*“notare e osservare i dati linguistici”*, Lo Duca, 2018, p. 36). Pupils should be encouraged to compare these data to extract the rules governing them rather than being taught abstract rules. In order to support children during this discovering process, it is important that teachers give them space to express their intuitions and encourage them to reflect about specific aspects of the language by asking them questions to stimulate their curiosity about the topic. As argued by Willemsen et al. (2020), peer-to-peer interactions are fundamental in classroom because students who encounter more difficulties can benefit from the contributions of their classmates. To do so efficiently, teachers should avoid hinting whether the single contributions are correct or not, and, instead, ask further questions to keep stimulating the pupils' reflections (Lo Duca, 2004). During whole-class discussions, it is also useful to take notes about the children's answers so that they can compare them more easily. As the awareness about language features grows, children should also be encouraged to manipulate language. This task could be presented as a playful activity that should be initiated by exercises that involve pictures and concrete objects (Lo Duca, 2018).

Another aspect that should be considered during the development of new teaching strategies is the target student population. As described in the first chapter, the number of second-generation immigrant pupils is constantly growing and often they encounter more difficulties than their native monolingual peers during their school experience. One fundamental question that should be addressed is whether the teaching methods used for students who are monolingual speakers of Italian are effective also for bilingual minority children, thus those students who are also

exposed to a heritage language at home and grow up in a bilingual or multilingual environment. Data concerning the difficulties encountered by these students in tasks including reading comprehension and their higher drop-out rates would suggest that the teaching methods generally adopted in Italian schools do not respond to the educational needs of the multilingual pupils. In fact, for those students, grammar teaching should aim more clearly to support language use (during comprehension and production) than to the development of abstract knowledge on linguistic structures.

As described above, we aimed to create teaching activities that were meant to stimulate pupils to reflect about the passive voice. In order to do so, we tried to elicit its spontaneous production and then ask questions to the class. Definitions were provided only at the end of the activities, when the children had already familiarised with the differences between active and passive voice, and they had discovered when these structures are used. A fundamental aspect of these activities was that the students' ideas and intuitions were at the centre of the attention: all the participants, in fact, were encouraged to interact with each other and discuss the topic.

The pedagogical intervention about the passive voice was inspired on the activities created by Merlin (2014) for low-secondary school. Merlin created exercises that encouraged 11- and 12-year-old students to observe and compare active and passive voice. The goal of the activities developed by Merlin (2014) was to manipulate sentences displaying both structures and let the students uncover the rules governing them. Since the target students for this activity had already received formal instructions about the passive voice, the expected time to complete all the exercises was two hours. During this time, students alternated work in couples to whole-class discussions in which they could explain and compare the ways in which they worked. The first task brought the students' attention to the way in which sentences displaying active or passive voice are built. They were encouraged to consider the differences between sentences, the position of the constituents, and the point of view from which the event was described. Afterwards, students discussed how they carried out the previous task and compared what they observed while working in couples. Then, students were asked to manipulate sentences and

transform them from active to passive or vice versa, and then they could compare again their answers during the whole-class discussion. Since Merlin (2014) developed these activities for older students, they were too advanced to be presented directly to fourth-grade pupils who had never explicitly learnt the passive voice, thus we developed some more exercises to gradually introduce the topic and then reach the point in which children could critically observe and manipulate the two structures.

In Appendix D, I reported the hand-outs used during the meetings concerning the passive voice.

### *9.2.1 Examples of activities*

During the first meeting with children, the activities were introduced without mentioning the topic directly. Students were told that I was going to lead some activities during Italian lessons, but they did not know we would focus on grammar or on passive voice.

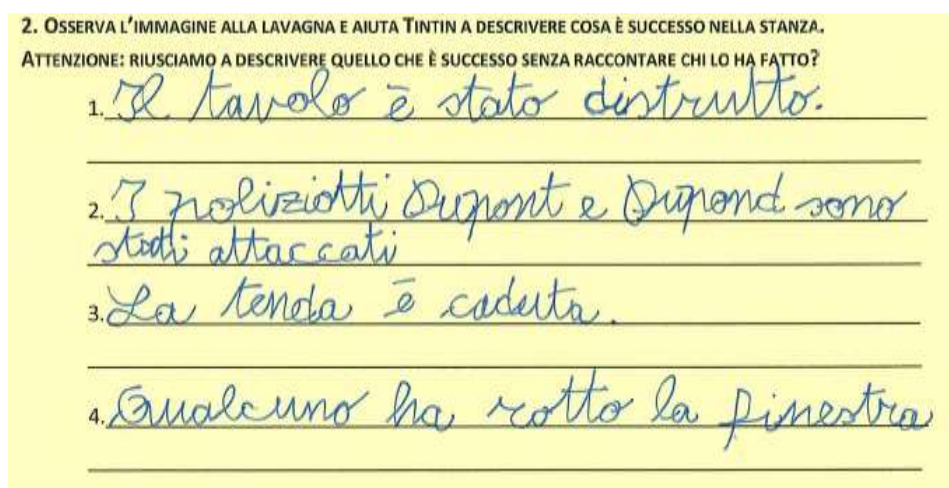
Before starting, we wanted to assess the students' abilities to recognise the different points of view in active and passive voices. To this purpose, we began with a short exercise in which there were twelve sentences, six displaying active voice and six displaying passive voice, and students were asked to draw an arrow on top of each sentence that started from the character performing the action and pointed to the character who received the action.

Following the guidelines presented in section 9.1, we wanted to start the activities providing the children with a meaningful context in which they could familiarise with the structure. Moreover, our goal of the first meeting was to make the students discover passive voice from their spontaneous productions. To do so, we tried to elicit the use of this structure by asking them to describe some pictures taken from the comic series *The adventures of Tintin*. After introducing the main characters of the series, we projected an image of Tintin entering a room that was ransacked. We asked children to help Tintin by writing down notes about what happened in the room. In order to elicit the production of sentences that displayed the passive voice, we stressed the fact that we did not know who ransacked the room



and, thus, it was important to describe what happened without blaming someone for it. This instruction was meant to make them focus on the actions that were performed in the pictures rather than on their unknown agent, as the context required. The same activity was done also with other pictures from *The adventures of Tintin* to allow the students to gradually discover the passive voice while engaging with motivating multisensory materials. During these activities, each student was writing down notes on the hand-outs. After the individual reflection, we began a whole-class discussion in which everyone could read out loud their productions to their classmates. Children adopted different strategies to complete this task and, at the beginning, only a few students wrote sentences that displayed the passive voice, but they gradually managed to use this structure more often as they got acquainted with it. During the discussions, students had the chance to discover that there are two ways of describing the same event: in the first one, i.e., active voice, the focus was placed on the agent, whereas in the second one, i.e., passive voice the patient received more attention. The example below in figure 9.1 shows the productions of a student to describe the picture in which Tintin enters the ransacked room and finds two policemen.

Figure 9.1 - Example of a student's production during the first meeting.



As said previously, in order to elicit the production of the passive voice, the children were asked to try and describe the scene without blaming anyone for what

happened in the room. This student wrote four sentences and adopted different ways to meet the request:

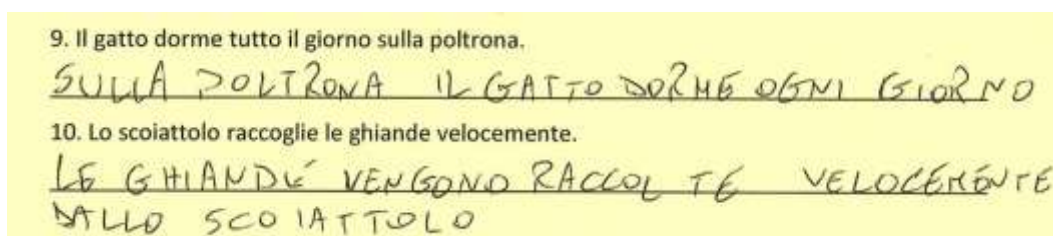
1. Il tavolo è stato distrutto.  
*The table was destroyed.*
2. I poliziotti Dupont e Dupond sono stati attaccati.  
*The policemen Dupont and Dupond were attacked.*
3. La tenda è caduta.  
*The curtain fell.*
4. Qualcuno ha rotto la finestra.  
*Someone broke the window.*

In the first two examples, he successfully managed to produce sentences that displayed the passive voice, but in the last one he resorted to the indefinite pronoun *qualcuno* and used the active voice.

After observing and reflecting about the different word orders and the messages they conveyed in the two structures, children started manipulating some of the sentences they wrote describing the pictures and tried to transform them from active to passive voice. This activity helped them discovering how active and passive voice are formed. Reflecting on the sentences they created describing the pictures led them to observe how agent and patient were switching position. It was only after they analysed the characteristics of the structure and observed when it could be used that we introduced the term “passive voice” to identify the structure in which the patient or the event itself was at the centre of the attention. Thanks to the reflections about the structure of the sentences displaying the passive voice, the students observed also that the subject of a sentence does not always correspond to “the character performing the action”, hence the agent. Moreover, when they focused on the verbal element, they recognised that the verb *to be* was used as an auxiliary in the latter structure. It was important to let these grammar concepts emerged from what the students’ noticed in their observations because it was a useful and effective way to make them discover rules that otherwise would have been abstract if presented out of a meaningful context.

One of the most important characteristics of the passive voice is that it can only be used with transitive verbs. Hence, another aspect that had to be considered when talking about passive voice is the difference between transitive and intransitive verbs. This difference was new for the students who attended fourth grade and we introduced it during the third meeting. We began this activity by presenting a manipulation exercise in which the students were asked to find a way to transform sentences from passive to active or vice-versa. However, not all the sentences they found in the hand-out displayed a transitive verb. We decided not to give any hint about this to verify whether they were mechanically applying rules or reflecting about the constituents of the sentences and checking whether there were situations in which the passive voice could not be formed. Figure 9.2 shows two examples taken from the manipulation exercise that led to the introduction of the difference between transitive and intransitive verbs. In this case, the student tried to overgeneralise the switching between constituents when he transformed a sentence from active to passive.

Figure 9.2 - Examples from the activity that introduced the concepts of transitive and intransitive verbs.



Sentence 9 (*Il gatto dorme tutto il giorno sulla poltrona*, “The cat sleeps all day on the armchair”) could only be active since it displays the verb “to sleep”. However, the student attempted to create a passive sentence by anticipating the last constituent. The result was *Sulla poltrona il gatto dorme ogni giorno* (“On the armchair the cat sleeps every day”). On the other hand, sentence 10 was manipulated correctly and *Lo scoiattolo raccoglie le ghiande velocemente* (“The squirrel quickly collects the acorns”) correctly became *Le ghiande vengono raccolte velocemente dallo scoiattolo* (“The acorns are collected quickly by the squirrel”). During this activity, several students said that they were facing some

difficulties transforming some sentences and preferred to leave them blank and wait for the whole-class discussion. Others confirmed that some sentences were more challenging but tried to transform them anyway switching the constituents. For instance, another item that could not be transformed from active to passive was *Il pagliaccio scivola sulla buccia di banana* (“The clown slips on the banana peel”) and some children tried to transform it writing: *La buccia di banana fa scivolare il pagliaccio* (“The banana peel makes the clown slip”). The think-aloud session that followed the transformation task was very useful to clear out doubts. Students were divided between those who thought they managed to switch the constituents, but did not form a sentence with passive voice, and those who thought it was not possible to complete part of the activity. In turns, they interacted commenting on the strategies adopted by the other classmates and made observations about how the construction “to make someone do something” used in the example above was not the same as the one they encountered in the examples of passive voice they had seen in the previous meetings. Once again, the students engaged in a conversation that led them to noticing and discovering that not all verbs allow the same constructions. When they analysed the sentences further, they concluded that the verbs that did not have the direct object could not have the passive voice. The concepts of transitive and intransitive verbs were then introduced. Furthermore, to strengthen the concept that not all verbs allowed the presence of a direct object, they were encouraged to play around creating sentences that violated the verbal argument selection. This activity was particularly entertaining because children found the ungrammatical sentences funny and enjoyed manipulating language this way.

During the last meeting, the students observed how active and passive voice were used in texts. We selected two different genres: the first text was about the first labour of Heracles whereas the second one was an explanatory text about space travels. Since the first story narrated focused on Heracles’ deed when he fought and slayed the Nemean lion, the text mostly included verbs using the active form. On the other hand, the one about space travels focused on description of events and allowed the frequent presence of sentences using the passive voice. The two texts were read in turns by the children. After that, the students focused on the structures

used in them, discussed how the texts were built, and how active and passive voice were used to achieve the authors' different goals.

Starting the activities describing the pictures was an effective way to make grammar less abstract and help the students feeling involved during the class. Moreover, another factor that contributed to the effectiveness of the activities was to focus on the children's productions instead of giving them sentences prepared in advance. During the meetings, the students participated actively and enthusiastically. Peer-to-peer interactions were a valuable tool also to support the students who were facing some difficulties during the tasks. When we checked the answers, in fact, all children were encouraged to discuss together the strategies they used and how they reached the answer they wrote down. Listening to peers explaining how they reflected while completing the exercise helped those who were struggling reviewing the methods they adopted.

### *9.2.2 Feedback*

As mentioned previously, at the end of each meeting, students could evaluate the lesson by voting whether they thought the activities were difficult (1) or easy (5), and boring (1) or entertaining (5). Overall, students judged the activities as quite easy ( $M = 3.70$ ;  $SD = 0.19$ ) and entertaining ( $M = 4.42$ ;  $SD = 0.10$ ). They recognised that from meeting to meeting the difficulty of the tasks was increasing, but they enjoyed the possibility to express and compare their intuitions and insights during whole-class discussions.

We received positive feedback also from teachers who were also present in class during the pedagogical intervention. In particular, they appreciated how whole-class discussions allowed also the students who normally were more silent to express their opinions. This method seemed to reduce the fear of making mistakes. In fact, students were not receiving direct feedback about the correctness of their intuitions from neither myself nor the teachers but were allowed to discuss the topics peer-to-peer. Everyone managed to participate actively despite the difficulty of a new and complex grammar topic. In general, they also noticed that children took the activities seriously. During some of the sessions, teachers decided

to award positive grades to some students for the way in which they were intervening and expressing their reflections.

### ***9.3 Making inferences***

In chapter 2, we discussed the Component Skills Approach (Grabe & Yamashita, 2022) and the distinction between lower- and higher-level processes during reading. The ability of making inferences was introduced as one of the processes involved when readers are creating their text- and situation-models. Inferencing happens when we cannot use lexical or syntactic information contained in the text itself to access part of its meaning (Perfetti & Stafura, 2015). In other words, when readers make inferences, they have to connect the information they find in the text with other pieces of information stored in their previous knowledge. In literature, we do not find a univocal taxonomy of inferences, but following the classification proposed by O'Brien and Cook (2015), they can be divided into two main categories, namely local and global inferences. Among local and global inferences, we can distinguish other sub-categories. Local inferences include (i) grammatical, (ii) discourse-based, and (iii) cohesive inferences. The first type includes, for instance, anaphora and ellipsis resolution. Discourse-based inferences are those that allow the readers to connect the sentences of a text to create a coherent idea of its content. Moreover, cohesive inferences are made when readers assign semantic roles to the characters of the text or unfold the meaning of metaphors. Global inferences, on the other hand, require the connection of what is said in the text with the readers' previous knowledge. This category can be divided further into (iv) elaborative and (v) evaluative inferences. The former type includes those processes that enrich the readers' mental representation of the text and allow them to identify causes and consequences of what is narrated in the text; the latter type helps readers understanding what were the intentions of the author or the emotional result of an event. Global inferences are characterised by being based on the readers' encyclopaedic knowledge. Another classification of inferences was developed by Bowyer-Crane & Snowling (2001). Their proposal groups all the local inferences mentioned previously in the category of cohesive inferences, and

maintains the distinction between elaborative and evaluative global inferences. Lastly, a third proposal was developed by Lumbelli (2009) and distinguishes only two types of inferences, namely *inferenze connettive* (“connective inferences”) and *inferenze elaborative* (“elaborative inferences”). Lumbelli’s classification of inferences roughly correspond to the distinction between local and global inferences: connective inferences, in fact, can be solved through vocabulary or syntactic knowledge and are used to create local coherence in the text, whereas elaborative inferences entail connections to the readers’ encyclopaedic and cultural knowledge. Making elaborative inferences often requires the use of more cognitive resources.

During the preparation of the tasks administered for this pedagogical intervention, we followed the classification proposed by Bowyer-Crane & Snowling (2001), hence we distinguished cohesive, elaborative, and evaluative inferences. Furthermore, we added questions that tapped also into the students’ vocabulary and background knowledge.

When we consider students’ abilities to make inferences during reading comprehension tasks, we notice that they often encounter difficulties. As summarised by Cain, Oakhill, and Barnes (2001), there may be several reasons for failure while making inferences. First of all, some readers may encounter difficulties during this process because their memory resources may be limited and, therefore, they do not manage to recall relevant information efficiently. Another hypothesis is that they face obstacles during the inferencing process itself. The authors identify three stages in which readers may have difficulties. Readers may fail to recall the correct premise either from the text or from their previous knowledge. The inference may not be made efficiently also when children do not manage to connect the relevant pieces of information they previously retrieved. Lastly, readers may connect the information extracted from the text with the incorrect pieces of information stored in their prior knowledge. Lumbelli (2009) also remarks that students encounter obstacles during this process because they make incorrect inferences, hence they do not manage to retrieve the appropriate pieces of information to integrate the content of the text.

The teaching activities about making inferences had mainly two goals. First of all, we wanted to examine in more detail the students' abilities to make inferences. As reported in the section dedicated to the *Prove di lettura MT* (Reading tests MT, Cornoldi et al. al 2017) in chapter 6 "Our Study", inferences were among the competences investigated by the tasks we selected to test reading comprehension abilities. However, in these tasks only a few questions were dedicated to test two types of inferences, namely lexical and semantic inferences, i.e., the children's ability to infer the meaning of words from the context in which they find them and their prior knowledge, and their ability to use prior knowledge to reconstruct details that were not explicitly mentioned in the texts. The second goal of these meetings was to train the students' abilities to make inferences with some activities that were specifically designed to enhance their awareness of the processes needed during reading comprehension tasks.

Cardarello and Lumbelli (2019) remark the importance of training students to be active readers. In order to do so, it is important to stimulate children to control the processes they are using during reading and make them aware of how they can monitor their performance autonomously. The authors argue that letting the processes employed during reading comprehension tasks emerge from the students' reflections help them becoming more aware of their problem-solving skills and strategies (Cardarello & Lumbelli, 2019). Moreover, the activities developed by Cardarello and Lumbelli (2019) present four characteristics that aimed to enhance reading comprehension abilities and the students' awareness about the processes they employed to achieve comprehension. Firstly, texts are divided into smaller parts and each part is followed by some questions. This way, students have the chance to promptly monitor their comprehension of the portion of the text they read. The questions present problem-solving situations that have the aim to stimulate and motivate readers to actively search the answer in the text. Furthermore, children are encouraged to read again certain paragraphs before answering. This choice aims to trigger more attention during the second reading. Lastly, activities present also exercises in which students have to re-elaborate the text, such as writing a summary of its content or answer to some questions writing a short text presenting their impressions about it.



As done during the didactic activities about the passive voice, we encouraged children to think about the strategies they applied when they were answering to questions and to discuss them with their classmates. In fact, peer-to-peer interaction can stimulate pupils to reconsider the way in which they approach comprehension tasks and refine their abilities.

The hand-outs with the texts and the activities done during the pedagogical intervention about making inferences can be found in Appendix E.

### 9.3.1 *Examples of activities*

During the first and last meetings of the pedagogical intervention about making inference, we collected data about children's inferencing abilities. In particular, we wanted to understand in more detail how students approached questions that aimed to assess different types of inferences, i.e., (i) grammatical or cohesive, (ii) elaborative, and (iii) evaluative. Moreover, as said previously, some questions were dedicated also to investigating the students' ability to reconstruct the meaning of words and how well they managed to connect the content of the text with their previous knowledge.

In order to do so, we developed two tasks. Each of them contained four short texts (around 150 words each) of different genres. Each text was followed by five multiple-choice questions. The four texts used during the first meeting were:

1. *Un avvistamento sul ghiaccio* ("A sighting on the ice"), adapted from an edition for children of Mary Shelley, *Frankenstein*;
2. *Strane "scienze": che cos'è la criptozoologia?* ("Strange 'Science': what is cryptozoology?"), adapted from an article published online on *Focus Junior* website, a children's magazine;
3. *In cima al mondo* ("On the top of the world"), adapted from an article on *Internazionale Kids*, a children's magazine;
4. *La verde collina* ("The green hill"), adapted from Lucio Carraro, Bianca Gallisay, and Nerina Vretrenar, *La verde collina*, a children's book.

The first and last texts were narrative stories, the second one was an explanatory text, and the third one was a magazine article about a child who climbed the Matterhorn. In the first part of the meeting, students had time to read one text at a time and answer to the questions following it. After completing the tasks individually, children were asked to reflect about the texts they had just read. In particular, they had to rank the texts from the one they found the easiest to the most difficult and highlight in the text the pieces of information that helped completing the comprehension task. Moreover, I asked them to reflect and write briefly how they were able to give an answer when the relevant information was not explicitly written in the text. When everyone completed this part, we started the collective part of the activity during which children could explain to their classmates how they answered and what strategies they used. Discussion was encouraged to let the pupils figure out together which were the correct answers. Our aim for this whole-class discussion was to make the students more aware of the processes they performed while answering to questions. During this part, it was important to also hear the strategies used by those who marked incorrect answers. Peer-to-peer interactions were fundamental to encourage children to self-evaluate the processes they adopted and let them discover on their own when they followed an effective approach and when they were misled during comprehension. Moreover, we used whole-class discussion also to stimulate awareness about the processes performed during the comprehension tasks. For instance, when making inferences was required to find the correct answer, several students wrote down that they “perceived it by intuition”. At first, only few of them tried to describe their reasoning process adding that they connected some pieces of information they read in the text with something they already knew. Thus, it was very useful for their peers to hear how these students reached the correct answer because it stimulated to reflect more carefully about the ways they reasoned while completing the task.

In the last meeting, we followed the same procedure, but we used four other texts:

1. *Come ho “ucciso” Plutone: Mike Brown* (“How I killed Pluto: Mike Brown”), adapted from the article written by Eleanor Hayes, published on the web magazine *Science in School*;
2. *Un mito: il filo di Arianna* (“A myth: Ariadne’s thread”), adapted from Cristina Cappa Legora, *I miti greci*;
3. *Si può far musica con tutto... basta saper suonare!* (“You can make music with anything... if you can play!”), adapted from an article published online on *Focus Junior* website;
4. *Warruwi, la piccola isola dove si parlano nove lingue* (“Warruwi, the small island where nine languages are spoken”) adapted from an article published online on *Focus Junior* website.

Once again, we chose texts from different genres in order to let the students face different styles and registers. We selected texts that were age-appropriate and that could be interesting for fourth-grade pupils to make sure that they were involved during the activities. The first text was the summary of an interview with the astronomer Mike Brown who contributed to the exclusion of Pluto from the main planets of the Solar System. This article included scientific lexicon. The second text was the only narrative one and told the story of how Ariadne helped Theseus escaping from the Labyrinth. The last two texts were magazine articles. One of them showed unusual ways of making music, whereas the other presented the peculiar linguistic situation we find in Warruwi, an Aboriginal community that lives in a small island close to Australia, where the members of each clan speak a different language.

In the second and third meetings, we alternated more frequently between individual work and collective discussion. The materials prepared included two texts taken by Cardarello and Lumbelli’s exercises (2019):

1. *Una bambina venuta dal mare* (“A girl coming from the sea”), taken from Lucia Tomiati, *Una casa in fondo al mare* (“A house under the sea”), a children’s narrative book.

2. *Il mimetismo. L'arte di nascondersi* (“Camouflage. The art of hiding”), taken from Simona Cerrato, *Mini-Darwin alle Galapagos* (“Mini-Darwin in Galapagos”), a science book for children.

The comprehension questions already included in the activities developed by Cardarello and Lumbelli (2019) were integrated with other questions that we prepared. As mentioned in the introduction of the section dedicated to this pedagogical intervention, Cardarello and Lumbelli advocate for the importance of breaking the texts into smaller parts and add questions after each of these parts. This method allowed us to alternate frequently problem-solving activities and discussions during which the students could monitor their comprehension and self-evaluate the strategies they were applying. In fact, similarly to what was done during the first meeting, students were asked to reflect on how or where they found the answers to the questions. After writing on the hand-out their reflections, all children were encouraged to share their strategies and discuss with their peers to find the correct answer. The exercises included both multiple-choice and open-ended questions that investigated the pupils' abilities to find information in the text or to infer it when it was not explicitly written. Moreover, each text also presented an activity in which children had to elaborate on what they read. After reading *Una bambina venuta dal mare*, the students had to reflect about whether the protagonist was happy or not when she was not living under the sea and explain why. This question aimed to let children evaluate the girl's experience and feelings. During the last activity of the text about the camouflaging abilities of insects and animals, students had to write a summary of the text after highlighting the most important information in it. This exercise was particularly challenging, but it allowed children to adopt a critical stance while reading the text again to try and find what they wanted to include in their summaries.

The activities of the third meeting also included two texts, the first one was narrative and the second one was explanatory. For this session, we chose:

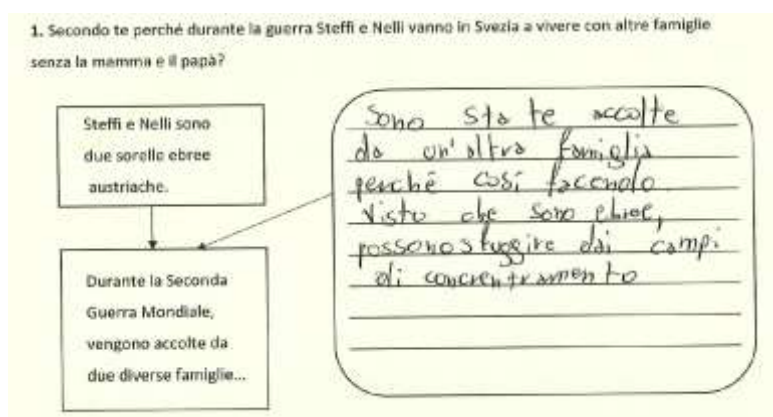
1. An extract taken from Annika Thor, *Un'isola nel mare* (“A faraway island”), a children's book;

2. *Alessandria e le città ellenistiche* (“Alexandria and Hellenistic cities”), taken from Vv.Aa., *La fabbrica dei saperi*.

Since the book narrates the story of two Austrian-Jewish sisters who escaped the Holocaust because they were adopted by Swedish families, the first text allowed us to explore how students managed to integrate their previous knowledge about the Second World War while reading the text. On the other hand, the second text was explanatory and was taken from the activities developed by Cardarello and Lumbelli (2019). Both texts were presented without a title because children were asked to invent one after they read them and completed the other activities.

After a short introduction about the origins of the two protagonists and the time and place where the story takes place, we used graphic models to facilitate the retrieval of the previous knowledge relevant to reconstruct the context of the first text. This method was tested by Elbro and Buch-Iversen (2013) as a strategy to activate background knowledge to make inferences. As shown in the example below (figure 9.3), in two boxes on the left of the page we reported some of the information presented in the introduction. On the right side of the page, there was an empty box to be filled in. Based on those pieces of information, students answered to a question asking why the protagonists’ parents did not go to Sweden with them. The expectation was that the graphic representation would help the students organising and connecting the pieces of information that were explicitly presented in the texts with their relevant background knowledge.

Figure 9.3 - Example of the task using graphic boxes to facilitate the connection between the content of the text to prior knowledge.



In this case, the student correctly connected the information presented at the beginning of the task with his background knowledge about the Second World War and how Jewish people were sent to concentration camps. He wrote: “they were welcomed in Sweden by another family because, since they were Jewish, doing so they could avoid concentration camps”.

The comprehension exercises included both multiple-choice, one short open-ended question, and another inference-making exercises with the graphic models. This way, the students were challenged to use different strategies to complete the tasks. As done also during the previous meetings, children worked both individually and in group to explain and discuss their strategies during reading comprehension.

Similar activities were dedicated also to the second text which talked about the ancient city Alexandria, its library, and all the places dedicated to the development of knowledge and science in the city. Among the exercises included in this section, there was one in which students were asked to reconstruct what was studied in the different buildings of the city from their name. Good vocabulary and morphological knowledge were required to complete this exercise. As done for the explanatory text used in the second meeting, students practiced searching the most important information in the text to write its summary.

### 9.3.2 *Feedback*

Similarly to what happened also for the other pedagogical intervention, children could evaluate each session and express their opinion about whether they found it difficult (1) or easy (5), and whether the texts were boring (1) or interesting (5). In general, the activities about making inferences and reading comprehension had an appropriate grade of difficulty ( $M = 3.44$ ;  $SD = 0.16$ ) and children found the texts quite interesting ( $M = 3.75$ ;  $SD = 0.11$ ).

Overall, the activities were welcomed with enthusiasm and peer-to-peer interactions favoured the active participation of all children. In particular, from the discussions it emerged that different strategies were used and comparing each other’s reflections allowed the students who struggle the most in these tasks to

evaluate the methods they adopted and find useful insights to monitor their comprehension.

The teachers also expressed positive feedback and appreciated both the variety of genres of the texts and how the questions addressed several different aspects of comprehension.

## CONCLUSIONS

In this section, I will summarise the results of this study and recapitulate their theoretical implications. As discussed in chapter 1, this study was motivated by the data showing that second-generation immigrant students tend to encounter more obstacles during the scholastic experience and that these difficulties are often reflected in the lower grades they obtain, especially when advanced skills in Italian are required (Giberti & Viale, 2017). We examined reading comprehension and a set of linguistic and non-linguistic abilities as its potential predictors to understand what are the skills that the two groups of students rely on when they face comprehension tasks. Moreover, we aimed to analyse in more detail where these difficulties in reading comprehension may generate. To do so, we investigated the on-line processing of complex grammar structures, i.e., object relative clauses and passive voice, to understand whether there were differences in the ways native and minority language bilingual students process Italian.

### *Reading comprehension*

#### **RQ1: Are there differences in reading comprehension and its predictors between native and second-generation immigrant students?**

The outcomes of our reading comprehension task confirmed what has been detected also during the national evaluation (INVALSI, 2019; 2021). Second-generation immigrant obtained lower scores compared to their native peers. When we look at the set of linguistic and non-linguistic abilities we explored as potential predictors of reading comprehension, we observe that the two groups display homogeneous abilities in all domains, with the only exception of vocabulary knowledge. More specifically, both bilingual and monolingual students obtained similar scores in general cognitive abilities, decoding skills, and receptive grammar knowledge. However, when lexical knowledge is considered, monolingual students obtained significantly higher scores. A limited vocabulary could constitute an obstacle during reading comprehension because students will encounter more



difficulties in the creation of appropriate networks of activation in their working memory. These networks are created to achieve local comprehension during reading and when they are incomplete or require considerable effort to be created, fewer cognitive resources will remain available to perform the higher-level processes needed to build text- and situation models during reading.

**RQ2: What are the best predictors of reading comprehension in monolingual and minority language bilingual students?**

We examined the weight of the predictors of reading comprehension for the two groups using the Random Forest analysis. The outcomes revealed groups differences. Reading comprehension achievements in monolingual native speakers of Italian were predicted only by their vocabulary knowledge. This finding indicates that, as expected in a transparent language, these students do not encounter considerable difficulties during decoding at this age. Moreover, that fact that grammar knowledge was not detected as a predictor of reading comprehension suggests that they have proceduralised this knowledge and, consequently, it does not require the employment of great cognitive effort during reading comprehension. On the other hand, the picture we obtain focusing only on minority language bilingual students is more complex. These students, in fact, seem to rely on several abilities during reading comprehension tasks. First of all, grammar knowledge was ranked as the second most important predictor of reading comprehension for this group. This result is in line with the findings obtained also by previous studies investigating reading comprehension in languages with a transparent orthography (Verhoeven, 1990; Bellocchi, Tobia, & Bonifacci, 2017). We might suppose that minority language bilingual students' exposure to complex syntactic structures contained in texts is limited and, thus, this process can be more effortful for them. Similarly to what was found for monolingual students, vocabulary knowledge is an important predictor of reading comprehension also for bilinguals. As mentioned above, bilingual students obtained lower scores than their native peers at this task. A smaller vocabulary size is acknowledged to limit also automatic word recognition during reading, hence bilingual students tend to rely more than monolinguals on their decoding skills. In particular, in line with what is found in literature that

investigates reading comprehension in languages with a transparent orthography, decoding speed played an important role predicting reading comprehension for minority language bilingual students (Bellocchi, Tobia, & Bonifacci, 2017; Bonifacci & Tobia, 2017; Carretti & Zamperlin, 2010; Moll et al., 2014; Verhoeven & van Leeuwe, 2012). Lastly, general cognitive abilities were also found to play an important role during reading comprehension for bilingual students. We argue that this finding reflects the fact that, given the less automatized linguistic knowledge that bilingual students display, reading comprehension is more cognitively taxing for these students who, thus, need to control for more processes with respect than their native peers to achieve higher results.

### **Theoretical implications.**

The results obtained from the analyses on reading comprehension and its predictors showed that the two populations investigated rely on different abilities to build comprehension. Crucially, bilinguals need to control several processes during reading comprehension tasks. We argue that an important starting point to reduce the performance differences registered between the two groups is to consider the importance of vocabulary during reading comprehension. As remarked in the Reading Systems Framework (Perfetti & Stafura, 2014), lexical knowledge is a pivotal ability that constitutes the link between local and global processing during reading comprehension. When students can rely on a rich vocabulary, they manage to create networks of activation in their working memory more efficiently and leave more cognitive resources free for higher-level processes that will lead to the construction of text- and situation-models. Teaching activities should give importance to the development of richer vocabulary using tasks that will encourage children to find different strategies to reconstruct the meaning of the words they do not know yet and gradually expand their lexical knowledge.

Another important factor that should be highlighted is the presence of grammar knowledge among the predictors of reading comprehension for bilingual students. As mentioned previously, we argue that this finding may reflect that, due to limited input in certain complex structures, their grammar knowledge may have not been completely proceduralised. Hence, it is fundamental to support bilingual

students in the development of their grammar competences, for instance using teaching activities that allow them to observe and reflect on these structures stimulating their metalinguistic awareness.

Moreover, another important factor that should be considered during the planning and development of teaching activities is to focus also on the global aspects of comprehension. During the pedagogical intervention, we also worked on the ability to make inferences. Our goal was to help the students reflecting on the strategies they were adopting during comprehension tasks and, in particular, how they could reconstruct the information that is not explicitly written in the text. Such activities are important to enhance the students' awareness about the ways in which they can read strategically and monitor their comprehension more efficiently.

#### *On-line processing*

#### **RQ1: Are there differences between native and minority language bilingual students during language processing?**

The analysis of reading times of the items that were correctly comprehended did not reveal group differences between native and minority language bilingual students. Both groups followed similar processing patterns. However, when we consider accuracy scores, monolingual native students obtained significantly higher scores. We argue that this result reflects the more demanding nature of on-line language processing in Italian for bilingual students (Hopp, 2007; 2010; 2014), rather than a qualitatively difference, as it would be suggested by the Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b; 2006c; 2018).

#### **RQ2: Do minority language bilinguals manage to process morphological cues in the same way during reading?**

The outcomes of the linear mixed effect regressions conducted on reading times in the Self-Paced Reading Task investigating the processing of morphological cues that could facilitate the correct interpretation of the sentences showed that both groups were sensitive to the information carried by the manipulation of the morphological marker expressing number in object relative clauses. In particular, when we consider this structure, both bilingual and monolingual students displayed

longer reading times in the region of interest of the sentences displaying the plural form. This outcome shows that the perspective switch required by object relative clauses (MacWhinney, 1982) was easier to recognise in the presence of the number manipulation. In fact, both groups also obtained higher accuracy scores in the manipulated stimuli.

As sentences with the passive voice are concerned, the analysis of reading times did not reveal any effect of group nor condition, as it was expected. Nevertheless, the presence of a plural prepositional phrase marginally contributed to facilitating the correct interpretation of the sentence for both groups.

**RQ3: Do minority language bilingual students rely more on pragmatic or semantic information than on syntactic relations while processing Italian sentences?**

This SPRT was the most challenging, especially for bilingual students who struggled particularly with sentences displaying the passive voice. The analysis of reading times suggested that there were no group differences. The manipulation of the Event Probabilities Principle (VanPatten, 2004; 2014), however, led to lower accuracy rates. The only difference between groups recorded in the analysis of reading times is that, even if both groups displayed longer reading times in the areas of interest of the manipulated stimuli, only the reading times of bilingual students were significantly longer than in the base condition. This result seems to corroborate the hypothesis that on-line processing is more cognitively demanding for this group, especially when the content of the sentences contrasts the expectations that they may have established with event probabilities. Higher error rates in the manipulated items were recorded for both groups, suggesting that both bilingual and monolingual students were distracted by the implausibility of the role assignment.

**RQ4: Do minority language bilingual students process semantic violations in the same way as monolinguals?**

Semantic violations were detected by both groups in the same way. The analysis of reading times revealed that all students remained longer in those areas

displaying a determiner phrase violating the semantic field pre-activated by the verb. This SPRT was developed to obtain a baseline in which we expected both groups to display the same processing patterns.

### **Theoretical implications.**

Overall, the results obtained by the analyses of reading times indicate that bilingual and monolingual students tend to follow the same on-line processing patterns also when they encounter complex grammar structures. However, as said previously, the two groups did not achieve similar scores at the questions following the items. We argue that this result reflects that processing is more cognitively costly for bilingual students, as suggested by Hopp's Fundamental Identity Hypothesis (Hopp, 2007; 2010; 2014), but ultimately, the processing patterns followed by the two groups do not show qualitative differences.

The fact that both groups display native-like processing patterns but do not achieve the same results when accuracy is concerned has important implications. This result in fact suggests that minority language bilingual students may need to strengthen their on-line grammar representation and monitoring mechanisms. In order to do this, it is fundamental to develop teaching activities that stimulate their metalinguistic awareness and help them reflecting about language. During the pedagogical intervention, we tested different activities that were meant to encourage the children to manipulate language to discover how it works and the rules that governs it. Our goal was to make grammar less abstract. To do so, we based the activities on stimulating multimodal materials such as pictures or texts, and we encouraged peer-to-peer interactions during whole-class discussions. The feedback received by both teachers and students was positive and encouraging.

### **Limitations and future directions**

One limitation of this study is that the investigation about the comprehension of object relative clauses and passive voice could not be more detailed. Typically, Self-Paced Reading Tasks are completed also by a task to assess the participants' off-line comprehension of the phenomenon or structure investigated. As mentioned previously in this dissertation, the limitations imposed

to contrast the Covid-19 pandemic affected considerably data collection. Since I had to carry out most of the collection by myself, this process required about five months. Moreover, throughout the year, the classes had to interrupt the teaching activities several times because of local or national lockdowns or quarantine periods. For these reasons and also considering the young age of the participants, we could not administer another task and make the sessions of data collection even longer.

Since the results obtain from the analysis of reading comprehension and on-line processing show that these tasks seem to be more cognitively taxing for minority language bilingual students, in future studies it would be important to include a task assessing working memory span. Adding such measure, in fact, could provide useful insights to delineate a more precise profile of the readers. As discussed in chapter 2, working memory is fundamental to create efficient semantic networks of activations that can support the readers during the development of whole-text comprehension. Another aspect that is pivotal to manage to develop efficient networks of activation is lexical knowledge. In order to precisely understand what students' vocabulary knowledge is, we should not only consider its size, but also its depth, hence how well a certain word is known, and its automaticity, thus, how promptly one can access, retrieve and therefore use a word (Schmitt, 2014). Considering working memory span and assessing vocabulary in a more detailed way could help us going beyond the distinction of bilingual or monolingual students. Moreover, it would facilitate delineating the learners' profiles more precisely and, thus, identifying which students are good comprehenders and which ones are struggling during comprehension. Understanding better where the students' difficulties arise and whether they are determined by limited lexical or grammar knowledge or whether they are caused by other factors will provide fundamental information for the development of appropriate and more efficient teaching activities. Ultimately, when all these aspects are considered, pedagogical practices will be more inclusive.



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## APPENDIX A – ITEMS SELF-PACED READING TASKS

### MORPHOLOGICAL CONDITION

#### LIST A

1. Il preside che ascolta il professore è annoiato.
2. La bambina che ringrazia le signore è allegra.
3. Il nuotatore che supera l'avversario è veloce.
4. L'imperatore che invita i presidenti è giapponese.
5. Il ragazzo che chiama il signore è simpatico.
6. Il tacchino che vede i conigli è sporchissimo.
7. La bambina che disturba la compagna è vivace.
8. L'infermiera che abbraccia le dottoresse è felice.
9. La commessa che saluta la signora è cordiale.
10. L'allenatore che aspetta i giocatori è impaziente.
11. La signora che incontra la vicina è chiacchierona.
12. Il bambino che rincorre i gattini è piccolo.
13. Il coniglio che guarda il leprotto è spaventato.
14. La barista che cerca le postine è indaffarata.
15. Il violinista che consola il ballerino è gentile.
16. Il marinaio che rimprovera i ragazzi è severo.
17. Il pasticciere che i clienti ringraziano è soddisfatto.
18. Il bambino che il compagno invita è amichevole.
19. La bambina che i genitori ascoltano è divertente.
20. Il nipote che il nonno vede è contento.
21. La tartaruga che le scimmie abbracciano è lenta.
22. Il signore che il dottore aspetta è ammalato.
23. Lo squalo che i delfini superano è affamato.
24. Il pulcino che il galletto rincorre è veloce.
25. La ragazza che le signore cercano è triste.
26. Il postino che il signore incontra è basso.
27. Il gigante che i fantasmi spaventano è enorme.
28. Il regista che l'attore chiama è famoso.
29. La fatina che le farfalle disturbano è carina.
30. Il presidente che il giornalista saluta è importante.
31. La cantante che le attrici aiutano è famosa.
32. La giraffa che la pantera guarda è alta.
33. Il generale viene accompagnato dal soldato alla caserma.
34. La cassiera viene rimproverata dalle clienti nel negozio.
35. Il segretario viene controllato dall'impiegato in ufficio.

36. Il pilota viene applaudito dai meccanici nella gara.
37. Il ballerino viene derubato dal fotografo nel camerino.
38. Il vincitore viene accolto dagli spettatori alla cerimonia.
39. L'aquilotto viene protetto dal falchetto nel nido.
40. Lo scrittore viene invitato dai giornalisti in tv.
41. Il tennista viene sconfitto dall'avversario al torneo.
42. Il criceto viene spinto dagli scoiattoli sull'albero.
43. Il gorilla viene spaventato dal cinghiale nella foresta.
44. Il fiorista viene aiutato dai postini nel negozio.
45. La gazzella viene consolata dalla giraffa nella savana.
46. Il coniglio viene ascoltato dal canarino nel cortile.
47. La formica viene sgridata dalla farfalla in giardino.
48. La maestra viene salutata dagli studenti a scuola.
49. Il calciatore applaude i compagni dopo il gol.
50. La commessa osserva la signora con la borsa.
51. Il presidente interrompe i giornalisti alla radio.
52. L'avvocato vede l'impiegato in corridoio.
53. La barista attende le cameriere al ristorante.
54. Il tifoso consola il campione allo stadio.
55. Il fornaio saluta i turisti in piazza.
56. L'elefante guarda il giaguaro allo zoo.
57. La maestra incontra i genitori a scuola.
58. La bambina abbraccia la compagna al parco.
59. Lo studente ascolta i professori a lezione.
60. Il paziente chiama il dottore al telefono.
61. Il cantante ringrazia i pianisti allo spettacolo.
62. Il presidente aspetta il direttore al ristorante.
63. Il postino cerca il gelataio al bar.
64. La capretta rincorre la farfalla nel prato.

#### LIST B

1. Il preside che ascolta i professori è annoiato.
2. La bambina che ringrazia la signora è allegra.
3. Il nuotatore che supera gli avversari è veloce.
4. L'imperatore che invita il presidente è giapponese.
5. Il ragazzo che chiama i signori è simpatico.
6. Il tacchino che vede il coniglio è sporchissimo.
7. La bambina che disturba le compagne è vivace.
8. L'infermiera che abbraccia la dottoressa è felice.
9. La commessa che saluta le signore è cordiale.
10. L'allenatore che aspetta il giocatore è impaziente.

11. La signora che incontra le vicine è chiacchierona.
12. Il bambino che rincorre il gattino è piccolo.
13. Il coniglio che guarda i leprotti è spaventato.
14. La barista che cerca la postina è indaffarata.
15. Il violinista che consola i ballerini è gentile.
16. Il marinaio che rimprovera il ragazzo è severo.
17. Il pasticciere che il cliente ringrazia è soddisfatto.
18. Il bambino che i compagni invitano è amichevole.
19. La bambina che il genitore ascolta è divertente.
20. Il nipote che i nonni vedono è contento.
21. La tartaruga che la scimmia abbraccia è lenta.
22. Il signore che i dottori aspettano è ammalato.
23. Lo squalo che il delfino supera è affamato.
24. Il pulcino che i galletti rincorrono è veloce.
25. La ragazza che la signora cerca è triste.
26. Il postino che i signori incontrano è basso.
27. Il gigante che il fantasma spaventa è enorme.
28. Il regista che gli attori chiamano è famoso.
29. La fatina che la farfalla disturba è carina.
30. Il presidente che i giornalisti salutano è importante.
31. La cantante che l'attrice aiuta è famosa.
32. La giraffa che le pantere guardano è alta.
33. Il generale viene accompagnato dai soldati alla caserma.
34. La cassiera viene rimproverata dalla cliente nel negozio.
35. Il segretario viene controllato dagli impiegati in ufficio.
36. Il pilota viene applaudito dal meccanico nella gara.
37. Il ballerino viene derubato dai fotografi nel camerino.
38. Il vincitore viene accolto dallo spettatore alla cerimonia.
39. L'aquilotto viene protetto dai falchetti nel nido.
40. Lo scrittore viene invitato dal giornalista in tv.
41. Il tennista viene sconfitto dagli avversari al torneo.
42. Il criceto viene spinto dallo scoiattolo sull'albero.
43. Il gorilla viene spaventato dal cinghiale nella foresta.
44. Il fiorista viene aiutato dal postino nel negozio.
45. La gazzella viene consolata dalle giraffe nella savana.
46. Il coniglio viene ascoltato dal canarino nel cortile.
47. La formica viene sgridata dalle farfalle in giardino.
48. La maestra viene salutata dallo studente a scuola.
49. Il calciatore applaude il compagno dopo il gol.
50. La commessa osserva le signore con la borsa.
51. Il musicista interrompe il giornalista alla radio.
52. L'avvocato vede gli impiegati in corridoio.



53. La barista attende la cameriera al ristorante.
54. Il tifoso consola i campioni allo stadio.
55. Il fornaio saluta il turista in piazza.
56. L'elefante guarda i giaguari allo zoo.
57. La maestra incontra il genitore a scuola.
58. La bambina abbraccia le compagne al parco.
59. Lo studente ascolta il professore a lezione.
60. Il paziente chiama i dottori al telefono.
61. Il cantante ringrazia il pianista allo spettacolo.
62. Il presidente aspetta il direttore al ristorante.
63. Il postino cerca il gelataio al bar.
64. La capretta rincorre le farfalle nel prato.

#### PRAGMATIC CONDITION

#### LIST A

1. Il poliziotto che insegue il criminale è stanco.
2. La bambina che pettina la parrucchiera è brava.
3. Il dottore che visita il signore è bravo.
4. L'uccello che rincorre il gattino è veloce.
5. Il bambino che accarezza il coniglio è vivace.
6. La principessa che salva il cavaliere è coraggiosa.
7. La signora che rimprovera la bambina è severa.
8. Il bambino che solleva il signore è forte.
9. La scimmia che spaventa la farfalla è dispettosa.
10. Lo studente che aiuta la maestra è gentile.
11. La nonna che veste la bambina è amorevole.
12. Il cavaliere che ospita il sovrano è buono.
13. Il pompiere che salva la signora è forte.
14. Il pagliaccio che guarda il bambino è contento.
15. Lo stregone che dimentica il pippistrello è distratto.
16. La bambina che culla la signora è dolce.
17. La principessa che il ranocchio bacia è bella.
18. Il cliente che il barista serve è simpatico.
19. Il vigile che l'autista ferma è attento.
20. L'arbitro che il portiere spinge è basso.
21. Il fantasma che il turista spaventa è impaurito.
22. Il padrone che il cagnolino segue è buono.
23. La maestra che lo studente controlla è simpatica.
24. La gazzella che la pantera rincorre è veloce.
25. Il pescatore che il merluzzo prende è bagnato.

26. La bambina che la signora chiama è affamata.
27. Il pirata che la ragazza spaventa è impaurito.
28. L'attrice che il signore applaude è talentuosa.
29. Il pastore che la pecora richiama è anziano.
30. Il cavallo che la bambina spazzola è nero.
31. Lo spettatore che il nuotatore applaude è felice.
32. La scolaresca che il professore richiama è chiassosa.
33. La regina viene dipinta dal pittore sul trono.
34. La maestra viene interrogata dallo studente in geografia.
35. Il calciatore viene intervistato dal giornalista allo stadio.
36. La ragazza viene aiutata dal bambino con i compiti.
37. L'insetto viene beccato dall'uccello sull'albero.
38. La strega viene intrappolata dalla fatina nel bosco.
39. La zanzara viene allontanata dal gattino con la zampa.
40. L'elefante viene spruzzato dal signore allo zoo.
41. Il marinaio viene sgridato dal capitano sulla nave.
42. Il dottore viene guarito dal paziente con lo sciroppo.
43. Il pirata viene inseguito dal capitano in mare.
44. Il fotografo viene chiamato dall'attrice per strada.
45. La ragazza viene protetta dal supereroe con prontezza.
46. Il cagnolino viene leccato dal bambino sulla faccia.
47. Il vincitore viene premiato dal sindaco sul palco.
48. Il signore viene scacciato dall'insetto con la paletta.
49. Il bagnante insegue lo squalo in mare.
50. Lo gnomo disturba la fatina nel bosco.
51. Il gallo spaventa la volpe nel cortile.
52. Il direttore rimprovera l'impiegato in ufficio.
53. Il criminale arresta il poliziotto al museo.
54. La nonna accompagna la bambina a scuola.
55. La zanzara cattura il ragnetto nella tela.
56. Il ladro deruba il signore al negozio.
57. Il gattino accarezza la signora sulla testa.
58. La mamma consola il bambino con il gelato.
59. La scimmia rincorre la pantera nella foresta.
60. Il ragazzo aiuta il nonno nell'orto.
61. Il cantante sconfigge il cavaliere in battaglia.
62. La gallina protegge il pulcino con amore.
63. Il ragazzo richiama il preside nell'ufficio.
64. La strega spaventa il coniglio con la magia.

## LIST B

1. Il criminale che insegue il poliziotto è stanco.
2. La parrucchiera che pettina la bambina è brava.
3. Il signore che visita il dottore è bravo.
4. Il gattino che rincorre l'uccello è veloce.
5. Il coniglio che accarezza il bambino è vivace.
6. Il cavaliere che salva la principessa è coraggioso.
7. La bambina che rimprovera la signora è severa.
8. Il signore che solleva il bambino è forte.
9. La farfalla che spaventa la scimmia è dispettosa.
10. La maestra che aiuta lo studente è gentile.
11. La bambina che veste la nonna è amorevole.
12. Il sovrano che ospita il cavaliere è buono.
13. La signora che salva il pompiere è forte.
14. Il bambino che guarda il pagliaccio è contento.
15. Il pippistrello che dimentica lo stregone è distratto.
16. La signora che culla la bambina è dolce.
17. Il ranocchio che la principessa bacia è verde.
18. Il barista che il cliente serve è simpatico.
19. L'autista che il vigile ferma è preoccupato.
20. Il portiere che l'arbitro spinge è basso.
21. Il turista che il fantasma spaventa è impaurito.
22. Il cagnolino che il padrone segue è giocherellone.
23. Lo studente che la maestra controlla è vivace.
24. La pantera che la gazzella rincorre è veloce.
25. Il merluzzo che il pescatore prende è grande.
26. La signora che la bambina chiama è simpatica.
27. La ragazza che il pirata spaventa è impaurita.
28. Il signore che l'attrice applaude è contento.
29. La pecora che il pastore richiama è smarrita.
30. La bambina che il cavallo spazzola è allegra.
31. Il nuotatore che lo spettatore applaude è veloce.
32. Il professore che la scolaresca richiama è severo.
33. Il pittore viene dipinto dalla regina sul trono.
34. Lo studente viene interrogato dalla maestra in geografia.
35. Il giornalista viene intervistato dal calciatore allo stadio.
36. Il bambino viene aiutato dalla ragazza con i compiti.
37. L'uccello viene beccato dall'insetto sull'albero.
38. La fatina viene intrappolata dalla strega nel bosco.
39. Il gattino viene allontanato dalla zanzara sulla poltrona.
40. Il signore viene spruzzato dall'elefante allo zoo.

41. Il capitano viene sgridato dal marinaio sulla nave.
42. Il paziente viene guarito dal dottore con lo sciroppo
43. Il capitano viene inseguito dal pirata in mare.
44. L'attrice viene chiamata dal fotografo per strada.
45. Il supereroe viene protetto dalla ragazza con prontezza.
46. Il bambino viene leccato dal cagnolino sulla faccia.
47. Il sindaco viene premiato dal vincitore sul palco.
48. L'insetto viene scacciato dal signore con la paletta.
49. Lo squalo insegue il bagnante in mare.
50. La fatina disturba lo gnomo nel bosco.
51. La volpe spaventa il gallo nel cortile.
52. L'impiegato rimprovera il direttore in ufficio.
53. Il poliziotto arresta il criminale al museo.
54. La bambina accompagna la nonna a scuola.
55. Il ragnetto cattura la zanzara nella tela.
56. Il signore deruba il ladro al negozio.
57. La signora accarezza il gattino sulla testa.
58. Il bambino consola la mamma con il gelato.
59. La pantera rincorre la scimmia nella foresta.
60. Il nonno aiuta il ragazzo nell'orto.
61. Il cavaliere sconfigge il cantante in battaglia.
62. Il pulcino protegge la gallina con amore.
63. Il preside richiama il ragazzo nell'ufficio.
64. Il coniglio spaventa la strega con la magia.

#### SEMANTIC IMPLAUSIBILITY CONDITION

#### LIST A

1. Il poliziotto che guida l'automobile è attento.
2. Il signore che legge la poltrona è stanco.
3. Il dottore che studia il manuale è concentrato.
4. Il cagnolino che nasconde l'automobile è giocherellone.
5. Il bambino che guarda la televisione è contento.
6. Il cavaliere che impugna la melanzana è coraggioso.
7. Il pittore che dipinge il quadro è talentuoso.
8. Il pasticciere che inforna i sassolini è felice.
9. La scimmia che mangia la banana è affamata.
10. La maestra che corregge il telefono è impegnata.
11. La signora che cucina la minestra è brava.
12. Il postino che consegna la merenda è veloce.
13. Il presidente che firma il documento è contento.

14. Il bambino che prepara il gioiello è goloso.
15. La commessa che riordina il negozio è stanca.
16. Il marinaio che timona il cocomero è bagnato.
17. Il braccialetto che il frigorifero indossa è elegante.
18. La crostata che la signora inforna è deliziosa.
19. Il cipresso che il cocodrillo taglia è altissimo.
20. Il pallone che il calciatore tira è rotondo.
21. La montagna che il bagnante scala è pericolosa.
22. Il bastone che il cagnolino riporta è lungo.
23. Il registro che l'orologio compila è grande.
24. La cartolina che il bambino spedisce è colorata.
25. Il racconto che il leprotto scrive è avventuroso.
26. Il tesoro che il pirata cerca è prezioso.
27. La moneta che il cinema trova è dorata.
28. Il bastone che il pastore tiene è lungo.
29. Il quaderno che il martello legge è interessante.
30. Il biglietto che lo spettatore compra è costoso.
31. Il traffico che il barista controlla è intasato.
32. La statua che il turista fotografa è bella.
33. Il quadro viene mostrato dal pittore al museo.
34. La verifica viene svolta dalla lavagna in classe.
35. L'articolo viene scritto dal giornalista sulla rivista.
36. La pentola viene comprata dal coperchio in negozio.
37. La medaglia viene consegnata dal direttore sul palco.
38. La fatina viene intrappolata dalla matita nel bosco.
39. La poltrona viene graffiata dal gattino con la zampa.
40. La fragola viene raccolta dalla valigia allo zoo.
41. Il cappuccino viene ordinato dal signore al bar.
42. Lo sciroppo viene bevuto dal bastone per la tosse.
43. Il maglione viene indossato dalla bambina per il freddo.
44. Il paesaggio viene ammirato dal pennarello al tramonto.
45. Il panino viene preparato dal ragazzo per merenda.
46. La chitarra viene suonata dalla formica al concerto.
47. La casetta viene costruita dal falegname in giardino.
48. Il giornale viene letto dal cuscino nell'ufficio.
49. Lo squalo rovescia la capanna in mare.
50. La commessa veste il manichino in negozio.
51. La gallina mangia il cemento in cortile.
52. La fatina annusa la margherita nel prato.
53. Il poliziotto prende il tappeto dal cassetto.
54. La signora cucina la bistecca in padella.
55. La strega mescola l'astuccio nel bicchiere.

56. Il criminale ruba il gioiello al museo.
57. Il cameriere pulisce il martello con passione.
58. La bambina riordina la cameretta con attenzione.
59. Il ragazzo suona il computer con energia.
60. Il cavaliere indossa l'armatura con difficoltà.
61. Il preside firma la lampada nell'ufficio.
62. Il tennista sceglie la racchetta per la partita.
63. Il cantante accende la lavatrice per il concerto.
64. Il pasticciere assaggia il biscotto in cucina.

#### LIST B

1. Il poliziotto che guida la cioccolata è attento.
2. Il signore che legge il giornale è stanco.
3. Il dottore che studia la fragola è concentrato.
4. Il cagnolino che nasconde la pallina è giocherellone.
5. Il bambino che guarda il cassonetto è contento.
6. Il cavaliere che impugna la sciabola è coraggioso.
7. Il pittore che dipinge il computer è talentuoso.
8. Il pasticciere che inforna i biscotti è felice.
9. La scimmia che mangia la pentola è affamata.
10. La maestra che corregge la verifica è impegnata.
11. La signora che cucina il bastone è brava.
12. Il postino che consegna la lettera è veloce.
13. Il presidente che firma la bistecca è contento.
14. Il bambino che prepara la merenda è goloso.
15. La commessa che riordina il pollaio è stanca.
16. Il marinaio che timona il vascello è bagnato.
17. Il braccialetto che la principessa indossa è elegante.
18. La crostata che il coniglio inforna è deliziosa.
19. Il cipresso che il giardiniere taglia è altissimo.
20. Il pallone che il manichino tira è rotondo.
21. La montagna che l'alpinista scala è pericolosa.
22. Il bastone che il pennarello riporta è lungo.
23. Il registro che la maestra compila è grande.
24. La cartolina che il righello spedisce è colorata.
25. Il racconto che lo scrittore scrive è avventuroso.
26. Il tesoro che la collana cerca è prezioso.
27. La moneta che il signore trova è dorata.
28. Il bastone che la collina tiene è lungo.
29. Il quaderno che lo studente legge è interessante.
30. Il biglietto che il pappagallo compra è costoso.

31. Il traffico che il vigile controlla è intasato.
32. La statua che la scatola fotografa è bella.
33. Il quadro viene mostrato dal coltello al museo.
34. La verifica viene svolta dallo studente in classe.
35. L'articolo viene scritto dal giornalista sulla rivista.
36. La pentola viene comprata dalla signora in negozio.
37. La medaglia viene consegnata dalla bambola sul palco.
38. La fatina viene intrappolata dalla strega nel bosco.
39. La poltrona viene graffiata dal fioraio con la zampa.
40. La fragola viene raccolta dall'elefante allo zoo.
41. Il cappuccino viene ordinato dal pennello al bar.
42. Lo sciroppo viene bevuto dal dottore per la tosse.
43. Il maglione viene indossato dal computer per il freddo.
44. Il paesaggio viene ammirato dal fotografo al tramonto.
45. Il panino viene preparato dal quadro per merenda.
46. La chitarra viene suonata dalla cantante al concerto.
47. La casetta viene costruita dal manichino in giardino.
48. Il giornale viene letto dal sindaco nell'ufficio.
49. Lo squalo rovescia il gommone in mare.
50. La commessa veste il bicchiere in negozio.
51. La gallina mangia il frumento in cortile.
52. La fatina annusa il pennarello nel prato.
53. Il poliziotto prende le manette dal cassetto.
54. La signora cucina lo scarpone in padella.
55. La strega mescola la pozione nel bicchiere.
56. Il criminale ruba il coniglio al museo.
57. Il cameriere pulisce il tavolino con cura.
58. La bambina riordina la caramella con attenzione.
59. Il ragazzo suona la batteria con energia.
60. Il cavaliere indossa la paletta con difficoltà.
61. Il preside firma la pagella nell'ufficio.
62. Il tennista sceglie il pomodoro per la partita.
63. Il cantante accende il microfono per il concerto.
64. Il pasticciere assaggia il motorino in cucina.

## APPENDIX B – TABLES OF RESULTS FROM FILLERS OF THE SELF-PACED READING TASKS

### MORPHOLOGICAL CONDITION

#### SUBJECT RELATIVE CLAUSES

*Table 1* – Morphological SPRT: mixed effect logistic regression for accuracy rates in subject relative clauses.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.61	0.20	3.11	< .01
<b>Implausible condition</b>	-0.28	0.38	-0.73	0.47
<b>TROG (percentile)</b>	0.02	0.00	6.36	< .001
<b>Group*Condition</b>	0.53	0.38	1.41	0.16

*Table 2* – Morphological SPRT: linear mixed effect regression of log-transformed reading times areas 4 and 5 in subject relative clauses.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>4</b>	<b>Monolingual group</b>	-2.30 e-02	5.54 e-02	-0.41	0.68
	<b>Implausible condition</b>	5.61 e-02	2.56 e-02	2.19	< .05
	<b>TROG (percentile)</b>	1.46 e-03	1.02 e-03	1.42	0.16
	<b>Group*Condition</b>	-1.08 e-02	4.00 e-02	-0.27	0.79
<b>5</b>	<b>Monolingual group</b>	-2.07 e-02	6.04 e-02	-0.34	0.73
	<b>Implausible condition</b>	1.75 e-02	2.33 e-02	0.75	0.45
	<b>TROG (percentile)</b>	2.69 e-03	1.12 e-03	2.40	< .05
	<b>Group*Condition</b>	-3.18 e-02	4.64 e-02	-0.69	0.49



SUBJECT-VERB-OBJECT

Table 3 – Morphological SPRT: mixed effect logistic regression for accuracy rates in SVO sentences.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.47	0.20	2.39	< .05
<b>Implausible condition</b>	-0.03	0.45	-0.07	0.95
<b>TROG (percentile)</b>	0.02	0.00	4.36	< .001
<b>Group*Condition</b>	0.49	0.37	1.33	0.19

Table 4 – Morphological SPRT: linear mixed effect regression of log-transformed reading times areas 3 and 4 in SVO sentences.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>3</b>	<b>Monolingual group</b>	-2.87 e-02	5.67 e-02	-0.51	0.61
	<b>Implausible condition</b>	5.07 e-02	2.95 e-02	1.72	0.11
	<b>TROG (percentile)</b>	4.17 e-04	1.05 e-03	0.40	0.69
	<b>Group*Condition</b>	-2.31 e-03	4.01 e-02	-0.06	0.95
<b>4</b>	<b>Monolingual group</b>	-3.80 e-02	5.91 e-01	-0.64	0.52
	<b>Implausible condition</b>	2.90 e-02	2.29 e-02	1.26	0.21
	<b>TROG (percentile)</b>	1.57 e-03	1.09 e-03	1.44	0.15
	<b>Group*Condition</b>	-4.42 e-04	4.54 e-02	-0.01	0.99

PLAUSIBILITY

SUBJECT RELATIVE CLAUSES

Table 5 – Plausibility SPRT: mixed effect logistic regression for accuracy rates in subject relative clauses.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.81	0.24	3.43	< .001
<b>Implausible condition</b>	-2.37	0.50	-4.77	< .001
<b>TROG (percentile)</b>	0.01	0.00	3.67	< .001
<b>Group*Condition</b>	-0.25	0.52	-0.48	0.63

Table 6 – Plausibility SPRT: linear mixed effect regression of log-transformed reading times areas 4 and 5 in subject relative clauses.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>4</b>	<b>Monolingual group</b>	5.80 e-02	6.21 e-02	0.93	0.35
	<b>Implausible condition</b>	2.93 e-02	3.08 e-02	0.95	0.36
	<b>TROG (percentile)</b>	2.18 e-03	1.21 e-03	1.80	0.08
	<b>Group*Condition</b>	3.23 e-02	4.61 e-02	0.74	0.46
<b>5</b>	<b>Monolingual group</b>	2.43 e-02	5.35 e-02	0.45	0.65
	<b>Implausible condition</b>	-9.37 e-03	2.35 e-02	-0.40	0.69
	<b>TROG (percentile)</b>	2.36 e-03	1.04 e-03	2.26	< .05
	<b>Group*Condition</b>	-1.19 e-02	4.69 e-02	-0.25	0.80

SUBJECT-VERB-OBJECT

Table 7 – Plausibility SPRT: mixed effect logistic regression for accuracy rates for SVO sentences.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.48	0.21	2.32	< .05
<b>Implausible condition</b>	0.33	0.34	0.98	0.33
<b>TROG (percentile)</b>	0.01	0.00	2.65	< .01
<b>Group*Condition</b>	-0.18	0.43	-0.41	0.68

Table 8 – Plausible SPRT: linear mixed effect regression of log-transformed reading times areas 3 and 4 in SVO sentences.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>3</b>	<b>Monolingual group</b>	1.78 e-02	5.61 e-02	0.32	0.75
	<b>Implausible condition</b>	-4.12 e-03	3.22 e-02	-0.13	0.90
	<b>TROG (percentile)</b>	3.31 e-03	1.10 e-03	3.01	< .01
	<b>Group*Condition</b>	-1.25 e-02	4.34 e-02	-0.29	0.77
<b>4</b>	<b>Monolingual group</b>	2.33 e-02	6.10 e-02	0.38	0.70
	<b>Implausible condition</b>	1.43 e-02	2.31 e-02	0.62	0.53
	<b>TROG (percentile)</b>	3.24 e-03	1.20 e-03	2.71	< .01
	<b>Group*Condition</b>	-2.85 e-02	4.59 e-02	-0.62	0.53

SUBJECT RELATIVE CLAUSES

Table 9 – Semantic violation SPRT: mixed effect logistic regression for accuracy rates in subject relative clauses.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.56	0.40	1.41	0.16
<b>Violation condition</b>	-0.86	0.63	-1.38	0.17
<b>TROG (percentile)</b>	0.02	0.00	2.79	< .01
<b>Group*Condition</b>	0.21	0.81	0.25	0.80

Table 10 – Semantic violation SPRT: linear mixed effect regression of log-transformed reading times areas 4 and 5 in subject relative clauses.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>4</b>	<b>Monolingual group</b>	3.84 e-02	6.80 e-02	0.56	0.57
	<b>Violation condition</b>	1.56 e-01	3.62 e-02	4.32	< .001
	<b>TROG (percentile)</b>	2.04 e-03	1.26 e-03	1.62	0.11
	<b>Group*Condition</b>	-2.08 e-02	4.23 e-02	-0.49	0.62
<b>5</b>	<b>Monolingual group</b>	-7.67 e-03	6.09 e-02	-0.13	0.90
	<b>Violation condition</b>	1.56 e-01	2.19 e-02	7.15	< .001
	<b>TROG (percentile)</b>	1.31 e-03	1.12 e-03	1.17	0.25
	<b>Group*Condition</b>	5.02 e-02	4.36 e-02	1.15	0.25

SUBJECT-VERB-OBJECT

Table 11 – Semantic violation SPRT: mixed effect logistic regression for accuracy rates in SVO sentences.

<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>z</i>	<i>p</i>
<b>Monolingual group</b>	0.43	0.24	1.76	0.08
<b>Violation condition</b>	-1.14	0.39	-2.92	< .01
<b>TROG (percentile)</b>	0.01	0.00	3.58	< .001
<b>Group*Condition</b>	0.44	0.53	0.84	0.40

Table 12 – Semantic violation SPRT: linear mixed effect regression of log-transformed reading times areas 3 and 4 in SVO sentences.

<b>Area</b>	<b>Condition</b>	<i>Estimate</i>	<i>SE</i>	<i>t</i>	<i>p</i>
<b>3</b>	<b>Monolingual group</b>	8.82 e-03	7.08 e-02	0.12	0.90
	<b>Violation condition</b>	9.11 e-02	4.19 e-02	2.171	< .05
	<b>TROG (percentile)</b>	2.26 e-03	1.29 e-03	1.75	0.08
	<b>Group*Condition</b>	-4.67 e-02	4.37 e-02	-1.07	0.29
<b>4</b>	<b>Monolingual group</b>	-2.32 e-02	5.94 e-02	-0.39	0.70
	<b>Violation condition</b>	7.34 e-02	2.48 e-02	2.96	< .05
	<b>TROG (percentile)</b>	2.16 e-03	1.08 e-03	2.00	< .05
	<b>Group*Condition</b>	7.80 e-03	4.01 e-02	0.20	0.85

## APPENDIX C – PROVE MT

### Voglia di giocare

Era un giorno bellissimo di fine luglio, azzurri cielo e mare. Nuotavo da circa mezz'ora, quando mi scordai delle bandierine rosse e presi il largo.

Bracciate lente, a “rana”; di tanto in tanto mi lasciavo trasportare inerte dalle onde. Il mare mi accarezzava e cantava: un canto lieve, tenue, come una nenia da bambini.

D'un tratto vidi lontano un sommovimento di acque e un triangolo nero avanzare. Mi ricordai di colpo dei pescicani. E mi dissi: “Se è un pescecane, è inutile affannarsi, tanto fra poco sarò fra le sue zanne. Se non lo è, tanto meglio”.

Decisi di tornare indietro e, come nulla fosse, mi diressi verso la lontanissima riva. Poco dopo, fra un ribollire d'acque, lo vidi vicino: non era un pescecane, era un grosso delfino.

E aveva voglia di giocare, il pazzerello.

Si mise a fare, intorno a me, giri vorticosi, poi salti fuori dalle onde, così che ne vedevo tutto il grande e bellissimo corpo; poi scomparve.

Passò un po' di tempo, non saprei di quanto...

All'improvviso il delfino venne di nuovo a galla buttandomi in aria, poiché si era posto con la schiena proprio sotto di me: sembrava io fossi diventato il suo giocattolo preferito.

Il gioco durò una buona mezz'ora, fra uno schiumare dell'acqua, un luccicare del grande animale, un diramarsi di rivoli come se fossero percossi da remi.

Alfine, stanco di saltare e di giocare, il delfino scomparve, e il mare ritornò tranquillo, azzurro, uniforme.

E io lentamente tornai a riva: ero veramente stanchissimo. Toccando terra non riuscivo neppure a stare in piedi.

*(di E. Franceschini)*

**Rispondi alle seguenti domande facendo una croce sulla risposta giusta**

1. (PLT) In che periodo dell'anno siamo?
  - A. Verso la metà di agosto
  - B. All'inizio dell'estate
  - C. Nel pieno dell'estate
  - D. In primavera
  
2. (IL) Il rumore del mare sembrava:
  - A. Quello di una canzone per bambini
  - B. Un gioco che fanno i bambini
  - C. I capricci dei bambini
  - D. Una cosa noiosa da bambini
  
3. ((IS) Il mare era:
  - A. Rumoroso
  - B. Sporco
  - C. Mosso
  - D. Calmo
  
4. (IS) Il protagonista si accorge che sta arrivando un grosso pesce
  - A. Perché sente un rumore strano
  - B. Perché vede dei pesci
  - C. Perché ha superato le bandierine rosse
  - D. Perché nota uno strano movimento di onde nel mare
  
5. (FLESS) Quando pensa di aver visto un pescecane, il protagonista ha paura di essere preso:
  - A. Tra i suoi denti
  - B. Dalle sue zampe
  - C. Dalla sua coda
  - D. Tra le sue pinne

6. (EI) Quando vede il triangolo nero il protagonista decide:
- A. Di chiamare aiuto
  - B. Di aspettare per vedere che animale è
  - C. Di uccidere quel grosso pesce
  - D. Di andare con calma verso riva
7. (FS) Come mai il protagonista quando vede il triangolo nero non scappa?
- A. Perché la riva è troppo lontana e sarebbe quindi inutile
  - B. Perché sa già che è un delfino
  - C. Perché è bloccato dalla paura
  - D. Perché non ha paura del pescecane
8. (IS) Il triangolo nero è:
- A. Una macchia nera sulla schiena del pesce
  - B. La caratteristica pinna dei delfini
  - C. Una boa in mezzo al mare
  - D. La testa del delfino
9. (FLESS) Il delfino, dopo aver girato intorno al protagonista:
- A. Nuota con lui
  - B. Va incontro al pescecane
  - C. Fa le bolle sotto acqua
  - D. Sparisce per un po' di tempo
10. (SS) Il delfino, per buttare in aria il protagonista:
- A. Si mette con la schiena sotto il corpo del protagonista
  - B. Dà un colpo con la coda
  - C. Lo afferra per le gambe
  - D. Si mette sopra la schiena del protagonista



11. (FS) Alla fine il delfino scompare perché:
- A. Erano ormai arrivati a riva
  - B. È stato spaventato da qualcuno o qualcosa
  - C. Era stanco di giocare
  - D. Il mare era diventato calmo
12. (FS) Alla fine, quando il delfino scompare, il protagonista:
- A. Sviene
  - B. Resta in acqua
  - C. È dispiaciuto che il delfino se ne sia andato
  - D. Torna sulla riva
13. (IS) Il protagonista è stato imprudente a non osservare le bandierine rosse:
- A. Perché poteva disturbare i pesci
  - B. Perché poteva farsi male contro gli scogli
  - C. Perché poteva perdersi
  - D. Perché poteva trovarsi in pericolo
14. (GT) Se dovessi cambiare titolo a questa storia, quale metteresti?
- A. Una avventura in mezzo al mare
  - B. I pericoli del mare
  - C. La lotta del delfino
  - D. Una gara di nuoto

## **Il panda**

Il panda è un buffo, timido, simpatico “orsacchiottone” di abitudini ritirate e abitatore delle foreste di bambù di alta montagna del Tibet orientale della Cina meridionale. Gli piace giocare, scivolare sull’erba, fare le capriole.

È molto bravo ad arrampicarsi sugli alberi grazie alle sue dimensioni ridotte.

Un po’ per la sua rarità, un po’ per il suo aspetto grazioso quasi da animale di pezza, il panda è stato scelto come simbolo della più grande organizzazione internazionale per la conservazione degli animali, il Fondo Mondiale per la Natura (WWF)

Tranne che allo zoo di Pechino non si è mai riusciti a far riprodurre in cattività questo graziosissimo animale bianco e nero, che tutti chiamano orso ma che con gli orsi ha solo una lontana parentela, poiché appartiene alla stessa famiglia dei procioni.

Il panda si nutre esclusivamente di germogli di bambù che mangia in grossa quantità dato che si tratta di un alimento poco nutriente. Infatti, ne mangia all’incirca 12 chilogrammi al giorno.

Raccoglie delicatamente le foglie e i germogli con le zampe anteriori: una specie di sesto dito gli permette di afferrare anche i pezzetti più piccoli.

Inoltre la sua abitudine a star seduto a sdraiato sul dorso, mentre strappa a morsi il cibo che tiene stretto tra le zampe anteriori, lo rende irresistibile.

*(da Pfeffer, Baschieri- Salvadori – Florio, A:  
Zoi e D.b. Zoi)*

**Rispondi alle seguenti domande facendo una croce sulla risposta giusta**

1. (IL) Il panda:
  - A. Non ha voglia di farsi vedere e di mettersi in mostra
  - B. È contento se tutti lo guardano
  - C. Gira sempre in cerca di novità
  - D. Ama vivere in campagna con orsi e procioni
  
2. (EI-FLESS) Il panda è bravo a salire sugli alberi perché:
  - A. Si allena ogni giorno
  - B. In Cina gli alberi sono piccoli e bassi
  - C. È un animale molto forte
  - D. È piccoli e agile
  
3. (SS) Il Fondo Mondiale per la Natura (WWF) è:
  - A. Una organizzazione internazionale
  - B. Un parco nazionale del Tibet
  - C. Una associazione che protegge i panda
  - D. Il simbolo del panda
  
4. (FLESS) In che posto si è riusciti a far riprodurre i panda?
  - A. A Roma
  - B. In alcuni circhi di Pechino
  - C. In uno zoo della Cina
  - D. In un parco del WWF
  
5. (IL) È molto difficile che il panda si riproduca:
  - A. Quando non è in libertà
  - B. Nelle foreste del Tibet
  - C. Perché è cattivo e antisociale
  - D. Durante l'inverno

6. (E) Perché si cerca di far riprodurre il panda in cattività?
- A. Per la sua pelliccia pregiata
  - B. Per regalarne uno a tutti i bambini
  - C. Perché è molto richiesto negli zoo
  - D. Perché ce ne sono pochi
7. (PLT) Possiamo dire che il panda:
- A. In realtà è proprio un orso di piccole dimensioni
  - B. È un animale amico dell'uomo e può vivere nelle nostre case
  - C. Appartiene alla stessa categoria di animali cui appartiene il procione
  - D. Appartiene a una specie rara ed è unico nel suo genere
8. (FLESS) Cosa mangia il panda?
- A. Di solito si nutre di germogli e di foglie
  - B. È capace di divorare un albero intero, tronco e rami
  - C. Solo pezzi molto piccoli di una pianta
  - D. Solo alimenti molto nutrienti
9. (FLESS) Quanto bambù mangia ogni giorno il panda?
- A. Diversi chilogrammi
  - B. Tutto un albero
  - C. Due chilogrammi
  - D. Dipende da quanto ha fame
10. (EI) il panda mangia molto bambù perché:
- A. Ha molta fame
  - B. Non c'è altro da mangiare
  - C. Il bambù è un alimento poco nutriente
  - D. Deve accumulare grasso per l'inverno

11. (IS) Il panda vive soprattutto in Cina perché:
- A. Lì è vicino allo zoo di Pechino
  - B. Lì trova il suo cibo preferito
  - C. In Cina ci sono molti alberi dove si può arrampicare
  - D. È il simbolo scelto dal WWF
12. (IS) Il sesto dito permette al panda di:
- A. Prendere anche i pezzi molto piccoli di bambù
  - B. Prendere il bambù con le zampe anteriori
  - C. Cercare i pezzi piccoli di bambù
  - D. Tagliare il bambù in piccoli pezzi
13. (GT) In questo brano l'argomento principale è:
- A. A cosa serve il bambù
  - B. La vita e le abitudini del panda
  - C. Che cosa fa il WWF
  - D. Come vivono gli orsi in Cina
14. (SENS) Questo brano è:
- A. Una descrizione
  - B. Una favola
  - C. Un racconto di un bambino
  - D. Un'avventura

## Omar e Hamed

Omar e Hamed erano di ricchi fratelli d'una città dell'Arabia. Poiché sentivano avvicinarsi la vecchiaia, disse il primo al secondo:

- Fratello, quando noi saremo morti, che ci ricorderà? Non sarebbe bene che pensassimo ad innalzarci un monumento che tramandasse alle genti il nostro nome?

- È giusto - acconsentì Hamed, - ma ciascuno di noi faccia il monumento che egli crede meglio, in piena libertà.

Omar allora chiamò dei valenti artefici ed ordinò loro di tagliare un grande obelisco marmoreo e, sopra una faccia di questo, fece scolpire la sua immagine e il suo nome.

L'opera risultò quanto mai preziosa e artistica e l'effigie del ricco cittadino sembrava parlante.

Quando il monumento fu compiuto, egli lo fece innalzare in mezzo all'arida sabbia del deserto, in modo che le carovane lo scorgessero da molto lontano.

Il vento turbinoso e soffocante si rompeva, sibilando contro i suoi spigoli acuti, ma non riusciva ad abatterlo e l'immagine ed il nome di Omar splendevano al sole perennemente.

Hamed invece, alcune miglia più distante di lì, costruì il suo monumento. Egli non chiamò valenti artefici, ma dei semplici operai e fece scavare un pozzo profondo, donde sgorgò e dove di raccolse l'acqua limpida e fresca, gioia e ristoro dei pellegrini assetati e degli stanchi dromedari.

Lo cinse d'un muricciolo, che lo difendesse dalla polvere e dalla sabbia: lo contornò di sedili, per riposarvi le membra affaticate, vi piantò tutt'in giro numerose palme, che porgessero ombra gradita col loro fogliame e cibo sostanzioso con i dolci datteri.

Non incise in nessuna parte né il suo nome né la sua immagine; ma le lunghe file di cammelli e di mercanti che comparivano all'orizzonte sulla gialla distesa sabbiosa si dirigevano verso il "pozzo di Hamed", che così era dovunque conosciuto e nominato.

Ed al “pozzo di Hamed” i pellegrini si fermavano e si ristoravano, mentre non degnavano che di un fuggevole sguardo l’obelisco superbo che s’ergeva, nudo e solitario, nel deserto sconfinato.

E dicevano:

- Omar pensò a sé solo: lo copra pure l’oblio. Hamed, cuor generoso, pensò invece agli altri: sia benedetto in eterno.

*(di E. Garro)*

**Rispondi alle seguenti domande facendo una croce sulla risposta giusta.**

1. (PLT) Omar e Hamed sono:
  - A. Due valenti artefici
  - B. Due pellegrini del deserto
  - C. Due anziani fratelli
  - D. Due ricchi mercanti arabi
  
2. (IL) Chi chiama Omar per costruire il monumento?
  - A. Alcuni esperti artigiani
  - B. Dei soldati valorosi
  - C. Dei robusti operai
  - D. Degli orefici molto abili
  
3. (FS) Omar ordinò di tagliare l'obelisco:
  - A. E di fare scolpire sopra il suo nome
  - B. E di farlo innalzare dopo la sua morte
  - C. Prima che le carovane lo scorgessero
  - D. Poi chiamò gli artigiani
  
4. (FLESS-SL) Il vento:
  - A. Faceva dondolare il monumento
  - B. Batteva con forza contro il monumento
  - C. Era riuscito a rompere gli spigoli dell'obelisco
  - D. Oscurava l'immagine di Omar sull'obelisco
  
5. (IS) Hamed fa costruire un pozzo:
  - A. Così i pellegrini possono fermarsi a contemplare il monumento di Oscar
  - B. Per vendere acqua e cibo e diventare ricco
  - C. Dove i pellegrini e i dromedari possono riposarsi e bere
  - D. Perché le carovane lo possono vedere da lontano



6. (PLT) Dove si trova il pozzo di Hamed?
- A. Ai piedi di una montagna
  - B. Poco lontano dall'obelisco
  - C. Vicino ad un mercato
  - D. In Egitto
7. (SS) da dove sgorga l'acqua?
- A. Da una speciale roccia di marmo
  - B. Dall'effigie sull'obelisco
  - C. Dallo scavo del pozzo
  - D. Dall'ombra delle palme
8. (FELSS) Hamed:
- A. Mise attorno al pozzo tanti tavoli per mangiare
  - B. Fece costruire tanti letti così i pellegrini potevano riposare
  - C. Fece mettere tante sedie per far riposare gli operai che costruivano il pozzo
  - D. Circondò il suo pozzo di panchine in modo che i pellegrini stanchi potessero riposarsi
9. (FLESS) Le palme offrono:
- A. Il fogliame come cibo ai dromedari
  - B. Qualche frutto da mangiare ai pellegrini
  - C. Un saporito succo di palma che toglie la sete
  - D. Un sostegno per i dromedari stanche di camminare

10. (FS) I pellegrini:
- A. Desiderano arrivare al pozzo di Hamed
  - B. Sono arrabbiati perché Omar ha costruito un monumento che non serve a niente
  - C. Sono dispiaciuti perché Omar ed Hamed stanno diventando vecchi
  - D. Osservano con ammirazione l'obelisco di Omar
11. (GT) Le persone si ricordano di Hamed:
- A. Perché egli voleva bene agli uomini
  - B. Perché egli era ricco
  - C. Perché il suo pozzo era utile
  - D. Perché egli dava da mangiare a tutte le persone
12. (EI) Il monumento di Omar:
- A. Non servì a nulla e non venne gradito
  - B. Venne ricordato da tutti per sempre
  - C. Diventò un posto importante per tutti
  - D. Diventò un luogo dove tutta la gente si incontrava
13. (IS) La gente pensa:
- A. Che Omar deve nascondersi
  - B. Che Omar verrà sempre ricordato
  - C. Che Omar deve essere ricompensato
  - D. Che Omar può essere dimenticato perché è stato egoista
14. (SENS) Secondo te il brano che hai letto è tratto da:
- A. Un libro di geografia sull'Arabia
  - B. Un di storie per bambini
  - C. Un libro sugli animali
  - D. Un romanzo

## **L'orso bianco**

L'orso bianco vive nel Mar Glaciale Artico e in alcune terre ad esso vicine.

A volte, però compie lunghe migrazioni, che lo portano anche migliaia di chilometri lontano dal punto di partenza, alla ricerca delle zone dove le foche sono più numerose. È infatti un predatore insaziabile che deve nutrirsi moltissimo per accumulare enormi quantità di grasso.

Solo così potrà superare il lungo e rigido inverno, durante il quale è praticamente impossibile trovare qualche preda.

Il corpo di questo bestione è più allungato rispetto a quello dell'orso bruno, e la parte posteriore, grossa e massiccia, contrasta con quella anteriore meno tozza.

Il suo collo è lungo e il suo capo slanciato.

Le zampe sono piuttosto grandi, adatte ad una vita sui ghiacci e sulla neve, ma anche in acqua: infatti le dita sono unite da una membrana che gli facilita il nuoto. Robusti e corti artigli rendono micidiali le poderose zampe.

Il pelo ha una tinta bianco-giallognola che gli permette di mimetizzarsi fra il bianco dei ghiacci.

Il suo olfatto straordinario gli segnala la presenza di prede anche a parecchi chilometri di distanza.

Individuata la vittima, il grosso plantigrado si avvicina strisciando carponi. Giunto a distanza ravvicinata uccide la preda con una zampata e la divora.

A volte si spinge con cautela in acqua, e, a nuoto, si dirige verso il blocco di ghiaccio sul quale ha adocchiato un pinnipede. Emerge quindi con un gran balzo, tagliando la ritirata alla preda.

Spesso attende vicino a un foro del ghiaccio che la foca emerga per respirare: quando le vede, subito la afferra e la uccide.

*(di D. Ticli)*

**Rispondi alle seguenti domande facendo una croce sulla risposta giusta.**

1. (FLESS) per trovare più foche l'orso bianco:
  - A. Fa molta fatica
  - B. Compie lunghi viaggi
  - C. Corre molto veloce
  - D. Si guarda bene attorno
  
2. (SS) L'orso bianco può superare l'inverno:
  - A. Perché ha accumulato molto grasso
  - B. Perché ha la pelliccia che lo ripara dal freddo
  - C. Perché si sposta in zone più calde
  - D. Perché si mimetizza
  
3. (FLESS) L'inverno nel Mar Glaciale Artico è:
  - A. Molto umido e ricco di precipitazioni nevose
  - B. Una stagione che dura poco, ma rigidissima
  - C. Molto freddo e dura molti mesi
  - D. Gelido e umido
  
4. (PLT) L'orso bianco fa fatica a trovare prede:
  - A. D'inverno perché va in letargo e ha mobilità ridotta
  - B. Con la nebbia dell'inverno perché la visibilità è molto ridotta
  - C. Durante i lunghi spostamenti che compie
  - D. Durante l'inverno perché è difficile trovare foche
  
5. (FLESS-IL) La parte anteriore dell'orso bianco è:
  - A. Meno lunga della parte posteriore
  - B. Meno grossa della parte posteriore
  - C. Meno colorato della parte posteriore
  - D. Più grossa della parte posteriore

6. (IS) Le zampe grandi servono per:
  - A. Mangiare più velocemente
  - B. Correre sulla neve
  - C. Arrampicarsi sulle rocce
  - D. Non scivolare e avere maggiore stabilità
  
7. (FLESS) Le dita dell'orso bianco:
  - A. Sono adatte al nuoto
  - B. Sono coperte da uno strato di grasso
  - C. Sono adatte alla vita tra le rocce
  - D. Si mimetizzano facilmente nel ghiaccio
  
8. (FLESS) Come sono gli artigli dell'orso bianco?
  - A. Sottili per meglio penetrare nel ghiaccio
  - B. Corti ma resistenti
  - C. Lunghi e pericolosi
  - D. Poco resistenti al ghiaccio e alla neve
  
9. (SL) L'olfato dell'orso bianco:
  - A. Segnala le prede che si stanno avvicinando
  - B. Gli permette di avvertire l'odore della foca anche la preda e sott'acqua
  - C. Gli permette di capire se ci sono animali da mangiare anche se sono lontani
  - D. Lo avverte quando il pericolo è vicino
  
10. (SL) L'orso bianco quando c'è a caccia di una preda:
  - A. Si avvicina cercando di non farsi notare
  - B. Si avvicina con grandi balzi alla sua vittima
  - C. Si fa sempre notare perché ha una corporatura massiccia
  - D. Resta immobile aspettando che qualche animale curioso si avvicini

11. (EI) Come mai l'orso bianco va in acqua?
- A. Perché vuole lavarsi
  - B. Perché ha visto una preda che non può raggiungere strisciando sul ghiaccio
  - C. Perché nuotando va a caccia di pesci
  - D. Perché è più rapido a catturare le prede in acqua
12. (IL) Il pinnipede di cui si parla nel brano è:
- A. La foca
  - B. L'anatra
  - C. L'orso
  - D. Qualsiasi animale con le dita unite da una membrana
13. (FS) Cosa fa l'orso bianco dopo che ha visto un pinnipede sul ghiaccio?
- A. Aspetta con pazienza che l'animale esca dal ghiaccio?
  - B. Fiuta l'aria cercando di sapere dove dirigersi
  - C. Entra in acqua con colma per non farsi notare
  - D. Cerca di spaventare la sua vittima con grandi balzi improvvisi
14. (FS) Cosa fa l'orso bianco quando la foca esce a respirare?
- A. La cattura immediatamente
  - B. Aspetta che esca dall'acqua
  - C. Fa un grande balzo
  - D. Le taglia la ritirata



## APPENDIX D – HAND-OUTS PEDAGOGICAL INTERVENTION ON PASSIVE VOICE

FIRST MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**1. DISEGNA UNA FRECCIA SOPRA ALLA FRASE CHE PARTA DA CHI COMPIE L'AZIONE E ARRIVI A CHI LA RICEVE.**

1. Il bambino viene accompagnato a casa dalla nonna.
2. Il lupo rincorre gli uccelli nel bosco.
3. Le pecore vengono radunate dal pastore.
4. La bambina viene abbracciata dalla mamma.
5. L'attrice viene fotografata dagli ammiratori.
6. Il cane rincorre il gatto in giardino.
7. Il nonno saluta il vicino dalla finestra.
8. I fiori vengono raccolti dalla ragazza in giardino.
9. Lo studente viene interrogato dalla maestra in scienze.
10. La maestra accompagna i bambini in gita.
11. Gli spettatori ascoltano il cantante durante il concerto
12. Il calciatore spinge l'avversario per terra.

**2. OSSERVA L'IMMAGINE ALLA LAVAGNA E AIUTA TINTIN A DESCRIVERE COSA È SUCCESSO NELLA STANZA. ATTENZIONE: RIUSCIAMO A DESCRIVERE QUELLO CHE È SUCCESSO SENZA RACCONTARE CHI LO HA FATTO?**

1. \_\_\_\_\_  
\_\_\_\_\_



2. \_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_

**3. CONFRONTIAMO LE NOSTRE RISPOSTE**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**4. OSSERVA L'IMMAGINE ALLA LAVAGNA E DESCRIVI COSA STA SUCCEDENDO. ATTENZIONE: RIUSCIAMO A DESCRIVERE QUELLO CHE È SUCCESSO SENZA RACCONTARE CHI LO HA FATTO?**

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_

4. \_\_\_\_\_  
\_\_\_\_\_

5. \_\_\_\_\_  
\_\_\_\_\_

**5. CONFRONTIAMO LE NOSTRE RISPOSTE**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. RIFLETTIAMO INSIEME**

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

**7. CONFRONTIAMO LE DUE FRASI**

1. \_\_\_\_\_  
\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_

**8. RILEGGIAMO LE NOSTRE FRASI E PROVIAMO A TRASFORMARLE COME NELL'ESEMPIO CHE ABBIAMO VISTO (MILÙ È INSEGUITO DA UN GROSSO CANE MARRONE → UN GROSSO CANE MARRONE INSEGUE MILÙ). POI DISEGNA UNA FRECCIA SOPRA ALLA FRASE CHE PARTA DA CHI COMPIE L'AZIONE E ARRIVI A CHI LA RICEVE.**

1.

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2.

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3.

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4.

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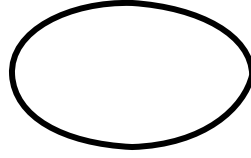
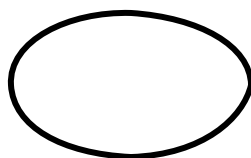
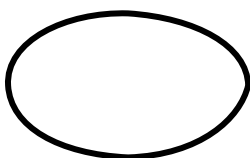
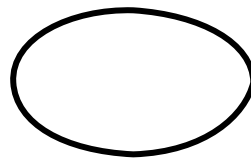
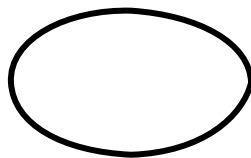
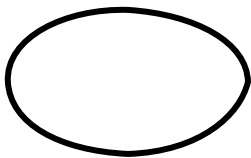
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5.

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**9. PROVIAMO A DIVIDERE LE FRASI IN PEZZETTINI**



**10. RIFLETTIAMO INSIEME**

1.

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2.

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**11. COME HAI TROVATO QUESTA ATTIVITÀ?**

11a.  molto difficile  difficile  normale  facile  molto facile

11b.  molto noiosa  noiosa  normale  divertente  molto divertente

SECOND MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**1. TRASFORMA LE FRASI DA ATTIVE A PASSIVE E VICEVERSA.**

1. L'esploratore studia la mappa con attenzione.

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2. Il libro viene letto dalla maestra a tutta la classe.

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3. La leonessa insegue la gazzella nella savana.

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4. La regina riceve gli ospiti nel suo palazzo.

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5. Il miele viene prodotto dalle api.

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6. L'automobile è stata riparata dal meccanico.

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7. La mamma viene abbracciata dalla bambina.

8. Il tennista saluta l'arbitro dopo la partita.

9. Il mago estrae un coniglietto dal suo cappello.

10. Una lettera importante è stata consegnata dal postino.

**2. OSSERVA ATTENTAMENTE L'IMMAGINE E DESCRIVILA SULLA SCHEDA. ATTENZIONE: PROVA A USARE SIA FRASI CHE CONTENGONO LA FORMA PASSIVA CHE LA FORMA ATTIVA.**

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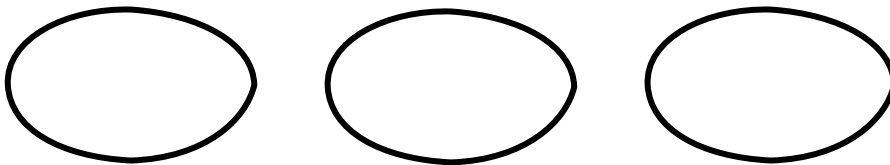
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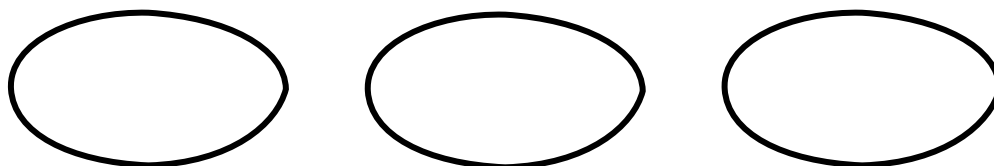
**3. ASCOLTA LE DESCRIZIONI DEI COMPAGNI E POI RIFLETTI SUL TUO TESTO.**

**3a.** Hai usato qualche frase alla forma passiva?  sì  no

**3b.** Scegli una frase passiva dal tuo testo o da quello di un compagno. Dividi la frase in sintagmi e inseriscili nello schema qui sotto.



**3c.** Trasforma la stessa frase alla forma attiva. Dividila in sintagmi e inseriscili nello schema qui sotto.



**4. CONFRONTA LA FRASE PASSIVA E QUELLA ATTIVA. QUALI DIFFERENZE NOTI?**

**4a.** La scena descritta cambia?  sì  no

**4b.** Cosa cambia nella struttura dei verbi?

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**4c.** Qual è il soggetto nella frase passiva?

---

**4d.** Qual è il soggetto nella frase attiva?

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**4e.** Assegna una categoria grammaticale a ogni sintagma negli schemi dell'attività 3? (Soggetto, verbo, complemento oggetto o complemento indiretto)

**4f.** Si può dire che il soggetto della frase attiva diventa il complemento indiretto della frase passiva?  sì  no

**4g.** Secondo te, possiamo dire che il soggetto è sempre il personaggio che compie l'azione in una frase?  sì  no

Sai spiegare perché?

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**5. COME HAI TROVATO QUESTA ATTIVITÀ?**

5a.  molto difficile  difficile  normale  facile  molto facile

5b.  molto noiosa  noiosa  normale  divertente  molto divertente

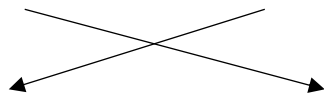
THIRD MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**1. RIVEDIAMO INSIEME UN ESEMPIO.**

a. La maestra interroga il bambino in storia. Forma \_\_\_\_\_



b. Il bambino viene interrogato dalla maestra in storia. Forma \_\_\_\_\_

**1a.** Chi compie l'azione nella frase a?

---

**1b.** Chi compie l'azione nella frase b?

---

**1c.** Chi è il soggetto nella frase a?

---

**1d.** Chi è il soggetto nella frase b?

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**2. TRASFORMA LE SEGUENTI FRASI DA ATTIVE A PASSIVE.**

1. Il pagliaccio scivola sulla buccia di banana.

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2. Un fulmine ha colpito un albero durante il temporale.

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3. Il cane corre allegramente nel prato.

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4. Il cuoco prepara la pasta al ristorante.

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5. Il direttore è arrivato in ritardo alla riunione.

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6. L'attrice recita con passione sul palcoscenico.

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7. Tanti turisti visitano il museo ogni anno.

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8. La nonna telefona alla mamma ogni pomeriggio.

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9. Il gatto dorme tutto il giorno sulla poltrona.

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10. Lo scoiattolo raccoglie le ghiande velocemente.

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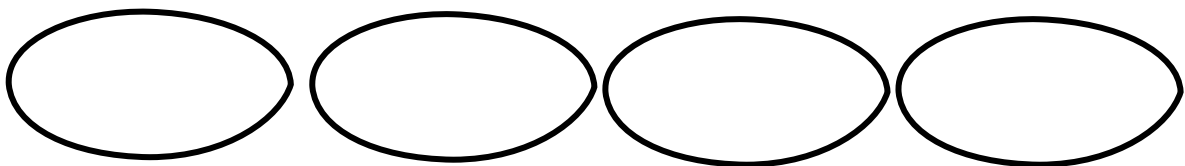
**3. OSSERVA LE FRASI DELL'ATTIVITÀ 2 E RISPONDI ALLE SEGUENTI DOMANDE.**

**3a.** Era sempre possibile trasformare queste frasi da attive a passive?

sì

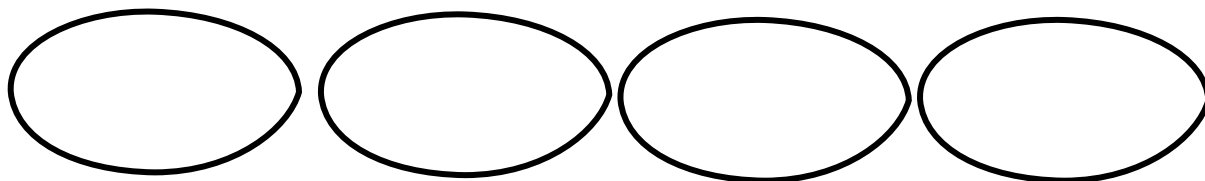
no

**3b.** Scegli una frase dell'attività 2 che non si poteva trasformare in passiva e dividila in sintagmi nello schema qui sotto.





**3c.** Scegli una frase dell'attività 2 che si poteva trasformare in passiva e dividila in sintagmi nello schema qui sotto.



**4. ANALIZZA LE FRASI CHE HAI SCELTO PER L'ATTIVITÀ 3.**

**4a.** Assegna una categoria grammaticale (soggetto – predicato verbale – complemento oggetto – complemento indiretto) a ogni sintagma delle frasi che hai scelto e confrontale. Noti qualche differenza?

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**4b.** Riesci a individuare quali sono le categorie grammaticali fondamentali per poter trasformare una frase da attiva a passiva? (più di una risposta è corretta)

- soggetto
- predicato verbale
- complemento oggetto
- complemento indiretto

**5. CONOSCI GIÀ LA DIFFERENZA TRA VERBI TRANSITIVI E VERBI INTRANSITIVI? SE SÌ, SAI DIRE QUAL È?**

sì

no

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**6. INVENTA UNA FRASE PER CIASCUNO DEI SEGUENTI VERBI.**

Cadere:

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Abbracciare:

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Entrare:

---

Sorridere:

---

Inseguire:

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**7. EVIDENZIA IL COMPLEMENTO OGGETTO NELLE FRASI CHE HAI INVENTATO NELL'ATTIVITÀ 6.**

**7a.** C'è il complemento oggetto in ogni frase?  sì

no

**7b.** Prova a trasformare la frase che hai inventato con il verbo *sorridere* da attiva a passiva.

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**7c.** Era possibile trasformare quella frase da attiva a passiva?

sì

no

Secondo te, perché?

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**7d.** Secondo te, “sorridere” è un verbo transitivo o intransitivo?

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**8. DOPO AVER RIGUARDATO LE ATTIVITÀ CHE HAI SVOLTO, SAI DIRE QUALI VERBI POSSONO AVERE LA FORMA PASSIVA?**

- verbi transitivi
- verbi intransitivi
- tutti i tipi di verbi

**9. COME HAI TROVATO QUESTA ATTIVITÀ?**

9a.  molto difficile     difficile     normale     facile     molto facile

9b.  molto noiosa     noiosa     normale     divertente     molto divertente

FOURTH MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**1. VERO O FALSO?**

- \_\_\_ 1. In una frase il soggetto è sempre il personaggio che compie l'azione.
- \_\_\_ 2. La forma passiva sposta l'attenzione sul personaggio o l'oggetto che riceve l'azione.
- \_\_\_ 3. I verbi transitivi devono avere il complemento oggetto.
- \_\_\_ 4. I verbi intransitivi non possono avere la forma passiva.

- \_\_\_ 5. In una frase il personaggio o l'oggetto che riceve l'azione non può mai essere il soggetto.
- \_\_\_ 6. In una frase con la forma passiva dobbiamo sempre specificare chi ha compiuto l'azione.
- \_\_\_ 7. "Il cane rincorre il gatto" e "il cane viene rincorso dal gatto" hanno lo stesso significato.
- \_\_\_ 8. I verbi intransitivi possono avere il complemento oggetto.
- \_\_\_ 9. La forma passiva si costruisce con l'uso di un verbo ausiliare.

**2. SCRIVI UNA FRASE PER OGNI VERBO E POI STABILISCI SE SI TRATTA DI UN VERBO TRANSITIVO O INTRANSITIVO.**

\_\_\_ 1. Leggere:

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\_\_\_ 2. Recitare:

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\_\_\_ 3. Dormire:

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\_\_\_ 4. Mangiare:

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\_\_\_ 5. Ascoltare:

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\_\_\_ 6. Piovere:

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\_\_\_ 7. Arrivare:

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\_\_\_ 8. Correre:

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**3. SOTTOLINEA O EVIDENZIA IL COMPLEMENTO OGGETTO NELLE FRASI CHE HAI INVENTATO NELL'ATTIVITÀ 2 E POI RISPONDI ALLE SEGUENTI DOMANDE.**

**3a.** C'è il complemento oggetto in ogni frase?  sì  no

Perché?

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**3b.** Credi sia possibile trasformare tutte le frasi dell'attività 2 dalla forma attiva a quella passiva?       sì                       no

Secondo te, perché?

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**3c.** Scegli una delle tue frasi e dividila in sintagmi. Poi assegna la categoria grammaticale giusta a ogni sintagma.

**4. LEGGI I SEGUENTI BRANI E SOTTOLINEA IN BLU I VERBI IN FORMA PASSIVA IN ROSSO QUELLI ALLA FORMA ATTIVA.**

**A. LA PRIMA FATICA DI ERACLE: IL LEONE DI NEMEA**

Non appena Eracle arrivò da suo cugino Euristeo, gli fu subito ordinato di andare a caccia di un terribile leone, enorme, ferocissimo e invulnerabile perché fatto di bronzo e ferro. Questo terribile mostro che divorava uomini e bestie devastava la regione di Nemea. Quando Eracle giunse sul posto non trovò nessuno: il leone era così spaventoso che le persone si nascondevano sempre.

L'eroe andò a cercare il mostro nella sua tana in cima a un monte e finalmente riuscì ad avvistarlo. Scagliò una raffica di frecce contro il leone, ma queste rimbalzarono sulla sua pelle dura senza ferirlo. Eracle provò allora a colpirlo con la spada. Ancora niente. Non gli restava altra scelta che affrontare il leone con la sola forza delle sue mani. Fu una lotta lunga e terribile, ma alla fine, lo spaventoso leone venne sconfitto dal coraggioso Eracle. Zeus decise di lasciare un segno nel cielo per celebrare e ricordare questa vittoria. Fu così, quindi, che inserì il leone di Nemea tra le costellazioni.

**B. VIAGGI NELLO SPAZIO**

L'era delle esplorazioni spaziali venne inaugurata nel 1957 dal lancio di due satelliti artificiali russi, lo *Sputnik I* e *II*. Una tappa fondamentale è rappresentata dal primo uomo sulla Luna: la navicella americana *Apollo 11* nel 1969 fece sbarcare l'astronauta Neil Armstrong sul suolo lunare. Vennero quindi messi in orbita i primi laboratori spaziali. I

satelliti artificiali sono privi di propulsione propria e vengono lanciati in orbita attorno alla Terra con razzi che poi si disperdono nello spazio. Negli ultimi decenni hanno rivelato informazioni su stelle e pianeti del sistema solare che non potevano essere ottenute neppure servendosi dei più moderni radioscopi. Hanno fornito misurazioni e dati in meteorologia e in geofisica, cioè la scienza che studia come è fatta la Terra. Molti satelliti che oggi orbitano intorno alla Terra servono per le telecomunicazioni: permettono di gestire gran parte del traffico telefonico, radiotelevisivo e informatico.

Prima di mandare l'uomo nello spazio, vennero eseguiti vari esperimenti con navette automatiche e poi con animali a bordo delle navicelle spaziali. Per esempio, una la cagnetta di nome *Laika* venne lanciata in orbita dai Russi con lo *Sputnik II*.

## 5. RIFLETTIAMO SUI TESTI.

**5a.** Secondo te, a quale genere appartiene il brano A?

- testo espositivo       testo narrativo       testo regolativo
- testo descrittivo       testo argomentativo

**5b.** Secondo te, a quale genere appartiene il brano B?

- testo espositivo       testo narrativo       testo regolativo
- testo descrittivo       testo argomentativo

**5c.** Quali sono le caratteristiche del brano A? (più di una risposta è corretta)

- narra una storia
- è oggettivo
- descrive dei fatti
- cerca di convincere il lettore
- descrive un personaggio
- è soggettivo
- spiega delle regole
- esprime l'opinione dell'autore
- fa uso della fantasia
- informa il lettore

**5d.** Quali sono le caratteristiche del brano B? (più di una risposta è corretta)

- narra una storia
- è oggettivo
- descrive dei fatti
- cerca di convincere il lettore
- è soggettivo
- spiega delle regole
- esprime l'opinione dell'autore
- fa uso della fantasia

descrive un personaggio

informa il lettore

**5e.** In quale testo hai sottolineato più verbi alla forma passiva?

La prima fatica di Eracle: il leone di Nemea     Viaggi nello spazio

**6. RIFLETTI SULLE CARATTERISTICHE DELLA FORMA ATTIVA E DELLA FORMA PASSIVA.**

**6a.** A chi diamo più attenzione quando usiamo la forma attiva?

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**6b.** A chi diamo più attenzione quando usiamo la forma passiva?

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**6c.** Osserva il brano che conteneva più verbi alla forma passiva. Secondo te, perché l'autore ha preferito usare la forma passiva invece che quella attiva?

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**7. COME HAI TROVATO QUESTA ATTIVITÀ?**

7a.     molto difficile     difficile     normale     facile     molto facile

7b.     molto noiosa     noiosa     normale     divertente     molto divertente

## APPENDIX E – HAND-OUTS PEDAGOGICAL INTERVENTION ON THE ABILITY TO MAKE INFERENCES

FIRST MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

### 1. LEGGI I SEGUENTI BRANI E RISPONDI ALLE DOMANDE.

#### A. UN AVVISTAMENTO SUL GHIACCIO

“Guardate! Guardate!” gridò il marinaio. Il capitano e tutto l’equipaggio gettarono lo sguardo attraverso l’immensa distesa di ghiaccio che copriva il mare Antartico e nella quale la loro baleniera andava aprendosi la strada. “È una slitta!”, disse il capitano Walton, “ma... mio Dio! Guardate la mole di quell’uomo!”. Il capitano fu colpito dalla figura che guidava il veicolo; con un binocolo, a fatica, notò infatti che si trattava di un individuo dalle dimensioni enormi...

1. Nel brano si dice che il capitano è colpito dalla mole dell’uomo sulla slitta. Che cosa vuol dire “mole”?

- a. la pancia dell’uomo
- b. la pelliccia che indossa l’uomo
- c. le dimensioni dell’uomo
- d. la borsa che porta l’uomo

2. Perché il capitano Walton dice all’equipaggio di guardare l’uomo sulla slitta?

- a. perché è meravigliato di vedere un uomo così grande
- b. perché è meravigliato di vedere un uomo sul ghiaccio
- c. perché conosce l’uomo sul ghiaccio
- d. perché vuole catturare l’uomo sul ghiaccio

3. Sai dire che cosa fa il capitano Walton con il suo equipaggio in mare?

- a. Stanno facendo una crociera
- b. Cacciano le balene
- c. Sono pirati in cerca di un tesoro
- d. Stanno facendo il giro del mondo

4. A chi si fa riferimento quando si dice “la figura che guidava il veicolo”?

- a. A un signore che guida un’automobile
- b. Al capitano Walton
- c. All’uomo enorme sulla slitta
- d. A una balena



5. Sai dove si trova il mare Antartico?
- Al polo Sud
  - Al polo Nord
  - In India
  - In Italia

**B. STRANE “SCIENZE”: CHE COS’È LA CRIPTOZOOLOGIA?**

Da sempre, l’uomo inventa leggende legate al mondo animale. Gli esseri che noi oggi conosciamo come frutto della fantasia, come l’unicorno, la sirena, il drago, la fenice figuravano perfino nelle enciclopedie del ‘600.

I criptidi sono definiti come animali “nascosti” e si sono rivelati quasi sempre delle “bufale”: è certo, ormai, che il mostro di Loch Ness, i draghi o il Big Foot sono solo miti, anche se in tanti credono di averli visti. Eppure, ci sono animali leggendari che sono stati scoperti in natura e accettati dalla comunità scientifica come il kraken (il calamaro gigante) e l’okapi (un po’ cavallo, un po’ zebra e un po’ giraffa) di cui si avevano notizie solo nei racconti di tribù africane.

- Nel testo si fa riferimento alle “bufale”. Che cosa sono?
  - Un tipo di mozzarella
  - Una notizia falsa
  - Le femmine dei bufali
  - Un animale mitologico
- Nel testo si parla di “criptidi” e di criptozoologia, qual è il significato di criptico?
  - Nascosto, misterioso
  - Grande, imponente
  - Che riguarda la natura
  - Chiaro, semplice
- Cosa sono le sirene che vengono nominate nel brano?
  - Un oggetto che emette forti rumori
  - Un essere di fantasia metà donna e metà pesce
  - Un tipo di squalo
  - Una torta con la crema
- Sai dire dove vive l’okapi?
  - Nelle Alpi italiane
  - Nell’oceano Pacifico
  - Nelle foreste africane
  - L’okapi non esiste
- Conosci il mostro di Loch Ness? Che tipo di mostro è?
  - Un dinosauro alato
  - Un orco della foresta
  - Un drago sputafuoco
  - Un mostro acquatico

### C. IN CIMA AL MONDO

Durante il *lockdown*, Jules, un bambino scozzese di 11 anni, si è allenato quotidianamente per raggiungere un grande obiettivo: scalare il Cervino, un monte delle Alpi alto ben 4.478 m. Il padre, anche lui appassionato scalatore, lo ha aiutato ad organizzare un rigoroso programma di allenamento per migliorare la sua resistenza fisica, la forza e la tecnica.

Dopo mesi di preparazioni, Jules e suo padre Chris sono partiti per la Svizzera e compiere l'impresa. "La notte prima ero talmente teso che ho dormito solo 4 ore", ha raccontato Jules, "all'inizio della scalata mi sentivo esausto, poi però cominciai ad andare e prendi ritmo". Ci sono volute quattro ore di scalata, ma, poi, a Jules sembrava di essere sulla cima del mondo!

1. Perché Jules e suo padre partono per la Svizzera?
  - a. Per andare in vacanza
  - b. Perché in Svizzera la cioccolata è buonissima
  - c. Per scalare il Cervino
  - d. Perché erano stanchi della Scozia
  
2. Nel brano si fa riferimento a una impresa, di cosa si tratta?
  - a. Il viaggio dalla Scozia alla Svizzera
  - b. La scalata del monte Cervino
  - c. Il giro del mondo
  - d. Alzarsi presto al mattino
  
3. Jules ha raccontato che era teso, perché?
  - a. La sera prima lui e il padre avevano litigato
  - b. Si era ricordato di non aver fatto i compiti
  - c. Era emozionato per la scalata
  - d. Aveva dormito male
  
4. Che cosa significa che Jules si è allenato quotidianamente?
  - a. Che si è allenato leggendo un quotidiano
  - b. Che si è allenato tutti i giorni
  - c. Che si è allenato una volta alla settimana
  - d. Che si è allenato in modo leggero
  
5. Sai dire dove si trova la Svizzera?
  - a. Un'isola del mar Mediterraneo
  - b. A nord dell'Europa
  - c. Negli Stati Uniti
  - d. A nord dell'Italia

## D. LA VERDE COLLINA

Quando Gigino arrivò a quella piccola duna in mezzo alla grande pianura, dai ragazzi chiamata “la collina”, non c’era ancora nessuno. Si tuffò nell’erba molle. Cominciò a nuotare, dimenandosi con ampie bracciate, come in un mare in tempesta. “Speriamo che si sbrighino...” pensò disteso. E di sopra: l’aria profumata del cielo. E di sotto: il calore dell’erba schiacciata dal corpo. E di sopra: la guerra tra le nubi a cavallo. E sotto: le formiche della giungla. Aspettare e cantare era dolce e non si accorse dell’arrivo degli altri, dietro le spalle. Francesco, Marcellino e Anguria lo stavano osservando da qualche minuto ridendo sotto i baffi. Lo avevano accerchiato in perfetto silenzio. Di colpo, a un cenno d’intesa, gonfiarono di fiato le guance e tuonarono: “Uhaoo ... Jeeeah ... siamo qui!”

1. Nel brano si dice che gli amici “tuonarono”? Sai dire cosa significa?
  - a. Hanno fischiato forte
  - b. Hanno sussurrato
  - c. Hanno corso molto velocemente
  - d. Hanno gridato forte
  
2. Perché gli amici accerchiano Gigino?
  - a. Gli vogliono fare uno scherzo
  - b. Stanno per abbracciarlo tutti insieme
  - c. Vogliono giocare al girotondo
  - d. Hanno disegnato un cerchio attorno a Gigino
  
3. Nella frase: “Francesco, Marcellino e Anguria lo stavano osservando da qualche minuto”, chi o cosa stanno guardando i tre bambini?
  - a. Le nubi del cielo
  - b. Le formiche
  - c. L’erba del prato
  - d. Gigino
  
4. Nel testo si legge che Gigino “cominciò a nuotare”. Cosa significa?
  - a. Che è andato in piscina
  - b. Che si muove sull’erba del prato da sdraiato
  - c. Che si trova nel mare in tempesta
  - d. Che sta nuotando in un lago di montagna
  
5. Sai cos’è una duna?
  - a. Un’automobile
  - b. Una collinetta di sabbia e vegetazione
  - c. Un prato di montagna
  - d. Uno scoglio vicino al mare

## 2. COME HAI TROVATO QUESTI TESTI?

- 2a.     molto difficili     difficili     normali     facili     molto facili
- 2b.     molto noiosi     noiosi     normali     interessanti     molto interessanti

**3. ORDINA I QUATTRO BRANI CHE HAI LETTO DA QUELLO CHE TI SEMBRA PIÙ FACILE (1) AL PIÙ DIFFICILE (4).**

- \_\_\_ Un avvistamento sul ghiaccio
- \_\_\_ Strane “scienze”: che cos’è la criptozoologia?
- \_\_\_ In cima al mondo
- \_\_\_ La verde collina

**4. SCEGLI DUE DEI BRANI CHE HAI APPENA LETTO E SOTTOLINEA O EVIDENZIA NEI TESTI, QUANDO POSSIBILE, GLI INDIZI CHE TI HANNO AIUTATO A TROVARE LE RISPOSTE.**

**5. QUANDO NON HAI TROVATO LE INFORMAZIONI SCRITTE NEL TESTO, COME HAI FATTO A SCEGLIERE LA RISPOSTA?**

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**6. DOPO AVER RILETTO I DUE TESTI CHE HAI SCELTO ED EVIDENZIATO GLI INDIZI CHE TI HANNO AIUTATO A SCEGLIERE LE RISPOSTE, LEGGI DI NUOVO LE DOMANDE E INDICA CON UN ALTRO COLORE SE CI SONO ALCUNE RISPOSTE CHE VORRESTI CAMBIARE. COSA TI HA FATTO CAMBIARE IDEA?**

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SECOND MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**LEGGI I BRANI E RISPONDI ALLE DOMANDE CHE TROVERAI DURANTE LA LETTURA**

## UNA BAMBINA VENUTA DAL MARE

**Stella vive nella profondità del mare insieme alla madre. Ogni tanto torna sulla terraferma dov'è nata e dove vive il padre.**

Il giorno dopo, appena sveglia, Stella apre il rubinetto della vasca da bagno e quando l'acqua arriva al bordo ci si immerge tutta. Oh, il suo mare com'è lontano e diverso. L'acqua di città ha un sapore dolciastro e quello in cui è immersa è un piccolo mare che sparisce appena si toglie il tappo. Un piccolo mare bianco e provvisorio.

1. Cos'è il piccolo mare al quale si fa riferimento?

- a. Il mare della piccola baia su cui si affaccia l'albergo.
- b. La piscina dell'albergo.
- c. Il mare nel quale Stella vive con la mamma.
- d. La vasca da bagno nella stanza dell'albergo.

Da cosa lo capisci?

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Una cameriera bussava alla porta. La mamma la fa entrare e con stupore vede un grande vassoio con bricchi di latte e cioccolata fumanti, un cestino di brioche, zucchero a volontà e due tazze fiorite. C'è anche una rosa infilata in un piccolo portafiori.

- Grazie – dice la mamma quasi senza parole.

Stella esce dall'acqua tutta bagnata e corre a vedere quel che succede in camera.

- Asciugati, Stella, prima di sederti. Sennò bagni la sedia. Qui si usa così. Abbi pazienza.

E stella sbuffando si avvolge in un morbido telo bianco di spugna. Annaspa un poco ma poi la tazza di cioccolato e le brioscine calde le fanno cambiare umore.

- Buone. Buonissime...

E la rosa? Sembra un corallo, ma è così morbida, profumata...

2. Nel testo si legge "Qui si usa così". Secondo te, il "qui" che cosa indica?

- a. In albergo.
- b. In camera da pranzo.
- c. Sulla terraferma.
- d. Davanti alla cameriera.

Quale indizio ti ha fatto scegliere questa risposta?

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La gioia della colazione dura poco. Il babbo arriva puntuale e sorridente a prenderle per fare assieme un giro in città.

Partono in macchina. Case, case e poi case. Alberi ogni tanto. Macchine, biciclette, motorini, autobus. Quando la macchina si ferma c'è una grande casa davanti a loro e sul portone ci sono masse di bambini che chiacchierano e ridono. Si tirano le spinte, si abbracciano.

- Ti piace questa scuola?

- No.

La signora resta zitta un po'. Poi va verso uno scaffale e ne estrae un grosso volume.

- Guarda – dice a Stella – forse ti piacerebbe conoscere qualche storia che riguarda i tuoi amici.

Davanti a lei Stella vede la foto dei pesci d'argento, azzurri, rossi, verdi, una grande tartaruga la guarda con due occhi grossi e seri.

Il cuore di Stella trema, non era preparata a questo. E quasi le vengono le lacrime agli occhi. Ma una bambina acquatica non deve piangere.

- Domani, se vuoi, potresti provare a venire, per un poco. Vuoi?

- Non lo so – dice appena Stella.

- Sei libera di provare o non provare – le dice solamente suo padre, salutando la signora Direttrice.

**3.** Nel testo si dice che Stella “non era preparata a questo”. Secondo te, a che cosa si riferisce la parola “questo”?

- a. Al fatto di incontrare una anziana signora.
- b. Al fatto di sfogliare un volume molto grosso.
- c. Al fatto di trovare immagini del suo ambiente abituale di vita.
- d. All'aver osservato una tartaruga con occhi grossi che la spaventa.

**4.** Spiega quali parole del testo ti hanno aiutato a rispondere alla domanda n. 3.

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5. Secondo a te, perché a Stella vengono le lacrime agli occhi? Cosa te lo fa capire?

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6. Nel testo si parla degli amici di Stella, sai dire a chi sono?

- a. I pesci e le creature marine che vede nel libro.
- b. I bambini che chiacchierano e ridono.
- c. Gli altri bambini che vivono sott'acqua con Stella.
- d. Le cameriere che lavorano all'albergo.

7. La signora chiede a Stella se vuole tornare in un posto. Secondo te, di che posto si tratta?

- a. L'albergo.
- b. La terraferma.
- c. Una scuola.
- d. Una biblioteca.

8. Quali parole ti hanno aiutato a rispondere alla domanda n. 7?

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**IMPRESSIONI DI LETTURA**

Dopo aver letto tutta la storia, ti sei fatto l'idea che Stella torni volentieri sulla terraferma?

Perché?

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## IL MIMETISMO. L'ARTE DI NASCONDERSI

In natura, tanti animali adottano un trucco per non finire in pasto ai predatori: cercano di sembrare qualcos'altro. Si chiama mimetismo.

Ci sono due tipi di mimetismo: in un caso gli animali cercano di confondersi con l'ambiente, nell'altro imitano altri animali per sembrare più pericolosi di quel che in realtà sono.

Così parecchi pesci hanno il ventre chiaro e il dorso scuro: i predatori che li osservano dal basso li confondono con il cielo e quelli che arrivano dall'altro non li distinguono dal fondo scuro del mare.

**1.** In questo modo, questi pesci diventano:

- a. Confusi e disorientati;
- b. Scuri come il fondo del mare;
- c. Invisibili ai predatori;
- d. pericolosi.

Le razze e le mante hanno il colore della sabbia, dove amano seppellirsi, alcuni gechi hanno code a forma di foglie, molti insetti hanno le forme e i colori delle piante su cui vivono, come l'insetto stecco che sembra un ramoscello.

**2.** Allora, si può dire che tutti questi animali:

- a. Diventano scuri come il fondo del mare;
- b. Si nascondono sugli alberi e si seppelliscono nella sabbia;
- c. Diventano pericolosi;
- d. Diventano invisibili.

I campioni di questo mimetismo sono il camaleonte e la seppia che cambiano molto velocemente colore.

**3.** In quali momenti seppie e camaleonti potrebbero cambiare velocemente colore? Prova a immaginare cosa potrebbe succedere prima e dopo che cambino colore.

Scrivilo qui sotto.

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Ma fra gli insetti c'è anche il secondo tipo di mimetismo. Ad esempio, alcune specie di mosche innocue assumono un aspetto con strisce gialle e nere: così sembrano delle vespe e avvertono i loro predatori "attenti ho un pungiglione!" e quasi sempre funziona.

4. Cosa significa "e quasi sempre funziona"?

- a. Che anche a quelle mosche cresce un pungiglione;
- b. Che quelle mosche tengono lontani i loro predatori.
- c. Che i loro predatori si mimetizzano;
- d. Che quelle mosche diventano innocue.

5. Secondo te, perché camaleonte e seppia vengono definiti "campioni" di mimetismo?

- a. Perché sono gli animali più forti tra quelli che si mimetizzano;
- b. Perché sono tra gli animali più esperti a mimetizzarsi;
- c. Perché ci sono gare di mimetismo e questi animali le vincono sempre;
- d. Perché sono gli animali più grandi tra quelli che si mimetizzano.

6. Rileggi tutto il brano: riesci a trovare **una frase** che riassume meglio che cosa è il mimetismo e il significato dell'intero brano? Scrivila qua sotto.

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7. Dopo aver letto tutto il brano, come potresti completare il titolo?

Il mimetismo. L'arte di nascondersi e

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8. Sottolinea nel brano le informazioni che ti sembrano più importanti.

9. Prova a scrivere un breve riassunto del brano che hai letto. Riguarda le informazioni che hai sottolineato prima; tieni conto anche delle risposte che hai dato alle domande e di altre informazioni del testo.

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**COME HAI TROVATO QUESTI TESTI?**

- a.     molto difficili    difficili    normali    facili             molto facili
- b.     molto noiosi    noiosi    normali    interessanti    molto interessanti

THIRD MEETING

NOME: \_\_\_\_\_

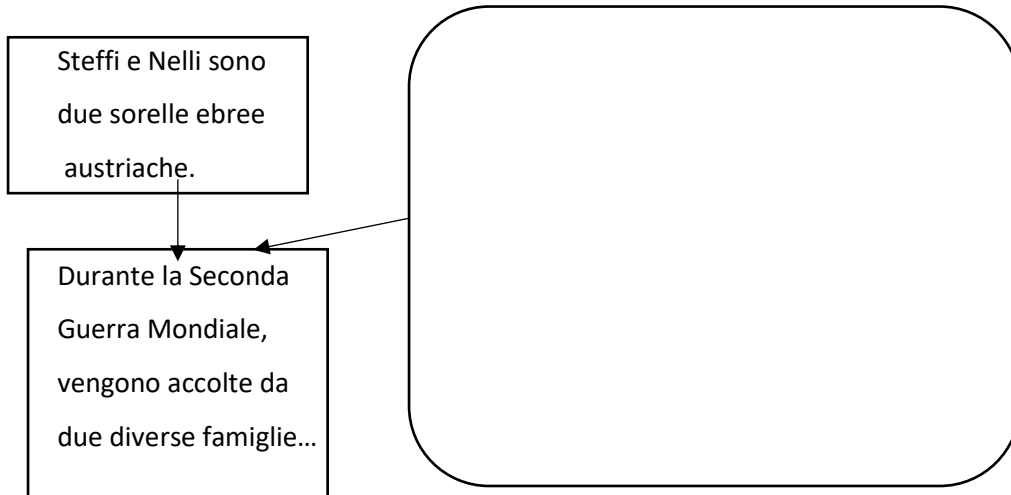
CLASSE: \_\_\_\_\_

**LEGGI I BRANI E RISPONDI ALLE DOMANDE CHE TROVERAI DURANTE LA LETTURA**

**A.** \_\_\_\_\_

**Steffi e Nelli sono due sorelle ebree austriache. Durante la Seconda Guerra Mondiale, vengono accolte da due diverse famiglie che vivono su un'isola in Svezia, al largo di Göteborg.**

**1. Secondo te perché durante la guerra Steffi e Nelli vanno in Svezia a vivere con altre famiglie senza la mamma e il papà?**



Mangiano le bacche direttamente dai cespugli e le loro dita diventano tutte violette di succo. Vera parla e ride. Steffi risponde con le poche parole svedesi che conosce.

**2.** Secondo te, che cosa possono essere le bacche che le protagoniste stanno mangiando?

- a. Prugne
- b. Arance
- c. Banane
- d. More

**3.** Evidenzia nel testo le parole che ti hanno aiutato a trovare la risposta.

**4.** Come mai Steffi conosce solo poche parole in svedese?

- a. Perché a Steffi non piace imparare le lingue
- b. Perché Steffi è in Svezia da poco e sta ancora imparando lo svedese
- c. Perché normalmente i bambini non parlano lo svedese
- d. Perché Vera le sta antipatica e quindi non vuole parlare tanto con lei

La gonna di Steffi s'impiglia in un ramo spinoso. Cerca di staccarla con la mano, ma le spine si sono fissate in profondità, come artigli che non vogliono mollare la presa. Steffi tira. Con un forte rumore la tela si lacera.

Steffi fissa la gonna. Un grosso strappo si è aperto nella stoffa. Lungo i bordi, il tessuto è macchiato di succo di mora. Cosa dirà zia Marta?

Vera ha l'aria spaventata. Solo Nelli continua a mangiare more in tutta calma.

- Devo andare a casa – dice Steffi a Vera, che annuisce con aria comprensiva.

5. Perché Steffi dice che deve andare a casa?

- a. È tardi e zia Marta la aspetta per cena
- b. Si è stancata di Vera e Nelli
- c. Vuole provare a rimediare alle macchie e allo strappo sulla gonna
- d. Ha fatto indigestione di more

- Cucire – dice mostrando che lo strappo può essere rammendato.

Fanno un pezzo insieme. Poi Vera imbecca un sentierino che a malapena si intravede. Agita la mano, sorride e scompare.

Steffi decide di andare dritto a casa. Magari zia Marta non c'è, e anche se è in casa forse Steffi farà in tempo a salire di nascosto e cambiarsi. Zia Marta senz'altro non si ricorderà quale vestito aveva tirato fuori quella mattina. Poi Steffi potrà infilarlo nello zaino e portarlo il giorno dopo da zia Alma, che saprà di certo come rammendarlo e togliere le macchie. Zia Marta non verrà a sapere niente.

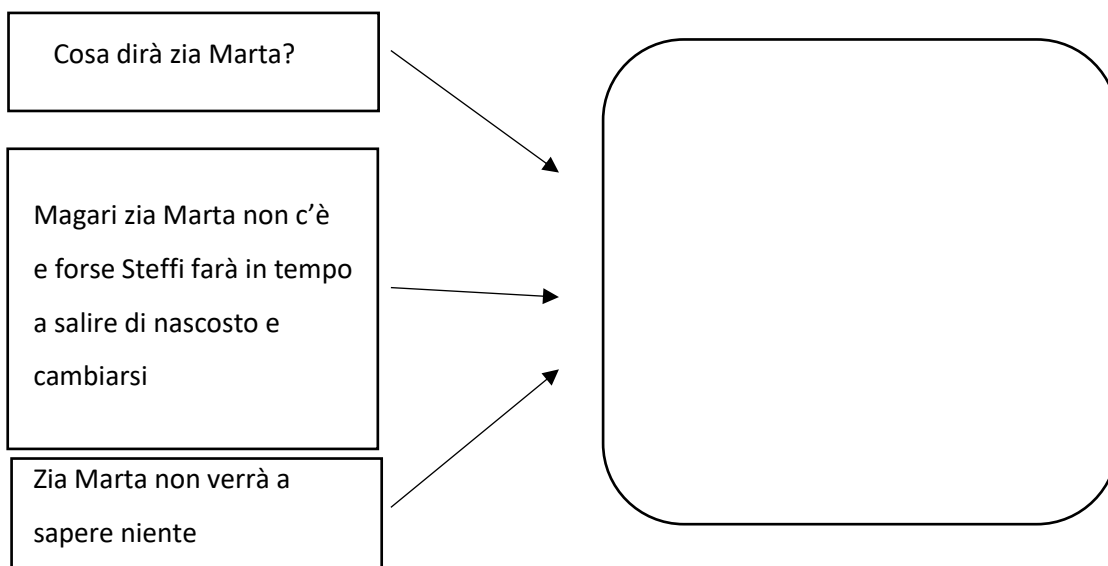
6. Conosci la parola rammendare? Riesci a trovare un suo sinonimo nel testo?

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7. Come pensi si senta Steffi dopo aver strappato e macchiato la gonna?

- a. Non le importa: quella gonna non le piaceva nemmeno
- b. È tranquilla: lei è brava a cucire e potrà aggiustarla facilmente
- c. È preoccupata: ha paura di come reagirà zia Marta
- d. È felice: ora la sua gonna è più bella con le macchie viola

8. Cosa riesci intuire sul carattere di zia Marta? Cosa pensa Steffi di zia Marta?



9. Scrivi un titolo per questa storia.

B. \_\_\_\_\_

Durante l'età ellenistica sorsero centinaia di città: sembra che solo Alessandro Magno ne abbia fondate 70 per dare una sistemazione ai soldati alla fine della carriera militare e ai coloni greci e macedoni. Queste città presentavano tutti i luoghi tipici delle città greche: l'agorà, il teatro, i templi, lo stadio.

Alessandria d'Egitto, che il giovane re fece costruire sul Delta del Nilo, divenne la città più grande del Mediterraneo, con oltre mezzo milione di abitanti.

1. In base a quello che hai letto nel testo, secondo te chi è il giovane re?

\_\_\_\_\_

Davanti alla città sorgeva l'isola di Faro, su cui venne costruito l'altissimo edificio chiamato appunto "faro", il primo della storia, una delle sette meraviglie del mondo. Di notte sulla cima di questa torre veniva acceso il fuoco che forniva luce ai naviganti.

2. Perché il testo dice che il faro era "il primo della storia"?

- a. Perché prima nell'isola di Faro non erano mai stati costruiti edifici con una simile altezza e con un fuoco sulla cima.
- b. Perché quell'edificio dell'isola di Faro era il primo inventato e costruito allo scopo di permettere la navigazione notturna.
- c. Perché in seguito sull'isola ne furono costruiti molti altri.
- d. Perché nessuno prima di allora aveva costruito una torre così alta da essere considerata tra le sette meraviglie del mondo.

3. Da quanto hai letto, dove pensi che sia stata costruita la città di Alessandria?

- a. Su una montagna molto alta.
- b. Su una grande pianura.
- c. Vicino al mare, o sul mare.
- d. Vicina ad altre 69 città fondate da Alessandro.

Ad Alessandria venne costruito un edificio, il Museo, con una grande Biblioteca. Nel Museo erano ospitati i più illustri studiosi e scienziati del tempo. Per i loro studi essi avevano a disposizione un osservatorio astronomico, un giardino zoologico, un giardino botanico, una sala anatomica, laboratori per il calcolo... La Biblioteca invece raccoglieva centinaia di migliaia di opere appartenenti a tutte le

civiltà del mondo antico; oltre alla raccolta, veniva curata anche la trascrizione in più copie dei testi per favorirne la diffusione. Di come apparisse la città però abbiamo solo fonti scritte: infatti il luogo dove sorgeva è sprofondato sotto il livello del mare e oggi si possono vedere solo pochi resti archeologici.

**4.** Cosa si studia nelle stanze del Museo?

Osservatorio astronomico: \_\_\_\_\_

Giardino zoologico: \_\_\_\_\_

Giardino botanico: \_\_\_\_\_

Sala anatomica: \_\_\_\_\_

Laboratori per il calcolo: \_\_\_\_\_

Biblioteca: \_\_\_\_\_

**5.** Se tu dovessi fare un elenco delle ragioni per cui Alessandria d’Egitto era importante, quali informazioni potresti ritenere NON indispensabili tra le seguenti? Scegline 2.

- a. Alessandro aveva fondato 70 città per dare una sistemazione ai coloni
- b. Alessandria d’Egitto è stata fondata da Alessandro, un giovane re
- c. Alessandria era una delle città più grandi dell’antichità
- d. Alessandria sorgeva sul mare e vicino a un fiume
- e. L’edificio costruito nell’isola di Faro era altissimo e ha preso il nome dell’isola
- f. Vicino ad Alessandria c’era il primo faro della storia, per fare luce nel mare di notte
- g. Il Museo e la Biblioteca di Alessandria erano luoghi per lo studio con molti strumenti e testi
- h. I resti archeologici di Alessandria d’Egitto sono pochi

**6.** Prova a scrivere un breve riassunto del brano che hai letto. Scegli le informazioni che ti sembrano più importanti; tieni conto delle risposte che hai dato alle domande e di altre informazioni del testo.

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**7.** Scrivi un titolo per questo brano.

### COME HAI TROVATO QUESTI TESTI?

- a.      molto difficili    difficili    normali    facili            molto facili
- b.      molto noiosi    noiosi    normali    interessanti    molto interessanti

### FOURTH MEETING

NOME: \_\_\_\_\_

CLASSE: \_\_\_\_\_

**LEGGI I SEGUENTI BRANI E RISPONDI ALLE DOMANDE. SOTTOLINEA NEL TESTO GLI INDIZI CHE TI HANNO AIUTATO A TROVARE LA RISPOSTA O DESCRIVI IL RAGIONAMENTO CHE HAI FATTO PER CAPIRE QUALE ERA LA RISPOSTA CORRETTA.**

#### **A. COME HO UCCISO PLUTONE: MIKE BROWN**

La scoperta di Plutone avvenne nel 1930 e non fu per niente facile perché gli astronomi si aspettavano che il nono pianeta fosse un gigante gassoso e, invece, scoprirono un pianeta molto piccolo. Dopo più di 60 anni, Mike Brown, un astronomo statunitense, era determinato a trovare un decimo pianeta da inserire nel Sistema Solare. Nel gennaio del 2005, Mike finalmente scoprì Eris, un corpo celeste dalle dimensioni e caratteristiche simili a quelle di Plutone, ma ancora più distante dal Sole. Tra gli scienziati, allora, è iniziato un importante dibattito: se anche Eris verrà riconosciuto come pianeta, dove si potrà tracciare il confine del Sistema Solare? Fu così che, nel 2006, Nettuno venne riconosciuto come l'ottavo e ultimo pianeta del Sistema e, quindi, Plutone ed Eris vennero classificati come pianeti nani.

1. Sai dire cos'è il Sistema Solare?
  - a. Un insieme di leggi e regole che sono valide solo sul Sole
  - b. Un metodo per raccogliere l'energia solare
  - c. Un metodo per studiare il Sole
  - d. Un gruppo di pianeti e corpi celesti che ruotano attorno al Sole
  
2. Sai dire chi è un astronomo?
  - a. Uno scienziato che studia i pianeti, stelle e tutto ciò che c'è nello spazio
  - b. Uno scienziato che studia la Terra e dei suoi abitanti
  - c. Un essere umano che viaggia nello spazio
  - d. Uno scienziato che studia i segni zodiacali
  
3. Perché, nel 1930, fu difficile scoprire Plutone?
  - a. Perché gli astronomi non avevano un buon telescopio
  - b. Perché era un gigante gassoso
  - c. Perché era sempre nascosto dietro a un altro pianeta
  - d. Perché era molto più piccolo di quanto pensavano gli astronomi

4. Perché il titolo suggerisce che Mike Brown ha *ucciso* Plutone?
- Perché Mike Brown ha davvero ucciso Plutone
  - Perché come conseguenza della scoperta di Mike Brown, Plutone è stato considerato un pianeta nano
  - Perché Mike Brown ha sconfitto Plutone in una guerra stellare
  - Perché dopo la scoperta di Mike Brown, Plutone è sparito dallo spazio
5. Nel testo si parla di un “nono” pianeta. Qual era?
- Eris
  - Nettuno
  - Plutone
  - Saturno

### B. UN MITO: IL FILO DI ARIANNA

Ogni nove anni, nell’isola di Creta, gli abitanti dovevano sacrificare 7 fanciulli e 7 fanciulle al Minotauro, un mostro che era per metà uomo e per metà toro. Egli viveva in un palazzo complicatissimo, il Labirinto: nessuno che vi era entrato, era mai riuscito a trovare l’uscita. Il Minotauro aveva un patto con gli abitanti dell’isola: chi fosse riuscito ad ucciderlo, avrebbe messo fine ai sacrifici. Un anno, un giovane di nome Teseo si offrì tra le vittime per poter affrontare il mostro, ma non sapeva come uscire dal Labirinto. La figlia del re di Creta, Arianna, ebbe un’idea molto astuta per aiutarlo: gli diede un gomitolo da srotolare all’interno del palazzo che gli avrebbe fatto ritrovare la strada del ritorno per poter uscire. Teseo affrontò con coraggio il Minotauro e lo sconfisse...

- Quali sono le caratteristiche del Labirinto?
  - chi entra nel Labirinto non ne esce
  - è molto grande
  - è il luogo dei sacrifici
  - è il palazzo reale
- Come pensi che prosegue la storia?
  - Gli abitanti di Creta si arrabbiano con Teseo per aver sconfitto il Minotauro
  - Teseo decide di restare nel Labirinto e sostituire il Minotauro
  - Arianna inganna Teseo e toglie il filo intrappolandolo nel Labirinto
  - Teseo segue il filo che gli ha dato Arianna e riesce ad uscire dal Labirinto
- Chi è Arianna?
  - Una delle fanciulle che devono essere sacrificate al Minotauro
  - La figlia del re di Creta
  - La figlia del Minotauro
  - Una fanciulla che vende gomitoli
- Sai dire cos’è un mito?
  - Una persona fortissima
  - Una storia realmente accaduta
  - Un racconto antico di fantasia
  - Un racconto che non ha una fine



5. Sai dire perché il mito si intitola “Il filo di Arianna”?
- Perché il filo del gomito di Arianna fa trovare l’uscita del Labirinto a Teseo
  - Perché Arianna era molto brava a tessere
  - Perché Teseo usa il filo come arma per sconfiggere il Minotauro
  - Perché i fanciulli erano in fila per poter entrare nel Labirinto
6. Quando possono finire i sacrifici?
- Dopo nove anni
  - Quando il Minotauro si è stancato dei sacrifici
  - Quando Arianna ha sconfitto il Minotauro
  - Quando Teseo sconfigge il Minotauro

### **C. SI PUÒ FAR MUSICA CON TUTTO... BASTA SAPER SUONARE!**

Qualsiasi oggetto può diventare uno strumento, basta capire come “classificarlo”: a corda, a percussione o a fiato? Anche la natura può sorprenderci creando musica.

A Zadar, in Croazia, hanno costruito il “Sea Organ”, una specie di organo che funziona con le onde del mare e diffonde la musica per tutto il lungomare. Le arpe eoliche, invece, catturano il vento, che ne fa vibrare le corde: esistono fin dall’antica Grecia e ce ne è una particolare in Sud Carolina (USA) lunga quasi tre metri. Infine, nelle caverne di Luray, in Virginia (USA), c’è il Grande Organo delle stalattiti. Durante una visita alla grotta, una guida percosse una stalattite con un martelletto, per farne sentire il suono. Uno dei visitatori, l’ingegnere Sprinkel, ebbe così un’idea. Egli ha costruito piccoli tubi di gomma che colpiscono le stalattiti e generano note diverse.

- Nella frase “ce ne è una particolare”, a cosa fa riferimento “ne”?
    - Al Sea Organ
    - A una delle caverne Luray
    - All’arpa eolica in Sud Carolina
    - A una stalattite
- Conosci la parola “eoliche”? Secondo te, qual è il suo significato?
    - Che riguarda il vento
    - Che riguarda l’Antica Grecia
    - Che riguarda Eolo, uno dei Sette Nani
    - Che riguarda il mare
- Qual è la caratteristica delle stalattiti?
    - Sono sassi piccoli e rotondi di colori diversi
    - Sono rocce a forma di stella
    - Sono colonne rocciose che scendono dal soffitto delle grotte
    - Sono rocce bagnate dal latte e che diventano bianche
- Secondo te, le stalattiti sono simili a uno strumento a fiato, a corda o a percussione?
    - Fiato
    - Corda
    - Percussione
    - Nessuna delle precedenti

5. Che cosa fa vibrare le corde dell'arpa eolica?
- a. Il vento
  - b. Il martelletto
  - c. Il piatto del musicista
  - d. L'ingegnere Sprinkel

#### **D. WARRUWI, LA PICCOLA ISOLA DOVE SI PARLANO 9 LINGUE**

Su un isolotto dell'Oceano Pacifico, vicino all'Australia, si trova Warruwi, un piccolo villaggio dove si parlano ben 9 lingue! Anche in Italia, a distanza di pochi chilometri si possono trovare dialetti molto diversi, ma sull'isola del Pacifico, la questione è un po' più profonda.

All'origine di questa particolarità c'è un forte senso di appartenenza nutrito da ciascun abitante di Warruwi nei confronti del proprio clan. Ogni gruppo, infatti, nel corso dei secoli ha adottato un proprio linguaggio e comunica solo con quello. Non farlo sarebbe una specie di "tradimento"!

Per questo motivo, sebbene gli abitanti di Warruwi comprendano tutte o alcune delle lingue degli altri clan, in una conversazione tra due membri di clan differente, ciascun parlante parlerà con il proprio idioma. Questo particolare fenomeno si chiama multilinguismo recettivo.

1. Conosci la parola "idioma"? Sapresti dire cosa significa?
  - a. È un sinonimo di lingua
  - b. È un sinonimo di identico
  - c. È un sinonimo di isola
  - d. È un sinonimo di nazione
  
2. Che cosa vuol dire "multilinguismo recettivo"?
  - a. Le persone conoscono e parlano 9 lingue diverse
  - b. Le persone possono parlare e capirsi usando un walkie-talkie
  - c. Le persone possono capirsi anche se ognuno usa una lingua diversa
  - d. Le persone possono parlarsi anche se appartengono a due clan diversi
  
3. Che cosa viene considerato "una specie di tradimento" a Warruwi?
  - a. Abbandonare il proprio clan
  - b. Parlare la lingua di un altro clan
  - c. Conversare con membri di altri clan
  - d. Lasciare l'isola
  
4. Cos'è un clan?
  - a. Un gruppo di clown che lavorano al circo del paese
  - b. Un gruppo di famiglie unite da una discendenza in comune
  - c. Un gruppo di sconosciuti che parlano la stessa lingua
  - d. Uno dei nomi che vengono dati agli abitanti di Warruwi
  
5. Ogni abitante di Warruwi parla le lingue di tutti i clan?
  - a. Sì, a scuola devono imparare tutte nove le lingue
  - b. No, ognuno sceglie quattro lingue da imparare
  - c. No, infatti i membri di clan diversi non si parlano mai
  - d. No, ognuno parla la lingua del suo clan, ma può capire anche le altre

**2. COME HAI TROVATO QUESTI TESTI?**

2a.  molto difficili  difficili  normali  facili  molto facili

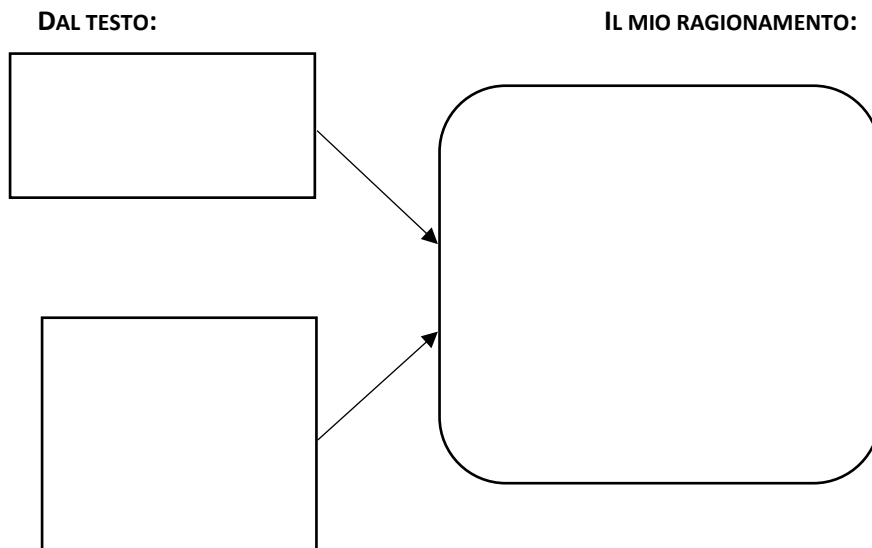
2b.  molto noiosi  noiosi  normali  interessanti  molto interessanti

**3. ORDINA I QUATTRO BRANI CHE HAI LETTO DA QUELLO CHE TI SEMBRA PIÙ FACILE (1) AL PIÙ DIFFICILE (4).**

- \_\_\_ Come ho *ucciso* Plutone: Mike Brown
- \_\_\_ Un mito: Il filo di Arianna
- \_\_\_ Si può far musica con tutto... basta saper suonare
- \_\_\_ Warruwi, la piccola isola dove si parlano 9 lingue

**4. COLLEGARE LE INFORMAZIONI. INSERISCI NEI RIQUADRI A SINISTRA LE INFORMAZIONI CHE HAI TROVATO NEL TESTO. NELLO SPAZIO A DESTRA, DESCRIVI IL RAGIONAMENTO CHE TI HA AIUTATO A DARE LA RISPOSTA ALLA DOMANDA.**

- Perché il titolo suggerisce che Mike Brown ha *ucciso* Plutone?



**5. DOPO AVER RILETTO I DUE TESTI CHE HAI SCELTO ED EVIDENZIATO GLI INDIZI CHE TI HANNO AIUTATO A SCEGLIERE LE RISPOSTE, LEGGI DI NUOVO LE DOMANDE E INDICA CON UN ALTRO COLORE SE CI SONO ALCUNE RISPOSTE CHE VORRESTI CAMBIARE. COSA TI HA FATTO CAMBIARE IDEA?**

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