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*The Additive Effects of Bilingualism on Third or  
Additional Language Acquisition: the Role of  
Metalinguistic Awareness*

**Coordinatore del dottorato:**

Prof. Carmine Pinto

**Candidata:**

Francesca D'Angelo

**Tutor:**

Prof.ssa Linda Barone

Prof.ssa Fabiana Rosi

Prof.ssa Antonella Sorace

**Matricola:**

**8801300009**

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## **Abstract**

### **The Bilingual Effects in Third (or additional) Language Acquisition: the Role of Metalinguistic Awareness**

The research conducted on the general effects of bilingualism on cognitive and metalinguistic development can be divided into two different phases demonstrating, respectively, its negative and positive effects. The “additive effects” phase started in 1962, when the most influential work on bilingualism was published. Peal and Lambert’s contribution (1962), *The Relation of Bilingualism to Intelligence*, paved the way to a number of important studies questioning the validity of previous research focused on bilingual disadvantages. Currently, the general view shared by academics in different fields including applied linguistics, psycholinguistics and foreign language education is that bilingualism fosters cognitive development and metalinguistic abilities.

The last decade has witnessed a considerable increase in interest in the bilingual advantage in third language acquisition (TLA). In the past, TLA was generally included either in the field of bilingualism or in the field of second language acquisition (SLA). Nowadays, despite the similarities between TLA and SLA, a growing number of researchers claim that second and third (or additional) language acquisition need to be considered as two distinct processes for a number of both linguistic and cognitive reasons. For instance, it has been argued that while in second language acquisition there are only two possible routes to follow, i.e. simultaneous and consecutive acquisition, in TLA the number of routes increases. Moreover, among the many other factors to take into account in TLA studies, the cognitive and linguistic profile of the language learners is considerably different as in SLA they are monolinguals at the initial state of language learning whereas in TLA they are already bilinguals.

The positive effects of bilingualism in TLA have related the advantages evident in bilingual learners to the influence of bilingualism on cognitive

development and, specifically, metalinguistic awareness (MLA) (Bialystok & Barac, 2012, Cenoz 2003, Cenoz & Genesee 1998, Cummins 1978, Jaensch 2009, Jessner 2006). Although it has been acknowledged that MLA is strongly affected by literacy and grammar related activities, only a few studies have attended to the context and method of acquisition of the bilingual learners' L2 to account for the positive effects shown in TLA (e.g. Cenoz 2013, Sanz 2000, Thomas 1988).

The different context of acquisition is particularly relevant for the purpose of the current research since it allows to distinguish between two types of bilingualism: i.e. primary and secondary. Hoffman (1991), referring to the definitions provided by Houston (1972), states that people who become bilingual through systematic instruction are defined as secondary bilinguals whereas who acquires the languages in an uninstructed way, from people around them, can be called natural or primary bilingual. This same dichotomy is defined by Adler (1977) as "achieved/ ascribed bilingualism".

The aim of the present study is to examine whether bilinguals' level of both implicit and explicit MLA in L2 is related to their attainment in third or additional language acquisition over and above their proficiency in L2, amount of formal instruction received, context of acquisition, and age of acquisition of L2. To demonstrate this hypothesis empirically, it was necessary to investigate the correlation between implicit and explicit MLA on one hand, and ability to learn an additional language at the initial stage on the other.

42 adult bilinguals, aged between 20 and 70, with German as an L2, with different levels of instruction received, and different age of acquisition of the L2, were assessed in their ability to learn an additional language at the initial stage through an artificial language task (Llama-F, Meara 2005). The study was conducted with participants living in Scotland and England. The majority of them had English as a first Language. 9 participants out of

42 had an L1 different from English: i.e. Italian, French, Chinese, Polish, Hungarian, Slovenian, Spanish, Dutch.

The level of implicit MLA was assessed with a Self-Paced Reading (SPR) task focused on sensitivity to case and agreement ambiguity in German L2 (Gerth et al., 2017). The level of explicit MLA was assessed with a task of Grammatical Knowledge (Roehr, 2008b). The influence of the other background variables, i.e. number of languages mastered, proficiency, age of acquisition of each language etc., was recorded with a Language Experience and Proficiency Questionnaire (Leap-Q: Blumenfeld & Kaushanskaya, 2007).

Correlations, ANOVAs, and multiple regression analyses were conducted to explore the relationship between performance in the artificial language task and various potential predictors: years of instruction, explicit MLA, implicit MLA, overall proficiency, age of acquisition, and level of instruction in German L2. In particular, the results indicate that the level of explicit MLA has a significant positive regression weight ( $\beta = .660$ ,  $t = 4,461$ ,  $p < .000$ ), suggesting that bilinguals with better explicit MLA skills are also expected to perform better in TLA, after controlling for the other variables in the model: i.e. level of proficiency and amount of formal instruction received in German L2.

A one-way between groups ANOVA with post-hoc tests was run to explore the impact of different sub-levels of explicit MLA, as measured by the explicit MLA test in German L2, on the performance in the Llama-F. Participants' scores in the explicit MLA test were grouped according to their ability to underline, correct, and explain the grammatical mistake. There was a statistically significant difference at the  $p < .05$  level in Llama-F scores for the first and third group [ $F(2,39) = 4.7$ ,  $p = .01$ ], suggesting that participants with higher levels of explicit MLA in an L2 (i.e. the ones who were also able to provide a grammatical explanation for the detected mistake) performed significantly better in subsequent language learning. The effect size, calculated using eta squared, was .19 which in Cohen's

terms (1988) is classified as a large effect ( $>.14$ ). Post-hoc comparison using the Tukey HSD test indicated that the mean difference for group 1 and 3 is 29.54 (Sig: .01).

A Spearman's Rank Order Correlation analysis was performed to assess the relationship between the level of implicit MLA as measured by the SPR task and language attainment, as measured by an artificial language task (Llama-F). The results show a non-significant relationship between the two variables [ $r = .209$ , sig .184] suggesting that the level of implicit MLA developed in a second language cannot be considered as a predictor for a better performance in TLA.

The main findings suggest that explicit MLA also developed in an L2 is the most important factor which assists and enhances the process of learning additional languages over and above implicit MLA, level of bilingualism (i.e. proficiency in an L2), age of acquisition of L2. Moreover, the study also demonstrates that bilinguals performed better in the artificial language task of grammatical inference the more languages they knew (specifically, more than three) and the more explicit their level of grammatical MLA was. The influence of the other aforementioned mediating factors such as participants' age and age of acquisition of German L2 was also controlled through partial correlation analyses. The results indicate that neither of them significantly affected the strength of the relationship between explicit MLA and performance in Llama-F.

Thus, the findings allow to confirm the main hypothesis of the study: that is, in order to benefit from the advantages of bilingualism when learning additional languages, it is necessary to develop explicit MLA also in an L2, in addition to other abilities gained through the experience of language learning, specifically, broader linguistic repertoire and better learning strategies.

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# **The Additive Effects of Bilingualism in Third or Additional Language Acquisition: the Role of Metalinguistic Awareness**

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## Introduction

Starting from the pioneering work of Peal and Lambert (1962), the benefits of bilingualism, in a number of different areas, have been supported by many studies in the last few decades. However, the study of how bilinguals can master and learn additional languages to different degrees has only recently established itself as an area of independent research. Indeed, the acknowledgement of bilingualism as the default state of language competence for over 50% of the world population prompted researchers to develop an adequate theory of language acquisition. Third Language Acquisition (TLA) denotes “the acquisition of a language that is different from the first” (Cenoz, 2013) as well as the area of research of third (or additional) language acquisition itself. This latter brings together two fields of study that have traditionally overlooked each other, that is, second language acquisition and bilingualism.

The common belief among lay speakers and the anecdotal evidence that bilinguals are facilitated in learning additional learning is also supported by experimental findings. In particular, the advantages of bilingualism in TLA have been generally explained in terms of higher levels of metalinguistic awareness (MLA), broader linguistic repertoire, and better learning strategies. However, most of the studies compare the performance of bilinguals with those of monolinguals. In line with research highlighting the need for a different methodological approach (e.g. Grosjean, 2006), due to the different cognitive and linguistic background of second and third language learners, the present thesis examines the performance in an L3 of bilinguals with different degrees of formal instruction and MLA developed in L2. Indeed, following Cummins’ (1981) interdependency hypothesis, if instruction in one language is effective in promoting proficiency in this language, the transfer of this proficiency will occur, provided there is enough exposure and motivation.

Moreover, on the basis of the current present Ph.D. study there is the underlying assumption, propounded by Bialystok, that:

“it is because metalinguistic aspects of language are not necessarily specific to particular languages that their discovery may be influenced by the mastery of two languages, and it is because metalinguistic awareness is consequential for other aspects of cognition, both linguistic and non-linguistic, that its study is important (Bialystok, 1991: 113)”.

In order to investigate whether metalinguistic awareness is a determining factor which helps bilinguals when dealing with third or additional languages in a formal setting, this study examines the relationship between adult bilinguals' implicit and explicit metalinguistic awareness and language learning experience on one hand, and their additional language learning ability on the other.

The first aim is to investigate the hypothesis that there is a relationship between bilinguals' explicit and implicit metalinguistic awareness also developed in a second language and the level of attainment in an artificial language task, assessing the ability to learn an additional language. Previous studies in the field indicate that metalinguistic awareness is a factor that boosts the process of language learning. However, researchers usually focus on MLA developed in a first language or in the target language, where target language attainment is considered. Additionally, previous research does not usually separate the effects of implicit and explicit MLA. The current study considers the impact of both implicit and explicit MLA developed in an L2 when learning additional languages in a formal environment reproduced by an artificial language task.

The second aim is to investigate the hypothesis that the more languages bilinguals master, the more successful they are at learning another language. A logical progression from previous research shows that people with multiple language skills are also better language learners due to a number of factors such as broader linguistic repertoire, better and wider language learning strategies, i. e. the type of approach adopted towards languages, and a higher level of MLA. Specifically, what is assessed in this study is the relationship between the level of attainment in the initial

stages of learning another language, where associative memory and grammatical inference are involved, and previous knowledge of three or more languages with different levels of proficiency.

The third aim is to consider the role of the amount of formal instruction received in a second language, level of proficiency, and exposure to the language as recorded by the language background questionnaire on one hand, and attainment in the artificial language learning on the other. This is to investigate the hypothesis that bilinguals' linguistic knowledge, (considered as explicit MLA) in an L2 brings about bilinguals' performance in an L3 over and above their language experience and proficiency in an L2.

The fourth aim is to investigate the hypothesis that a higher level of explicit MLA in an L2 relates with a longer time of exposure to the language in a formal environment. In other words, more years of formal instruction and language learning experience received are expected to correlate with higher levels of MLA in the language under investigation.

Fifth, the hypothesis that, when MLA is split into three levels of explicitness (i.e. identify, correct, and explain the mistake) bilinguals also showing the ability to verbalise the mistake and account for a metalinguistic explanation perform better in the artificial language task compared to those who are only able to identify and/or correct the mistake.

In order to probe the aforementioned research hypotheses, I use a psycholinguistic, quantitative research design. In particular, to assess whether a higher level of metalinguistic awareness developed in an L2 represents a determining factor which assists in learning additional languages, I evaluate a group of 42 bilinguals with different levels of implicit and explicit MLA recorded in L2 and their language learning ability, measured through an artificial language task.



The thesis is organised as follows. In chapter 1, the elusiveness and complexity of the main phenomenon under investigation, i.e. bilingualism, is considered. Indeed, instead of propounding the best, most complete, satisfactory and effective definition, it reviews a number of definitions focusing on different aspects of bilingualism in order to discuss some of its most relevant factors and provide a broader understanding of the concept as well as of the different dimensions characterising it.

Chapter 2 focuses on the so-called "bilingual advantage", providing a historical, cognitive, and linguistic insight into the costs and benefits of bilingualism. To explain the bilingual paradox, which sees bilinguals advantaged in non-verbal tasks and disadvantaged in tasks involving verbal skills, the most important contribution from the literature focused on both verbal and non-verbal domains are examined. Specifically, it investigates the effects of the bilingual experience on cognitive skills involved in language learning processes such as speed of processing, Working Memory (WM), Theory of Mind (ToM), and Executive Functions (EFs). Besides, it also analyses how differentiating between analysis of representation and control of attention leads to different outcomes in linguistic and non-linguistic tasks.

Chapter 3 introduces the area of research of TLA, highlighting the most striking differences with second language acquisition research according to which it should be considered as a separate field of study. The two main domains that have received the most attention in the studies on TLA are then investigated. First, the difference between monolingual and bilingual speech processing, reviewing the most influential models advanced by academics in the last decades. Second, the cross-linguistic influence on TLA, where the three most important models of language transfer, advanced in the field of formal linguistics, are compared and contrasted: i.e. the Cumulative Enhancement Model (CEM; Flynn et al., 2004), the Typological Primacy Model (TPM; Rothman, 2011), and the L2 Status Factor (L2SF; Bardel & Falk, 2007).

Chapter 4 addresses the relationship between previous formal language learning and development of MLA, that is the crucial factor under investigation in the present thesis. First, a historical perspective of the attitude towards bilingualism in language learning contexts is provided. Second, the most influential works in the literature showing the bilingual advantage in TLA are reviewed, in order to identify the main factors responsible for bilinguals' better performance. Third, an insight into implicit and explicit learning is offered, since they lead to the development of different types of knowledge, i.e. implicit and explicit. Fourth, the complex, non-unitary nature of MLA is portrayed, i.e. implicit/explicit; cognitive/linguistic. Finally, the role of MLA and other mediating factors on TLA, that is level of bilingualism, literacy, the age of acquisition in L2, language use etc. is considered.

Chapter 5 introduces the methodology of the study. First of all, the independent and dependent variables of the experiment are presented. Second, the hypotheses and thesis are propounded. Third, the rationale and test design are defined, including materials and procedure. Finally, information about participants' individual features, such as age, gender, number of languages mastered etc. is provided.

Chapter 6 describes the preliminary phase to the analysis, that is triggering and coding the data, as well as the statistical techniques employed for the different analyses carried out to answer to the different research questions of the study. In particular, among the most important analyses techniques, linear multiple regressions, correlations, and, ANOVAs are used.

In chapter 7, a discussion of the results for the propounded hypotheses is given. Following, an overall conclusion of the study is provided, including aspects concerning significance, limitations, and suggestions for further research.

## **Chapter I: Bilingualism and “Bilingualisms”: Definitions and disambiguation of fundamental concepts**

### **1.1 Introduction**

What makes the concept of bilingualism so difficult to define? Why are there so many different definitions of bilingualism, each of them lacking information on specific factors to take into account when describing the phenomenon? The aim of the present chapter is not to attempt to find the best, most complete, satisfactory and effective definition of bilingualism. Instead, considering the broad and complex nature of the phenomenon, a number of definitions focusing on different aspects of bilingualism will be reviewed in order to discuss some of its most relevant factors and provide a broader understanding of the concept as well as of the different dimensions characterizing it.

### **1.2 The elusiveness of the concept of Bilingualism**

Nowadays, considering the existence of almost 7000 languages and about 200 countries, there is ample support to claim that bilingualism is a widespread phenomenon all over the world (Lewis, 2009). Nonetheless, it is important to highlight that statistics may mislead, especially when there is no proper distinction between societies and individuals. Indeed, multilingual countries might also have monolingual individual citizens. Similarly, countries which are officially recognised as monolingual, such as Italy and France, in fact, have considerable numbers of multilingual speakers.

Li Wei (2008) advances a number of questions that arise from the issue just presented: i.e. “why are some countries officially multilingual

whereas other are officially monolingual? [...] What are the effects of bilingualism and multilingualism on the country's economic and social development?". As the author points out, individual and societal bilingualism cannot be considered as separate phenomena. Indeed, multilingual speakers in countries which are officially monolingual often find themselves constrained by official policies and unable to use their full linguistic repertoire. On the other hand, monolinguals in officially multilingual countries usually experience difficulties in crossing the boundaries to make full use of the opportunities and resources at their disposal.

Moreover, apart from discussing the practical problems experienced by multilinguals in their countries, Li Wei also provides his own definition of multilingualism. This latter, mainly focuses on the active and passive skills of the speakers: "a multilingual individual is anyone who can communicate in more than one language, be it active (through speaking and writing) or passive (through listening and reading) (Li Wei, 2008: 4)."

Thus, the most salient feature of bilingualism that can be observed so far is the complexity and multifaceted aspect of the phenomenon, since it is not possible to establish clear cut-off points for where it starts and who can be considered as a bilingual. Accordingly, there is no unique definition explaining what bilingualism is, considering the multiple factors characterising and affecting the phenomenon itself. Indeed, it is exactly the relativity and lack of any clear cut-off points to allow so many different definitions and interpretations.

Before taking into account a number of definitions proposed by scholars based on particular dimensions of bilingualism taken into account, it is worth starting with a disambiguation of some key terms which may often be responsible for misinterpretations and confusion. After a close look at the previous and current most relevant literature into the field, it can be argued that the term multilingualism covers a

number of meanings. In Jessner's own view (2009) both terms are still used as synonyms for multilingualism as in the past the majority of studies focused on second language learning and bilingualism. For instance, in his pioneering work on multilingualism, Haugen included bilingualism under the meaning of multilingualism and argued that the term bilingual also refers to plurilingual and polyglot (Haugen, 1956: 9).

Cenoz (2013) on the other hand, points out that in recent years the term multilingualism has gained currency at the expense of bilingualism. However, the literature shows no consensus on that, which means that among scholars there are still different positions and uses for the terms bilingualism, multilingualism, and plurilingualism. The traditional position reflecting the importance of research involving two rather than additional languages considers bilingualism as a generic term. Even so, the term is also used in a broader sense to refer to two languages but can also include more languages (Cook & Bassetti, 2011).

On the other hand, the mainstream position nowadays considers multilingualism being the generic term used to refer to two or more languages (Aronin & Singleton, 2008). On these grounds, bilingualism and trilingualism are considered as instances of multilingualism. Finally, some scholars use bilingualism and multilingualism as different terms, to distinguish between speakers of two languages and speakers of three (or additional) languages (De Groot, 2011). Despite the fact that this is regarded as the most common approach among researchers working on Third Language Acquisition, the most traditional position considering bilingualism as the broader, generic term will be adopted in the present thesis.

### 1.3 Individual and Societal Bilingualism

The most important parameter of variation to address is the difference between societal and individual bilingualism. Individual multilingualism is sometimes referred to as plurilingualism. For instance, the Council of Europe defines the term as "the repertoire of varieties of language which many individuals use" so that "some individuals are monolingual and some are plurilingual." In contrast, multilingualism is described as "the presence in a geographical area, large or small, of more than one variety of language". This distinction is the same as the most widely used distinctions between individual and societal multilingualism, as Cenoz points out (2013).

However, Moore and Gajo (2009: 138) also made use of the term to underline "the focus on the individual as the locus and actor of contact", in a more holistic view of the phenomenon. Fishman (1980), on the other hand, made use of the two terms, bilingualism or multilingualism, to distinguish between the already mentioned individual and societal dimension of the phenomenon.

One of the most influential definitions taking into account the difference between the social and individual aspect of bilingualism comes from Hamers and Blanc's work, *Bilinguality and Bilingualism* (2000: 6). The authors describe the concept of societal bilingualism as "the state of a linguistic community in which two languages are in contact with the result that the two codes can be used in the same interaction and that a number of individual are bilingual".

On the other hand, individual bilingualism (or bilinguality) is presented as "the psychological state of an individual who has access to more than one linguistic code as a means of social communication". They also argue that the different kind of access to the linguistic codes will depend upon a number of dimensions, which will be addressed in the

present chapter: i.e. psychological, cognitive, psycholinguistic, linguistic.

#### **1.4 Factors promoting bilingualism**

Bilingualism is, of course, the result of contact between speakers of different languages. Looking at bilingualism as a group phenomenon, it can be stated that it is mainly the result of two main conditions: i.e. close proximity and displacement. The first condition occurs when ordinary life events in one's ethnic group put speakers in close proximity to speakers of a different language.

Additionally, as Myers-Scotton (2005) points out, if learning the other's group language is not of reciprocal interest, it is the group with the less prestigious and powerful language that will make an effort to learn the other group's language.

There are a number of conditions due to close proximity with other groups that promote bilingualism. Immigrants, for instance, whether settlers or invaders, bring languages into contact and sometimes, as with imperialist and colonial expansion, it is unnecessary for many people to physically move. Their language may make its presence felt through military, religious or economic force. Multilingualism can also arise as a result of political union among different linguistic groups: i.e. Switzerland incorporates German, Italian, Romansch, and French population; Belgium unites (sometimes precariously) French and Flemish speakers; Canada has English and French "charter" groups.

These are the main circumstances involving multilingual arrangements, but there are many others. Cultural and educational motivations can also expand linguistic repertoires, not only on individual basis. Moreover, of particular relevance here is the degree to which a

language community is open to the use of its variety by others. A notable example is the difference between the attitude of English and French speakers. The French have traditionally been much more conservative about their language and, if on one hand they have been engaged in the so-called "mission civilisatrice" trying to spread the French language all over the world, on the other, they have also been very careful in protecting its "purity" at home as well as abroad. English, instead, has not been treated in the same guarded way; while there are books and journals devoted to the new Englishes and to "world" English, there are a few similar treatments for French. English is thus becoming internationalised in a way that French is not, and an important consequence is that a language that once tainted by imperialism is rapidly becoming the home language in many parts of the world.

Another condition of close proximity which promotes bilingualism is living in a bilingual nation as a minority group member. These individuals speak a mother tongue that is not the official language of the nation-state and can exist in either rural or urban settings. The word "minority" is used to refer to groups in a nation-state that do not have large numbers of mother tongue speakers when compared with the group whose L1 is the official language.

Additionally, there is another more striking reason to call them minority groups which goes beyond just the number. Indeed, the most important sense in which they are minority groups is that they usually lack political power within the nation-state and socio-economic prestige. In other words, these groups lack the same level of official standing as the main official language and, because of the lack of political and economic power, they often become bilingual in the dominant national language for both instrumental and psychological reasons.

Accordingly, it can be argued that from the point of view of the dominant group, the presence of minority groups can be perceived as



an obstacle to communication and, more importantly, to national integration. To better portray the issue, a comment by Laponce (1987: 198) is reported, that is dominant groups tolerate minorities “only on condition that they accept at least partial linguistic assimilation (i.e. that they learn the dominant language) and keep their number small”.

Furthermore, other conditions of close proximity promoting bilingualism are living in a border area between ethnic groups or nations and living in a multi-ethnic urban area. In many parts of the world, wherever there is a border between nations or between ethnic groups, at least parts of the neighbouring populations show some degree of bilingualism.

However, this does not necessarily mean that bilingualism is always reciprocal. Indeed, as already argued, speakers of a less dominant language are more likely to learn the language of the more dominant group. Where there are borders between nations, very frequently, speakers also learn the language spoken across the national frontier. It is worth noticing that there may be more bilingualism today where closely related varieties are spoken on either side than years ago. In the past, in fact, there was less motivation to learn the varieties across the borders in order to communicate with inhabitants there because, in case of closely related varieties, such as German and Dutch, people on each side could speak their own variety and easily understand each other.

Nowadays, cities all over the world are generally multilingual. In some nations considered as multilingual, there are large numbers of speakers of different languages mingled together, but largely only in the urban area. For example, all the major cities in Africa are multilingual whereas the rural areas are not.

Another important factor which promotes bilingualism can be found in the need that speakers have nowadays of getting in touch with speakers of other languages for their jobs. People’s occupation, then,

represents a reason to learn a new language, particularly if the job comes into the category of trading. There are a number of examples of how trade has always promoted bilingualism in history. In addition, in today's global economy, learning at least a second language has become the main requirement for people working for multilingual corporations. Indeed, often, business meetings involve speakers from different parts of the world with different languages. Or, it happens that employees are transferred to another branch of the corporation to another country. That is why the majority of them choose to learn the second language with the widest range of usefulness for the company. Needless to say, this language is often English, being the lingua franca of the international business world.

Finally, other ordinary conditions of life that put speakers in close proximity with speakers of different languages occur when people get married outside their ethnic group and, as a consequence, their children will have parents and grandparents of different languages. In such cases, children may learn the language of either the mother or the father or sometimes both, resulting in incrementing bilingualism. However, often, children will learn the most dominant and prestigious language within the speech community.

On the other hand, among the most common conditions of displacement responsible for the spread of bilingualism, there are migration, wars and colonialism, national integration, and acculturation. First of all, throughout history, groups of people have decided to migrate for a number of reasons: i.e. to find better jobs, to seek political or religious refuge. In every case, an outcome of migration has been bilingualism in the mother tongue and the dominant language of the nation receiving the immigrants.

Nonetheless, notably, not all first generation immigrants become bilinguals but it is almost always the case for the second generation of immigrants. Secondly, colonialism, sometimes preceded by war, leads

to some imposition of the language of the conquerors on the local population. Thirdly, probably the best example of condition of displacement promoting bilingualism is given by the kind of bilingualism for the purpose of national integration.

In China, for example, the standard dialect (i.e. Putonghua) is spoken more and more widely as a second dialect. However, many of the so-called second dialects in China are different enough to be called separate languages. The promotion of Putonghua contributes to the increase of a sense of national unity.

Finally, there is also a psychological reason that has been regarded as the main factor promoting bilingualism: i.e. the attractiveness of the "other". That is to say, there are situations where people experience a sense of psychological displacement, after getting in touch with different cultures, in the sense that they feel that their first language is no longer suitable or sufficient to express themselves. This is the case of the so-called "world citizen", that may wish to join another culture even if only symbolically through a language.

### **1.5 Degrees and dimensions of bilingualism**

To provide a comprehensive overview of the phenomenon, in this chapter, a set of established descriptive labels based on specific features affecting bilingualism will be taken into account. Among these, the most relevant factors listed by Baetens Beardsmore (1982) are: age of second language acquisition; context in which a language is acquired; relationship between sign and meaning (i.e. the mental organisation of speech in a bilingual person); order in which both languages are acquired and consequence – the results of their acquisition; proficiency in both languages; and use, that is to say, the language choice determined by the purpose of communication.

### **1.5.1 Age of Acquisition**

The age when bilinguals acquire languages is regarded as one of the most important factors affecting the nature of their bilingualism. Indeed, it has been considered by previous literature as the most striking variable which explains success in second language acquisition. When dealing with this kind of distinction, the terminology employed is early bilingualism and late bilingualism.

Specifically, an early bilingual can either fall within the category of infant bilingualism or child bilingualism (Haugen, 1956: 72), where the conventional cut-off point between the two has been established at the age of three (Mc Laughlin, 1984: 73). On the other hand, as far as late bilingualism is concerned, the line established to discern between child and adult bilingualism falls at the age of puberty. Generally speaking, the main differences that have been observed between these types of bilinguals concern a number of cognitive features such as language production and perception, language processing, and storage.

The common belief among lay speakers which is also the most supported claim among scholars is that younger learners acquire a second language more quickly and with a better outcome. That is to say, it results in a higher level of proficiency reached in L2. However, previous literature on this topic (e.g. Bialystok and Hakuta, 1994; Krashen et al., 1982) have shown no total consensus on this claim. Indeed, it has been argued that supporters of this view, the so-called "critical period for second language acquisition", usually refer to the literature on first language acquisition, such as studies of children with severe and extreme linguistic isolation in early childhood.

It is important to notice that despite the evidence of the critical period effects, this does not necessarily mean that this implies the same consequences for learning additional languages. For instance, one of the most supported positions in the field states that the child bilingual

will never reach the full competences of the infant bilingual in the second language (Lenneberg, 1967). On the other hand, there is the view that late bilinguals make greater use of the right hemisphere when dealing with a second language, whereas the left hemisphere is active in the acquisition and processing of the first language.

The widespread belief that considers early bilingualism as the only “real” bilingualism is also supported by a number of academics. Adler, for instance, maintains: “One fact is clear: whether a person in his future life really masters two languages completely is decided in early childhood. When he does not learn the language then he will never be completely perfect in both” (Adler, 1977: 13).

From this claim, two main assumptions can be drawn: i.e. the idea that the bilingual will never reach a perfect level of proficiency in both languages and that children have better language learning skills compared to adults. However, as Hoffmann points out, there are a considerable number of aspects to take into account when addressing these topics. First of all, the idea that bilinguals achieve complete, perfect mastery of both languages is an unrealistic scenario. Indeed, even the total linguistic repertoire of fully balanced bilingual consists of items taken from both languages which complement each other and may also overlap to different degrees. As regards the second assumption, the author maintains that there is no solid evidence to state that children are better than adults at learning languages.

It has been argued that the impression that children achieve a higher fluency in a second language more easily than older people cannot be scientifically proved because of two different factors involved. On one hand, the apparent ease with which children acquire languages and the greater analytical abilities of adult learners on the other cannot be put on the same level. Indeed, apart from pronunciation that is supposed to be the only exception, the difference between first and

additional language learning cannot be considered only either qualitative or quantitative.

Despite the already mentioned differences between first and second language acquisition, there are two main theories from the field of first language acquisition that are particularly worth mentioning in this discussion. Indeed, the Language Acquisition Device (LAD) and the Critical Period Hypothesis (De Keyser, 2000) have been considered of fundamental importance to account for the idea that children are better language learners compared to adults.

Noam Chomsky, reviewing the work *Verbal Behaviour* by the psychologist Skinner, argued that the reason why children are so fast and efficient at acquiring languages cannot be explained in terms of stimuli and responses. Instead, he maintained that children are somehow specially-programmed, predisposed from birth to learn languages. This latter idea became the main pillar of mentalist theories during the 1960s and the expression LAD was used to refer to the hypothesised innate mechanism towards languages which only needed to be activated to start working (Chomsky, 1964). In other words, it was sufficient for the child to come into natural contact with a human language for the LAD to function.

On the other hand, there is the aforementioned “Critical Period” during which children are supposed to exploit their potential at best, being particularly successful at acquiring languages. There was supposed to be a biological link between this period, from the age of two to the age of puberty, and the brain’s dominance of language function through lateralisation. That is to say, the left side of the brain, more involved in language processes, was supposed to be particularly efficient during the critical period. The supporters of this theory argued that before the age of two language acquisition could not occur whereas, after puberty, the brain loses its plasticity and it was no longer enough receptive for the task.

Nonetheless, a number of psycholinguists have gone through the theory of the critical period (e.g. McLaughlin, 1984), questioning both upper and lower limits. In the early 1970s, for example, it has been suggested that the process of brain lateralisation was completed long before adolescence and, possibly, that it was even completed at birth (Krashen, 1975). Seliger (1978), on the other hand, advanced the hypothesis that there are different critical periods for distinct abilities explaining why a number of aspects of language can be acquired at varying ages.

In addition, other theorists believe that the very sensitive times in a child's life are just "sensitive periods" (Finn , 2010). They agree that children who do not get the right nurturing at the right times to jumpstart their developmental potential are going to have problems later in life, but they do not think that this inability to develop is permanent. However, despite the lack of considerable evidence to support the critical period hypothesis, what is generally widely accepted is that children have certain qualities that enhance the process of language acquisition. For instance, they are good at mimics, they lack the inhibition that usually characterise adult learners and enjoy learning by playing. All these factors together may result in a better fluency and pronunciation.

Because it is difficult to fix a clear cut point where language learning can take place naturally, some researchers have presented a revised version of the critical period. They use the term 'sensitive period,' rather than 'critical period,' for second language acquisition. The distinction between the critical period and the sensitive period hypothesis is whether acquisition is 'possible only within the definite span of age' or 'easier within the period.' Oyama (1979:88) says that sensitive periods are preceded and followed by less responsive periods. Seliger's proposal (1978) is that there may be multiple critical or sensitive periods for different aspects of language. The period 'during which a

native accent is easily acquirable' appears to end earlier than the period governing the acquisition of a native grammar.

Charlotte Hoffmann (1991) analyses a number of reasons which may actually question the mainstream idea that children are better language learners (Snow and Hoefnagel-Höhle, 1978). In particular, after a closer investigation of the issue, she concludes that if we assume that language acquisition is a process starting from birth, in fact, children spend a lot of time observing the language before being able to produce utterances.

In addition, she maintains that assuming that the process of language development is concluded by the age of five or six is an exaggeration. The linguistic standards expected from a child are generally much lower and less sophisticated than the ones expected from adults. In fact, she argues, if we consider the amount of time taken to acquire the first language by children, it is adults the ones that seem to learn fast and to master a variety of languages in relatively little time.

Hence, Hoffmann concludes that in absence of a scientifically based evidence suggesting that there is a biological explanation for the critical period of language acquisition, it is not possible to claim that children possess superior intrinsic language abilities if we exclude the phonetic-auditory skills. Therefore, she suggests that the outcomes of bilingualism, i.e. whether they will be successful or unsuccessful may rather depend on a number of psychological factors, which will be discussed in the present chapter.

Another problem with early ideas about the critical period in child language acquisition is that researchers did not usually consider a language as a set of different systems. Indeed, by considering a language as a whole single system, they missed the point that not necessarily all the different systems are acquired at the same time and



by the same age and, most obviously, vocabulary increases through the lifetime.

As mentioned earlier, the only area where children are undoubtedly better compared to adults and show better performance is phonology. Indeed, recent research shows that infants can distinguish many pronunciation features of what will become their first language from other sounds at a very early age. In particular, it has been shown that by the age of two months infants can tell the difference between languages characterised by different prosodies if one of the languages involved is the infant's L1 (Bosch and Sebastián-Galles, 2001). However, if the languages are prosodically very similar it takes longer to perceive the difference. The authors also demonstrated that very young infants are able to perceive differences between the two languages to which they have been exposed. They tested children raised in both Spanish and Catalan and they demonstrated that at about four months of age they were able to perceive phonological differences between the languages.

On the other hand, certain studies focused on the productive phase of the phonological system. That is to say, they looked at the already mentioned native-like pronunciation that is only supposed to be reached by early bilinguals. Indeed, there are a number of studies which support Hoffmann's claim that pronunciation is the only field where early bilinguals always outperform late bilinguals. For example, a study by Paradis (2001) indicated that two years old French English bilinguals have separated phonological systems for syllable structure.

An interesting study focused on the cognitive aspects of bilingualism (Bak et al., 2014), using tests of auditory control, confirmed the benefits of also acquiring a second language later in life. Indeed, it has been acknowledged that early bilinguals tend to outperform monolinguals on attention tasks, it still remained to be proved whether such advantage could be extended to late bilinguals. The study

compared monolingual and bilingual university students on tests of everyday attention. Three further distinctions were made within the bilingual group: early childhood bilinguals, late childhood bilinguals and early adulthood bilinguals.

The results showed that bilinguals only outperformed monolinguals on auditory attention tests but not on visual search tasks. This has been explained in terms of specific differences between bilinguals and monolinguals rather than generally higher cognitive skills in bilinguals which lead to better performances. In particular, it is important to highlight that, within the bilingual group, early childhood bilinguals performed better on attention switching whereas late child bilinguals and early adult bilinguals showed a significant advantage on selective attention. Accordingly, the authors concluded that the positive effects of bilingualism are not confined to childhood bilingualism.

### **1.5.2 Mental Organisation of Speech**

From a psycholinguistic perspective, bilingualism has been also defined in terms of mental organisation of the speech, that is to say on the basis of the relationship between signified and signifiers. The first to introduce the labels *compound*, *coordinate* and *subordinate* bilinguals has been Uriel Weinreich in his work *Languages in Contact* (1953) which focuses on the phenomenon of linguistic interference.

The coordinative bilingualism occurs when the lexicon of L1 and L2 have one common system of meaning, i.e. when a signifier and a signified from each language is combined with a separate unit of content. Compound or mixed bilingualism describes the situation where the lexicon of L1 and L2 has one common system of meaning. In other words, bilinguals identify the two signifiers but they consider them as a single (compound) unit of meaning. Finally, subordinative (or subordinate) bilingualism occurs when the L2 can only access the

systems of meaning through the lexicon of L1 and it is usually the case of people learning a new language with the help of another, resulting then in L1 influencing L2 to a greater extent.

It has been argued that Weinreich's distinctions have often been the object of misinterpretation in the literature, since they have been considered as a way of characterising different levels of proficiency in the language. In fact, there are cases where subordinate bilinguals show a very high level of proficiency in processing both languages, in terms of grammaticality and fluency of speech. On the other hand, there are also cases of coordinative bilinguals, usually labelled as highly proficient bilinguals, who show difficulties in processing two languages simultaneously, such as in code-switching or foreign words identification tasks.

As Li Wei (2008) points out, according to Weinreich's definitions, bilingual individuals are distributed along a continuum going from a subordinate or compound end to a coordinate end. That is to say, bilinguals do not belong either to a certain category or the other since they can be at the same time more subordinate or compound for certain concepts and more coordinate for the others depending on a number of factors, among which age and context of acquisition of the second language.

The latter concept can be better understood by considering Ervin and Osgood's research (1954) which investigates differences among the three labels proposed by Weinreich. In particular, the authors fused compound and subordinate types into one and investigated differences between compound and coordinative bilinguals. Their claim is that the former acquired language in fused contexts, such as formal language learning or continual language switching, whereas the other group learned the two languages in different contexts, e.g. one at home and one at school.

A study by Lambert, Havelka, and Crosby (1958) found that compound bilinguals had more similar profiles of meaning for words in both languages than coordinate bilinguals, who showed more differences. However, other research did not confirm these findings. Indeed, Olton (1960) compared coordinate and compound bilinguals in their reaction to a word recognition task and did not find any particular difference between them. Additionally, Lambert and Moore (1966) proved that the associational networks of the two languages of compound bilinguals differed considerably, which questions the theory of meaning systems of the two languages as being identical.

The aforementioned experiments have been criticised on different aspects. Grosjean (1982), for instance, states that semantic differential scales test the connotative meaning, whereas they do not measure the denotative meaning, the one that Weinreich was referring to. Moreover, it is worth noticing that some words in the bilinguals' two vocabularies can have either the same, different or overlapping meanings. Finally, as already mentioned, bilingual speakers may be more coordinate in some domains and more compound in others.

Nonetheless, it can be argued that despite all the criticism to this “vague and abstract theory” (Lambert, 1978), Weinreich’s work has influenced much of the psycholinguistic modelling of the bilingual lexicon and still retains its popularity among many researchers in the field of psychology and education. Potter et al. (1984), for instance, presented a reformulation of the manner in which bilingual lexical knowledge could be presented in the mind in terms of two competing models: i.e. the Concept Mediation Model and the Lexical Association Model. In the former, words of both L1 and L2 are linked to modal conceptual representations. In the latter, on the other hand, words in a second language are understood through L1 lexical representations. These two models can be considered as being structurally equivalent

to Weinreich's distinction between coordinative and subordinate bilingualism.

Besides, a number of researchers advanced the hypothesis of the so-called Dual-Store Model (e.g. Kolers & Gonzales, 1980) which was also the starting point of the studies on bilingual language switch, postulated to account for bilinguals' ability to switch between languages on the basis of environmental demands.

However, certain aspects of the proposed models have been questioned by additional studies since conflicting evidence has been found. This can be explained in terms of the high level of variability proficiency level, age, and context of acquisition of the languages of the bilingual speakers used in the experiments. According to Li Wei (2008), a possible explanation is that lexical mediation is associated with bilinguals with a lower level of proficiency whereas concept mediation characterises bilinguals with higher levels of proficiency, particularly for late childhood and adulthood bilinguals.

Interestingly, several studies have focused on the relationship between the neurobiological substrate for multiple languages on one hand and the environmental factors such as age of acquisition, exposure, and proficiency to investigate the cognitive organisation of languages in the bilinguals brain. The major findings suggest that the patterns of brain activation associated with tasks that engage specific aspects of linguistic processing are consistent across different languages and speakers. On the other hand, proficiency seems to be the factor with the major modulating effect on the brain activity since more extensive cerebral activation are associated with production in the less proficient language, and smaller activations with comprehending the less proficient language.

The two main issues addressed by psycholinguistic studies on bilingualism deal with levels of activation of the languages involved and

selective access to the lexicon. As already discussed, one of the most important features characterising multilingual speakers is the ability of language switching, making appropriate language choices based on a number of factors. Indeed, bilinguals select the language to use according to the type of person addressed, the subject matter of the conversation, location or social setting and relationship with the other speakers. More interesting and more complex are the situations where bilinguals talk to other bilinguals who master the same languages, i.e. with the same linguistic background, code-switching from one language to the other during the conversation.

These observations lead Grosjean (1998) to describe a situational continuum including different language modes. On one hand of the continuum, bilinguals are in a completely monolingual language mode, when they are interacting with a monolingual in one of the languages they master. At the other end of the continuum described by Grosjean, bilinguals are in a bilingual language mode since they are talking to other bilinguals with two (or more) languages in common and with whom they are used to mix languages.

Additional dimensions can be found at the intermediary points of these two extremes, that is to say when more than two languages are involved in the conversation. When bilinguals find themselves in the monolingual mode, they will adopt the language of the interlocutor and deactivate the other language(s) as much as possible.

Differently, when bilinguals are in a bilingual mode, they will access and select words from different languages to produce utterances. The process they follow to access and select the words in speech production has been a controversial issue in psycholinguistics. In particular, the question addressed is how different lexical items in different languages may be accessed or selected differently. Myers-Scotton (2005) proposed a Differential Access Hypothesis for bilingual production, following previous research in the field.

It assumes the so-called 4-M model, which differentiates four types of morphemes and three types of systems morphemes: i.e. early system morphemes, bridge late morphemes and outsider late system morphemes. In particular, content morphemes and early system morphemes are accessed at the level of the mental lexicon whereas it is suggested that late system morphemes only become salient at the level of the formulator. Myers-Scotton's hypothesis has received considerable attention and has been tested in several phenomena involving language contact.

### **1.5.3 Proficiency**

One of the most controversial issues in the attempt of defining the concept of bilingualism is proficiency, i.e. the level of competence attained in a second language. How proficient in both languages one needs to be in order to be considered as bilingual? This question has been answered in very different ways by acknowledged scholars in the field. Nonetheless, the issue still remains unresolved considering the complexity of the phenomenon. Indeed, there are a number of factors to take into account such as establishing who assesses the level of proficiency, on the basis of which criteria and which particular competences are considered in the assessment (i.e. phonology, morphology, lexicon etc.).

The definitions proposed by academics can be divided into two main categories, that is those expressing a maximalist view and those using a minimalist point of view. In particular, the most common labels employed by the maximalists are, for example, perfect bilingualism, true bilingualism, and ambilingualism. Following the maximalist criteria, an ambilingual is defined as a speaker with perfect control of the two languages and makes use of both in all uses to which he puts either of them (Halliday, McIntosh and Strevens, 1970: 141).

However, put in these terms, the concept of bilingualism becomes an exclusively rare phenomenon since it goes beyond the demand of mastering two languages. Indeed, bilingualism is seen as the ability to use all the skills in both languages to the extent of socially equivalent monolingual speakers of the languages involved.

Besides, these definitions exclude a vast number of people who do not show native-like command of the languages despite using them on a regular basis. Adopting the maximalist view, then, one should call them monolinguals. Therefore, a more realistic approach is needed, such as the one advanced by Haugen (1969: 6-7) who places proficiency on a continuum.

Bilingualism may be of all degrees of accomplishment, but it is understood here to begin at the point where the speaker of one language can produce complete, meaningful utterances in the other language. From here it may proceed through all possible gradations up to the kind of skill that enables a person to pass as a native in more than one linguistic environment.

On a similar line, Macnamara (1967) argues that fluency in even one skill is sufficient to be considered as bilingual since most speakers make use of the additional languages for different purposes and in different situations so that equal proficiency in all skills is not necessary. In other words, according to this other criterion, a bilingual is a person who achieves a level equal to a minimal degree in L2 in at least one of the competences: i.e. reading, speaking, writing and listening.

Additionally, Grosjean's own definition (2001:11) considers bilingual those speakers who "use two or more languages (or dialects) in their everyday lives", regardless of their level of proficiency. Thus, adopting this flexible definition of bilingualism, it could be argued that the majority of the world's population is in fact bilingual.



On the other hand, there is an intermediate position which makes use of the notions of equilingualism or balanced bilingualism. The label balanced bilinguals has got different aspects in common with ambilingualism as it implies an equal degree of proficiency in both languages. However, it does not require to possess a level of proficiency comparable to the one shown by monolingual speakers in their own languages. Indeed, balanced bilingualism has become the most common expression and its use does not only refer to the level of perfection theorised by Steiner. Even a rougher equivalence of fluencies, however, still implies a category in which most bilingual or multilingual individuals cannot be placed.

On the other hand, a number of scholars (e.g. Lambert, Havelka and Gardner, 1959: 81) use the same label balanced bilinguals to refer to speakers with full competences in both languages. In particular, they argue that:

The closer an individual approaches bilingual balance, the more he will be able to perceive and read words in both languages with similar speeds, to associate in both languages with similar fluency, to make active use of his vocabularies in both languages, and to be set to verbalise in both languages.

Beatens Beardsmore (1982) propounds another idealistic view of ambilingualism as it requires, in his own definition, to function equally well in both languages, in all kind of context and who shows no interference of one language when using the other. However, as it has been argued, this is a rather rare scenario since most bilinguals tend to have one language stronger than the other, at least in specific contexts. This is not surprising since, as Grosjean points out (1982), language use depends upon a number of social and psychological factors, i.e. situation, participants, topic and purpose of communication.

Thus, it is important to keep in mind that in everyday life, bilinguals rarely have equal control of both languages because it is very unlikely for them

to use the same languages in exactly the same situations and with the same persons. Therefore, a fundamental conclusion needs to be drawn. In the world there are very few truly balanced bilinguals for two main reasons: first, it is more likely that one language is acquired more fully than the other; second, one of the languages is likely to be used more frequently than the others that may be known to varying degrees.

What makes proficiency so difficult to assess? As discussed above, one of the issues that cannot be resolved is who decides that someone is bilingual. Speakers can identify themselves or can be identified by others as bilinguals or not on the basis of one of the perspectives considered so far. An even more complex issue is how proficiency is assessed by professionals and whether a reliable measure exists.

There is no common agreement on it since, first of all, linguistic varieties consist of different levels. Secondly, all native speakers of average intelligence have almost equal competence in the phonology, morphology, and syntax of their first language with an exception for the vocabulary, which may vary. Instead, a speaker of a second language may have decidedly more ability in one or two of the linguistic levels than the others.

The most evident uneven competence across second language speakers is phonology. Indeed, very few persons who acquired their second language as adults manage to achieve the native-like pronunciation skills. However, they may be able to speak very fluently and have an extensive vocabulary in that language. Therefore, it is very difficult to assess proficiency in speakers with different levels of competence across the linguistic systems.

Interestingly, it has been argued (Myers-Scotton, 2005) that while morphology and syntax are the aspects of a language that non-native speakers try very hard to master, it is not always the case for phonology. Indeed, the author suggests that some speakers deliberately decide not to

speak the second language with a native-like pronunciation. The reasons accounted for this choice may be different.

#### **1.5.4 Proficiency as a dynamic concept: Convergence and Attrition**

The level of proficiency that individuals reach in any language cannot be described as a static concept since it changes through the lifespan as it is affected by a number of factors such as language exposure, language use, code-mixing as well as other psychological and social factors.

The expressions “incipient bilingualism” (Diebold, 1961), “ascendant bilingualism”, and “recessive bilingualism” (Beaten Beardsmore, 1982) provide an interesting explanation of the order in which two languages are acquired and the consequences of their acquisition. Specifically, the first two refer to the progress made by individuals in their ability to use the two languages.

The expression recessive bilingualism, on the other hand, indicates a decrease in this capacity. Becoming less fluent in a language is a very common phenomenon among bilinguals and may either be the result of a conscious decision or because language becomes unnecessary due to external events. Grosjean (1982) makes use of the label “dormant” bilinguals to refer to those speakers who become hesitant in their language production, who code-switch a lot between different languages and who frequently borrow words and expressions from their dominant language most of the times without being aware of it. The most affected domains are pronunciation, at the level of stress and intonation, and writing. Language comprehension, instead, seems to be preserved the longest.

To better explain the aforementioned phenomena, it is useful to provide a definition of the related concepts of convergence and attrition. The first is meant as “speech by bilinguals that has all the surface level forms from

one language, but with parts of the abstract lexical structure that underlies the surface-level patterns coming from another language (Myers-Scotton, 2005)". The second involves the same outcomes but is generally thought of a language change within the speech of one individual. Both processes affect bilinguals' first language when they live in a speech community where there is a socially and/or politically dominant language. Code-switching is the phenomenon which precedes both even though extensive code-switching is not necessary for convergence and attrition to occur.

This distinction should not be confused with the labels "additive" and "subtractive" bilingualism advanced by Lambert (1974). Indeed, despite the similarity of the concepts, the former describes a situation where learning a second language can enrich the person's social, cognitive, and linguistic skills, whereas the latter refers to an adverse condition. In other words, the second language is learned at the expense of the first language, which may even lead to language shift.

### **1.5.5 Context of acquisition**

Another problem when dealing with proficiency is that any assessment ought to take into account both grammatical and communicative competence. The former is what lay speakers mean by "knowing a language" or "speaking properly". More specifically, grammatical competence refers to speakers' ability to produce and recognise well-formed utterances in a language. In other words, grammatical competence enables you to make grammaticality judgments.

On the other hand, communicative competence refers to the ability to use those utterances in ways that are considered unmarked or appropriate in a particular situation. In order to determine what is unmarked, one needs to consider the participants, topic, and setting of the conversation. In addition, the communicative competence allows us to recognise marked usages and what the speaker intends by such utterances. A marked

choice of words and expressions conveys the level of communicative competence. For instance, the ability to choose the different register to address somebody, yet, reflects the communicative competence.

It has been argued (Myers-Scotton, 2005) that native speakers of a language, i.e. someone who has learned the language since early childhood, do not need to be taught either grammatical or communicative competence as they acquire them with no particular effort. Indeed, the acquisition process requires some exposure to the language in use in the speakers' community, and it is based on the innate learning principles that all humans have.

This is not the case when the second language is taught in a formal setting since the focus is mainly on teaching the grammatical competence of the language. Because of the belief that grammar constitutes the essence of the language, different programmes only concentrate on teaching a language in an explicit way, that is on teaching grammatical constructions. That is why many L2 speakers show more control of the L2 grammar than of its appropriate use in a specific context. However, lately, more and more second language programmes are giving importance to the communicative competence.

The aforementioned different competences achieved in a second language allow us to introduce a further definition of bilingualism based on the context of acquisition of the second language. A number of labels have been used in the literature to describe bilinguals who acquired the second language in a naturalistic setting and bilinguals who learned it in a formal setting. The German linguist Braun, for example, in the attempt to find a definition for multilingualism, distinguished between natural multilingualism, in the sense of acquired from birth, and learned multilingualism. In his view, learned multilingualism can also result in active balanced proficiency, but this is an unusual case linked to specific circumstances (Jessner, 2008).

Yet, another common terminology employed by researchers is primary and secondary bilingualism to distinguish between a dual competence acquired naturally through contextual demands, and one where systematic and formal instruction has occurred. Nonetheless, it is important to highlight that these do not need to be considered as watertight compartments. Indeed, for example, a speaker might develop fluent conversational skills in a language in a relatively informal way and only later feel the need to add some formal literacy skills. This would, incidentally, reproduce the way a mother tongue is acquired and it has been reflected in many second language programmes.

Still, it has been noticed that there are some important and socially relevant differences between those who became bilingual informally and those whose second competence is more self-consciously acquired. For instance, Edwards (2013) points out that it would not be appropriate to gather under the same label English-Gaelic bilinguals in Ireland or Scotland who are fluent in both languages as a result of growing up in a particular location and those who set themselves to become bilingual.

This last nuance has been usually conveyed by referring to *élite* and *folk* bilingualism. The former refers to two prestigious languages and has to do with social status marking, the need for knowledge and cultural boundary crossing. *Folk* bilingualism, on the other hand, is generally suggestive of a more informal and necessity driven expansion. However, it has been argued that both varieties are in fact driven by necessity even though we are talking about different levels and types of necessity. Moreover, formal education per se does not seem to be enough to elicit the *élite* label. There are real-life mixtures examples that show how inaccurate simplistic categorisations are.

Besides, as Fishman points out (1966) the distinction between *folk* and *élite* bilingualism is more related to the prestige and social status of the languages involved rather than with the context of acquisition. The *folk* are immigrants and linguistic minorities who exists within the milieu of a

dominant language that is not their own and whose own language is not held in high esteem within the society. The élite are those who speak the dominant language and whose societal status is enhanced through the mastery of additional languages.

The following observation by Fishman is very meaningful to understand the social implications as well as the perception that lay speakers have of language prestige:

“Many Americans have long been of the opinion that bilingualism is a good thing if it was acquired via travel (preferably to Paris) or via formal education (preferably at Harvard) but it is a bad thing if it was acquired from one’s immigrant parents or grandparents (Fishman, 1966: 122-23).”

The child who acquires a language is presented to it in a given context, which may be fused or separate. The former situation occurs when both parents speak both languages to the child or when both languages are used in the child's environment, i.e. in a multilingual society. The latter situation occurs when the parents follow the one-parent-one-language rule or when one language is learned in a context and/or country and the second in the other. All these scenarios characterise the so-called "ascribed bilingualism" to use Houston’s own words (1972) or, as already mentioned, natural or primary bilingualism.

On the other hand, the label “achieved bilingualism” (Adler, 1977), that is instructed or secondary bilingualism, describes the situation when a person learns a language through systematic instruction. A further distinction has been proposed by Skutnabb-Kangas (1984: 95) between natural bilingualism on one hand and school/cultural bilingualism on the other. School bilingualism is involved with formal language teaching in a school environment, and the language is rarely used outside this context. Cultural bilingualism applies more to adults, who learn a language for purposes of travel, leisure, and work, and who recognise the cultural value of knowing more than one language.

However, despite the distinctions proposed above, there are still some researchers who do not acknowledge school bilinguals as real bilinguals. Indeed, in their own view, those bilinguals who acquired their second language in a formal setting only have a good command of the language but they are not necessarily bilinguals. Malmberg, for instance, claims that knowledge of a second language laboriously acquired does not result in bilingualism. This then establishes an acceptable boundary between bilingualism and a knowledge of foreign languages".

According to his definition, "a bilingual is an individual who, in addition to his mother tongue, has acquired from childhood onward or from early age a second language by natural means (in principle not by formal instruction), so that he has become a fully competent member of the other linguistic community within the sphere, the occupation or social group, to which he naturally belongs" (as cited in Skutnabb-Kangas, 1984: 96).

Skutnabb-Kangas points out that there is a connection between the origin of bilingualism and the bilingual's dependency on it, when she establishes that "for naturally bilingual people bilingualism is a must", while for school and cultural bilinguals "bilingualism is often more or less voluntary [...], not vital for them, but a desirable extra, something they enjoy or find useful" (Skutnabb-Kangas, 1984: 96).

Nonetheless, instructed (or secondary/achieved) bilingualism is a more common situation if we consider that second language learning in a classroom setting is a necessary fact of life in many parts of the world. Indeed, almost every state in the world has a population characterised by different first languages. The minority language groups need to learn the majority language both for practical reasons and because, most of the times, schooling is only available in that language. In nations where no one language group dominates in number or politically, then either one regional language or an outside language is selected as a lingua franca. In this case, this language is studied at school and becomes the medium of instruction for at least the upper primary grades.



In addition, in many countries, apart from studying the official language of schooling and education, upper-level students have to study one or more international languages as part of the programme, such as English. Indeed, it is important to highlight that English is spoken by 400 million people as a first language but at least one billion people study it as a foreign language or as an official second language (Crystal, 1987).

A number of researchers have examined the recurring features of classroom environment to be relevant to students' development of a second language. Specifically, they question what cognitive components or mechanism are available to second language learners. On the basis of the point of view they assume on this matter, especially on the role given to instruction, they have been distinguished into two main groups.

The first group (see Mitchell & Myles, 2004 for a review) includes the Universal Grammar proponents, also called nativists, arguing that second language acquisition has distinct similarities to first language acquisition. In their opinion, learners have some access to the same innate language faculty that makes first language acquisition rather effortless. Therefore, their main aim is to provide evidence that in the performance of L2 learners it is Universal Grammar and not the instruction that plays the most important role in determining any success.

The other group of Second Language Acquisition researchers attributes a more important role to instruction (e.g. Cenoz & Valencia, 1994; Sanz, 2000; Thomas, 1988). Their starting point used as main assumption is that the process of second language learning is very different from the acquisition of the mother tongue. They argue that even though L1 acquisition is based on an innate language faculty, it is no longer active to the same extent for second language learning. Their main focus is to find evidence for the type of learning that is possible for L2 learners. It is precisely the kind of learning promoted that determines a further internal division within the group. On one hand, there are the promoters of explicit learning, convinced of the benefits of instruction in SLA. On the other,

there are some researchers claiming that learners achieve the best results through teaching methods that favour implicit learning.

Moreover, there is an additional group with similar theoretical premises of the second main group described which pays particular attention to the context of acquisition in which the learning takes place as well as to the learners' motivations and expectations related to the level of success attained.

On the role and effectiveness of instruction in second or additional language learning, there is a large amount of literature. As already mentioned, there is a group of researchers who do not recognise any specific effect to instruction since, in their own view, L2 learning is an incidental process guided by universal mechanisms (e.g. Krashen 1985, 1994). Therefore, the implication of the so-called "non-interventionist" group was that no positive effect on intervention (i.e. instruction) could be acknowledged and that SLA was best cultivated in ways which resemble first language acquisition.

On the other hand, the supporters of an effective role of instruction in SLA claim that instruction plays a fundamental role in SLA especially for adult and foreign language learners who do not receive enough input outside the classroom and for those wishing to achieve high level of grammatical accuracy (Ellis, 1991, 2005; Long, 1988). Indeed, based on the findings of a wide range of studies in the field, it can be argued that secondary bilingualism represents, in fact, an advantage when either type and amount of naturalistic exposure and instruction are held constant (Doughty, 2003).

More specifically, the effects of instruction have been investigated along the three basic dimensions of the L2 learning process, that is the route, rate, and end state of learning. The general findings of the studies have been summarised and reported by De Graaff and Housen (2009) in the following terms. As regards the first dimension, it has been argued that

both instructed and uninstructed learners follow the same route. Therefore, instruction will only affect the acquisition of specific linguistic patterns when the learners are developmentally ready for acquiring them.

In addition, it is worth stressing that contrary to previous beliefs that developmental orders are primarily driven by universal processing constraints, recent research has shown that developmental orders are primarily caused by learners-external features such as the perception of linguistic features in the input (Goldschneider & DeKeyser, 2001). In terms of rate, instruction has been demonstrated to improve the speed of acquisition compared to non-instructed learners. Finally, as far as the end-state is concerned, instructed learners have been reported to achieve higher levels of interlanguage development as well as higher levels of proficiency than uninstructed learners.

At this point, once acknowledged the general benefits of instructed bilingualism, it is worth providing a brief insight into the types of instruction available to the learners. A basic distinction can be made between meaning-focused instruction (MFI) and form-focused instruction (FFI). The term "form-focused instruction" is defined by Ellis (2001:2) as "any planned or incidental instructional activity that is intended to induce language learners to pay attention to linguistic form". The MFI is characterised by a focal attention exclusively on the communication of relevant meanings and authentic messages (Norris and Ortega 2001). Examples of this type of learning can be found in the Natural Approach to L2 teaching, in the Communicative Language Teaching methods as well as in the immersion programmes. On the other hand, FFI aims at drawing the learners' attention to language form by means of an instructional activity where grammatical structures, lexical items, phonological features etc. are taken into account.

From a look at the review of research on the effects on FFI, it can be noticed a lack of clarity and consistency in definitions of terms such as Focus on Form, Form-Focused Instruction Focused Instruction etc.

However, the common feature that all these expressions seem to share is the concept of language seen as an object. Different scholars have different views on how this focus on form is achieved.

Long (1996), for instance, claims that focus on the form may occur in different ways including problem-solving tasks, provision of negative feedback, and common error focus tasks. Brown (2007) proposes a continuum of explicit-implicit approaches to form. On one hand of the continuum are the explicit, discrete-point metalinguistic explanations and discussions of rules and exceptions. On the other, there are the implicit, incidental references to form; noticing, i.e. the learner's paying attention to specific linguistic features in input and, finally, the incorporation of forms into communicative tasks or, to say it in Ellis' words (1997), the grammar consciousness raising.

Sharwood-Smith (1991) propounds a re-analysis of the notion of consciousness raising in language learning. The 'input enhancement', i.e. the process by which language input becomes salient to the learner can be a result of deliberate manipulation, or it can be the natural outcome of some internal learning strategy. Moreover, according to the author, it can vary quantitatively and qualitatively, and, interestingly, not necessarily involving conscious analysis of rules.

Yet, about the implicit explicit dichotomy, according to Ellis (1994) there are three main ways used by learners of a second language to acquire a new form: i.e. explicitly, via given rules following instructions; explicitly, through selective learning, searching for information, comparing and contrasting hypothesis; implicitly, by abstracting unconsciously the structural nature of the material derived from experience of specific instances.

Additionally, he argues that adult L2 learners are likely to make use of all the aforementioned procedures. On the basis of these learning

procedures, the two types of form-focused instruction may be applied in a second language classroom, that is to say, implicit and explicit.

A number of studies have looked more generally at the effects of monolingual and bilingual school environments on the overall language and cognitive development of language learners. Paul and Jarvis (1992), for example, compared English language learners in bilingual and monolingual prekindergarten classrooms and found positive outcomes for children in the bilingual classroom.

Another study in which classroom activities were carried out exclusively in Spanish (Campos, 1995) shows similar positive effects of first language use on second language acquisition. These studies point to the importance of understanding the linguistic environments of institutional settings that serve as the primary base for second language acquisition.

Thus, it can be argued that understanding even preschool environment is critically important to predict the outcomes of learning for several reasons. First, it has been demonstrated that the development of the native language and of the second language are interdependent in the sense that they affect each other thanks to the implicit transfer of knowledge of the languages. That is to say, learners develop cross-linguistic awareness, the learners' tacit and explicit awareness of the links between their language systems.

It has been suggested that studies of the nature of what can be transferred from first to second language reading need to take into account not only the level of first language reading but also the level and content of the second language reading material (Hakuta & Kenji, 1998). Second, future successful readers typically arrive at school with a set of prior experiences and well-established skills conducive to literacy, including an understanding of literacy, abstract knowledge of the sound and structure of the language. Third, early instruction is impacted by lack of explicit

instruction in the local orthography, absence of background knowledge and skills acquired in highly literate environments.

Besides, it has been claimed (Jessner, 2008) that in order to benefit from multilingual education in classroom environments two main principles need to be followed. First, languages being taught in the classroom need to be linked in order to profit from transfer and to exploit the resources that students have already developed through previous language learning. Second, as Jessner suggests, some form of linguistic background documentation should be obligatory in any classroom so that to identify and exploit any positive effects of multilingualism.

## **1.6 Conclusion**

To conclude, as it has been shown through an insight into the main definitions proposed by different scholars dealing with specific aspects of the phenomenon investigated, defining bilingualism is not an easy task as each definition varies greatly in perspective and use. The challenge of trying to characterise the concept of bilingualism has prompted scholars in the field of psychology, linguistics, and sociolinguistics to generate a wide spectrum of definitions. That is why, any attempt to find or propound the best, unique, most appropriate categorisation of bilingualism, involving all the factors and variables analysed in the present chapter would lack of many fundamental aspects. Indeed, assuming only one of the definitions presented above as the best and only possible label of bilingualism may either be too generic or too specific.

To sum up, this chapter is concerned with the issue of providing a broader understanding of the concept of bilingualism, by reviewing and comparing the main definitions advanced by scholars from different areas of research. In particular, after a disambiguation of central terms commonly used to address bilingualism, some specific aspects characterising the phenomenon are taken into account. Particularly, the domains that have

been object of investigation to analyse the propounded definitions deal with the individual and societal dimension of bilingualism, age of acquisition, mental organisation of speech, level of proficiency attained in the second language(s), conversion and attrition, context and method of acquisition, metalinguistic awareness.

## **Chapter II: The “Bilingual Advantage”? - Cognitive Costs and Benefits of Bilingualism**

### **2.1 Introduction**

The study of how individuals can master two or multiple languages has attracted the attention of different scholars from both a cognitive and linguistic point of view. The rise of interest in the last two decades is due to the increased awareness of the sociological reality that, in most parts of the world, over 50% of the population is in fact bilingual. Moreover, if one considers the impact of dialects too, the percentage is even higher and bilingualism becomes the norm since almost everybody also speaks a dialect.

As a consequence of the recognition of bilingualism as the default state of language competence, the phenomenon started to be investigated from different perspectives: i.e. educational, cognitive, neurolinguistics, psycholinguistics etc. The present chapter focuses on the so-called “bilingual advantage”, providing an insight into the phenomenon by reviewing the most important contributions which examine the cognitive costs and benefits of the phenomenon under investigation, in both verbal and non-verbal domains. Specifically, it investigates the effects of the bilingual experience on cognitive skills involved in language learning processes such as speed of processing, Working Memory (WM), Theory of Mind (ToM), and Executive Functions (EFs). Besides, it also analyses how differentiating between analysis of representation and control of attention leads to different outcomes in linguistic and non-linguistic tasks.

### **2.2 Historical perspective of the bilingual advantage**

From a close look at the literature on bilingualism and intelligence over its long history, two contrasting assumptions can be delineated. Early



literature, prior 1962, showed that bilingualism had negative consequences on cognitive development, whereas the more recent literature, improving on the earlier methodologies, showed the opposite, that bilingualism could have a positive effect on cognitive development. To highlight the two contrasting views, it is worth analysing the following assumptions on the relationship between bilingualism and intelligence, as reported by Hakuta et al. (1987:287). “Conclusions from the early literature can be summarized by the following statement that appeared in George Thompson’s (1952: 367) American textbook on child psychology:

There can be no doubt that the child reared in a bilingual environment is handicapped in his language growth. One can debate the issue as to whether speech facility in two languages is worth the consequent retardation in the common language of the realm.

A rather brighter portrait is drawn by Elizabeth Peal and Wallace Lambert (1962) in reporting a study of bilingual children in Montreal. They describe their typical subject as:

a youngster whose wider experiences in two cultures have given him advantages which a monolingual does not enjoy. Intellectually his experience with two language systems seems to have left him with a mental flexibility, a superiority in concept formation, a more diversified set of mental abilities... In contrast, the monolingual appears to have a more unitary structure of intelligence which he must use for all types of intellectual tasks (p. 20).

Thompson’s statement and its inherent contradictions can be interpreted as a dramatic example of a superficial approach to such a complex phenomenon. On one hand, when dealing with empirical research on bilingualism, different degrees and types of bilingualism need to be taken into account. On the other, current studies have highlighted the importance of considering the joint relationship between different aspects of cognition, which are affected by the bilingual experience in different ways. Specifically, the two main cognitive components, namely analysis of representation and control of attention, lead to cognitive costs and benefits

depending on the extent to which they are involved in the task under investigation.

One of the most worrying consequences of the studies supporting the claim of bilingual cognitive deficits was the constant attack against bilingual education. As already discussed in the previous chapter, the attack against bilingual education can be explained mostly in terms of political, cultural, and socioeconomic variables. On the other hand, from a cognitive point of view, the most common beliefs held against bilingualism and, thus, against bilingual education were summarised by Tucker and D'Anglejan (1971) as follows:

- 1) Children who are instructed bilingually from an early age will suffer cognitive or intellectual retardation in comparison with their monolingually instructed counterparts.
- 2) They will not achieve the same level of content mastery as their monolingually instructed counterparts.
- 3) They will not achieve acceptable native language or target language skills.
- 4) The majority will become anomic individuals without affiliation to either ethnolinguistic groups.

As Diaz (1983) points out, some of these beliefs remain just that: beliefs. That is to say, they lack empirical evidence to be supported. Others are based on studies that were poorly designed and that failed to control for relevant confounding variables such as children's actual knowledge of their two languages bilingual-monolingual group differences in socioeconomic status. Nowadays, almost everyone in the field agrees research prior to Peal and Lambert's pioneering work was based on inappropriate measures of bilingual performance as most of the tasks used rely on verbal skills. Indeed, as it will be seen in the present chapter, the type of task used to compare bilingual and monolingual performance is fundamental in that it determines the extent to which certain cognitive domains are involved.

Systematic studies on the relationship between bilingualism and intelligence began in the early 1920s, together with the flourishing of psychometric tests of intelligence. However, since the measurement of intellectual potential was heavily dependent on verbal abilities, psychologists and educators were concerned about the validity of bilingual education programs. The main concern was that bilingual children would suffer from some kind of language handicap, and this, in turn, would be an obstacle for school performance. The overwhelming majority of studies prior to 1962, indeed, found strong evidence for the so-called "language handicap" in bilingual children (e.g. Macnamara, 1966). When compared to monolinguals, bilingual children appeared inferior on a range of linguistic abilities. For instance, bilinguals were shown to have a poorer vocabulary, deficient articulation, lower standards written composition, and more grammatical errors (Diaz, 1983).

Interestingly, this (pseudo) evidence of a language handicap in bilingual children did not lead to a questioning of the validity of psychometric tests of intelligence employed. Instead, the consistent findings of bilinguals' poor performance in verbal tasks contributed to support the idea of the negative effects of bilingualism on children's intelligence. During that period, children's bilingualism was considered as something detrimental for their intellectual development. The language handicap of bilinguals was mainly interpreted as a linguistic confusion that deeply affected children's intellectual skills and academic performance. Moreover, these false beliefs about the disadvantages of early bilingualism were further confirmed when several studies showed that bilinguals also performed significantly lower than monolinguals on tests of nonverbal abilities, such as tests of dextrality and mathematical competence.

However, as it has been mentioned, most of this research presents a wide range of serious methodological problems to such an extent that they have been considered as totally unreliable by more recent literature in the field (see Cummins, 1976).

For example, one of the major problems concerning early studies on bilingualism is that they failed to control for group differences in socioeconomic status between bilingual and monolingual samples. In the United States, in particular, bilingualism was seriously confounded with low socioeconomic status. More than half of bilingual children in schools could be classified as belonging to families from the unskilled labour occupational group. Accordingly, Fukuda (1925) alerted researchers to the fact that high-scoring, English-speaking subjects were mostly in the occupational and executive classes; he reported a correlation of .53 between the Whittier (socioeconomic) Scale and the Binet IQ for this population. Nevertheless, prior to the early 1960s, most studies investigating the effects of bilingualism on children's intelligence did not account for group differences in socioeconomic status.

Another major problem observed in the early studies on bilingualism is that they failed to control for type and degree of bilingualism in that the criteria used to distinguish between monolingual and bilingual children and among different type of bilinguals were totally unreliable. Brunner (1929), for example, divided his bilingual sample into three categories on the basis of the birthplace of their parents: i.e. both parents born in the same country; one parent born here and one abroad; both parents born abroad. The classification was simply assumed to represent children's varying degree of bilingualism. In other studies, the samples of bilingualism were assessed through family names or even place of residence.

The other fundamental problem with previous literature highlighting the bilingual disadvantages is that they mainly assessed bilinguals' verbal abilities. Nowadays, thanks to a more refined methodology and a broader knowledge of the phenomenon under investigation it does not seem surprising that bilinguals performed poorly than monolinguals in most of the tasks. Indeed, as it will be discussed in the present thesis, the bilingual experience leads to some sort of paradox since an increased linguistic

knowledge leads to more benefits in cognitive, domain-general abilities than in verbal skills.

### **2.3 Bilingual Language Processing**

From a cognitive point of view, in the past, researchers on bilingualism have mainly focused on the linguistic aspects of the phenomenon. That is to say, how two or more languages are mastered at the same time in the bilingual brain, whether bilinguals have access to two (or more) separate lexicons or one large bilingual lexicon, the mechanisms allowing language lexical access and lexical selection etc. On the other hand, in the last decades, several studies have directed the attention to the non-verbal skills affected by bilingualism. In other words, they started to investigate the more general effects on basic cognitive skills where it was possible to observe an “advantage” of bilinguals over monolinguals.

The core question addressed in the field of neurolinguistics investigates how multiple languages are processed, i.e. whether they are processed in different ways by the brain or there is a common mechanism supporting all the languages involved. Moreover, if differences in brain activation are found, researchers have tried to find out where these differences are localised and what accounts for them. In other words, whether language is lateralised to the same degree in monolinguals and bilinguals or bilinguals process languages more bilaterally.

The issue of language laterality in bilinguals has been debated in the field for decades and still remains unresolved. Bilinguals, similarly to monolinguals, typically show left-hemisphere lateralisation for all languages even though the strength of that laterality seems to be weaker in bilinguals than in monolingual participants. In some studies conducted on bilinguals, the right hemisphere appears to be more involved during L2 processing compared to L1 processing (e.g. Ibrahim et al. 2010). However, it has been argued that there are a number of factors such as

linguistic distance, language-specific characteristics, non-native status, type of language task, and age of L2 acquisition which modulate the degree of lateralisation in bilinguals (Higby, Kim, and Obler, 2013).

On the whole, research on the representation of different languages in the brain has demonstrated that the brain typically involves classic left-hemisphere peri-Sylvian language areas for languages learned later in life. However, additional brain areas or networks may be needed to handle the unique issues of second language processing which refers to languages with a lower proficiency or that have been acquired at a later age. There is other research showing differences based on the number of languages spoken by the participants. More experiments are needed to elucidate precisely the role played by the number of languages on language processing and whether the differences reported are greater on certain linguistics tasks compared with others.

There is growing evidence that various experiences have a significant effect on behavioural, neuropsychological, and structural aspects of cognitive performance. In particular, a set of studies focusing on structural changes caused by the bilingual experience have demonstrated, via neuroimaging, that bilinguals have an increased density of grey matter in the left inferior parietal cortex. The measures used in this research refers to both grey matter (cortical) and white matter (subcortical) density, with the assumption that the greater density in certain regions reflects a greater development of neural networks. It has been reported that this change is particularly evident in early bilinguals and more balanced bilinguals, i.e. those with greater proficiency in the second language (Mechelli et al., 2004).

Not only has grey matter density been shown to differ for bilinguals compared to monolinguals but also among bilinguals with different ages of acquisition of the second language. A number of studies (i.e. Golestani and Pallier, 2007; Mohades et al., 2012) investigated the density of white matter fiber tracts which is responsible for a more efficient communication

among different regions of the brain. They found that early bilinguals showed increased density in the left inferior area compared to bilinguals who had learned the second language after the age of three and monolinguals.

## **2.4 The bilingual advantage in switching costs and executive functions**

As already argued, the publication of Peal and Lambert's work (1962) started a substantial discussion on the advantages and disadvantages of bilingualism. It was the first contribution to the literature on the so-called "bilingual advantage" and paved the way to a number of studies investigating the effects of bilingualism across a number of different cognitive tasks. Before examining in detail each cognitive process affected by bilingualism, it is important to underline that these studies all contributed to shed light on the concept that language and cognition cannot be processed separately in the brain. Instead, they interact, affect, and enhance each other.

Another fundamental contribution to the development of research into the positive effects of bilingualism comes from Green's "Inhibitory Control Hypothesis" (1998). It accounts for a central aspect of bilingualism which is responsible for the better cognitive performance of bilinguals on a number of tasks. Green's model is based on inhibitory control in which the non-relevant information (i.e. the non-target languages) is suppressed using the same executive functions that are generally used to control attention and inhibition. Accordingly, bilinguals are expected to have developed such an extensive practice in inhibitory control with languages that allows them to extend it across general cognitive domains. Indeed, for fluent bilinguals, who use both languages on a regular basis, two or more languages are active and available when one of them is being used. This creates a problem of attentional control which is unique to bilinguals

as they constantly need to select the target language according to the situation and inhibit all the other competing languages. It is this constant control of attention to the target language that makes bilingual speech production different from that of monolinguals and that, at the same time, is responsible for the different linguistic and cognitive outcomes of bilingualism (Bialystok, 2009).

The positive and negative bilingual effects have been evaluated by means of a number of different tasks. In particular, a number of studies (e.g. Costa & Santesteban, 2004) have focused on inhibitory control and switch cost in order to investigate the role of bilingual language switching in more general cognitive domains. The switch cost was a measure of how fast individuals could inhibit the unwanted language and select the target language in naming objects or digits where participants could sequentially or randomly use either of the languages. The time required for switching between languages in these tasks reflects how efficiently individuals can control their language switching in their brain.

The most common task where a bilingual advantage in executive processing has been demonstrated is the Simon Task (Simon & Ruddell, 1967). Participants are presented with stimuli containing both target information that indicates the correct response (i.e. colour cues) and position information which is irrelevant to the correct response (i.e. presentation of the stimulus to the right or left of the screen). The combination of these features creates either congruent or incongruent trials, depending on whether position and colour converge or not. The congruent and incongruent trials are presented randomly, necessitating the executive control processes for monitoring and switching. Bilinguals' better performance in this task is explained following Green's inhibitory hypothesis. They have been shown to perform the Simon task more easily, with faster reaction times in line with the assumption that bilinguals are better at resolving conflicting response options. The bilingual



advantage over monolinguals has been observed in children, young adults, and middle-aged and older adults (Bialystok, 2009).

In line with the role of inhibitory control and language switching a number of researchers (Costa et al., 2008) tried to figure out whether that constant inhibitory control used by bilingual speakers through their lives also results in enhancing other general attentional mechanisms. They compared the performance of bilinguals and monolinguals on various attentional network tasks (ANT), finding that bilinguals outperformed monolinguals on the attentional network task in terms of efficiency as well as of reaction times. Accordingly, the study credited bilingualism with resulting in superior selective attention by providing measures of conflict resolution and overall speed of responding.

In addition, another important task showing executive control and conflict resolution is the Stroop Task (Bialystok et al., 2008). The design included two control conditions in which participants either named a colour word printed in black as quickly as possible or the colour in which a row of Xs was printed. In both conditions, bilinguals at different ages showed a smaller cost in naming the ink colour in the incongruent trials than did the monolinguals.

The enhancement of general executive functions, as a consequence of bilinguals' constant involvement of the executive control system to manage attention to the target systems, has been confirmed also with experiments on children. Early studies found an advantage in bilingual children on metalinguistic tasks requiring controlled attention and inhibition. These positive effects were not confirmed on comparable tasks more based on knowledge of grammar (e.g. Bialystok, 1988). For example, in a grammaticality judgement task all children were able to detect grammatical violations (e.g. "Apples grewed on trees"). Bilingual children, however, were more successful than monolinguals in recognising that there were anomalous sentences from a semantic point of view that were grammatically correct (e.g. "Apples grow on noses"). This experiment

requires effortful attention to ignore the misleading semantic distractor that induces the child to judge the sentence as grammatically incorrect. A more detailed explanation for bilingual's different performance in this task will be provided in the next sections of the chapter, in relation to analysis and control.

An important extension of this research aimed at demonstrating that the same mechanism of inhibition and control responsible for bilingual better performance in verbal tasks are also effective in nonverbal domains (e.g. Bialystok and Majumder, 1998). Researchers started to investigate to which extent the bilingual advantage could be confirmed in non-verbal domains and which were the specific conditions leading to this difference.

The studies on children have shown that bilingual children develop the ability to solve problems that contain conflicting cues earlier than monolinguals. One example can be found in the card sort task developed by Zelazo and colleagues (Zelazo et al., 1996). In this task, children are presented with a set of bivalent stimuli that they need to sort by one feature (for example, colour) and then immediately by another (for example, shape). Children under 4 or 5 years old usually find it difficult to state the new rule as they continue sorting by the original criterion provided on the first round. The effort required in the second round does not only consist in understanding and remembering the rule. Instead, they need to be able to focus on the feature that is relevant and ignore the non-relevant feature which is still present. This is particularly demanding if one considers that the features that they need to suppress and ignore in the second round were the basis for performance required in the first round and still highly salient. It has been argued that this ability to switch criteria for the sorting decision and attend to the new feature with the previous (now irrelevant) feature still present indicates a better executive control on behalf of bilingual participants. In particular, studies on bilingual and monolingual children have shown that bilinguals are able to master this problem earlier than the monolingual counterpart.

The review of the studies focused on switching costs in verbal and non-verbal domains suggests that not only language dominance but also language proficiency have an impact on bilingual switching costs. However, even though it has been confirmed that multiple language users outperform monolinguals in inhibition and attention tasks, it still remains unclear whether this is mainly to be attributed to language dominance or absolute proficiency.

## **2.5 The Bilingual Advantage in Working Memory**

Another important cognitive ability that plays a major role in language processing and learning is Working Memory (WM). It has been considered as part of Executive Functions by some cognitive scientists and as an independent component by some others. Baddeley and Hitch (1974) defined it as a specialised memory system where small amounts of information can be simultaneously stored and processed for a brief period of time during the performance of a task. It has been seen to be fundamental in language processing. Interestingly, for the purpose of the present thesis, additional language learning has been reported to be significantly affected by WM abilities (e.g. Baddeley et al., 1988).

What makes it so crucial in language processing is the fact that it is recalled in demanding tasks where participants need to ignore interferences, distractions and resolve conflictual information. WM refers to a limited capacity system responsible for the temporary storage and processing of information while cognitive tasks are performed. The multi-component model proposed by Baddeley and Hitch (Baddeley & Hitch, 1974; Baddeley, 1986) represents the most extensively investigated and the best articulated theoretical account of working memory. It consists of a modality-free controlling central executive which is aided by two slave systems ensuring temporary maintenance of verbal and visuospatial information: the phonological loop (composed of a phonological store and

an articulatory rehearsal system) and the visuospatial sketchpad. This model has unquestionably contributed to a better understanding of the part played by working memory in various domains of cognition. In particular, numerous findings suggest that working memory (especially the phonological loop and the central executive components) makes significant contributions to some aspects of language processing such as sentence comprehension, speech production, vocabulary acquisition, and reading (Collette et al., 2000).

Despite the evident relationship between bilingualism and cognitive performance on one hand, and the crucial role played by WM in language processing on the other, studies on the relationship between WM and bilingual language processing have found controversial results. Some studies show superior performance on WM tasks on behalf of bilinguals whereas others have found no significant difference between bilinguals and monolinguals. Bialystok (2009) proposes an interesting explanation for these different results based on a series of studies involving both verbal and non-verbal tasks. Indeed, she claims that if it is true that memory is equal in monolinguals and bilinguals, bilinguals are disadvantaged in verbal tasks. For instance, considering the evidence for verbal memory as measured by free recall where monolinguals and bilinguals were asked to recall lists of 20 words under various conditions, bilinguals were observed to perform poorly at both ages and under all conditions. Therefore, as Bialystok points out, this is not surprising considering the premise that bilinguals are disadvantaged in verbal tasks compared to monolinguals.

The results from two composite analyses by Bialystok and Feng (2009) provide no evidence to claim that WM is enhanced by the bilingual experience, despite being part of the executive functions. In particular, in the first study, they examined the performance of 190 monolingual and bilingual children in recalling long strings of animal names showing no difference between the two groups. The second study included 544

participants, younger and adults, monolingual and bilingual, showing no difference in solving the task among groups. They were asked to listen either to increasing strings of words and re-order them alphabetically or to two-digit numbers and re-order them in ascending sequence.

Accordingly, Bialystok tries to disentangle the complex issue by reviewing a number of studies assessing WM in a non-verbal domain, that is, which administered input that is not supposed to favour monolinguals. One of the tasks was the self-ordered pointing task (Petrides and Milner, 1982), where participants were presented with 12 abstract drawings and were asked to update a mental list of these images by pointing to a different drawing on each page without repetition. The performance in WM was calculated as the number of repetitions errors committed. The second task employed was the Corsi block test (Milner, 1971) involving 10 wooden blocks spread out in a random array. The participants are required to reproduce the sequence in either the same (i.e. forward span) or reverse order (backward span). There was no significant difference in performance between monolinguals and bilinguals in the forward span condition. However, in the most cognitive demanding condition, i.e. the backward span, the younger group outperformed the older group and, among the young participants, bilinguals performed better.

Following these premises, Bialystok and colleagues developed non-verbal tasks to assess WM in both children and adults (i.e. Feng, Diamond and Bialystok, 2007). The tasks included conditions that varied in their demands for executive control for adults and children. The results suggested that the difference in performance between monolinguals and bilinguals was not due to the memory ability but in conditions that included higher demands for control and inhibition. In other words, in simple condition, all participants achieved the same recall score but as soon as the executive control demand increased, the bilingual group demonstrated to be able to maintain the same performance level in all condition.

Thus the findings from these studies indicate that the cognitive advantages of bilingualism manifest differently for tasks involving WM and tasks that involve other types of cognitive abilities on one hand, and for verbal and non-verbal tasks input on the other. This suggests that WM may operate differently for perceptive and productive language tasks. More research in the field of psycholinguistics is needed to clarify the specific role of WM in bilinguals by partialling out its unique component from the executive functions. Indeed, it is worth investigating in which ways the bilingual experience leads to superior processing and storing of information compared to monolinguals. In particular, it is necessary to shed light on whether lifelong experience speaking multiple languages leads bilinguals to possess a more advanced WM system compared with monolinguals.

### **2.5.1 Working Memory and Brain Activation**

From a neurological point of view, in terms of brain areas activated in WM processes in bilinguals, studies suggest that the dorsolateral prefrontal area plays a crucial role in the WM network. However, a different type of involvement for the brain is observed depending on the type of language processed, i.e. L1 or L2. For instance, in a PET study, Rinne et al. (2000) observed that Finnish-English professional interpreters resort to the left frontal lobe when interpreting into L1 while a greater left-sided area of the frontotemporal lobe was involved when interpreting into the L2. This is in line with Ardila's (2003) claim that the direction of the interpreting between languages affects the brain activation for lexical retrieval, semantic processing, and verbal WM. Accordingly, a more widespread brain involvement when the L2 is processed may suggest a less efficient L2 verbal processing for the WM, considering the greater amount of workload and complexity of understanding the L2 compared to L1. Thus, the role of the dorsolateral prefrontal area in WM indicates that it is not a completely separate process from the other EFs (Higby et al., 2013). Therefore, more

research is needed to examine how these two types of cognitive ability interact and affect each other.

### **2.5.2 Working Memory and L2 Acquisition**

If the role between EFs and WM needs to be further explored, the role played by WM in second language aptitude still remains unclear. Some studies report a correlation between WM and L2 learning (e.g. Mackey et al., 2002) whereas some others have not confirmed this relationship. Moreover, as already argued, there is evidence that the bilingual experience leads to benefits in inhibitory control in a number of verbal and non-verbal tasks. A series of studies have tried to account for the individual differences in inhibitory control that are involved in L2 processing. In particular, Linck and Weiss (2011) adopted a longitudinal approach to investigate whether two fundamental EFs, namely, WM and inhibitory control predict the acquisition of explicit L2 knowledge in a formal setting (i.e. classroom).

As already mentioned, according to Baddeley WM includes a short-term storage component (i.e. short-term memory) and an attentional control component, i.e. the central executive. These components are correlated but distinguishable from a conceptual and empirical point of view. A growing body of research provides evidence on the role of WM in L2 learning. Individual differences in WM have been correlated with L2 proficiency as measured by TOEFL scores, reading comprehension tasks, different types of feedback etc. Psycholinguistic research has demonstrated, through online language processing tasks, that while using the L2, control of attention on behalf of WM is required.

Thus, on one hand, the crucial role played by WM and inhibitory control on cognitive control of memory and attention has been demonstrated. On the other, it still remains to clarify the role of each of them in L2 learning. Indeed, if one might expect that they are fundamental in L2 learning and

processing, given that both languages are active in the mind and of the learner and can interfere with one another. Thus, the main goal of the aforementioned study was to disentangle the effect of these two specific cognitive processing abilities in predicting the explicit acquisition of L2 knowledge. They found that even after controlling for a number of other important individual difference variables such as SAT (Scholastic Aptitude Test), GPA (University Grade Point Average) and motivation to learn an L2, WM was still the most important predictor of L2 proficiency. On the other hand, inhibitory control did not predict performance in L2.

## **2.6 The Bilingual Advantage in Theory of Mind (ToM)**

Another important cognitive ability where a bilingual advantage has been observed is the ability to develop a Theory of Mind (ToM). In developmental psychology, it is generally defined as the intuitive understanding of one's own and other people's minds and mental states, i.e. thoughts, beliefs, perceptions, knowledge, intentions etc., and how these mental states affect behaviour. This ability to understand and acknowledge that others have mental states different from one's own make it possible to infer and predict what other people are thinking as well as how they may act. It develops by different degrees from infancy through childhood, adolescence into adulthood. It has been considered a fundamental skill for language acquisition and for the development of appropriate social behaviour.

ToM is involved in all aspects of daily living and social interactions and, in children, is strongly correlated with language ability. Indeed, bilingual children in pre-school age have increased understanding of both mental and non-mental representations. The acquisition of ToM is delayed in children with some specific language impairment. On the other hand, it has been demonstrated that ToM skills predict later metamemory (i.e.



knowledge and beliefs about one's own memory) and metacognition (i.e. knowledge and beliefs about one's own cognitive processes).

A number of studies suggest that ToM skills are likely to improve children performance in the classroom. Indeed, ToM skills underlie a child's ability to understand and make up stories, which are fundamental for developing reading skills. In particular, Astington and Pelletier (1996) have argued that there is a relationship between the degree of ToM and the ability to learn by instruction and collaboration. What is more, it is also linked to the development of scientific and critical thinking.

A study by Klein (1998) demonstrated how students' skills to predict and explain a doll or cartoon character's behaviour correlated with their ability to explain the causes of events. The development of ToM may be particularly relevant to classroom learning during middle childhood and adolescence. Although all normal children develop ToM skills in basically the same sequence, the development of ToM may be different in different cultures. This may be due to the different vocabularies about mental states in different languages in thinking and talking about mental states.

Brain screening experiments while performing ToM tasks has suggested the activation of the neurons of the anterior paracingulate cortex. This area is responsible for the central ToM task of distinguishing between one's own mind and that of another person.

In the research addressing whether bilingual children have an advantage over their monolingual peers in the development of ToM, the answer has been mixed. A recent study (Schroeder, 2018), has tried to disambiguate the conflicting results from previous literature through a meta-analysis combining statistical data from many previous experiments. The results indicate a bilingual advantage in ToM, however, it does not address the cause for this advantage. The author accounts for three main potential reasons why bilinguals might have an advantage in mental state reasoning, namely, the "executive functioning" account, the

“metalinguistic awareness” account, and the “socio-pragmatic” account. Future research is needed to determine the relative contributions of these accounts and others.

The first account, “executive functioning,” is based on evidence that bilingualism improves executive functioning and this, in turn, predicts performance in ToM (Devine and Hughes, 2014). The supposed enhanced attentional control abilities of bilinguals could be used to down-regulate th  
The second account, “metalinguistic awareness,” is based on evidence that bilingualism enhances metalinguistic awareness Bialystok, as it will be discussed in the present thesis, and that metalinguistic awareness is linked to ToM development too (Doherty, 2000). Indeed, it has been claimed that bilinguals’ metalinguistic understanding that there are two labels for the same concept (i.e., one label in each language) enhances the understanding that two people can have a different mental state in relation to the same event (and thus that someone else’s mental state can differ from their own).

The “socio-pragmatic” account is that bilinguals come to understand that some people speak only one of the languages they master (either language A or language B) and some people speak both of them (languages A and B). This understanding that two people can have different (or similar) language knowledge may transfer to the more general understanding that two people can have a different (or similar) mental state. Although all of them appear to explain the relationship between language development and ToM, future research is needed to understand the extent to which they affect this relationship.

## **2.7 The Bilingual Disadvantage in Verbal Tasks**

Despite the substantial advantages in EFs reported in bilinguals, the literature investigating the effects of bilingualism has also reported a series of cognitive and linguistic processes where bilinguals are seen to perform

poorly compared to monolinguals. Specifically, the most important disadvantages related to the bilingual experience concern lexical retrieval, verbal fluency, and language proficiency. Most of the experiments employed are based on response times and have neural correlates.

It is well documented that bilinguals control a smaller vocabulary in each language compared to monolinguals. As Bialystok points out, this is particularly important given that vocabulary size is a central measure to assess children's progress in language development. Specifically, a richer and more refined vocabulary reflects a better understanding of the language under investigation. Nonetheless, developmental research has demonstrated that bilingual children control a smaller vocabulary in each language than their monolingual peers (e.g. Oller and Eilers, 2002). Bialystok and Feng (2009) confirmed these findings by combining the findings from a standardised Peabody Picture Vocabulary Test score of monolingual and bilingual children aged between 5 and 9 years old, who had participated in a number of studies for several years. The difference between bilingual and monolingual children was confirmed in each age group and the vocabulary gap was constant through the sample as the analysis showed no interaction of age and language group.

The same scenario is found in adults even though the measures employed do not concern vocabulary size but rather access to vocabulary or lexical retrieval. During picture-naming tasks, for instance, reaction times have been observed to be slower for bilinguals immersed in their L1 environment and for those living in the L1 environment (Gollan et al., 2008, Ivanova & Costa, 2008). Moreover, bilinguals have also been reported to have longer reaction times in verbal fluency tasks, where they are asked to produce as many exemplars as possible within a given category or given a first letter (e.g. Sandoval et al., 2010), in semantic decision tasks (e.g. Proverbio et al., 2007). In addition, bilingual have been reported to experience more tips of tongue, demonstrate poorer word

identification through noises and experience more interference in lexical decision.

It has been argued that on the basis of the bilingual deficit in all these studies there is the interface from other competing languages. Costa (2005) points out that manipulating the relationship between the words into the two languages changes bilingual performance, for example, by controlling the cognate value or adjusting word frequency.

Bialystok (2009) claims that the bilingual disadvantage in lexical access and retrieval persists with aging. In order to confirm this hypothesis, she administered three tasks to assess verbal knowledge and retrieval: an English vocabulary test and two tests of verbal fluency. What was particularly interesting about the design of tasks is that the author decided to substitute the drawings that they were supposed to name with verbal definitions. The assumption was that accessing words would be more demanding from abstract definitions rather than concrete drawings, where a contextual support can be found. The findings confirmed bilinguals' worse performance compared to monolinguals in both age groups.

### **2.7.1 Different Accounts for the Bilingual Disadvantage**

A number of researchers also support the aforementioned assumption that it is the cross-language interference to cause bilinguals' poor performance (e.g. Rosselli et al., 2000, Sandoval et al., 2010). However, they notice that bilinguals show poorer performance on certain tasks such as semantic fluency tasks and no difference compared to monolinguals on letter fluency tasks.

To account for these differences, an alternative explanation has been proposed, that is the "Weaker Links Hypothesis" (Gollan et al., 2008). It states that as regards lexical retrieval, the disadvantage is due to the fact that each individual lexical item is used less frequently by bilinguals

compared to monolinguals of the same language used in experimental settings. Therefore, this explains why the lexical items within a language are less strongly connected in bilinguals than in monolinguals. To support this hypothesis, Gollan and colleagues demonstrated that bilinguals poorer performance occurred, specifically, for low-frequency words compared to high-frequency words, especially in their non-dominant language. Moreover, they also found that these frequency effects were attenuated in older participants, supporting the claim that frequency counts in the lexicon of bilinguals may be lower.

This explanation comes from bilingual language modelling where the retrieval effects are simulated in a connectionist network. That is to say, the associative networks between words and concepts are distributed across two (or more) languages, making the association less practiced and less fluid.

On the other hand, Hernandez and Li (2007) have advanced a different explanation to account for the bilingual disadvantage in lexical retrieval. Indeed, they propose an explanation involving the age of acquisition of the vocabulary in each language, with the different performance on behalf of bilinguals depending on the age of the L2 acquisition.

In addition, there are other views propounded to explain the reduction in lexical retrieval referred to the already mentioned conflict created by the competition between the item in the target and non-target language, which is still available in the bilingual lexicon (Green, 1998). This competition requires longer times to access the lexicon as a mechanism for controlling attention to the target language and for inhibiting the non-target one needs to be activated. This conflict is generally resolved by the executive processes for control, attention, and switching.

Neuroimaging studies have found support for the idea that bilinguals and monolinguals process their native languages differently in lexical retrieval, although there is no common agreement among the studies on the brain

regions involved, which distinguish monolinguals and bilinguals. Park et al. (2012) observed greater activation in the bilingual participants for both L1 and L2 compared to monolinguals in lexicon decision tasks. In particular, bilinguals involve more the left middle and superior occipital gyri and the right middle occipital gyrus whereas monolinguals showed greater activation of the right supramarginal gyrus.

Nonetheless, it has been argued that there may be additional factors to take into account when examining these differences in brain activation. For instance, the participants of the study had different L1s and the bilingual group had been living in the L2 environment for many years, suggesting an effect of L1 attrition. Similarly, a study by Park et al. (2012) identified five left-hemisphere brain regions that showed greater activity for bilinguals than monolinguals in both of their languages.

The type of tasks used in different studies may also account for different brain activation in monolinguals and bilinguals. For instance, Park et al. used a lexicon decision task while Parker Jones et al. employed picture naming and word reading tasks. On the other hand, Martin et al. (2012) conducted a go/no-go word length task to measure Event-Related Potential (ERP) responses. Interestingly, the explanation advanced by the researchers for bilinguals slower lexical access is that they automatically process semantic information in both languages even when it is not needed. Participants were required to respond to the pseudowords determining whether or not they were more than five letters long, ignoring the real English words. The access to semantic information was not necessary for the task. However, bilinguals were reported to always process the semantics of English words, while monolinguals showed no difference between primed and unprimed words. Therefore, the study suggests that bilinguals delay in the lexical decision due to the stage of semantic analysis always occurring.

All these studies highlighting differences in monolingual and bilingual language processing, apart from explaining bilinguals' poorer performance

in certain tasks, provide additional evidence to the claim that bilingual experience reshapes speakers' linguistic system as a whole. Grosjean (1985, 2006) was the first to propound the view that bilinguals are not two monolinguals put together, that is bilinguals do not simply add an L2 repertoire to their original one. The concept is also in line with the dynamic system theory by De Bot and colleagues (2007), according to which a speakers' linguistic system encompasses all languages known and is an ever-changing identity. Differently from the linear additive approach to language development, the theory posits that language development is a dynamic system comprising a set of variables that interact with each other and continue changing throughout individuals' life.

It has been argued (Higby et al., 2013) that the dynamic system theory, in fact, can account for both the positive and negative effects of bilingualism in that it explains the unique characteristics of bilingual language processing. Indeed, the idea that multilinguals have a single linguistic system involving different linguistic repertoires is supported by a series of studies of cross-linguistic interference. These studies have found that bilinguals tend to resolve differences in their multiple languages by forming a set of intermediate representations that appear dissimilar from those of monolinguals in the same languages. This claim has been supported by empirical evidence in different areas such as in lexical category boundaries (i.e. Ameel et al., 2009), use and interpretation of grammatical subject (i.e. Tsimpli, Sorace et al., 2004), colour perception (Athanasopoulos et al., 2010) etc.

Thus, to better understand the positive and negative effects coming from the bilingual experience, it is necessary to consider the linguistic system as a whole, its complex dynamics and how managing two or more language involves different cognitive processes which, in turn, affect linguistic and non-linguistic outcomes.

To find a unique explanation that accounts for both the advantages and disadvantages observed in bilinguals in the different cognitive domains

examined so far is not an easy task. Bialystok (2009) suggests that the central conflict on the basis of bilingual language processing and production could explain the enhancement in executive control on one hand and, the slower lexical retrieval on the other. Indeed, it compromises lexical access in that, as already discussed, it is more effortful and enhances executive control through its continuous involvement in language production. In terms of memory, there is a little impact but since memory performance relies on either linguistic or executive processing monolinguals and bilinguals will perform differently depending on the type of task used.

In addition, the fact that linguistic and non-linguistic processing are controlled by networks of activation (Abutalebi and Green, 2007) entails that bilingualism affects the entire brain processing, with consequences on the linguistic and non-linguistic cognitive aspects discussed. Besides, bilinguals have been reported to resolve verbal conflicts activating two areas that monolinguals use to resolve non-verbal conflicts, including Broca's area. Instead, another study by Bialystok et al. (2005) revealed that to resolve verbal conflicts, bilinguals have more resources (i.e. Broca's area) as well as more efficient resources (i.e. other frontal areas). Therefore, surprisingly, the bilingual experience seems to lead to great benefits in non-linguistic processing and to costs in language production.

## **2.8 The “Bilingual Paradox”**

Bialystok and Ryan (1985) provided an interesting explanation to account for the positive and negative effects of bilingualism, reported in the present chapter, moving performance in the opposite direction. On average, bilinguals have been seen to perform poorly compared to monolinguals in tasks based on the rapid lexical access whereas they perform more efficiently on non-verbal tasks assessing executive control. To explain this paradox where linguistic experience leads to costs for language



processing and benefits for the non-verbal cognitive ability the authors refer to two different components involved: i.e. analysis of representation and control of attention. Indeed, they argue that both components are required for skilled performance in language processing and production and, when they are at different levels, they cannot be integrated properly into fluent performance. In particular, the knowledge base is the representation of information needed to perform in a cognitive domain.

However, linguistic development does not simply rely on the accumulation of knowledge since the increased organisation of that knowledge is needed to support higher levels of performance, that is to say, analysis. The more knowledge becomes organised and structured, the more it becomes explicit and can be manipulated. Therefore, through the process of analysis, knowledge is continually rebuilt by adding new information and by the constant restructuring of it that makes knowledge more abstract and accessible.

Moreover, Bialystok and Ryan claim that information moves along a continuum from implicit to explicit knowledge, with different degrees of explicitness needed to perform certain types of tasks. In this sense, the analysis is responsible for the reforming the organisational structure of information needed to support increasingly complex performance.

As regards the other component, control of attention, it refers to the cognitive procedures employed to access knowledge and carry out the required task. It started to be particularly relevant in the attempt to explain the relationship between explicit knowledge of the language, fluent performance and MLA. Indeed, the control of attentional processes is fundamental when there is misleading or irrelevant information that needed to be avoided so that the selection of the target information occurs efficiently. Differently from the analysis component, which is domain specific, control of attention is domain general, that is it does not reside in a particular knowledge system but in the resource-limited attention mechanism of the mind.

To better understand the role of analysis and control in performance, it is worth reconsidering the aforementioned metalinguistic awareness task administered to children (Bialystok, 1986), where they were asked to judge the grammaticality of sentences. Children's ability to reject an ungrammatical sentence, that is to say, a sentence such as "Apples grew on trees" relies on their representational knowledge of grammar (i.e. analysis of linguistic structures). On the other hand, children were also warned that the only criterion for judging the acceptability of the sentences was whether or not they were said "the right way", even though there might be some sentences that were considered to be "silly". Accordingly, when a sentence like "Apples grow on noses" is presented, children that were able to ignore the semantic anomaly and still judge the sentence as acceptable relied on their control of attention. Indeed, the salient anomaly acts as a distractor that needs to be inhibited to focus attention on the formal structure of the sentence.

Thus, the two components involved explain why in tasks where both analysis of representation and control of attention bilinguals and monolinguals perform differently. Specifically, they are equally successful at determining whether a sentence is correct or not but bilinguals are better at dealing with a grammatical but semantically anomalous sentence. This is due to their more efficient use of the control of attention component, fundamental where inhibition of the non-relevant information is involved.

On the other hand, as discussed in the present chapter, bilingualism also leads to costs in cognitive performance. The difference between the tasks that lead to a deficit or advantages for bilinguals can also be interpreted in light with the analysis and control theory advanced by Bialystok and Ryan. All the tasks where bilinguals have been reported to perform poorly, that is lexical access tasks, involve rapid retrieval of a lexical item from semantic memory. The most important factor which determines how fast and how efficiently this retrieval occurs is the nature of the representational base in

semantic memory. In other words, the better and more explicitly the linguistic and conceptual representations are organised, the easier it will be to retrieve specific items. However, the authors argue that while there is no reason to assume that bilinguals have less defined and organised representational systems, there is a reason to assume that bilinguals' representational systems for each language are less well connected to the conceptual system. Indeed, bilinguals use each of their naming options less often than monolinguals with the consequence of having a less efficient and fluent access to the items. Moreover, bilinguals poorer vocabulary in each language diminishes the representational base from which performance in these tasks proceeds.

In contrast, all the studies reported where a bilingual advantage was observed mainly rely on aspects of executive control. Thus, it can be argued that both, analysis of representation and control of attention, are involved in linguistic and non-linguistic tasks but the different performance between bilinguals and monolinguals is due to the different emphasis of each component. Thus, the general disadvantage for bilinguals in representation and the general advantages in control determines performance in these paradigms.

Nonetheless, the authors states that in fact, it would be more precise to claim that verbal and non-verbal tasks rely on the interaction of both components rather than mainly on one or the other. This interaction is particularly evident in linguistic tasks that also carry significant demands for executive control. Thus, it can be argued that Bialystok and Ryan's model accounts for a wide range of cognitive tasks including different domains and levels of skilled performance. That is, every single task we perform depends on how efficiently we manage to use both components to support performance. However, analysis of representation is specific to a domain while control of attention and executive procedures for monitoring information, conflict resolution, and task switching are more advanced for bilinguals and these processes concern all domains of expertise.

Accordingly, the model provides a reasonable account for learning and development for language ability.

### **2.8.1 Analysis and Control in Metalinguistic Tasks**

Another research by Friesen and Bialystok (2012) examines the relative contribution of language knowledge on one hand and executive control ability in metalinguistic tasks. Indeed, it has been argued that ML tasks, unlike the reviewed linguistic tasks, require to access both attentional processes and linguistic knowledge in different extents. Again, the findings are consistent with the already discussed general framework of control and language analysis as originally proposed by Bialystok and Ryan (1985). What is more, through a number of different tasks that vary with regard to linguistic and metalinguistic demands, the authors were able to focus on the metalinguistic development of bilinguals. Indeed, the study provides additional evidence to understand the impact of each component and how analysis and control jointly affect MLA.

In particular, they demonstrated that the two most important factors affecting bilinguals' performance are the nature of the task demands and the degree of bilingualism. In the Wug test (Berko, 1958), children need to apply English morphological rules to nonsense words. It does not make a high demand on the executive control as there is no salient distracting information to ignore. Instead, it requires a high level of English morphological knowledge. Bilingual positive effects, here, were only observed with balanced bilinguals, that is participants with an equal level of proficiency in both languages. No additional advantages were recorded in participants becoming bilinguals with dual language exposure. Therefore, the better performance on the Wug test was due to the initial increased insight into the relationship between language's form and meaning and not by improving executive control.

On the other hand, in the grammaticality judgement and verbal fluency tasks, requiring high levels of executive control, the study showed that the superior executive control skills developed by bilinguals enable them to compensate for the weaker language skills. Moreover, the greater bilingual experience was the factor which determined the improved mechanism control observed.

## **2.9 Conclusion**

Thus, the main aim of discussion developed in the present chapter, based on evidence coming from different studies, each employing a particular methodology to address specific questions, was to disentangle the complex argument of the so-called bilingual advantage. However, it can be concluded that since bilingual language processing relies on a series of networks, it is not possible to identify one single cause accounting for the different effects of bilingualism.

Indeed, the positive effects observed in a number of EFs such as inhibition, control, attentional networks, WM, ToM etc. and the negative effects found in lexical retrieval, verbal fluency, and vocabulary size can all be considered as part of the complex, unique cognitive structure of bilingual language processing. Any attempt to define this system as better or worse compared to the monolingual system would fail, in that, the language deficit on one hand and the control advantages on the other constitute the peculiar aspects of the bilingual mind which makes it different from the monolingual one.

## **Chapter III: Third (or Additional) Language Acquisition**

### **3.1 Introduction**

Third Language Acquisition (TLA) is a relatively new field of study, developed considerably in the last few years. It refers to the study of a non-native language by learners who have previously acquired or are acquiring two languages. Cenoz (2013) defines it as “the acquisition of a language that is different from the first and second and is acquired after them”. Moreover, it is important to highlight that the expression TLA is referred to the acquisition of a third or additional language as well as the area of research itself. The study of TLA brings together two fields of study that have traditionally overlooked each other, that is, second language acquisition (SLA) on one hand and the study on the effects of bilingualism on the other.

Despite the similarities of SLA and TLA, it can be argued there are a number of reasons to consider TLA as a distinct process and area of research from SLA. Indeed, in a sense, the rise of TLA in the last few decades has been considered as a reaction to the neglect of the differences it has compared with SLA. What mostly differentiates the two processes is the more language experience that third language learners have at their disposal, the general effects of bilingualism on cognition, and the access to two linguistic systems when acquiring an additional language.

The present chapter deals with the two main domains that have received the most attention in the studies on TLA. First, the difference between monolingual and bilingual speech processing, reviewing the most influential models propounded by academics in the last decades. Second, the cross-linguistic influence on TLA, where the three most important models of language transfer, advanced in the field of formal linguistics, will be compared: i.e. the Cumulative Enhancement Model (CEM; Flynn et al.,

2004), the Typological Primacy Model (TPM; Rothman, 2011), and the L2 Status Factor (L2SF; Bardel & Falk, 2007).

### **3.2 SLA vs. TLA: Cognitive and Linguistic Differences**

As already mentioned, after nearly two decades of intense research on TLA, it is now commonly agreed that there are several cognitive and linguistic reasons to consider TLA as an independent field of study from SLA. Until very recently, third language learners were included under the umbrella of learners of a second language. However, it has been argued (González Alonso et al., 2016) that second and third language learners come to the process of language acquisition with a linguistic and cognitive background that differs considerably, both quantitatively and qualitatively. Indeed, a second language learner is a monolingual at the initial state of SLA, whereas a third language learner is already a bilingual (potentially early/late, simultaneous/consecutive, etc.).

This entails that having at least two languages in their linguistic repertoires allows third language learners to relate new structures, new vocabulary, or new ways of expressing communicative functions to the two languages they already know, not just one of them, as in the case of monolinguals. Moreover, third language learners show more refined skills and strategies for achieving the language-learning task.

Another remarkable difference between the two processes concerns the learning context. SLA usually means that a second language is chronologically learnt after the first language. However, the L2 can be learnt in a variety of different ways. For example, it can be studied as a foreign language for a few hours a week at school, or it may be the language of instruction or the main language of the community. What is more, the differences could also relate to the many other factors involved in the complex area of research of TLA: i.e. age, instructional methods, or motivation. Indeed, in the TLA, all these differences must be considered

not only for the target language but also for the second language acquired. TLA is very is very common among early bilinguals who have acquired their two first languages simultaneously. Another main difference relates to the use of the languages involved. For instance, some L3 learners are active bilinguals who use their other two languages in their everyday life, while others live in a monolingual context and use their second language, in this case, a foreign language, only occasionally.

Additionally, in terms of the order of acquisition of the languages, the two processes of language acquisition differ considerably. In SLA there are only two possible routes, i.e. either the two languages are learnt simultaneously or one after the other. In TLA, instead, the number of possible routes increases as there are at least four main types of order of acquisition (Cenoz, 2000). The three languages can be acquired consecutively (L1>L2>L3); two languages can be acquired simultaneously before the L3 is acquired (Lx/Ly>L3); or after the first languages (L1>Lx/Ly) or the three languages could be acquired simultaneously in early trilingualism (Lx/Ly/Lz). Finally, among the other factors affecting the process of TLA, it is worth mentioning the status of the different languages involved, the degree of bilingualism, and the type of bilingualism in the L1 and L2 (or Lx and Ly) presented by the learners when acquiring the third language.

Thus, with TLA, a new approach of research is presented that requires a new methodology which takes into account three main aspects: i.e. the multilingual speaker, the whole linguistic repertoire, and the context. Regarding the first aspect, as Grosjean (1992) points out, multilingual speakers cannot be considered as several monolinguals of different languages put together as their multilingual competence is of a different type. Indeed, Kecskes (2010: 100) claims that these differences are not only quantitative but also qualitative in that “monolingual and bilingual children do not differ in what they do with languages, but in how they do it”. Specifically, according to the author, there are conceptual differences



between monolinguals and bilinguals, because bilinguals use strategies such as code-switching and translanguaging (García, 2008). Code-switching, in particular, has been considered as the most distinctive feature of bilingual speakers. Therefore, it is important to be aware of the fact that the comparisons between monolinguals and bilinguals, in the studies on the effects of bilingualism on TLA, must be considered carefully in that two different types of competencies are being compared.

In addition, another important issue deserving attention is the difference between two types of third language learners, that is active bilinguals and the so-called foreign language users. Psycholinguistic studies on TLA have usually compared active bilinguals to monolinguals, highlighting the benefits of bilingualism on cognitive and enhanced MLA.

However, the focus on multilingualism approach suggests looking at the different types of L3 learners to see whether the cognitive benefits can be extended to those learners who have just acquired a foreign language but do not use it regularly in a multilingual context. In other words, if the advantages of bilingualism in TLA are mainly due to the constant use of previous languages or to other factors such as level of bilingualism achieved, the age of acquisition of the L2 etc. Therefore, considering different types of L3 learners means attending to how bilingual speakers integrate a third language into their linguistic repertoire and the fluidity between their three languages.

The second aspect taken into account in TLA is the focus on the whole linguistic repertoire instead of "one language only" or "one language at a time". Indeed, to consider the complexity of multilingualism and how the different subsystems are connected across the languages in their development, it is necessary to look at all the languages in the multilingual speakers' repertoire. As it will be explained in more details in the following sections, the dynamic system theory of SLA can be used to interpret the effects of bilingualism on TLA. In fact, by looking at the interaction among languages in the multilingual learner's repertoire, it is possible to identify

“connected growers” that facilitates TLA. In other words, the interaction between different languages can be seen when the scores in the three languages are correlated and the patterns of cross-linguistic interaction are analysed.

Finally, the third component to be considered in the focus on multilingualism approach is the context of use of each language, as multilinguals build up their competence in social interaction. Indeed, the importance of context when analysing the effects of bilingualism on TLA aims at explaining how the L3 is incorporated into the multilingual speaker's language practices. To sum up, the alternative approach of focus on multilingualism proposes to study the influence of bilingualism on TLA based on the whole linguistic repertoire and the interaction between languages. At the same time, it considers the acquisition and use of languages in relation to the social context.

### **3.3 Monolingual, Bilingual and, Multilingual Speech Production Models**

As anticipated at the beginning of the chapter, one of the most significant differences between second and third language acquisition is the cognitive profile of the learners. That is to say, monolinguals and bilinguals have been seen to process linguistic information differently. Therefore, the following section will provide a comprehensive account of the most important speech production models currently available.

#### **3.3.1 Levelt (1989)**

Since most of the models of multilingual speech production are based on models originally created for monolingual speakers, it is worth examining Levelt's (1989) influential model, developed for monolingual processing. Indeed, both De Bot (1992) and Clyne (2003b) use his model as a basis

for their reflections on multilingual production. Levelt states that speech processing takes place in successive steps in three information stores: i.e. the conceptualiser, the formulator, and the articulator. The conceptualiser transforms communicative intuitions into preverbal messages. It allows the speaker to access extralinguistic world knowledge as well as the individual communicative situation. Messages are received by the formulator, which has access to the lexicon.

The formulator converts the preverbal message into meaning. Conversion occurs through the activation of semantic, syntactic, morphological, and phonological information at the lemma and lexeme level. Precisely, the lemma part contains the world's semantic and syntactic information, whereas the lexeme part specifies the possible forms of the world. Lemma activation is argued to be the first to take place. Once the output of the formulator (i.e. phonetic plan) is ready, it passes on to the articulator in order to be converted into overt speech. The phonetic plan (i.e. internal speech) is further checked via the speech comprehension system so that any errors can be detected and rectified before the overt speech is produced.

### **3.3.2 De Bot (1992)**

De Bot (1992) uses Levelt's model as the basis for his reflections on multilingual production. Indeed, as already mentioned, all models of multilingual speech production are essentially extended or revised models of monolingual and bilingual's speech production models. In fact, as De Angelis (2007) claims, it would be more accurate to state that there are no models specifically formulated to account for multilingual speech production. Instead, there are only models of monolingual and bilingual speech production that account for multilingual production as well.

In particular, De Bot's model accounts for the speech of healthy individuals and is not specifically concerned with language disorders, language

learning processes or language skills other than speaking. The author emphasises that Levelt's model was particularly reliable as it is based on "several decades of psycholinguistic research and is based on a wealth of empirical data, obtained through experimental research and the observation of speech errors" (De Bot, 1992: 2). Therefore, he claims that the bilingual version of the model only needs some minor modifications to be adapted and work efficiently.

In addition, it is important to highlight that the model was also extended to multilingual speech production. This means that one of the most comprehensive and detailed proposals of multilingual speech production available in the literature today, in fact, is based on a framework empirically based on monolingual data. However, De Bot (2004) maintains that our knowledge of how languages interact in the multilingual mind is still too limited to make a specific model for multilingual processing necessary.

In his bilingual model, De Bot describes how selection and control work in a bilingual speaker. Accordingly, he also draws on Green's inhibition/activation model (that will be discussed in more detail in the following sections). De Bot introduces a language node with a monitoring function. It provides information about the state of activation of various languages and acts as a monitoring device which compares the intended language with the language currently used.

According to the author, the main conditions that a bilingual speech production model should satisfy are:

- 1) to account for the speaker's ability to use languages separately or mix them during the speech, as is the case with code-switching;
- 2) to account for instances of cross-linguistic influence;
- 3) it should not be concerned with speed of production as the use of several languages should not slow down the entire production process;

- 4) it should be able to account for the different levels of proficiency of the bilinguals' languages;
- 5) it should be able to cope with a potentially unlimited number of languages and must be able to represent interactions between these different languages.

As a consequence, in order to satisfy these requirements and be applied to multiple languages, a number of main changes to Levelt's original model were required. First of all, referring to the conceptualiser, De Bot rationale is built upon two main considerations: i.e. Levelt's discussion on registers and the knowledge of how concepts are lexicalised in different languages. De Bot agrees with Levelt's principle, that information on language registers are added to the preverbal message in the conceptualiser and extends it to the bilingual version. As regards the second point, De Bot additionally takes into account the difference in the way concepts are lexicalised in different languages and argues that language-specific information must necessarily be added to the preverbal message into the conceptualiser.

In terms of the formulator, at first, he proposes two scenarios which see, respectively, the existence of one common lexicon for both languages where information is distinguished through a labelling system and, on the other hand, two separate formulators and lexicons for each language involved. In a second phase, the author advances a solution that is somehow in the middle of the two extremes proposed earlier. That is, some elements of the two languages are stored together and some others are stored separately, depending on variables such as linguistic distance and proficiency level.

Finally, as regards the articulator phase of the model, Levelt maintains that speakers store a large number of syllables rather than sounds. The phonetic plan is argued to consist of strings of such syllables. De Bot proposes that bilinguals have a common store for the syllables of both

languages, and patterns are stored only once if they are identical in the two languages, or individually if there are no matching patterns.

The idea that syllables belonging to different languages are all grouped in a common store raised a number of questions. In particular, it was argued that some language-specific labelling mechanism was required, otherwise, the learner would not be able to match incoming information with the syllables.

De Bot clarifies this point by stating that speakers have all sounds and patterns in the mind. However, it is still not clear how these sounds are distinguished during the production process. He maintains that the learners, at first, apply the L1 norms to L2 sounds and then, once the proficiency in the L2 reaches a level that allows the two systems to become independent, they do not need to rely on the L1 anymore. This mechanism would also account for the cross-linguistic phenomena attested from L1 to L2.

### **3.3.3 Green (1986, 1998)**

The aforementioned model proposed by Green (1986, 1998) is particularly relevant for the purpose of the current discussion as it has been used as a starting point by a number of authors, including the De Bot. From his studies on code-switching and bilingual aphasia, Green concluded that bilingual speakers do not switch their languages on and off, rather their languages show different levels of activation.

Specifically, in order to explain how control is executed, Green combines the notion of activation and inhibition, suggesting that they operate concurrently during the production process. When an item from the target language is selected, the activation of the item itself occurs together with the inhibition of all its competitors from other non-target languages.

When inhibition occurs, the activation level of all potential competitors is raised, reducing the possibility that the incorrect item will be selected in place of the target one. Accordingly, the highest level of activation occurs when a language is selected and controls the output. In a speech situation, all the languages available to the bilingual speaker are then selected to varying degrees. For instance, a language may be selected as the language to speak, being active as it takes part in the speech processor, or dormant as stored in the long-term memory but not interacting in the speech process.

The speakers control the activation and inhibition process by using a number of resources, constantly replenished by a resource generator. Resources have been compared to the energy of the production system. However, there are situations in which the speaker will not have full access to the resources. For instance, when he/she is not completely focused for only a limited amount of energy can be used at a given time. In the case of second language speakers and learners, needless to say, the amount of energy required is even larger as their L2 system is not as automatized as the L1 system. When the speaker does not have sufficient resources to use, the type of “errors blends” described by Green (e.g. strying, springling) can occur in production.

The underlying theoretical argument to Green’s model is that the way aphasic patients behave, essentially, indicate a problem associated with control of “intact language systems”. He maintains that languages cannot be lost after injuries, but they simply become less accessible during comprehension and production. Therefore, the aforementioned errors found in the speech of healthy individuals reflect poor control of the intact system. Although this latter has not been explicitly defined by the author, from what he writes, it has been inferred (De Angelis, 2007) that an intact system is a system containing a native-like knowledge. Assuming that language knowledge is native-like allows analysing speech production without being concerned with defining the type of knowledge in the mind.

Consequently, from this point of view, any language in the mind represents an intact system, entailing that it can be added with no need to define its content. Following these principles, the model has been also extended to multilingual speakers.

One of the main questions raised was to which extent multiple languages could be effectively be controlled in the multilingual mind. As already mentioned, Green argues that languages can be activated to various degrees and are presented in one of the following states. That is, they can be selected (i.e. controlling speech output); active (i.e. playing a role in ongoing processing); or dormant (i.e. residing in long-term memory but exerting no effects on ongoing processing).

It is the frequency of use of each language that determines in which of the three states it resides. For example, the language used more frequently can remain active in the background during online processing and the parallel activity that occurs results in a sort of influence on the target language. Instead, languages that are not used for a long time are in a dormant state and do not affect online processing.

In addition, about ten years later, Green (1998) developed the inhibitory model emphasising multiple levels of control. In particular, a language task inhibits potential competitors for production at the lemma level resorting to the language tags. A supervisory attentional system monitors the established scheme. The switching cost is defined as asymmetrical in that switching to the suppressed language, in unbalanced bilinguals, take longer.

#### **3.3.4 Grosjean (1998, 2001)**

Grosjean's bilingual view has been most influential in research on multilingualism for a number of reasons. He propounds that the speech of bilinguals and multilinguals is regulated by different modes in which the



speaker can be set during speaking. Specifically, he explains the Language Mode Hypothesis in these terms:

“A mode is a state of activation of the bilinguals’ language and language processing mechanisms. This state is controlled by such variables as who the bilingual is speaking or listening to, the situation, the topic, the purpose of the interaction, and so on (Grosjean, 1998: 136)”.

The author argues that at one hand of the continuum, bilinguals are in a totally monolingual language mode when they interact or listen to monolinguals who only know one of the languages they master. At the other hand of the continuum, bilinguals are in a bilingual language mode, that is, when they are interacting or listening to bilinguals who share two or more of the languages they speak. In the first case, one language is active in the mind and the other is deactivated. In the second case, instead, both languages are active but the one that is used as the main language of processing is more active than the other(s). In between the two endpoints described, bilinguals also find themselves at intermediary points, depending on the influence of the factors named by Grosjean.

Indeed, he also defines the language mode as a “state of activation of the bilingual’s languages and language processing mechanism at a certain point in time (Grosjean, 2001: 2).” Among the factors named by the author, it is worth mentioning the participants’ language mixing habits, the usual mode of interaction, the presence of monolinguals, the degree of formality, the form and content of the message etc.

Grosjean’s language mode hypothesis is particularly suitable to be applied to speakers of several languages, as languages can be activated to various degrees during the speaking process and influence the target language output. However, its validity still needs to be assessed more systematically with multilingual speakers.

### **3.3.5 The Factor Model (Hufeisen, 1998; Hufeisen& Marx, 2007b)**

Hufeisen's model has been developed to explain the foreign language process with a special focus on multiple acquisition in an instructed context. It takes into account the factors which influence the language acquisition process. Specifically, Hufeisen (1998) describes four initial stages of language acquisition referring to the four languages that the learner is acquiring. As reported by Jessner (2008), for each stage, the factors affecting the language learning process are the following:

- a. neurophysiological factors which provide both the basis for and the precondition of general language learning, production and reception capability;
- b. learner external factors such as socio-cultural and socio-economic surroundings, including culture-specific learning traditions, type and amount of input the learner is exposed to;
- c. emotional factors such as anxiety, motivation, or acceptance of the new target language;
- d. cognitive factors such as language awareness, linguistic and metalinguistic awareness, learning awareness, knowledge of one's own learner type and the ability to employ learning strategies and techniques;
- e. linguistic factors as included in the learner's L1(s).

Hufeisen's model is particularly relevant for the purpose of the current discussion, in that it highlights the reasons that make second and third language acquisition as two different processes that need to be examined separately. Indeed, Hufesein addresses the argument by advancing a number of convincing reasons why TLA cannot be subsumed under the umbrella of SLA.

First of all, while the L2 learner is a complete beginner in the learning process of a second or first foreign language, the L3 learner is already familiar with the foreign language learning process. Accordingly, he/she

has already developed a number of individual techniques and strategies to learn a new language. What is more, learners may have already learned to be aware of their individual learning style.

All these new features involved belong to a new set of factors: i.e. foreign/L2 specific factors (such as the individual L2 learning experience); explicit or implicit foreign language learning strategies and interlanguages of other learned languages. It has been argued that it is at this stage that the L2 works as a supporting language in the TLA process. This means that, in other words, L3 learners have language-specific knowledge and competencies at their disposal that L2 learners do not.

Hufeisen's model is particularly useful to illustrate the prototypical language learning process by taking into account each individual learning situation for the analysis. According to the author, indeed, each learner will develop a specific factor complex, where some factors turn to be particularly predominant for the learners while some others do not exert a significant influence on the learning situation.

### **3.3.6 The Multilingual Processing Model (Meißner, 2004)**

The Multilingual Processing model, developed by Meißner (2004), accounts for the processes taking place during the reception phase of written and oral texts in a foreign language. Ideally, the language belongs to a typologically related family, following the assumption that the learner will develop receptive skills in all the languages related to the one that he/she already knows. The focus is on the underlying processes which facilitate and enable the understanding of a new language.

Indeed, on the basis of the model, there is the idea that learners constantly rely on the knowledge they have in previous languages to understand a new text, in the unknown language. Where two typologically related languages are involved, the hypotheses are constantly revised by

the learner. This process has been seen as spontaneous or “hypothetical grammar”, relying more on the system of the previously learned languages than on the target one. During the learning process, the spontaneous grammar is constantly revised by the learner and developed by adding the structure and lexicon of the target language. As the structure of the languages known is close to the target language, they work as a sort of matrix for the structures and lexicon to be compared and contrasted.

However, there are a number of preconditions to be met for a spontaneous grammar to occur:

- a. an etymological relationship between the languages should exist;
- b. the learner has to be proficient in the bridge language(s);
- c. the learner has to be instructed on how to use the knowledge of a previously learned language as a bridge language.

When all the aforementioned conditions are met, the development of the receptive skills goes through four different stages. The initial understanding of the first stage is facilitated by the bridge language. In particular, the generation and revision of the hypotheses for this grammar about inter-lingual regularities works in a dynamic way, by systemising and generalising the target language input.

At the second stage, through spontaneous grammar, there is the creation of an interlingual correspondence grammar, which constructs interlingual correspondence rules. An evident feature of this interlingual correspondence grammar can be seen in the transfers between the source and target languages.

The third stage consists of a multilingual intersystem where all the interlingual transfer processes are stored. Thanks to this transfer base, the learner is provided with a general framework for decoding and understanding the new language. Among the most important transfer bases, it can be named the communicative strategy transfer, the transfer

of interlingual processing procedures, and the transfer of cognitive principles.

The final stage stores all the learning experiences in the target language as metacognitive strategies. Through time, the learner develops the ability to construct multilingual system knowledge based on positive and negative correspondence rules.

### **3.3.7 A dynamic System Theory Model of Multilingualism (Herdina & Jessner, 2002)**

The research on TLA has been particularly influenced by the already discussed model of bilingual processing, advanced by Grosjean. What is relevant about this latter is the fact that it presents the bilingual learners as multicompetents, with specific speaking and processing abilities that make them not comparable to the monolingual in either language.

This holistic approach to the linguistic system was also adopted by Herdina & Jessner's (2002) model, with a specific focus on the dynamics of multilingualism as a necessary condition. The changing nature of the multilingual development required the scholars to restructure the way of thinking about it. Indeed, they applied the dynamic system theory (DST), also known as complexity theory, taken from the fields of mathematics, physics, and biology, to the study of multilingualism. The DST maintains that the subsystems of a complex system need to be considered as a whole in the way they affect the overall and individual development.

Accordingly, Herdina and Jessner's dynamic model of multilingualism (DMM) claims that the development of a multilingual system is changeable, non-linear, and reversible (e.g. it may result in language attrition and loss), and complex. In addition, it is also highly variable for it depends on social, psycholinguistic and individual factors.

Thus, the model is designed as an autonomous model that is able to bridge the already discussed gap between research on bilingualism and research on SLA. It suggests that future language acquisition studies should go beyond the study of language contact between two languages in order to include other forms of bilingualism, considered as the knowledge of two or multiple languages. Moreover, it allows to predict multilingual development on the basis of the factors proved to be involved in the process.

More specifically, the DMM is based on the assumption that there are a number of psycholinguistic systems (i.e. LS1/LS2/LS3 etc.) defined as open systems which depend on psychological factors. Each system is interdependent and not autonomous from the other ones but, rather, perceived in mainstream research. In the DMM, the stability of the system depends on language maintenance. The language choices of the multilingual speakers are affected by the perceived communicative needs. Therefore, the holistic approach described in the model is crucial to understand the dynamic interaction among complex systems in multilingual language processing. Accordingly, multilingual proficiency (MP) is described as the dynamic interaction among various psycholinguistic systems, crosslinguistic interaction (CLIN), and the M(ultilingualism)-factor or M-effect (Jessner, 2008):

$$LS1, LS2, LS3, LSN + M\text{-factor} = MP$$

It has been argued (Sharwood Smith & Kellerman, 1986) that crosslinguistic interaction is a much broader concept than crosslinguistic influence in that, apart from transfer, borrowing and code-switching, it also includes cognitive effects of transfer. Indeed, the M-factor refers to all the features of multilingual systems that distinguish a bi/multilingual from a monolingual. That is to say, all the qualities developed in multilingual learners and speakers which cannot be described and observed in a cumulative way. Metalinguistic awareness, for instance, represents one of

these qualities, as a result of the increase in language contacts on behalf of multilinguals.

The M-factor is regarded as one of the most important properties which contributes to enhancing bilinguals' performance in a third or additional language. As it will be discussed in more detail in the present thesis, the key variable responsible for their improved outcome in TLA is the level of metalinguistic awareness. It consists of a set of skills or abilities developed by multilingual learners as a result of their prior linguistic and metacognitive knowledge. In particular, the catalytic effect of TLA has mainly been observed in experienced language learners with typologically related languages. From a DST perspective, thus, it can be pointed out that multilingual systems are inherently different from monolingual systems. In addition, even when the two systems share certain features, in the multilingual system they have a different significance.

### **3.4 Cross-Linguistic Influence in Third Language Acquisition: Morphosyntactic Models of Transfer**

Once acknowledged that there are psycholinguistic reasons to consider SLA and TLA as two different processes, especially for the greater complexity and number of variables affecting the outcome of TLA, it is worth examining the mechanisms that regulate the L3/Ln cross-linguistic influence. The majority of scholars dealing with TLA in the last decade mainly focused on lexicon, lexical access, and retrieval. However, if on one hand it was commonly agreed that cross-linguistic influence and transfer come from either L1 or L2, a number of other factors still remained unexplored. In particular, in TLA, the main issues concerned which was the language involved with the most prominent role and why. A number of factors from formal approaches to the L3 morphosyntax were considered such as proficiency, recency of activation, L2 status and typological similarity between the L3 and the previously learned languages.

Thus, it has been claimed (González-Alonso & Rothman, 2016) that the greater complexity of L3/Ln learning is due to two main aspects. The first concerns the initial stages of interlanguage formation, in that multiple grammatical configurations are present in the learners' mind and are all available for transfer. The second aspect deals with the lower predictability of developmental patterns, both linguistically and non-linguistically, that are supposed to be affected by cross-linguistic influence and a number of many other cognitive factors.

Despite the different theoretical background assumed as a starting point by researchers, they all share the main focus of the investigation. That is, how the linguistic parser solves the optionality coming from the unique L3 setting, as two or more systems are potentially available to influence the acquisition of the target L3.

Importantly, all models advanced assume that this does not happen randomly and that one or more linguistic and cognitive factors take precedence over the others in determining which of the previously acquired languages are selected as a source of transfer. The morphosyntactic models of transfer in L3, selected and reviewed in the present chapter, mainly vary along a temporal or quantitative dimension in terms of how they conceptualise transfer in TLA. In other words, they either focus on the point at which the language transfer of the predominant language occurs or on the wholesale versus property-specific transfer. In addition, another feature shared by all the model addressed is the underlying assumption that transfer takes place as a result of cognitive economy, in order to avoid redundancy in language acquisition.

#### **3.4.1 Cumulative Enhancement Model (Flynn et al., 2004)**

The Cumulative Enhancement Model, developed by Flynn et al. (CEM, Flynn et al., 2004), claims that transfer takes place on a property-by-property basis through the development. It represents both a model of the



initial state as well as a theory of developmental and attainment in L3. The CEM has been considered as the first L3/Ln initial state model, despite some formal linguistic works in L3 syntax existed before (e.g. Klein, 1995). The authors maintain that transfer at the initial state and beyond is supposed to be maximally facilitative. Indeed, they argue that developmental patterns are not redundant and that language acquisition is facilitated since each prior language can either enhance TLA or remain neutral. Therefore, previous linguistic knowledge is expected to transfer in multilingual development only when a positive effect is observed. Otherwise, the transfer does not take place.

In brief, the model entails that the learning process is cumulative and that all the languages the learner is familiar with can potentially affect (i.e. enhance) the development of the target language. Therefore, the privileged role of the L1 as a source of transfer is no longer supported, in that all the languages involved in the multilingual system play a significant role in additional language acquisition.

The authors advance this proposal on a series of studies on relative clauses on adults and children and the consequent comparison of the results for L1, L2, and L3 acquisition. Specifically, for TLA, they tested three types of relative clauses:

1. lexical head with semantic content (e.g. “the owner questioned the businessman who greeted the worker”);
2. lexical head with no semantic content (e.g. “the janitor criticised the person who called the lawyer”)
3. free relative (e.g. “the professor introduced whoever greeted”).

The major strength of this research design has been considered to be the choice of language used for the experiment (De Angelis, 2007). Indeed, the participants' L1 is Kazakh, i.e. a Turkish language with a head-final, left-branching structure like Japanese. On the other hand, Russian, the participants' L2, is a Slavic language with a head-initial, right-branching

structure like English. Therefore, if in the acquisition of English L3, learners rely on their prior knowledge as regards the relative clause structure in English, evidence of the use of a right-branching language would suggest an influence of the Russian L2. This latter, in turn, would provide evidence for the CEM of acquisition.

Thus, by demonstrating that previously learned grammars are used as a source to rely upon during additional language acquisition, Flynn et al. (2004) provide a valuable contribution to the field of research for a number of reasons. First, they show that previously non-native languages can influence the attainment in an L3/Ln to a significant extent, even when proficiency in the L2 is low or intermediate. Second, the influence of order of acquisition is also highlighted as, in the study, the possible difference between simultaneous and sequential acquisition was also taken into account.

#### **3.4.2 L2 Status Factor Model (Bardel & Falk, 2007; Falk & Bardel, 2011)**

The L2 status factor model does not support a strong position regarding the aforementioned argument about wholesale versus property-by-property transfer. Instead, it maintains that the largest amount of default L2 transfer would come at the earliest stages. On the privileged role taken by the L2 in the initial state of L3 syntax, it has been argued that the L2 acts as a filter to the L1 grammar.

To advance this hypothesis, Bardel and Falk examined two different groups of participants, i.e. L1 verb second (V2) / L2 non-V2 on one hand, and L1 non-V2 / L2 V2 on the other, both learning Swedish or Dutch as an L3. The results of the experiment demonstrated that the L2 Dutch/German group, who did not have a V2 L1, performed better than the L2 English group, whose L1 is V2, in producing postverbal negation. The authors

argue that only a privileged role for the L2 could account for these findings.

The L2 status factor is a particularly strong hypothesis since it allows to make valuable predictions that are testable independently of the language pairings. To say it in other words, the authors suggested that the L2 status factor determined the transfer source, independently of the relative typological similarity or genetic relatedness of the languages involved.

According to Falk and Bardel (2010 and 2011), the L2 status factor is an outcome of the higher degree of cognitive similarity between L2 and L3 than between L1 and L3. In addition, there are a number of other features that L2 and L3 learning have in common. In Falk and Bardel (2010, 2011), it was suggested that the L2 status factor is an outcome of the higher degree of similarity between L2 and L3 than between L1 and L3, regarding age of onset, outcome, learning situation, degree of metalinguistic knowledge, learning strategies and degree of awareness in the process of language appropriation. Accordingly, the differences just mentioned between the acquisition of an L1, and the learning of an L2 and an L3 might, in fact, account for why L2 is often present and sometimes even preferred over L1 as a transfer source.

An interesting approach comes from the neurolinguistic framework which would support Falk and Bardel's model (2011), that is the declarative/procedural memory elaborated by Paradis (1994). Indeed, the declarative and the procedural memory systems are well studied and constitute a powerful basis for predictions about language acquisition, within a neurolinguistic approach. Paradis (1994) was the first to point out the fundamental difference between procedural and declarative memory in relation to implicit linguistic competence and explicit metalinguistic knowledge, respectively. Specifically, he claims:

“Within the framework of the implicit/explicit perspective (...), all late-learned languages (L2, L3, Ln) are sustained to a large extent by declarative memory. As such, they are more likely to manifest dynamic

interference from one another than from the native language(s) (Paradis, 2008: 344).”

Following Paradis’ own view, in L1, procedural memory sustains implicit linguistic structure (phonology, morphology, syntax and the lexicon) whereas declarative memory sustains vocabulary (words as form-meaning pairs). While L1 grammar is implicitly acquired and sustained by procedural memory, L2 grammar (“to the extent that teaching of L2 is formal”) is based on explicit knowledge and sustained by declarative memory. Therefore, since vocabulary is sustained by declarative memory in L2 as well as in L1, there is a more obvious difference between L1 and L2 (Ln) when it comes to phonology, morphology, syntax and the morphosyntactic properties of the lexicon. Indeed, these latter components are acquired implicitly in L1 while they are learned explicitly in L2.

### **3.4.3 Typological Proximity Model (Rothman, 2011)**

Differently, from the just discussed model advanced by Bardel and Falk, another influential model proposed by Rothman (2011), the Typological Proximity Model (TPM), proposes multiple sources of transfer in the multilingual syntactic acquisition. It explicates a hypothesised instance of initial stages wholesale transfer of one of the previously acquired languages, the result of which is assumed as the initial interlanguage grammar of the L3.

The TPM has also been considered as a more restricted version of the CEM (Flynn et al., 2004), reviewed in the present chapter, in that neither of the models predicts absolute, categorical transfer from L1 or L2. On the other hand, if the CEM claims that multilingual language learning is determined by a cumulative effect of the previous linguistic acquisition, the TPM assumes that transfer is conditioned by factors related to psychotypology between the languages involved.

Besides, what differentiates the two models is the assumption, on behalf of the TPM, that transfer is constrained by either typological proximity or perceived proximity between the three grammars. That is, typologically-closest languages to L3 between L1 and L2 has priority to be selected as a source of transfer, even when the transfer is not facilitative and causes errors in the production of the L3. In this particular case, typological proximity refers to the perceived similarity on behalf of the learner, as suggested by Kellerman (1983).

Importantly, the TPM assumes that learners already have some sort of awareness of language typology as well as of typological proximity between two languages. However, it is not clearly explained to what extent learners must be consciously aware of these factors. In the case of equally distant or equally close languages, the model makes no predictions.

It has been argued (Rothman et. al, 2012) that since all the model advance different assumptions regarding non-facilitative transfer, it is possible to test them against one another, under the right conditions. In particular, Rothman (2010) tested them by examining the L3 acquisition of Brazilian Portuguese, comparing two groups of L3 learners: i.e. L1 speakers English who were highly successful Spanish learners and L1 speakers of Spanish who were highly successful learners of L2 English. The experiment was focused on word order restrictions and relative clause attachment preference. The choice of languages is particularly relevant since if it is true that Spanish and Brazilian Portuguese are typologically similar, in fact, Brazilian Portuguese patterns are more similar to English as regards the features under investigation.

The findings demonstrated that Spanish was preferred as a source of transfer independently of the order of acquisition and despite the fact that English would have been a more facilitative option. Therefore, on the basis of these observations, Rothman maintained that the results provide evidence in favour of the TPM and against the predictions of the CEM as well as of the L2SF. Moreover, the author found similar effects

investigating the area of adjective placement and semantic entailments (Rothman, 2011).

All the three models examined and discussed in the present chapter, i.e. CEM, TPM, and L2SF, despite proposing different views in terms of the impact of L1 and L2 on L3 learning, make similar predictions regarding the role of typological proximity. Specifically, they all agree that prior L2 learning experience with a typologically similar L2 will enhance L3 learning more than experience with a typologically different L2.

However, it has been argued (Park & Starr, 2014) that all these models are based on data drawn from late bilinguals, that is to say, that they acquired the first language in infancy and only later studied an L2. Therefore, in their study, they examine whether the models also apply to early bilinguals. In contrast with Rothman's results, Park and Starr (2014) did not find a significant effect of L2 typological proximity when learning an L3 among early bilinguals.

On the other hand, the study provides additional evidence to support the view that any language learning experience, in a formal setting, is advantageous in learning additional languages. Accordingly, the data indicate that the transfer of previous language knowledge does not represent the underlying mechanism which accounts for the benefits of bilingualism in TLA. Instead, it appears that the advantage may come from the general level of metalinguistic awareness developed through learning languages in a formal setting.

### **3.5 Interface Hypothesis (Sorace and Filiaci, 2006; Sorace, 2011)**

An influential theory which relies on processing factors to explain different outcomes in L2 learners is the Interface Hypothesis (IH), propounded by Sorace and colleagues (e.g. 2006, 2011). The theory provides additional evidence of the linguistic and cognitive differences between second and

third language acquisition, since it has also been extended to L3 learners. Indeed, recent acquisition studies have maintained that interfaces are particularly vulnerable in language acquisition. The IH (Sorace, 2006; Sorace & Serratrice, 2009; Sorace, 2011) was specifically proposed to account for some of the persistent non-target like patterns found in the adult L2 end-state grammar. The underlying assumption is that different interfaces pose different levels of difficulties in learning second language properties. In particular, properties which involve sub-modules of language (internal interface) are expected to be acquired relatively easier than those relating to cognitive domains (external interface), external to core computational system.

That is to say, since integrating context and grammar requires additional effort for the processor, internal interfaces - such as those between syntax and other linguistic modules - are less problematic for L2 learners than external interfaces. Thus, it was argued that processing difficulties in external interface domains may trigger residual optionality at the end - state grammar of L2 learners.

Sorace points out that, in order to better identify and understand the aforementioned optionality as well as the instability found in bilingual speakers at interface conditions, two main factors need to be considered. On one hand, speakers need to acquire the knowledge of structure and of the mapping conditions that operate within interface components. On the other, they also need to acquire the processing principles that apply in the real-time integration of information from different domains.

It has been argued that early research on the IH had taken a restricted perspective on the nature of the interface. Indeed, they have mainly focused on the target knowledge representation of structures, rather than the online processing operations involved in production and comprehension. Instead, the aforementioned two factors discussed by Sorace represent two main accounts: i.e. representational account and processing resources account. They are both particularly relevant for the

purpose of the current discussion since, as already mentioned, they further highlight what differs between monolingual and bilingual speech processing. The first account is based on the assumption that bilinguals and monolinguals are different in how they represent knowledge, in that one of the grammatical system may affect the other. The second account considers the difference between monolinguals and bilinguals at the level of processing strategies required in the use of interface structures in real time.

Overall, the main reason why bilingual speakers have been reported to perform poorly compared to monolinguals at processing structures, at the syntax-pragmatics interface, is that syntactic processing may be less automatic for them. This can be due to linguistic and/or cognitive factors, that is to say to a less developed knowledge of representation or to a less efficient access to these representations.

Thus, on one hand, the IH encouraged an interdisciplinary approach of studies on bilingualism since, as it has been argued, there is no reason to consider linguistic, psychological, and neurocognitive research on bilingualism as separate areas that work independently from each other. Instead, the final aim for linguistic theory is “a full integration of the different levels postulated in the study of the brain/mind (Rizzi, 2004: 325).”

In addition, the IH theory has highlighted the need for comparison across sub-fields of bilingual L1, L2, and L3 acquisition as well as attrition. Therefore, it assumes the bilingual speaker as a term of comparison rather than the monolingual one, which is, from a methodological point of view, empirically more reliable for all the reasons discussed in the course of the present chapter.



### **3.6 Conclusion**

The three most influential models of cross-linguistic influence in TLA, compared and contrasted in the present chapter, aim at providing an answer to the question of how previous linguistic knowledge affect (by facilitating or complicating) additional language acquisition. It is crucial to highlight that another issue taken into account by the three model is the economy of linguistic representation. Indeed, the CEM and TPM maintain that L3 learners make use of any previous linguistic knowledge at their disposal to facilitate the task. On the other hand, the L2SF model assumes that the L2 is more accessible as it is the last language acquired and, therefore, it would be more available to the building of the L3 system.

To conclude, the main issue addressed in the present chapter was to analyse, from a psycholinguistic perspective, the research on TLA for the main reasons. First, to highlight the complex cognitive nature of multilingual minds which supports the claim that TLA is, inherently, a different process from SLA that needs to be investigated separately in empirical research. Second, to account for the phenomena of transfer and cross-linguistic influence and the other potential factors that can influence the outcome of TLA.

To say it in Cenoz's words, the study of cross-linguistic influence in TLA is potentially more complex than the study of cross-linguistic influence in SLA "because it implicates all the processes associated with SLA as well as unique and potentially more complex relationship that can take place among the languages known or being acquired by the learner (Cenoz, 2004: 8)."

## **Chapter IV**

### **The Role of Prior Formal Language Learning and Metalinguistic Awareness in Third or additional Language Acquisition**

#### **4.1 Introduction**

The popular belief among lay speakers that bilinguals are also better language learners is also supported by several influential studies in the field of third or additional language acquisition (e.g. Cenoz & Genesee 1998, Jessner 1999, Thomas 1988). However, until a few decades ago, this thesis was not widely accepted by all scholars because of the several prejudices towards bilingualism and because of the lack of experimental evidence supporting the so-called "bilingual advantage".

Nowadays, despite the increasing number of research on the cognitive and linguistic effects of bilingualism, the literature still shows no consensus on the main factors responsible for bilinguals' better performance when learning foreign languages. The present chapter, first of all, aims at comparing and contrasting previous and current research on third language acquisition in order to determine the extent to which a number of cognitive and affective attributes have a significant impact on the performance of bilinguals when learning any additional language in a formal context.

Secondly, among these individual difference factors, a special focus will be put on two specific variables, i.e. metalinguistic awareness and previous language learning experience in order to investigate how they can be conceptualised, their development and how they relate and affect each other. In particular, the development of metalinguistic awareness will be described taking into account the different aspects characterising this complex and dynamic phenomenon on the one hand and its influence on the acquisition of additional languages on the other.

As regards the other major factor under investigation, i.e. previous language learning, it will be analysed considering the possible effects of two different kinds of learning, i.e. implicit and explicit, amount of exposure to any previous language, context of acquisition, i.e. formal and informal, age of acquisition, level of proficiency of L2 and, finally, the effects of literacy.

#### **4.2 Attitudes Towards Bilingualism: an Historical Perspective**

As already mentioned, previous language knowledge and previous learning experience have not always been regarded as an advantage by academics. Indeed, it is commonly agreed that the turning point establishing the beginning of a positive attitude towards bilingualism is 1962, year of publication of the most influential contribution by Peal and Lambert: i.e. *The Relation of Bilingualism to Intelligence*.

Before this date, the shared view was that bilingualism had detrimental effects on cognitive development and, therefore, on the process of learning subsequent languages too. On the basis of this negative perception of the phenomenon, there was the idea that bilingualism was associated with a number of problems in individuals such as speech disorders, cognitive deficits, confusion and mental retardation (De Angelis, 2007). In his work, Hakuta (1986) argues that during that time, researchers simply assumed, without any doubts, that bilinguals were disadvantaged compared to monolinguals in different cognitive tasks. The only aspect to differentiate them was the extent to which being experienced in more than a language could, in fact, modify bilinguals' cognitive functions.

On the one hand, hereditarians put forward the view that, being the intelligence innate, it was impossible that it could be modified by experience in other languages. Therefore, individuals that were observed to perform poorly were just considered to have lower IQ scores. On the

other hand, environmentalists argued that dealing with more than a language was an obstacle to cognitive development, leading to a number of mental problems and impairments.

Edwards (2004), provides a sociolinguistic explanation in the attempt to find the origins of this prevailing belief. He points out that these negative views were due to the fact that the majority of studies at the time were conducted in the United States, during an era of great social tensions between local population and immigrants from all over Europe. In other words, he states that research might have been simply misused to support racial discrimination and restrict the inflow of immigrants in the USA.

Indeed, bilingual immigrants were asked to perform tests of intelligence in English, likewise English monolinguals. Therefore, it was not surprising that they recorded lower scores, which placed them in a disadvantaged position. Inevitably, since these studies were also published in the most influential scientific journals at the time, they gained the support of the majority of academics and educators with drastic consequences in educational methodologies. Monolingualism became the norm and any kind of practice of home language by pupils was highly discouraged at school so that it could be totally repressed.

Peal and Lambert's work started to highlight the weakness of all previous research. It advanced clear methodological arguments to question it, developing the claim that types of bilingualism and socioeconomic status of the participants had not been properly controlled. Indeed, in their pioneering study on bilingualism and intelligence, the authors compared the performance of monolingual and bilingual children attending school in Canada examining their cognitive abilities with a number of verbal and non-verbal tasks. What is particularly relevant about the research is that, for the first time, variables such as socioeconomic status and level of proficiency in each language were controlled.

### **4.3 Bilingual Effects on Cognition and Language Learning**

Starting from the advent of this pioneering study, the approach and methodology of research into bilingualism have completely changed. Currently, there is overwhelming evidence for the notion that bilingualism fosters cognitive development and also facilitates the acquisition of additional languages. However, some negative associations with bilingual experience can still be found in some specific domains, such as lexical access. During the past twenty years, the study on bilingualism from a cognitive point of view has attracted the attention of a large number of researchers focused on the linguistic aspects of a bilingual brain such as the modality of access to the lexicon, how two or more languages are mastered together, and so on. Recently, an increasing number of studies has shifted to the bilingual effect in executive function tasks aiming at assessing whether mastering more than a language has a general effect on basic cognitive, non-verbal skills.

Bialystok's work (2009) takes into account a number of prominent studies which demonstrate how bilingualism affects cognitive and linguistic performance across the lifespan in order to provide a general understanding of the different areas where bilingual experience has reported to show a positive effect, a negative effect or no effect at all compared to monolinguals. The author points out that individuals who speak a second language have been shown to have increased density of grey matter in the left inferior parietal cortex, the region responsive to vocabulary acquisition in monolinguals and bilinguals.

Additionally, being bilingual has also been reported to enhance the so-called cognitive reserve, that is the protective effects against cognitive decline with aging. The main explanation for the generalised cognitive effects of bilingualism comes from the well-known Green's inhibitory hypothesis, according to which the non-relevant language is suppressed by the same executive functions involved in the control of attention and inhibition. In other words, it is the constant need to select the target

language meeting both formal and semantical criteria that is responsible for the positive and negative consequences of bilingualism under linguistic and cognitive points of view.

On the other hand, among the studies where a negative effect has been observed, language proficiency and verbal fluency are the most affected domains by the bilingual experience, Bialystok reports. Indeed, using a variety of tasks such as picture naming, lexical decisions, verbal fluency etc., bilinguals have shown lower scores compared to monolinguals and have experienced more tips of tongue as well as interferences. One of the possible explanations for bilinguals' deficits in vocabulary access deals with the conflict created by the competition from the corresponding item in the non-target language, related to the aforementioned inhibitory hypothesis by Green.

Another prominent view in the literature argues that bilinguals use each of their languages less often than monolinguals, resulting in weaker connections among the different parts involved in speech production (Michael and Gollan, 2005). Finally, other interpretations consider the age of acquisition of the vocabulary in each language as being the most responsible factor, with different outcomes depending on the age of acquisition of the second language (Hernandez and Li, 2007).

Bialystok's research on the distinction between control and representational processes sheds the light on the differences observed between monolinguals and bilinguals' performance. Indeed, according to the author, the functions contributing to control processes include selective attention, inhibition, and switching between competing alternatives whereas representational processes concern encoding problems in sufficient details, accessing relevant information, and making logical inferences about relational information. Bialystok's distinction allows associating bilinguals with more effective and faster control processes explained by their constant management of two or more languages. On

the contrary, her study does not confirm any relevant difference between bilinguals and monolinguals in representational tasks.

Specifically, she analyses the reason why bilingualism leads to different effects in different types of tasks, that is to say, costs in lexical retrieval and benefits in non-verbal tasks. She argues that linguistic and non-linguistic tasks produce different results, despite the involvement of both representation (analysis) and attention (control), because of the different emphasis put on them in each case. Indeed, the fundamental component involved in verbal retrieval is representation, whereas the primary component required in non-verbal tasks is control. This explains, according to Bialystok, the general disadvantage for bilinguals in representation and the general advantage in control even though both components are involved. In addition, it is worth noticing that there is interaction between these two elements, in what actual cognitive performance cannot be described in terms of relying either on one or the other. This interaction is particularly evident in linguistic tasks where there is a significant demand for executive control, such a verbal fluency tasks.

As shown previously, one of the control processes enhanced by the bilingual experience, particularly relevant in the process of language learning, is the ability to focus and maintain attention more efficiently and for longer periods of time. What is more, this advantage has been confirmed in both early and late bilinguals. Among the factors responsible for the enhanced performance, again, there is the need to control two or more linguistic systems in the brain according to the given linguistic circumstances (i.e. communicative situation, interlocutor's language). On the other hand, from a referential point of view, this ability has been explained by the fact that bilinguals associate at least two different signifiers to concepts resulting in the development of better linguistic awareness.

Another cognitive ability improved by bilingual experience which plays a crucial role in the language learning process is working memory (WM),

considered as part of the executive functions skills by some scientists and as an independent skill by others. Baddeley (1992) defines it as a specialised memory system, where small amounts of information can be simultaneously stored and processed for a brief period of time during the performance of a task. The reason why it plays a crucial role in language processing and learning is that it is fundamental in a number of different cognitive tasks where it is necessary to focus the attention, avoid any kind of distraction and interference, and overcome any conflicts involved in the information processing. Recent studies have reported superior performance on WM tasks for bilinguals compared to monolinguals, especially in Simon-type tasks focusing on inhibition abilities.

In particular, Linck and Weiss (2011) argue that working memory is able to predict the acquisition of explicit knowledge in a second language. Indeed, in their study, they examined whether executive functioning predicts acquisition of explicit L2 knowledge in a classroom context. The data yielded provide convincing evidence that the executive functioning of WM is an important component of L2 aptitude, especially for predicting explicit L2 acquisition during the early stages of learning. What makes this longitudinal study particularly significant is that it has been the first to demonstrate that a learner's WM can predict L2 learning over time in a classroom context. Moreover, it also suggests that individual differences in WM may have a larger impact on learning than other cognitive processes associated with L2 processing differences such as inhibitory control.

The importance of WM started to be highlighted by research into another fundamental factor of foreign language learning, that is language aptitude (Linck et. al., 2014; Martin & N. Ellis, 2012). This complex individual variable, closely related to WM, is not easy to define and measure. The concept was first introduced in the 1960s as an innate, relatively fixed predisposition for language learning, distinct from other traits such as intelligence or motivation. It used to be considered as a componential feature, not modified by training or affected by previous language



experience. It is a multifaceted factor, that several researchers have attempted to measure through different instruments, with different outcomes and focus on different aspects.

Carroll (1959) developed the Modern Language Aptitude Test (MLAT) to predict the rate at which an individual would learn a particular language under specific conditions. The four components taken into account are phonetic coding ability; grammatical sensitivity; rote learning ability; inductive learning ability. Another attempt to provide a complete measure of aptitude comes from Pimsleur language aptitude battery (1966). The authors used the empirically-based psychometric approach administering various tests that seem to predict language learning success and then select the tasks that best differentiate between successful and unsuccessful learners. However, the most striking flaw of the experiment consists in the lack of a theoretical foundation for the nature of the phenomenon in question was not clearly defined. One of the most successful attempts to overcome this weakness comes from the Cognitive Ability for Novelty in Acquisition (CANAL-F), i.e. a theory-based aptitude test.

Nowadays, researchers take into account cognitive and perceptive factors (e.g. Doughty et al., 2010; Linck et al. 2013) and consider language aptitude as a complex cluster of interactive variables. In Robinson's view (2002a), for example, language aptitude is not a fixed characteristic of the learner but rather a complex reflection of the whole learning situation including instructional conditions and type of language exposure. The so-called "aptitude complex hypothesis" is grounded under the assumption that clusters of traits coming together due to interactional and mutual support have better predictive powers than traits considered in isolation.

Skehan (2015) added a temporal dimension to the phenomenon suggesting that particular skills and cognitive abilities become essential at various stages of language acquisition. That is to say, the aspects of language aptitude change and adapt in response to changing

environmental demands and a growing level of L2 proficiency activates different aptitude components. For example, it has been argued that phonetic coding ability is very important at the initial stages of learning whereas grammatical sensitivity starts to be activated later on. Hence, in Skehan's opinion, aptitude can be described as a fixed identity that changes qualitatively but not quantitatively. To put it in other way, it changes according to the different stages of the acquisitional micro processes rather than on the beginning or ending phase of learning process.

#### **4.4 The “Bilingual Advantage” in Third Language Acquisition**

From an analysis of the most recent literature provided so far, there is ample support to claim that being bilingual mainly leads to advantages in a number of different cognitive and linguistic tasks. In particular, the last decade has witnessed a considerable increase of interest in the benefits of bilingualism in the field of third or additional language acquisition. However, if on one hand it is widely acknowledged that bilingualism fosters cognition and, therefore, the language acquisition process on a general level, on the other, it still remains a matter of debate among scholars which specific variables have the greatest impact on the outcome of TLA.

As De Angelis points out (2007), there are at least three common hypotheses put forward by academics concerning the factors responsible for bilinguals' better performance when learning foreign languages. The first hypothesis is that the knowledge of more languages by individuals facilitates and increases the learning process in speed and efficiency thanks to the enhancement of cognitive development. An alternative hypothesis found in the literature is that additional language knowledge does not represent a significant difference in the language acquisition process. Indeed, it seems that bilinguals are better and more efficient than

monolinguals on a general level but they are essentially similar in the way they acquire languages. Finally, there is a further hypothesis claiming that additional language knowledge may be detrimental to the other languages known by speaker.

All these views take into account two fundamental elements which need to be distinguished. First, there is the effect that the knowledge of previous languages has on the cognitive development, including the aforementioned skills such as problem-solving, attention, memory etc. Second, there is the effect that previous language knowledge and experience have on the acquisition process itself. In other words, the discussion focuses on whether these factors may have a significant impact on the level of proficiency and grammar accuracy in a third or additional language.

As far as the effects of prior language knowledge on foreign language achievement are concerned, two main critical questions have been raised by previous literature, known as "Threshold Hypothesis" and "Developmental Interdependence Hypothesis", both formulated by Cummins (1976, 1979). The first deals with level of proficiency that the learner must reach in one language so that to be able to benefit from the so-called bilingual advantage. In particular, it suggests the existence of two different threshold levels of linguistic competence. If learners reach the first level, they will be able to avoid any cognitive disadvantage associated with bilingualism. The second level, instead, is necessary for the positive effects of bilingualism in improved executive functions to occur.

More specifically, the "threshold level" of linguistic competence allows learners to avoid cognitive deficits as well as to exploit the potential aspects of becoming bilingual. The developmental interdependence hypothesis, on the other hand, states that the linguistic competencies achieved by the learner in a second language are partly due to the

competence already developed in the first language, since they can be transferred and used to learn additional languages.

Besides, another relevant observation provided by Cummins is that the experience of becoming bilingual can positively influence aspects of cognitive functioning either as a result of home or school experience. This lend support to two main claims: first, also learning languages in a formal educational environment has an impact on cognitive growth. Second, bilingual language experience in a school setting may be more capable of influencing divergent than convergent thinking skills, as he reports.

#### **4.5 Implicit and Explicit Language Learning and Knowledge**

Which are the variables affecting the process and outcome of learning any additional language? Language learning is a complex cognitive phenomenon involving different factors. It is possible to distinguish them in two main categories: i.e. cognitive and individual. Among the most relevant cognitive variables, together with the level of memory and intelligence, the learning strategies developed through particular type and amount of exposure to previous languages play a fundamental role. Recent research into the field of language acquisition seems to validate the importance of distinguishing between two different types of learning, i.e. implicit and explicit since they seem to lead to the development of different types of knowledge.

There are a number of fundamental skills relying upon implicit knowledge such as social interaction, music perception, intuitive decision making as well as language comprehension and production. In particular, when dealing with TLA research, being aware of this fundamental difference is of crucial importance in order to understand the way they interact and the extent to which they affect the process of learning additional languages.

Arthur Reber was the first one to employ this terminology (Reber 1967), defining implicit learning as "a process during which subjects derive knowledge from a complex, rule-governed stimulus domain without intending to and without becoming aware of the knowledge they have acquired". As regards the term explicit, it is usually employed for learning environments where subjects are instructed to actively look for patterns, in other words, learning is an intentional process resulting from conscious knowledge. Reber's theory of primacy of implicit processes (Reber, 1993) has been extended to the development of MLA. He maintains that implicit processes developed earlier in humans' evolution and are less subject to variation. On the other hand, explicit processes show much greater flexibility, are more trainable, they develop to a greater extent and are faster. That is why when focusing on form, the patterns of grammar are more likely to be internalised.

On the role of noticing, Truscott & Sharwood Smith (2011) argue that it should be important for the acquisition of metalinguistic knowledge but should not play a direct role in development of the language module. More specifically, as regards the role of consciousness in the input-intake relationship, they propound an interpretation in terms of the interdisciplinary framework called Modular Online Growth and Use of Language (MOGUL). That is: "a representation becomes conscious if and only if its activation level crosses a threshold (the activation hypothesis). The representations that can attain such levels are those in perceptual output structures and those in affective structures (2011: 524)".

The implicit-explicit relationship has also been defined as the "Interface Question in SLA" (N. Ellis, 2011) and is crucial in understanding what originates the different theses put forward by academics on the role played by instruction in language learning. To portray the issue in Nick Ellis' terms (2011), the most evident difference between explicit and implicit knowledge is that children are able to acquire their first language from their caretakers in a naturalistic setting without any particular effort. On

one hand they are able to acquire complex knowledge of the structure of that language, on the other, they are not able to describe the different patterns of the linguistic structure and the mechanism on the basis of its working.

Thus, it can be argued that, first, the acquisition of L1 grammar is implicit and derives from experience rather than from explicit rules, second, no explicit instruction is needed. Adult acquisition of languages is a completely different matter since what can be acquired in a spontaneous environment is quite limited in comparison to native speakers norms. Plus, in order to reach a certain accuracy level, it usually requires the support of additional conscious explicit knowledge.

These different conceptions of the nature of language representation and acquisition have led to different teaching methods. On one hand, the supporters of a rule-governed way of teaching languages developed teaching programmes based on grammar and form, motivated by the idea that before using a language it is necessary to be aware its rules. On the other hand, the so-called "communicative" or natural approach is grounded on the assumption that adult language learning is implicit, like L1 acquisition. Since this approach maintains that language skills and having knowledge about language are different matters, it denies the value of any explicit grammar-based instruction.

The most prominent contribution to the characterisation of implicit and explicit knowledge comes from Krashen's work (1982), where he refers to this fundamental distinction employing different terms that is "acquisition" and "learning". The first is described as an incidental process resulting in tacit linguistic knowledge, whereas the second is an intentional process that results in conscious, metalinguistic knowledge. He points out that conscious learning of language and subconscious acquisition of it are completely different, providing evidence that L2 students of grammar-translation methods with a technical knowledge of the grammar, which is even superior to the native speakers of that language, are not necessarily

fluent in conversational skills. Thus, from these premises advanced by Krashen, three important conclusions can be drawn. First, there is no strong interface between explicit and implicit knowledge, second, they are not connected in any way in process of learning/acquisition, third "acquisition" (i.e. implicit learning) is, in fact, the only one leading to development in any foreign language since the role of "learning" (i.e. explicit learning) only works as a monitor to avoid mistakes during the production of utterances. Accordingly, he argues that it is necessary to create the conditions for language acquisition to take place since second language development is mainly the results of unconscious acquisition facilitated on meaning alone. On the other hand, explicit learning, that is the conscious attempt to look for grammatical rules, only leads to the development of a peripheral system which is independent of the acquired system.

Krashen's model of second language acquisition, despite being criticised for not giving enough importance to the role of grammatical skills and metalinguistic awareness, paved the way to an intense debate among scholars on the controversial issue of the role and nature of explicit and implicit learning. Indeed, on the basis of empirical analysis of learners attending the communicative (grammar-free) programmes, researchers started to highlight the limits of the accuracy of their language performance. Consequently, these empirical pieces of evidence together with the critical theoretical disagreement with Krashen's hypothesis prompted Schmidt (1990) to argue that conscious cognitive effort where noticing was involved was the necessary condition for the conversion of input into foreign language acquisition to occur. In other words, learners in all conditions who claim to have noticed the rules should outperform those who do not, in what conscious noticing is necessary to subsequent learning. But does the level of awareness developed during training affect the extent of learning equally in all conditions? According to Robert (1997) the answer to this question is yes, depending on the level of awareness of participants.

Krashen's claim has also been questioned by a number of studies (i.e. De Keyser 1995, Robinson 1997, De Graaf 1997) which probed that L2 learning in explicit conditions, involving some degree of metalinguistic awareness and instruction, was at least as effective as learning in implicit conditions even where the stimulus domain was complex. Therefore, the demonstrable role of noticing in second (or additional) language acquisition gradually led to a rejection of the extreme non-interface position.

Within the field of applied linguistics, there were supporters of some form of Weak Interface Position (e.g. Ellis 1994; Long 1991). According to this sort of middle-ground position, explicit instruction plays different roles, especially in the perception of L2 form by facilitating the process of noticing the input, i.e. paying attention to specific linguistic features. The supporters of the weak interface brought back the attention to the role of explicit instruction. However, this did not translate into decontextualised and meaningless exercises, which come under the definition of "Focus on Form" (Long 1991). Instead, instruction started to be integrated into meaningful communicative contexts where learners' errors were corrected in the course of naturalistic conversation rather than through negative evidence only relying upon explicit focus on form.

Dienes (Dienes 2004, 2008) observing participants behaviour in artificial learning (ALL) tasks, tried to dissociate conscious and unconscious knowledge and she concluded that there are two kinds of knowledge characterising ALL: i.e. structural and judgment knowledge. In the test phase, people use their structural knowledge to form a new piece of knowledge whereas the understanding of whether a particular test item has the same structure as the training items is part of judgment knowledge.

The author argues that both can be conscious or unconscious and that conscious structural knowledge leads to conscious judgment knowledge but if structural knowledge is unconscious, judgment knowledge can be



either conscious or unconscious. Going back to natural languages, these interesting observations shed the light on the difference between the structural linguistic knowledge, which is unconscious, and metalinguistic judgment knowledge, which is conscious. This explains why even people who feel confident in making grammatical decisions are not necessarily able to explain the reasons for their choices.

It has been argued that there are a number of psychological processes by which explicit knowledge of form-meaning associations has an impact upon implicit language learning. The role of consciousness supports the weak interface position with the focus on explicit instruction. Indeed, it has been considered of crucial importance in second language learning by means of “noticing the gap” and guided output practice.

According to Rod Ellis (2005), the interface, like consciousness, is dynamic, situated, and decontextualised: it happens transiently during conscious processing, but the influence upon implicit cognition endures. Schmidt (2001) maintains that since many features of L2 input are likely to be infrequent, non-salient, and communicatively redundant, intentionally focused attention may be a practical necessity for successful language learning. Terrell (1991) points out that explicit instruction is targeted at increasing the salience of commonly ignored features by providing meaningful input that contains the same grammatical meaning-form relationship. Moreover, as regards the “noticing the gap” process, it has been argued that a learners’ output can prompt negative feedback in the form of a corrective recast. That is to say, reformulation of spontaneous utterance replacing non-target items by the corresponding target language forms. The importance of a recast consists in presenting the learner with psycholinguistic data optimised for acquisition since it makes the gap evident (Long, 2006).

As far as the role of output practice is concerned, experimental findings support the effectiveness for second language acquisition of encouraging learners to produce output (e.g. Norris & Ortega, 2000; De Keyser et al.,

2002). Explicit memories guide the conscious building of novel linguistic utterances through the process of analogy of formulas as well as of pedagogical grammar rules, which bring to the conscious creation of utterances. Afterwards, through use, the move from declarative to procedural knowledge occurs.

Although much of first language acquisition involves implicit learning, the same mechanisms do not suffice for second (or additional) language learning because of learned attention and transfer from L1. That is why it has been argued that second language acquisition must overcome the processes of L1 employing additional resources of explicit learning. Thus, to sum up, the interface between explicit and implicit knowledge is dynamic, consciousness plays a number of different roles in second language acquisition, including learners' noticing negative evidence (i.e. "noticing the gap"); their attending to language form; their perception, focused by explicit instruction; their voluntary use of grammatical descriptive and analogical reasoning. In other words, consciousness represents the interface by creating access to the vast amount of unconscious resources of knowledge broadcast through the brain.

#### **4.6 Relationship Between Development of MLA and Prior Language Learning Experience**

On the basis of the description and analysis provided, it can be argued that the most striking difference between implicit and explicit learning is the presence or lack of awareness. Given the multifaceted and complex nature of the phenomenon, it is not easy to characterise and measure MLA in both language acquisition and non-language acquisitions domains such as cognitive psychology, cognitive science, and neuroscience. Indeed, the role of awareness in learning is explicitly or implicitly subsumed in several variables in these fields, including type of learning, learning condition, type of awareness (i.e. language, metacognitive, conscious, unconscious etc.) as well as constructs such as noticing and

perception. Within the fields of studies outside language acquisition, the concept of awareness has been vaguely defined. For instance, in cognitive psychology, Merikle et al. (2001) make use of the term awareness as a synonym of consciousness when they point out that “any evidence that perception is not necessarily accompanied by an awareness of perceiving attracts attention because it challenges the idea that perception implies consciousness (2001: 116).”

In second language acquisition research, the most representative definition comes from Tomlin and Villa’s work (1994), where they point out that awareness is a particular state of mind in which an individual has undergone a specific subjective experience of some cognitive context or external stimulus. The role of awareness in language learning is subsumed in many instruction or exposure strands of second language research. Many studies consider the construct of awareness not as an independent variable but, instead, as an element which implicitly or explicitly plays a role in the processing of input in the noticing condition (e.g. Schmidt, 1990).

More specifically, when dealing with language learning, these concepts are often associated with the term “metalinguistic”, i.e. metalinguistic awareness and metalinguistic knowledge of the language. The majority of the studies taken into account in the present work explain the instructed bilinguals’ better performance in TLA in terms of higher metalinguistic awareness and improved linguistic strategies. However, to the best of my knowledge, there are only a few studies which directly compare these two types of bilingualism based on the context of acquisition of the second language. Indeed, the most of the times, researchers compare monolinguals and bilinguals learning languages, while the effects of instruction or non-instruction in a second language are usually overlooked or only marginally observed through post-studies regression analysis.

As already argued, the general assumption that bilinguals are also better language learners has been supported by several studies which identified the enhanced level of metalinguistic awareness as the key element fostering the process of foreign language acquisition (e.g. Cenoz & Genesee, 1998; Jessner, 1999; Thomas, 1988). However, it is not entirely clear how and to which extent metalinguistic awareness helps multilingual learners to acquire an additional language.

But what is metalinguistic awareness and why is it considered of fundamental importance for the development of additional languages in bilinguals? To provide a general and commonly accepted definition of metalinguistic concepts is not an easy task. The terminology used by academics to describe them may seem rather confusing due the different scientific approaches (i.e. cognitive, psychological, educational) adopted to analyse metalinguistic awareness and to the variety of competing words employed to describe specific aspects of metalinguistic concepts.

In Cenoz's view (2003), metalinguistic awareness works as a mediator between bilingualism on one hand and third (or additional) language acquisition on the other. This means that bilingualism has a positive effect on the development of metalinguistic awareness and communicative skills and these factors, in turn, have an impact on the process of learning new languages. In other words, positive effects on bilingualism on foreign language learning occur at least because they have a positive influence on metalinguistic awareness in the first place.

Following Malakoff's own definition (1992: 518), metalinguistic awareness

"allows the individual to step back from the comprehension or production of an utterance in order to consider the linguistic form and structure underlying the meaning of the utterance. Thus, a metalinguistic task is one which requires the individual to think about the linguistic nature of the message: to attend and to reflect on the structural features of the language. To be metalinguistically

aware, then, is to know how to approach and solve certain types of problems which themselves demand certain cognitive and linguistic skills.”

An enormous contribution to a better understanding of the degree and nature of metalinguistic concepts comes from Bialystok's work *Bilingualism in Development* (2001) where she managed to remarkably disambiguate the three main entities qualified by the term metalinguistic: i.e. knowledge, ability, and awareness.

As regards the first concept, metalinguistic knowledge (or knowledge about language), she states that what makes it different from knowledge about grammar is the level of generality at which rules are represented. "It is the broader knowledge of abstract principles of languages which is distinct from the knowledge of a particular language."

On the other hand, the metalinguistic ability is portrayed as “the capacity to use knowledge about language as opposed to the ability to use language.” According to Bialystok, this distinction makes it easy to explain why all children learn to speak but some of them struggle to acquire metalinguistic concepts. Moreover, it allows to further explain why metalinguistic awareness is the reserve of some privileged few: i.e. the more intelligent, the more educated, the more multilingual and so on. Finally, in order to have metalinguistic awareness, it is necessary that attention is actively focused on the domain of knowledge that describes the explicit properties of languages.

De Angelis (2007), adopts the broader definition of MLA, i.e. “the learners' ability to think of language and of perceiving language including the ability to separate meaning and forms, discriminate language components, identify ambiguity and understand the use of grammatical forms and structures”. It is worth noticing that the author emphasises the importance of the role played by the formal context of acquisition of the languages involved in order to provide further metalinguistic knowledge that learners can rely upon when learning additional languages. In other words, formal

instruction in the second language has been seen as a determining factor that has an impact on students' performance in a third language.

Hence, it can be argued that the reason why metalinguistic knowledge, ability, and awareness have a positive influence for bilingual learners of additional languages is that they are all represented in an abstract and general sense so that to become explicit and universal and to be applied to any other language. Previous and current research into the field has resorted to a number of different arguments to explain the cause of the increased level of MLA reported in bilinguals which was also responsible for their better performance in L3.

Indeed, because of the complex nature of the relatively new field of study as well as the number of variables to consider in TLA, there is still no common agreement among scholars whether MLA is mainly to be attributed to the context of acquisition of the L2 (i.e. formal/informal), the level of proficiency attained in the L2 or the amount of use and exposure to the language itself. Moreover, if on one hand it is commonly agreed among scholars that MLA is one of the first and most important variables which makes bilinguals better language learners, it still remains to clarify whether MLA improves the process of language learning or whether it is the other way round.

Generally speaking, the most plausible explanation provided for bilinguals picking up languages faster and better than monolinguals takes into account two main factors: i.e. how the input is perceived and organised on one hand, how explicit knowledge relates to speed of acquisition (Bowden, Sanz et. al., 2005). The former deals with bilinguals' better processing strategies developed thanks to the practice to adapt to the new language and to restructure their language system. Indeed, they use cognitive strategies that facilitate more efficient use of processing resources in the construction of formal rules. The latter assumes the weak interface position, already analysed in the present chapter, as a starting point. That is to say, explicit knowledge acts as an advanced organiser and focuses

learners' attention on the relevant feature of language. Therefore, bilinguals show superior explicit knowledge of a target language, benefits which concern each level of the linguistic system: morphology, semantics but also syntactic and phonological awareness (Werker, 1986).

#### **4.7 The Role of Metalinguistic Awareness and Other Mediating Factors in Third Language Acquisition**

Which are the necessary conditions responsible for the development of metalinguistic awareness? Does the context and type of acquisition of previous languages play a crucial role for this fundamental factor to occur? One of the first studies taking into account the context of acquisition of the L2 as an individual difference variable is Jaqueline Thomas' experiment (Thomas, 1988). The research compares adult bilinguals who learnt their second language informally with those who had already received formal classroom training in both languages.

The data gathered in the study suggest that bilingual students who received formal training in both languages perform better than students who received no formal training. Moreover, they provide convincing evidence that bilinguals who acquire two language systems naturalistically and later acquire literacy only in their first language do not necessarily develop the skills required to learn an additional language in a formal setting.

Indeed, instructed bilinguals' better performance is explained resorting to the superior MLA defined as "students' conscious knowledge of the rules and forms of language" since MLA works as "a monitor to create acceptable spoken or written utterances in a third language". Thus, Thomas maintains that in order to fully exploit the advantages of learning a language that is typologically related to the target language, it is necessary

for students to have explicit instruction in the second language.

Confirmatory evidence comes from another study (Thomas, 1992), where the researcher compared the performance in French L3 of English-Spanish bilinguals who received instruction in Spanish L2 with bilinguals who did not receive any formal training in Spanish. She concludes that even at an elementary level of foreign language learning, students' performance is facilitated by MLA and that it works as "a monitor to create acceptable spoken or written utterances in a third language" (Thomas, 1988: 236).

Along similar lines, in a work by Roehr and colleagues (Roehr Gànem-Gutiérrez 2009), the impact of Metalinguistic Knowledge (MLK) on TLA has been tested in English speaking University level learners of German and Spanish. The findings appear to suggest that language learning experience in formal settings considerably affected the level of MLK attained by the participants. Additionally, a closer look at the data indicates that despite a considerable relationship with language learning aptitude and working memory, MLK is separable and distinct and, therefore, it constitutes an individual difference variable on its own right in the field of language learning research.

After administering a biodata questionnaire and a two sections metalinguistic knowledge test with the aim of measuring the participants' descriptive and analytic abilities about language, the authors concluded that the development of MLK is affected by internal and external variables. The former deals with the learners' individual difference variables including the aforementioned cognitive based learners' internal factors (i.e. working memory, aptitude towards languages etc.), the latter refers to external factors such as language learning experience, type of context and length of exposure have been considered as having a great impact on the quantity and quality of MLK and, therefore on TLA.



Another key concept to remember from this research is that the nature of MLK has been described as a learnable, task-dependent and malleable feature rather than stable. This means that, likewise MLK, it can be brought into awareness and articulated with processes involving these kinds of knowledge drawing on the higher level of mental faculties of reasoning and analysis.

#### **4.7.1 Level of Bilingualism: the Role of Proficiency in L2**

In another influential paper (Roehr 2008), Roehr specifically looks at the correlation between proficiency in L2 and metalinguistic knowledge in L1 English learners of German as a second language. She points out that knowledge of grammar and vocabulary as evident in proficient L2 performance may not only be built upon the basis of explicitly acquired metalinguistic knowledge but may also help a learner develop their metalinguistic knowledge in the first place. In other words, she argues that knowledge about knowledge may arise from language competence (i.e. proficiency) rather than the other way round.

Besides, the author rises some other important questions, such the extent to which metalinguistic description explanation ability may have different roles to play at different levels of second language proficiency. She suggested that in order to investigate the cause-effect relationship between explanation and language analytic abilities, it is necessary to compare several proficiency levels through a longitudinal study assessing whether metalinguistic knowledge about specific features is constructed on the basis of L2 knowledge.

One of the most interesting approaches into the field comes from the work by Cenoz & Valencia (1994) that considered the influence of bilingualism on third language learning comparing Basque/Spanish bilinguals learning English as an L3. Assuming the Interdependence Hypothesis as a starting point, (Cummins, 1981), they report that if instruction in one language is

effective in promoting proficiency in this language, the transfer of this proficiency to another language will occur, provided there are enough exposure and motivation. What is particularly remarkable about the study is that it also controls the potential influence of a number of mediating variables, i.e. linguistic, sociolinguistic, psychological and educational. Indeed, this is of crucial importance if one takes into account the complexity of the phenomena of bilingualism and third language acquisition as well as the number of the aforementioned factors which affect them.

Participants' performance in the third language was assessed through five different tests of English to measure different dimensions of proficiency: i.e. four tests of language skills (speaking, listening, reading, writing) and a multiple choice test of vocabulary and grammar. In agreement with previous studies, the findings show that: first, bilingualism has a positive mediating effect on TLA; second, the regression analysis demonstrated that the inclusion of bilingualism significantly improved the effects of other predictors and third and most important, there were no interaction effects between bilingualism and other predictors. This means that the effects of bilingualism were obtained regardless of the effects of cognitive, sociocultural, psychological variables. Therefore, the experiments confirm the claim proposed by Swain and colleagues (Swain et al. 1990) that literacy in a heritage language is associated with higher levels of achievement in a third language.

Another contribution aiming at investigating the impact that the level of proficiency in a second language has on the acquisition of a third or additional language comes from Jaensch (2009). The three languages involved in the research were Japanese (L1), English (L2), and German (L3). The significance of the study relies on the fact that not only does it demonstrate that L3 learners perform better than monolinguals both in terms of general and specific features proficiency, but it also rises the question of whether the proficiency level in an L2 can affect the

performance on a specific element in the L3 which is absent in the participants' first and second language.

Notably, the results indicate that despite the fact that grammatical gender is not marked on determiners in English, participants with similar proficiency in German but higher proficiency in English L2 performed better in the gender assignment task. However, it is worth underlining that this beneficial effect is not recorded at all levels of proficiency and for all features. To interpret these findings, the authors resort to two different theories: i.e. the additive effect of bilingualism hypothesis and the already mentioned threshold hypothesis. The first is fully supported by the results since those L3 learners of German with higher proficiency in English L2 outperformed learners with similar levels of German but lower proficiency in the second language. The second is only partially confirmed by the study as if on one hand lower intermediate learners of German (L3) did not show a considerable effect of L2 English proficiency on the detection of gender and case of the determiner, on the other, the L2 higher proficiency effect was evident on the same features but on the attributive adjective.

However, in order to fully confirm or disconfirm the two hypotheses, larger groups of participants are needed and, in particular, as regards the threshold hypothesis, it would be worth observing a more heterogeneous group including lower proficiencies in L2.

On the basis of the evidence provided, the author suggests that learners of a third language exhibit more refined metalinguistic awareness, a wider lexical knowledge, and more developed cognitive skills which lead them to become more sensitive to new features in the third language. Jaensch has named this skill as "enhanced feature sensitivity", which is responsible for helping third language learners to trigger the setting of Universal Grammar parameters.

A similar account is provided by Klein's study (Klein 1995). She compared monolingual and multilingual schoolchildren in the acquisition of specific

properties in lexical and syntactic learning. The previous languages of the multilinguals varied but all were very similar to English in the manner in which Wh-questions are formed, specifically, none of them allow preposition stranding. The multilingual group significantly outperformed the monolinguals both in correct sub-categorization and preposition stranding. The author concluded that the attitude to learning, heightened metalinguistic skills, enhanced lexical knowledge and cognitive skills of multilinguals are all advantageous in triggering the setting of UG parameters.

#### **4.7.2 The Role of Literacy in Prior Languages**

As mentioned previously, a particular question of interest discussed by Swain and colleagues (Swain et al., 1990) was the impact on third language learning of Heritage Language (HL) use which includes literacy compared to Heritage Language use which does not include literacy. Results showed that literacy in the Heritage Language has a strong positive impact on learning French as a third language in the bilingual programme, whereas Heritage Language use without literacy has little effect. The learning of second language literacy skills is enhanced through having developed such skills in the first language.

To the best of my knowledge, however, there are no studies which examine the impact of first language literacy knowledge and use on third language learning. The effect of first language literacy has been reported per se, independently of first language oral language skills, general level of proficiency and typological proximity between the two languages. The main limitation of the study is that it is unknown when the HL students learned to undertake literacy activities in their HL: for some, it is highly probable that they learned these skills in Heritage Language programmes at school.

This means that, for them, HL might not be their language of initial literacy. However, what is remarkable is that HL literacy provides them with a broader understanding of “what reading and writing are for, using the medium of a language that [they] speak fluently” (Hudelson, 1987: 830). Besides, it may help them to enhance pride and self-confidence, which, as the authors suggest, may breed further success and linguistic interdependence.

Another contribution looking at the specific role of literacy comes from Cristina Sanz (2000), who investigated the relationship between biliteracy in the minority and majority language, i.e. Catalan and Spanish, and the acquisition of English as a foreign language. In this research, apart from separating the effects of biliteracy and bilingualism, a number of predicting factors in the acquisition of additional languages was also controlled, such as intelligence, motivation and sociolinguistic status. Additionally, despite not having operationalised the effect of cognitive variables like Working Memory and Metalinguistic Awareness, the study suggests interesting hypotheses on the basis of previous studies’ results, which explain advantage of bilinguals over monolinguals on TLA.

Referring to the weak interface position in L2 acquisition theory (R. Ellis, 1994), Sanz propounds the view that if on one hand it is not possible for explicit knowledge to be transformed into implicit knowledge of L2, it can still help into the acquisition process by acting as an advanced organiser, focusing learners’ attention on the relevant features of the language. Indeed, she states that bilingualism may naturally show the behaviour that different researchers working within the focus on form tradition (i.e. Doughty & Williams, 1998) are trying to induce in classroom language learners.

Thus, it can be argued that literacy encourages MLA on account of language being turned into a visual medium. That is, readers focus on form and improve their memory skills, their aesthetic function as well as their reifying function, i.e. the meaning no longer resides in speaker but in

the text (Kemp, 2001). Writing, in particular, provides the means of analysing language because it turns the language into an object. Therefore, literacy is fundamental for the development of MLA in that it permits people to visualise the language.

Besides, once acknowledged that biliteracy enhances MLA and, consequently, the process of language learning itself, it is worth pointing out that even a limited amount of formal L2 learning help develop the aforementioned metalinguistic skills. Indeed, an interesting study by Yelland et al. (1993) appears to validate such a view since it proved that advanced bilingualism is not necessary for a learners' metalinguistic skill to develop. That is, even a limited contact with a second language can have beneficial effects, which have been observed to carry on into the acquisition of literacy. In particular, the work examined the effects of marginal bilingualism on MLA on the basis of reading acquisition skills. Two sets of English native speakers were tested, one of which studied Italian for one hour per week. The results showed a causal relationship between six months of language learning and increased rates of reading acquisition, measured according to word awareness skills.

#### **4.7.3 Early and Late Bilingualism: the Role of Age of Acquisition of Previous Languages**

A number of controversial issues largely debated among scholars, on the benefits of bilingualism in the acquisition of any additional language, concern the age of acquisition and type and amount of instruction that bilinguals must have in the L2 in order to show an advantage in the process and outcome of learning an additional language.

In a recent paper, after comparing previous research into the field, Rothman (2015) argues that early bilinguals outperform late bilinguals in TLA thanks to the fact that they have two activated grammatical systems developed from an early age. On the other hand, Jaensch's view (2012)

rests on the assumption that there are more advantages for learners of an L3 if their L2 experience begins at an older age since they can have access to a more enhanced MLA in contrast to the more implicit learning environment of younger learners.

Cenoz (2001) presents similar findings in her study on cross-linguistic influence on third language acquisition. The results concerning the relationship between cross-linguistic influence and age indicate that older learners show more cross-linguistic influence than younger learners. According to the author, this is due to the higher MLA developed by older students which allow them to perceive the typological distance of the languages involved and to choose which one is the most suitable to use as a source of transfer when acquiring a foreign language.

Specifically, the older participants involved in the study were reported to transfer more words from Spanish than Basque when learning English as a third language since they were aware of the linguistic distance. On the other hand, younger participants with a lower degree of MLA used both, Spanish and Basque terms, as a source of transfer since they were not able to perceive the objective linguistic distance.

In a recent work, it has been claimed that both early and late bilinguals have benefits in TLA following different routes and learning strategies (Park & Starr 2015). Indeed, if on one hand early bilingualism is achieved in a more implicit language learning environment, it is also true that learners can access two more developed grammatical systems. On the other hand, late bilingualism is more explicit in that it facilitates the acquisition of formal rules in a subsequent language. In other words, both explanations account for enhanced levels of MLA with a difference concerning the routes of acquisition and the particular kind of this fundamental cognitive skill.

#### **4.7.4 The Role of Language Use and Language Knowledge**

Further evidence to better understand the role of MLA under specific circumstances of language learning comes from Bialystok and Barac's work (2012). In their study, an accurate analysis of the different factors associated with the reported advantages found in fully bilinguals is provided in order to dissociate the effects of metalinguistic awareness and executive control. More specifically, the research aim was to identify the specific features of the bilingual experience responsible for different performance on metalinguistic and executive function tasks in children becoming bilingual. The results demonstrated that the two areas investigated are affected by different aspects of bilingualism. That is, metalinguistic performance improved with increasing knowledge of the language of testing whereas performance in executive control tasks improved with more experience in a bilingual education environment.

This dissociation has a great impact on previous research into bilingualism for at least three main reasons. First, these findings highlight the importance of spending time in a bilingual education program in order to have improvements in children's executive functions. Moreover, an important implication of the study is that it questions previous research assumptions that fully balanced bilingualism is necessary for modifications in executive functioning to occur (e.g. Bialystok & Majumder, 1998; Carlson & Meltzoff, 2008). Instead, the study shows that the accumulation of experience in a formal bilingual setting also contributes to the development of executive control for those children.

Moreover, the results shed light on the relationship between metalinguistic performance and bilingualism providing evidence to promote the formal study of languages too. Indeed, unlike executive control, metalinguistic advantages have been reported even in participants with lower levels of bilingualism. Therefore, it can be argued that what makes the difference in metalinguistic tasks is not the degree of bilingualism but the level of linguistic proficiency attained in that language. That is to say, knowledge



of English was associated with higher metalinguistic performance in English but this relationship would be expected in monolingual children too.

What was surprising is that an increased level of bilingualism was not necessarily associated with enhanced performance in the task. According to the authors, this could be explained by the fact that bilingualism helps to develop and understand structural relations within languages but, beyond that insight, more bilingual experience does not lead to further development in that area.

Finally, what makes the study particularly relevant and worth mentioning is the contribution it gives to the understanding of the mechanism by which bilingualism affects cognitive and linguistic outcomes by taking into account two aspects of bilingualism responsible for differences between monolinguals and bilinguals: i.e. proficiency and use.

Indeed, the outcomes of bilingualism depend on both the achievement of adequate linguistic proficiency and experience using two languages. These factors can be explained in terms of the previously mentioned distinction proposed by Bialystok between the representational structure of knowledge and control of attention. In particular, metalinguistic tasks focus on linguistic representations and representational structure is sensitive to increasing knowledge. In other words, knowing two languages enhances knowledge of abstract linguistic structures and, therefore, it can be argued that bilingualism improves metalinguistic performance. However, it is the absolute level of linguistic knowledge and not the degree of bilingualism that plays a role in this development.

On the other hand, control of attention is sensitive to accumulating experience and performance in executive control tasks depends upon domain-general systems also involved in bilingual language processing. However, a certain amount of time is required for these systems to reach a certain level which allows them to influence non-linguistic domains.

Therefore, it can be claimed that the two main areas where a positive bilingual effect has been observed, i.e. metalinguistic awareness and executive control, are influenced by different kinds of experiences: the achievement of adequate linguistic proficiency for the former and accumulated practice in the language for the latter.

However, there have been dissenters to the view that literacy fosters the process and outcome of language acquisition. Mägiste's findings, for example, contradict the assumption shared by the studies discussed so far since she suggests that differences in performance are to be attributed to whether a language is used or not rather than to the level of literacy achieved in the second language (Mägiste 1984, 1986).

This pattern was evident with different types of tests administered. The popular view in the literature that people who become bilingual at an early stage will later have greater facility in picking up a third language is only partially acknowledged by the author. Indeed, she states that if on one hand this is certainly the case at certain metalinguistic levels, on the other, it does not occur automatically at a very elementary level of language learning, where it seems to be more a question of strategy.

#### **4.8 From Metalinguistic Knowledge to Metalinguistic Awareness**

Another particular aspect of MLA that has been object of intense debate is whether it belongs to the linguistic or cognitive domain and whether it is a cause of effect of cognitive and linguistic development. Again, this still remains unclear because all develop through childhood and it is not always possible to separate them experimentally in children and relatively little research takes place in adults' MLA. Psycholinguists argue that the development of MLA is related to cognitive development, for it involves cognitive processes that are different from those operating for language perception and production.

Bialystok's interpretation to account for different findings coming from the research into bilingualism and metalinguistic awareness, employing different tasks and looking at specific variables, concern the difference between analysis and control (Bialystok 2001). After an accurate review of previous research into the effects of bilingualism and literacy, she concluded that higher levels of control increases with bilingualism, whereas higher levels of analysis increases with literacy. This accounts for different performances in different types of tasks on behalf of bilinguals with different linguistic and cognitive backgrounds. In particular, it has been observed that the advantage occurred most often when the level of bilingualism was controlled, i.e. balanced bilinguals performed better in all tasks.

Another possible interpretation provided by Bialystok accounts for the progression from metalinguistic knowledge and metalinguistic awareness observed in the participants. Indeed, this progression reflects an increase in the amount of attentional control required to accomplish the tasks. Therefore, participants begin to show different results as soon as the task aimed at assessing metalinguistic awareness rather than metalinguistic knowledge.

Rebuschat and colleagues (Rebuschat & Williams 2011) state that in psychology the most commonly used criterion for discerning between implicit and explicit knowledge is the presence of lack of awareness. That is, implicit knowledge is unconscious knowledge that subjects are generally not aware of possessing whereas explicit knowledge is conscious knowledge that subjects are aware of possessing even though they may not always be able to provide an explanation for it.

The same view is shared by Robinson (2017) in a recent publication, where the author highlights the role of attention as a measure to determine the aforementioned distinction between implicit and explicit learning. Attention and awareness are presented as two related concepts playing a

fundamental and different role in the process of language learning. In particular, the two types of attention described are perceptual attention, automatic and involuntary, and focal attention, which relies on some degree of voluntary executive control. As discussed above, the issue of the amount and type of attention to input necessary in order for subsequent learning to occur, as well as the difference between noticing and understanding, has attracted a large amount of interest among academics in SLA (see Truscott & Sharwood Smith, 2011).

In cognitive and language acquisition domains, non-attentional learning means learning without focal attention to the input stimuli, selecting them for further processing and encoding in memory. It has been reported (Tomlin & Villa, 1994) that, in some cases, simple detection of input at a stage of perceptual processing prior to selection contribute to learning. That is to say, learning could be said to take place without awareness since focal attention is widely acknowledged as a precondition for awareness.

#### **4.9 Conclusion**

To conclude, after comparing and contrasting previous and current research focused on specific aspects of the relationship between level of MLA developed, previous language learning experience and TLA, it can be argued that there are at least two main aspects that still need to be further investigated. That is, in order to have a broader understanding of these concepts as well as a common agreement into the field of research, task construal and sensitivity of measurement of awareness need to be considered as crucial factors in future studies. Accordingly, it would be worth adopting sensitive measures to detect the status of awareness under different points of view, i.e. cognitive, psychological, linguistic on one hand and new methodologies to explore and operationalise these fundamental aspects of language learning on the other.

Besides, the context of acquisition of bilinguals' second language should be considered as a separate individual difference variable which affects the process and outcome of language learning for two main reasons. First, on the basis of the evidence provided by the most influential works taken into account, it can be suggested that it plays a crucial role in the development of more effective learning strategies and enhanced metalinguistic awareness. Second, in order to observe positive effects of bilingualism in the acquisition of third or additional languages in a formal environment, it is necessary that bilingualism is supported by instruction in both first and second language.

Thus, across all the studies examined, it is possible to conclude that despite the considerable amount of interest among scholars into the relatively new field, there is still a lot to investigate due to the high complexity of the phenomenon. The numerous variables involved that need to be controlled at the same time such as age of acquisition, context of acquisition, level of proficiency and typological proximity of at least three different languages involved on one hand and the difficulty to measure and determine what is implicit and explicit on the other, make TLA domain difficult to analyse.

Indeed, as Cummins points out, the expectation that research into the psychological, linguistic and cognitive consequences of bilingualism should produce completely consistent results is a false premise. That is to say, there is not one single phenomenon called bilingualism which ought to influence the mental lives of all bilinguals in the same way. Accordingly, research should be directed towards identifying those conditions under which bilingual learning experience are likely to enhance or retard all the different aspects of cognitive growth, with context of acquisition of previous languages being one of the most important.

## **Chapter V: Methodology**

### **5.1 Introduction**

In order to investigate whether metalinguistic awareness is a crucial factor which assists bilinguals when dealing with third or additional languages, this study examines the relationship between adult bilinguals' implicit and explicit metalinguistic awareness and language learning experience on one hand, and their language learning ability on the other.

The first aim is to investigate the hypothesis that there is a relationship between bilinguals' explicit and implicit metalinguistic awareness, also developed in a second language, and the level of attainment in an artificial language task, assessing the ability to learn an additional language. Previous studies in the field indicate that metalinguistic awareness is a factor that boosts the process of language learning. However, researchers usually focus on MLA developed in a first language or in the target language, where target language attainment is considered. Additionally, previous research does not usually separate the effects of implicit and explicit MLA. The current study considers the impact of both implicit and explicit MLA developed in an L2 when learning additional languages in a formal environment, reproduced by an artificial language task.

The second aim is to investigate the hypothesis that the more languages bilinguals master, the more successful they are at learning another language. A logical progression from previous research shows that people with multiple language skills are also better language learners due to a number of factors such as broader linguistic repertoire, better and wider language learning strategies, and a higher level of MLA. Specifically, what is assessed in this study is the relationship between the level of attainment in the initial stages of learning another language, where associative memory and grammatical inference are involved, and previous knowledge of three or more languages with different levels of proficiency.

The third aim is to consider the role of the amount of formal instruction received in a second language, level of proficiency, and exposure to the language as recorded by the language background questionnaire on one hand, and attainment in the artificial language learning on the other. This is to investigate the hypothesis that bilinguals' linguistic knowledge (i.e. explicit MLA) in an L2 relates to bilinguals' performance in an L3 over and above their language experience and proficiency in an L2.

The fourth aim is to investigate the hypothesis that a higher level of explicit MLA in an L2 relates with a longer time of exposure to the language in a formal environment. In other words, more years of formal instruction and language learning experience received are expected to correlate with higher levels of MLA in the language under investigation.

Fifth, the hypothesis that, when MLA is split into three levels of explicitness (i.e. identify, correct, and explain the mistake) bilinguals also showing the ability to verbalise the mistake and account for a metalinguistic explanation perform better in the artificial language task compared to those who are only able to identify and/or correct the mistake.

## **5.2 Independent Variables (IVs) and Dependent variable (DV)**

The language background variables under investigation are participants' number of language mastered, level of proficiency in German L2, the amount of formal instruction received in L2, the age of acquisition of L2. The two main independent variables considered are implicit MLA assessed by a Self-Paced Reading Task and explicit MLA assessed by a task of Metalinguistic Knowledge in German. Participants' language learning attainment is the dependent variable under investigation, assessed by an artificial language task of grammatical inference.

### **5.3 Research Hypotheses**

In this thesis I propose that adult bilinguals with higher levels of explicit MLA also developed in a second language perform better in the artificial language task of grammatical inference, assessing their attainment in beginning to learn an additional language, over and above their level of general proficiency reached in the L2. I suggest that it is the explicit knowledge of the language which fosters the process of learning further languages in a formal environment and not the level of bilingualism (i.e. general language proficiency in at least two languages). Indeed, explicit MLA conceived as an abstract knowledge of the language as a dynamic system made of different levels which interact among each other may assist language learning. Specifically, it speeds up the learning process of additional languages due to the ability to analyse and manipulate the linguistic system as an abstract concept, independently of the specific language involved, and the consequent internalisation of the input which is transferred to any other language. Accordingly, bilinguals develop an increased ability to learn additional languages through their highly developed MLA together with other cognitive, experiential, and affective aspects/attributes. Bilinguals' MLA is both implicit and explicit as a result of implicit and explicit learning and knowledge of the language. However, I consider the role of explicit MLA as more predominant to boost the process of additional language learning where grammatical inference is required on account of language learning experience, better learning strategies and sensitivity to linguistic rules.

To investigate this thesis, I examine the research data in order to analyse, first of all, the relationship between implicit and explicit metalinguistic awareness developed in L2 and attainment in beginning to learn a third or additional language under controlled conditions. Secondly, the role of other mediating factors in the L2 is also taken into account: i.e. level of proficiency, age of acquisition, amount formal instruction received.



## **The Null Hypothesis**

The Null Hypothesis is that all participants will perform at the same level in the artificial learning task because bilinguals with broader linguistic repertoire in more than two languages, better learning skills and a higher level of metalinguistic awareness also developed in a second language are not advantaged in learning additional languages. Bilinguals' sensitivity on language ambiguity in L2 (i.e. implicit MLA) will show no improvement in their language learning attainment, nor will the younger age of acquisition of the L2.

### **Hypothesis 1.**

Bilinguals' Explicit Metalinguistic awareness (i.e. grammatical knowledge of the language) developed in the L2 has a positive relationship with the score in the artificial language task.

### **Hypothesis 2.**

Bilinguals' Implicit Metalinguistic Awareness (i.e. implicit perception of grammatical ambiguities) without an explicit focus on the form does not necessarily correlate with a better performance in the artificial language task, where grammatical inference is required.

### **Hypothesis 3.**

All the language background variables (i.e. the number of languages mastered, years of formal instruction received in German L2, the age of acquisition of German L2, level of proficiency in German L2) are expected to have a positive correlation with participants' ability to learn additional languages. In particular, knowing more than three languages (even at different levels of proficiency), being exposed to the L2 in a formal learning environment for more time, a higher overall proficiency in L2, and having acquired the L2 at a younger age are supposed to be predictors of a better performance in the artificial language task.

#### **Hypothesis 4.**

Bilinguals' highly developed explicit metalinguistic awareness develops through more years of formal instruction received in the language under investigation.

#### **Hypothesis 5.**

The more explicit the level of MLA is, the better it predicts the ability to learn subsequent languages.

#### **Hypothesis 6.**

Bilinguals' highly developed implicit metalinguistic awareness correlates with a higher overall proficiency of the language and more exposure to a bilingual environment where the L2 is used.

### **5.4 Data Collection**

To test the aforementioned hypotheses, 42 adult bilinguals were assessed on their language background, their implicit and explicit metalinguistic knowledge in German L2, and their ability to learn an additional language. These tasks were chosen for their predictive or evaluative power as the most appropriate to measure the variables under investigation.

The effects of language background variables as well as of the implicit and explicit level of MLA on the third or additional language acquisition are assessed using a within-participants design.

The experiential background variables, i.e. number of language mastered, years of formal instruction received in L2, age of acquisition of each language, are assessed through a language background questionnaire: Leap-Q. The explicit level of metalinguistic awareness is assessed through a test of grammatical knowledge in German L2, with three levels of explicitness of the linguistic knowledge recorded. The level of implicit MLA

is assessed through a Self-Paced Reading task focused on the perception of the case and agreement ambiguities in German L2. Language learning attainment is assessed using Llama-F, an artificial language learning task of grammatical inference.

#### **5.4.1 Participants**

42 participants were tested to address the aforementioned research questions and hypotheses. They were recruited through different advertising channels in England and Scotland: staff and students' mailing lists of the University of Edinburgh, Bilingualism Matters, University of Glasgow, Loughborough University; joining social groups on Facebook; taking part in events organised by German Meetup; contacting German societies, the German Consulate, and different German schools in Edinburgh and Glasgow; through friends and leaflets.

The selecting criteria were: having English as an L1, German as an L2 learned under any condition (i.e. through formal instruction or in a naturalistic setting). The participants were aged between 18 and 74 (age mean 41), they are 18 females and 24 males. The age of acquisition of German L2 varied between 0 and 26. Equal age of acquisition, equal competence in both languages and amount of instruction received in L2 was not sought as their impact on learning additional languages is part of the factors under investigation.

9 participants out of 42 have a different L1 from English: i.e. Italian, French, Chinese, Polish, Hungarian, Slovenian, Spanish, Dutch. The language neutrality of the artificial language task allowed me to keep the data from these participants as the results would not be affected by the typological relatedness.

As regards the number of languages mastered, which is another factor under control in the experiment, 23 participants can speak more than three languages whereas 19 participants could only speak up to three languages with different levels of proficiency.

As regards the level of overall proficiency in German L2, the participants have a mean of 7.5, as assessed by the language background questionnaire. The average for the proficiency in reading was slightly higher (8) compared to the one referring to all the four competencies. This latter is particularly important for the Self-Paced Reading task since a low level of competence in reading would affect the results of the task itself.

21 participants declared to have received more than three years of formal instruction in German either at school, University or attending German classes at private schools. The other 21 declared to have learned German either at home, from their parents or spending a considerable amount of time in a German-speaking country. Some of them also declared to have attended short courses in German but they were not enough to be considered as a strong factor having an impact on their proficiency in German.

All participants received 16 or more years of full-time overall education, that is they all have an A-Level Diploma or a Degree. This was a selecting criterion in order to avoid the disparity in the general level of MLA that other studies have reported being caused by schooling (e.g. Scribner & Cole, 1981; Dabrowska, 1997). Indeed, it has been argued that considering the great effect that literacy has on metalinguistic ability overall, it is not worth comparing people with a high degree of education with people who have much less experience in literacy. People without these skills may be in a disadvantageous position due to the fact that they are not used to the environment of test taking. For instance, it has been argued that there are a number of factors that could affect their performance. For instance, they may be stressed by the time restrictions and/or disturbed by the presence of the researcher. Moreover, they may not be able to keep their attention focused for the time necessary to complete the whole set of tasks.

All the participants received an email with a consent form to be read and agreed before administering the tests. They were informed on the nature

of the study, their rights and contribution to the research, and what would be done with their data. They also received information about the procedure of the tests, duration, risks (no risks were involved), and benefits. Their participation in the study was voluntary as they did not receive any compensation in money. However, they had the chance to win Amazon vouchers and they were offered refreshments during the breaks.

As anxiety is known to affect participants' performance and their results, all possible measures were taken to reduce it. First, the participants were contacted by mail or text messages before the session to make sure that they were still willing to participate after reading all the details about the testing procedure as well as to check that they had understood what they were going to do. They also had the chance to ask questions before meeting me in the laboratory.

The tests were always referred to as "tasks" and they were informed that their name would not appear on any of the tests. I personally administered all the tests. Some participants chose to complete the language background questionnaire at home but they had the chance to ask for clarification on any questions considered as ambiguous. Before starting and during the course of the untimed tests, that is the questionnaire and the test of Explicit MLA, I was checking on the participants to make sure everything was clear to them about the procedure and questions, to encourage them to take their own time and to feel comfortable with the situation as I was not examining their personal competencies.

They also had the possibility to stop at any time during the off-line tasks and to pause the SPR whenever they felt the need to rest their eyes or ask me any questions. Refreshments were given whenever required through all the session but the Llama-F as it was not possible to pause it during the five minutes training session.

### **5.4.2 Materials**

The following materials were used in the course of the tests:

1. Language Background Questionnaire – Leap-Q (Marian, Blumenfeld, and Kaushanskaya (2007).
2. Self-Paced Reading task developed using items taken from a study by Gerth et al. (2017).
3. Adaptation of the test of metalinguistic knowledge of German (part one) developed by Roehr (2006).
4. Artificial Grammar Task- Llama-F test of grammatical Inference (Meara, 2005).

### **5.4.3 Location**

The whole testing session took place in the University laboratory equipped with computers programmed with the Self-Paced Reading and the Artificial Grammar Task. Some of the participants, given the choice, decided to complete the background questionnaire at home.

## **5.5 Rationale and Test Design**

The rationale using each of the tests is explained here together with the description of the test design process.

### **5.5.1 Leap-Q: Language Background Questionnaire**

The Language Experience and Proficiency Questionnaire (LEAP-Q) is a self-report measure developed by Marian, Blumenfeld and Kaushanskaya (2007) as a reliable and valid tool for constructing an informative bilingual profile and assessing language proficiency. Although the use of self-report

questionnaires has been criticised within the research field, an investigation into the validity of the LEAP-Q has revealed results which suggest that self-report measures are indicative of bilingual performance on standardised linguistic tests (Marian et al., 2007). The internal validity of the assessment has been established and replicated, suggesting that the LEAP-Q may be used as an efficient and reliable measure of bilingual language status (Marian et al., 2007).

The language background questionnaire was chosen to assess participants' level of proficiency in German L2 (in speaking, reading, listening, and writing skills), age of acquisition of each language, number and type of languages known, language choices, amount of exposure to the languages in both formal environment and bilingual informal setting. It provides an effective tool to test participants in all the languages they know, how they have learned them, and under what circumstances. It was a quick and effective way to obtain a large amount of information in a relatively short amount of time, only focusing on the parts of the language learning history relevant for the purpose of my research.

The written form was preferred to the interview in order to present and collect the data in a form that was comparable between participants and to avoid the risk of influencing the responses. Nonetheless, participants were free to ask questions about the questionnaire through the time they were filling it to ensure that they responded with the required information without misinterpreting the questions.

The Leap-Q was developed as a reliable and valid instrument of bilingual language status with a predictable relationship between self-reported and behavioural measures. The authors of the questionnaire assessed its validity through two different studies. The internal validity of the Leap-Q was established on the basis of self-reported data from 52 adult multilinguals. The second study assessed the criterion based validity on the basis of standardised language tests and self-reported measures of 50 Spanish-English bilinguals. The participants were all healthy adults with

high-school education or higher. The results allow claiming that the Leap-Q is a reliable, valid, and effective tool for assessing language profile of adult bilinguals in experimental settings. The internal validity was proved via factor analyses revealing consistent factors across both studies. On the other hand, multiple regression and correlation analyses established criterion-based validity and suggested that self-reports were reliable indicators of language performance.

Specifically, one of the main reasons why I opted for this type of background questionnaire is that it provides three separate measures for competence in each language, that is language proficiency, language dominance, and language preference. Since conflating the three measures may lead to difficulties in interpreting the results, each of them was kept separately.

As regards the age of acquisition of each language, it has been proved to be closely related with language learning, to influence participants' own perception and assessment of language proficiency and dominance, and to predict their performance on behavioural tasks. The leap-Q elicited four age of acquisition measures for each language mastered: i.e. age of initial language learning, age of attained fluency, age of initial reading, and age of attained reading fluency.

Moreover, the environment in which the language is learned is particularly relevant for the purpose of the current research for it affects proficiency attainment. It has been argued (Flege et al., 2002) that the years of formal education received in an L2 country, years of residence in an L2 country, the average of use of L1-L2, chronological age of acquisition of each language all affect bilingual language dominance. For all these reasons, the Leap-Q provides descriptions of acquisition modes in terms of learning environment and in terms of the extent to which these learning environments contributed to language acquisition.



Given the evidence that prior language exposure influences bilingual performance, the Leap-Q assesses exposure to a language in four different environments: i.e. in a country, at school, at work, and at home. Specifically, it elicits information about bilinguals' current exposure to each language during reading, watching TV, listening to the radio, as well as through self-instruction and language tapes.

### **5.5.2 Self-Paced Reading**

In order to assess the participants' implicit level of metalinguistic awareness, I used a Self-Paced Reading task. There are several reasons why I opted for an online sentence processing task. Even though most studies investigating language comprehension have used off-line experiments to address how children and adults comprehend words and sentences, it can be argued that off-line tasks present several limitations which make the interpretation of data difficult.

First, off-line sentence comprehension tasks measure how participants interpret a sentence after they have heard the complete sentence. This means that high demand on working memory is required since participants have to process the sentence online as they hear it and to keep them in the working memory until the choice is required. Therefore, working memory could be a confounding variable as participants with a better working memory may outperform those with a relatively low working memory. Another important limitation to take into account refers to the type of knowledge that participants tap into. Indeed, in an offline task, participants can take time to think about the meaning of the sentence before making a decision. That is to say, they make a conscious and controlled decision about the processed sentence which would test their explicit knowledge of the language, in other words, their explicit metalinguistic awareness.

On the other hand, online comprehension tasks assess participants' unconscious and automatic response to language stimuli. They do not have the time to think about the meaning of the sentence and do not use their explicit knowledge of the language. Accordingly, despite the longer time required to prepare and perform an online task, as it requires more experimental items as well as more complex data to analyse, I opted for a Self-Paced Reading task to assess participants' sensitivity to morphosyntactic ambiguities.

The basic premise behind self-paced reading is that "the eyes can be a window on cognition (Just and Carpenter, 1980)". The authors proposed the eye-mind assumption, which states that the amount of time taken to read a word reflects the amount of time needed to process the word. While subsequent research has revealed that the connection between reading times and processing is, in reality, more complex, the basic assumption still holds in the broad sense and reading time data, as a specific class of reaction times (i.e., response times or response latencies), are interpreted with the goal of drawing inferences about the cognitive processing of language. Specifically, relatively longer reading times are taken as indications of processing difficulty, while faster reading times are interpreted as a sign that facilitation occurred.

The question of the reliability of the SPR task as a measure of implicitness of linguistic knowledge has been addressed by several scholars in previous research in different fields of linguistics. Squires (2016), for instance, in her study on the relationship between English speakers' processing and awareness of morphosyntactic abilities, makes use of a SPR as a measure of perceiving of grammatical differences and the noticing of these differences which, she argues, provide the foundation for implicit knowledge of variation and social meaning.

Breadmore et al. (2014) use a SPR task to measure awareness during reading comprehension. Specifically, the RTs were indicators of implicit awareness of subject-object agreement mismatches whereas, for explicit

awareness, a post-experiment error correction task was used. The findings suggest that explicit and implicit awareness are not always aligned. In other words, what is perceived not always lead to consciousness. This has also been confirmed by studies from neurolinguistics research (e.g. Batterink and Neville, 2013) showing that the brain may detect syntactic errors even when a listener does not consciously register them.

It has been suggested that in sociolinguistics research, awareness seems to be a matter of the raising of the internal knowledge of the surface of a speaker's consciousness, with a continuum of awareness representing a continuum from knowledge that is implicit to explicit. Differences within and among constructs like knowledge, awareness, and noticing have been discussed at length in the field of second language acquisition research. Schmidt (1990), for instance, determines three ways in which consciousness has been seen by scholars: i.e. as awareness, intention, and knowledge. Furthermore, he makes a distinction among three levels of awareness, which is particularly relevant for the purpose of the current study: i.e. perception, noticing, and understanding. The author points out that things are frequently perceived, without being noticed, and are frequently noticed without being understood. He claims that noticing is the fundamental requirement for understanding as it is related to rehearsal within working memory and the transfer of information to long-term memory, to intake, and to item learning. Understanding, on the other hand, is related to the organisation of material in long-term memory, to restructuring, and to system learning (Schmidt, 1993). Second language acquisition relies on both item and system learning. Schmidt claims that while noticing is a necessary and sufficient precondition for learning, understanding which includes MLA is facilitative but not required. Despite the distinction between these two components of language learning has been object of a large debate among academics which still remains unresolved, Schmidt's noticing hypothesis remains at the core of much empirical work on language learning.

Accordingly, assuming these premises as a starting point, knowing what the participants noticed through the recorded RTs of the SPR task and whether they understood what they have noticed, through the post comprehension questions, is supposed to shed light on their implicit metalinguistic knowledge of German L2.

Most SPR paradigms examine processing difficulties that arise during the reading of sentences that contain what could be classified as either an ambiguity, an anomaly, or a distance dependency. Ambiguities arise where the grammar permits two or more distinct syntactic interpretations of a word or phrase in the sentence and observable processing strategy often occurs when the (native) parser tends towards one interpretation over the other. Such structural ambiguity can be either local, meaning it occurs temporarily during reading but is resolved within the same sentence, or global, meaning that even after the whole sentence has been read the ambiguity remains. Local or temporary ambiguities are also referred to as garden path phenomena because such sentences are designed to initially lead the reader in the wrong direction with regard to the structure of the sentence. Garden path effects are evident in increased SPR times at or after the point in the sentence where it becomes evident to the reader that the initial interpretation was incorrect.

In the present self-paced reading, participants read sentences word-by-word by pressing a button. The task is “self-paced” in that they have control over the rate of presentation of each sentence. Each button press is recorded so that to provide information about how fast participants process each word. Specifically, in this case, longer reaction times (RTs) at a particular position in the sentence are thought to reflect processing difficulties, which in this specific case, indicate higher sensitivity to case and agreement ambiguity and, therefore, higher levels of implicit metalinguistic awareness.

The items are shown following a centred non-cumulative presentation, where words disappear each time a new word appears on the computer

screen so that participants cannot read previous words again. The main advantage of the non-cumulative presentation is that it provides a more accurate picture of how participants process sentences online compared to the cumulative presentation. Indeed, in the non-cumulative presentation participants cannot go back and read parts of the sentence again. Another reason why I opted for a centred (and not linear) presentation is that most participants develop a reading strategy in which they reveal several segments of a stimulus at a time before reading them all at once through the dashes of the upcoming words. This procedure avoids expectations on behalf of participants about the length of the next word as well as on how close they are to the end of the sentence. It has been argued that this presentation type is also more similar to the way we process language when we listen to sentences.

In addition, post comprehension sentences at the end of each sentence have been included to keep the participants focused on the task of reading and comprehending the sentences instead of pressing the button mechanically. This provides additional accuracy data for the comprehension of the experimental sentences and fillers. Based on the comprehension accuracy criterion, it is possible to keep the analyses of the RTs from correctly and incorrectly comprehended sentences separately (Juffs & Harrington, 1996).

Filler sentences are also added to disguise the purpose of the task from participants and to avoid developing expectations and strategies. Moreover, as RTs for each word of the sentences are recorded, the ambiguous and non-ambiguous items have similar length and structure to avoid differences in length and complexity that may affect the design and results. The experimental sentences include a critical segment with a disambiguating word and the following item (spillover effect) which provide crucial information for the research question.

Temporarily ambiguous sentences have played a major role in experimental psycholinguistic research as they allow to examine which

analysis or interpretation is preferred, and how participants recover from an initial misanalysis. Meng and Bader (2000a), for instance, presented native German speakers with subjects/object ambiguities that were disambiguated towards object-initial order either by a number marking on the final verb or by nominative case marking on the subject noun phrase.

These types of morphosyntactic disambiguation cues typically cause measurable processing difficulty, also known as Garden-Path (GP) effects. Coming across a morphosyntactic error signal is thought to force the parser to abandon the initially favoured subject-initial analysis and to trigger reanalysis of the incorrectly parsed string. Gerth et al. (2017) study, investigated to what extent L2 comprehenders' online sensitivity to morphosyntactic disambiguation cues are affected by L1 background. They concluded that intermediate to advanced learners are sensitive to morphosyntactic interpretation cues during online processing regardless of whether or not corresponding grammatical distinctions exist in their L1.

As reported by Gerth et al. (2017), in sentence processing research, GP sentences are constructed so as to mislead comprehenders initially, with the structurally simplest, most frequent and/or most plausible analysis proven wrong by the subsequent input. Previous research has proven that L2 speakers tend to be garden-pathed in a similar way as L1 speakers (e.g. Jackson, 2008; Jacob & Felser, 2015). It has been argued that the presence or size of GP effects may be affected by a number of individual factors such as L1 background, L2 proficiency, reading speed, and working memory. Difficulty recovering from GPs may be reflected in low comprehension accuracy and/or incorrect acceptability judgements.

Case information generally provides a better reanalysis cue than agreement (Fodor & Inoue, 2000). Therefore, a weaker GP effect for the case is expected compared to agreement disambiguation across participants' reading times, and higher comprehension accuracy for case-disambiguated than for agreement-disambiguated GP sentences.

Over the past thirty-five years, all types of SPR paradigms have been employed to study fundamental questions in native language sentence processing such as whether the parser considers multiple plausible analyses simultaneously or sequentially, whether all types or modules of linguistic information are immediately available or only syntax is active at first, and to what extent these basic principles vary cross-linguistically, among others. On the other hand, non-native sentence processing research is a relatively new area of study that can be uniquely informative with regard to these pre-existing broad questions in psycholinguistics, and which has also begun to articulate its own research agenda within the field of second language study (Jegerski, 2014).

SPR investigations have focused on the issue of learnability and age effects in processing, on the closely related debate as to whether divergence in adult SLA is rooted in competence or performance, and on the question of L1 transfer in processing, so far with relatively less attention dedicated to other L2 questions like mapping the developmental trajectory of non-native processing behaviour. Thus, in most cases the SPR method has been employed to measure linguistic skill and knowledge for the purpose of making comparisons, either between native and non-native processing in the L2, between native processing in the L1 and non-native processing in the L2, or between the L2 processing behaviours of participant groups with different native languages.

Comparison on the basis of SPR data can be designed and interpreted from at least two different perspectives. First, because grammatical processing relies on existing knowledge of grammar that is stored in memory, the SPR method in L2 research was first viewed as complementary to previously established measures like grammaticality and acceptability judgments. Accordingly, for the purpose of the present research, SPR data can be seen as an indirect measure of grammatical competence, that is implicit MLA, and regarded as a relatively more direct or more implicit measure of grammar than off-line judgments as the time

constraints of on-line processing allow less room for the application of explicit grammar rules. The most common SPR paradigms employed in this vein of research are with grammar violations or anomalies and with distance dependencies, both of which can be linked to the formal linguistics traditions of grammaticality judgments with relative ease. Sensitivity to an experimental manipulation of grammar (i.e. agreement and case ambiguity in the present study) and in the form of increased reading times at or near the site of a violation, is interpreted as evidence that the relevant underlying grammatical competence has been acquired. This is, of course, assuming that such sensitivity is also evident among a comparison group of native speakers and can, therefore, be reasonably expected, given that even violation-based reading time effects - which tend to be more robust and more reliable than those that occur with dependencies or ambiguities - can sometimes be inconsistent among native speakers.

Second, the SPR method can be used as a measure of performance, or processing behaviour itself, a perspective that is becoming dominant as the study of L2 processing grows. A number of different reading time effects are targeted with this aim, including ambiguities, distance dependencies, and anomalies. However, the interpretation of data can be considerably less straightforward than when SPR is employed as an indirect measure of grammatical competence, especially when the method is used to compare native and non-native processing. That is to say, data interpretation is fairly straightforward when a group of native readers exhibits a reading time effect that is not at all evident among a group of non-native participants, as most researchers would agree that such an outcome indicates a difference between native and non-native processing.

On the other hand, there are occasions where a group of native readers shows a SPR effect that is even more pronounced among the non-native readers, meaning that the effect is sustained over more than one region of interest or it surfaces again during sentence wrap-up or while answering a



post-stimulus distractor question. Particularly if the SPR effect in question is presumed to signal syntactic reanalysis, a more pronounced effect among non-native readers could be interpreted as a sign of additional processing difficulty rather than native-like processing skill. Another experimental outcome that can be subject to multiple interpretations is when non-native participants display a reading time effect that occurs a region or two later than that exhibited by the native readers or perhaps does not surface until wrap-up occurs at the last region of the stimulus. In both of these scenarios, there is some room for debate as to whether the observed differences between native and non-native processing are critical, meaning whether they represent qualitative or merely quantitative differences.

In general, reading time data from SPR experiments are more nuanced and thus tend to demand more complex interpretation than data from off-line measures like grammaticality judgments. In some cases, the interpretation of L2 SPR data can be relatively straightforward, but it is not always clear whether increased reading times among L2 learners reflect the target native-like processing difficulty induced by experimental manipulation of the stimuli (i.e., learner-external factors) or a different type of difficulty that has to do with the limitations of L2 processing (i.e., learner-internal factors). In the former scenario, increased SPR reading times would be interpreted as evidence of native-like processing strategy, whereas in the latter they would be taken as evidence of an L2-specific processing struggle.

Specifically, as it will be explained in more details in the analysis section, increased RTs will be interpreted as a measure of detecting the case and agreement ambiguity in German L2 on behalf of bilingual participants so that to assess their level of implicit MLA.

Thus, on the basis of the analysis provided, it can be argued that there are several advantages that account for my choice to use a SPR task to assess participants' implicit knowledge of German L2. First, SPR is an

inexpensive and highly portable online method for sentence processing research accessible to a wide range of researchers. Indeed, the experiment can be built and run on a basic laptop and participants could be tested anywhere. It was created using free software, (i.e. Opensesame: Mathôt et al., 2012), with the advantage of having a graphic user interface. Moreover, it is efficient as there is no need to supervise the participants as closely as with other devices, where adjustments may be needed. This convenience makes it feasible for a researcher to run different experiments at the same time.

In addition, one of the most important reasons why I opted for a SPR is that it is an exceptionally covert measure of sentence processing. That is, participants' conscious attention is easily diverted away from language to a distractor task, answering to comprehension questions, which is also more familiar to them as an assessment than SPR. Additionally, participants do not need to know beforehand that the software program is recording their reading times, they are not likely to have previous assumptions regarding the task because it is one of few methods used exclusively for psycholinguistic research, and they do not come into contact with any specialized technical equipment that could lead them to adopt task-specific strategies.

Finally, SPR materials can also be relatively covert with regard to their linguistic targets and they are particularly suitable for my research aim, i.e. assessing implicit knowledge of the language under investigation. While some SPR paradigms do employ stimuli with grammatical violations that may invite explicit judgments or the activation of metalinguistic knowledge, particularly among participants formally trained in the L2, my experiment is created to obtain significant reading time effects with more subtle paradigms in which all stimuli are grammatical but temporarily ambiguous as they allow a double interpretation of the elements at the beginning of the sentence.

### **5.5.3 Test of Explicit Metalinguistic Knowledge**

To assess the participants' explicit level of Metalinguistic Awareness in German L2, the first part of a test of metalinguistic knowledge designed by Karen Roehr (2008b) was used. The test was developed to incorporate measures of L2 proficiency on one hand, and language analytic abilities on the other. She found out that the linguistic and metalinguistic knowledge of advanced university level L1 English learners of L2 German correlated strongly. Moreover, the study suggests that learners' ability to correct, describe, and explain highlighted L2 errors and their L2 language analytic ability may constitute components of the same construct.

In view of the assumption based on the research conducted on MLA and TLA that developing explicit knowledge also in an L2 may assist the language acquisition process itself, it is necessary to measure this component in order to correlate it with language performance in L3.

Existing empirical research on the relationship between L2 proficiency and MLA includes studies with longitudinal and cross-sectional designs (e.g. Bialystok 1979; Sorace 1985). From the previous studies, it is possible to highlight the following main findings. First, when comparing learners' ability to correct L2 errors and to state the violated grammar rules, it was found that students did not necessarily acquire the rules they had been taught (Sorace 1985; Green and Hecht 1992). On the other hand, being unable to state the pedagogical grammar rule did not mean that learners were consequently less able to correct L2 items instantiating the rule in question (Sorace 1985; Green and Hecht 1992; Elder et al. 1999).

Second, researchers report that some rules and categories of pedagogical grammar had been acquired and were applied more successfully than others (Bialystok 1979; Green and Hecht 1992; Renou 2000). Third, large-scale correlational studies have revealed the inter-learner variability of metalinguistic knowledge as well as the variable application of such knowledge across tasks (Alderson et al. 1997; Elder et al. 1999; see also

Clapham 2001). Fourth, positive correlations between L2 proficiency and metalinguistic knowledge have been identified. Nonetheless, it appears that the relationship between L2 proficiency and metalinguistic knowledge is less substantial than one might expect, especially given the widespread use of pedagogical grammar in university classrooms. Moreover, significant positive correlations were mainly obtained on the basis of written measures of L2 proficiency.

Thus, to sum up, existing empirical research has uncovered a positive, but mostly moderate relationship between learners' L2 metalinguistic knowledge in the sense of correction, description, and explanation ability, and their L2 proficiency as measured by means of various written tests. Additionally, it has been suggested that L2 metalinguistic knowledge in the sense of correction, description, and explanation ability and language-analytic ability might be parts of the same underlying construct (Roehr, 2008b).

More specifically, in the most general terms, metalinguistic knowledge can be defined as learners' explicit knowledge about language (e.g. Bialystok 1979; Alderson et al. 1997; Elder et al. 1999). While implicit knowledge is knowledge that cannot be brought into awareness or articulated, explicit knowledge is declarative knowledge that can be brought into awareness and that is potentially available for a verbal report (e.g. Anderson 2005; Hulstijn 2005).

In accordance with Roher's own view about MLA, i.e. the learners' ability to correct, describe, and explain second language (L2) errors (Roehr, 2007), the task has been selected as it allows an investigation of these three levels of explicitness of linguistic knowledge. Chomsky (1975), has defined the field of metalinguistic as "the subject knowledge of the characteristics and structures of language." MLA, then, refers to the understanding that language is a system of communication, connected to the rules, and forms the basis for the ability to discuss different ways of using language.

Roehr (2007) pointed out that metalinguistic ability refers primarily to “the possibility of using language above the surface structures, of using language in an abstract way, of thinking deeply it, while making use of it in our understanding and observations”.

Metalinguistic is an awareness of the language, its structures, and functions that allow the speakers of that language to think about and use the language consciously. It consists of the knowledge and awareness of phonemes, syllables, rhyme, and morphology (Andrew, 2004). Indeed, consciousness and activation of attention are the components that allow to distinguish between implicit and explicit knowledge of the language. A number of studies has examined the relationship between learners' explicit and implicit knowledge, where the former is defined as the learners' being able to explain language, its features such as structures and phonemes, whereas the latter was operationalized through using these features in oral or written forms of language.

Bialystok (1999) has defined metalinguistic awareness as the ability to attend to and reflect upon the properties of language. Accordingly, MLA can be defined as the awareness of the features of the language that gives the speakers of that language the ability of not only comprehending or producing utterances but also checking the linguistic form and structure underlying the meaning of the utterances as a sort of monitor (Malakoff, 1999).

In other words, implicit knowledge is the acquisition of knowledge about the underlying structure of a language by a process which takes place naturally and without conscious attention, whereas explicit knowledge is conscious in the sense that individuals attend to particular aspects of the stimulus and structures (Ellis, 2008).

In her 1999 study, Bialystok proposed the idea that metalinguistic awareness involves the operation of control as a cognitive process. She defines control as the process of selective attention, the ability to monitor

and regulate the processing of information. It concerns the intentional selection and application of knowledge employed in solving metalinguistic problems.

As Alipour (2014) points out, grammatical competence is the knowledge in the mind that occurs automatically and is not available to introspection, implicit knowledge that a speaker has about language, and that comes from the distinct but the interrelated unit of the mind associated with the human language faculty (Chomsky, 1975).

Metalinguistic awareness is often assessed using tasks of syntactical awareness (Bialystok, 1999). Generally speaking, a metalinguistic task is the one that requires the individuals to reflect on the linguistic features of the language and the linguistic nature of the messages (Malakoff, 1999).

The main reason why an adaptation of Roehr's MLK test was chosen, is that it allows to distinguish among three levels of MLA, that is three levels of explicitness of grammatical knowledge of German L2. In particular, the construct of L2 metalinguistic knowledge was operationalized by means of a two-section test. The first section was aimed at measuring learners' ability to correct, describe, and explain selected L2 features. The second section was aimed at measuring learners' language analytic ability. Each test section included 15 items. The description/explanation section consisted of twelve L2 sentences (items 1–12), each of which contained one highlighted error. However, as the test was readapted for the purpose of the present research to provide three measures of MLA, the mistake was not highlighted.

Therefore, participants were required to identify, correct, describe, and explain the mistakes. A maximum of 36 points could be obtained for successful correction. The description/explanation section further contained three short L2 passages which had been paraphrased in an inappropriate manner (items 13–15). Learners were required to describe and explain why the given paraphrases were unacceptable. This part of

the task mainly relies on L2 features depending more strongly on pragmatic and discursive context, that is, features which could not easily be described and explained on the basis of an isolated sentence. The description/explanation section tested learners' ability to implement pedagogical grammar rules since each targeted error or inappropriate paraphrase could be described/explained by means of a statement of the type: 'As form X occurs / function X is being expressed, form Y needs to be used'. Essentially, the targeted description answered the question 'What form?', while the targeted explanation answered the question 'Why this form?'. Put differently, learners were required to describe metalinguistic categories as well as explain the relations between these categories. Items targeting syntactic, morphological, and lexical features of the L2 were included. As each of the 15 items was scored separately for description and explanation, this test section yielded a maximum of 45 points (i.e. a maximum of 3 points per sentence).

Roehr's language test involves a range of L2 features representative of aspects covered in tertiary-level foreign language instruction for L1 English-speaking learners of L2 German. Therefore, targeted features were based on notions of pedagogical grammar (Swan 1994; Westney 1994; McDonough 2002), rather than a specific linguistic theory. In accordance with this rationale, the explicit MLA test includes:

- features of the L2 constituting either real cognates, in the sense that direct;
- English translation equivalents exist (e.g. modal particles), or false cognates, in the sense that apparent analogies between the L1 and L2 mask formal or functional differences (e.g. German *seit* typically combining with the present tense as opposed to English *since* typically combining with the present perfect tense);
- functional features of the L2 that exist in English but differ in terms of their formal realisations (e.g. word order in subordinate

clauses; passive constructions); and formal features of the L2 that have no direct equivalents in English (e.g. separable verbs; grammatical gender).

In particular, the following list shows the grammatical items used to assess participants' explicit level of MLA in German L2.

### **L2 features included in the language test and the description/explanation section of the metalanguage test**

Item no.

- 1 Separable verbs
- 2 Prepositions and cases (accusative/dative)
- 3 Attributively used adjectives/adjectival inflection
- 4 Lexically expressed directional movement
- 5 Seit and present tense
- 6 Subordinating conjunctions/word order in subordinate clauses
- 7 Past subjunctive (Konjunktiv II)
- 8 Genitive case
- 9 Collocations: Idiomatic use of the L2
- 10 Attributively used adjectives/ adjectival inflection
- 11 Past subjunctive (Konjunktiv II)
- 12 Negation (nicht versus kein)
- 13 Passive and alternatives to the passive
- 14 Past participle
- 15 Lassen as an alternative to the passive/infinitive constructions without zu

#### **5.5.4 Artificial Language Task of Grammatical Inference: Llama-F**

The artificial grammar task Llama-F, a test of grammatical inference, assesses participants' ability to learn additional languages in a formal setting. It is part of the battery of Llama tests developed by Meara (2005)



as shorter, free, language-neutral tests, loosely based on the Modern Language Aptitude Tests by Carrol & Sapon (1959). The first attempt at works in this area appeared as Meara, Milton, and Lorenzo-Dus (2002) and included a set of five tests assessing different aspects of language learning aptitude, i.e. vocabulary learning, grammatical inferencing, sound-symbol association, phonetic memory, and a test of memory for unusual sound sequences. The rise of interest generated in the research community since the first publication prompted the authors to adapt the tests for people with a different L1 from English, as requested by researchers. Moreover, another problem was that some of the material languages developed as part of the original test started to be familiar to potential participants. For instance, Polish and Turkish, although not widely recognised in the UK, are more familiar to test takers with Hungarian or Azeri as an L1.

Hence, the need for a new set of tests, which was largely independent of the participant's L1, led the designers to develop the actual version. In particular, three new tests are introduced to the original Llama-A, B, C, D, E: Llama-B, F, and D. Llama-B is a new version of the former Llama-B test of vocabulary learning based on picture stimuli rather than verbal stimuli. Llama-D substituted the Turkish language of the original version, which turned out to be known by different test takers, with a Northern Canadian dialect.

Llama-F, selected as part of the task battery of the current study, is an updated version of the original Llama-C, a test of grammatical inferencing. It is based entirely on picture stimuli and has eliminated the need for an L1 database. This is the main, practical reason for choosing this test, as not only does it allow to control for participants' L1, but it also allows to control for the amount of exposure and level of competence in L3. In fact, being an artificial language, test takers are not supposed to be familiar with the language of the task involved. Moreover, it would have been difficult to find participants with the same level of proficiency in any natural language as

an L3, the same amount of exposure to the language, the same method of acquisition and level of formal instruction received. The second reason was that the task does not explicitly focus on grammar and metalinguistic awareness of the language as no instruction or request about the formal aspects of the grammar was included. Instead, the grammatical rules beyond the unknown language are only implicitly inferred in order to match the sentence description with the picture. Additionally, the restricted time that participants have at their disposal to passively observe the artificial language and figure out the mechanism beyond it as well as the fact that they were not allowed to take notes, make the task more similar to the implicit learning process of the language. Accordingly, the task does not directly facilitate bilinguals with higher levels of metalinguistic awareness and language learning experience, that are supposed to perform better in TLA, as claimed in the hypothesis of the present chapter.

Nonetheless, there is no common agreement on what is measured through artificial language tasks among scholars. Spark et al. (1995), for instance, argue that instructed L2 group would outperform the group of monolinguals and uninstructed bilinguals in L2 on explicit measures due to the more developed strategies for learning vocabulary and pattern recognition. However, this hypothesis was not confirmed statistically as the instructed L2 group, in fact, did outperform the other two groups but the results did not reach significance.

Granema (2013) found that Llama-F measures more explicit aspects of language learning concluding that L2 learners (i.e. bilinguals that also received instruction in their L2) would perform better as vocabulary learning and grammar rules are core elements of L2 classroom instruction. At this point, another issue arises, that is to say, the idea of a "training effect". Indeed, Nayak et al. (1990) state that what makes bilinguals better at taking tests is being more adept at using strategies rather than being more successful overall. Therefore, bilinguals prior instruction in both languages would outperform the others in TLA. But is the concept of

aptitude stable of trainable? Further research is needed to answer to this question.

On the other hand, the validity of the artificial language tasks has been questioned in that they cannot be compared to natural language learning. However, there are a number of studies that have assessed the validity of artificial language tasks by comparing performance in these tasks with performance in natural language tasks with a number of internal factors controlled.

In a recent work, Ettliger et al. (2015) investigated the relationship between artificial and second language learning (ALL). Despite ALL experiments have become an important tool in exploring principles of language and language learning ability. However, as already mentioned, a persistent question in the field of second language research is whether ALL studies are ecologically valid assessments of natural language ability. The study bridged the gap between ALL and natural language learning research by comparing the performance of adult learners of Spanish as an L2 and ALL enhancement. The findings suggest that performance in ALL tasks correlates positively with indices of L2 learning even after controlling for IQ, general intelligence and the potential mediation of these internal factors. Moreover, the study also considered the effects of specific features of ALL tasks such as including or not a semantic aspect as well as presenting a complex or simple grammar. From the results, they inferred that ALL studies that incorporate a semantic component and involve more complicated grammatical systems may closely resemble the learning process of natural languages.

Besides, an additional element which supports the relationship between ALL and natural language learning can be inferred on the basis of an important key element which plays a fundamental role in both types of learnings: working memory. In artificial and second language learning there is a large amount of evidence supporting the relationship with working memory (e.g. Robinson 2002, 2005a; Misyak and Christiansen,

2012). However, it still remains unclear whether ALL studies assess language-specific learning abilities or participants' general learning abilities or general intelligence, which in turn affect second language learning (Genesee, 1976).

The validity of the Llama-tests has been assessed in a recent study by Rogers, Meara, and colleagues (2017). In particular, the issues raised by the authors concern whether the tests are language neutral, the effects of bilingualism and age on Llama-tests scores, and the amount of variance that background factors can account for in the Llama-tests results.

To investigate the effects of age, bilingualism, as well as the language neutrality, 240 participants were tested. The authors did not find any significant difference in terms of language background, suggesting that Llama-tests are indeed language neutral as there are no differences between groups once other factors (i.e. L2 instruction) are controlled for.

As regards the effects of bilingualism, specifically, the difference referred to monolingualism, bilingualism, and instruction in L2, instructed L2 learners significantly outperformed the monolingual and bilingual group on two sub-components: Llama-B and Llama-F. As it has already discussed in the present chapter, these are considered to measure more explicit aspects of language learning. However, despite the unresolved question of whether aptitude is a trainable or stable, the authors suggest that Llama-tests seem to be influenced by prior experience or training (instruction). This is particularly relevant to the aim of the present research as it assesses, among other factors, the effects of the level of instruction received in L2.

The hypothesis of a training effect is also related to the results found in terms of the effects of age. Younger groups (10-11 years old) were outperformed by older groups (20-21 Years old) suggesting that Llama-tests are not suitable for children as older learners may have developed more refined learning strategies over the years.

Finally, the effects of six background individual factors were also considered to see how much of the variance in the Llama-tests score could be accounted for by each of them: i.e. L1, L2 status, age, highest formal education, gender, and logic training (puzzles). The multiple regression results from 404 participants show that Llama-tests can generally be used across different L1s, with male and female participants of different education levels and with different ages as these factors did not consistently affect the variance in scores. The only individual variable to predict most of the variance was prior instruction in a second language in Llama-B (6%) and Llama-F (2.6%). Therefore, on the basis of the analysis provided, it can be argued that Llama-tests can be considered as robust and measures of language learning aptitude. Additionally, they are particularly suitable for the purpose of my study, considering the large amount of variation found in TLA research, as they are not subject to significant external factors or individual variables that would affect the results.

## **5.6 Procedures**

### **5.6.1 Language Experience and Proficiency Questionnaire (Leap-Q)**

The questionnaire was administered to each of the 42 participants as the first task of the session. It was a useful introductory task to make the participants comfortable, to get information about their personal circumstances, what makes them bilingual, and how they had become bilingual. The questionnaire consists of a first page with general information about the participants and the languages known (i.e. personal details, number of languages known in order of dominance and acquisition, language use, formal education etc.). The next pages, a page per each language, are focused on specific aspects of language acquisition, exposure, proficiency, use as well as the most important factors which contributed to the learning of the language.

Instructions and examples on how to fill the questionnaire were provided to the participants and they were also free to ask any questions before and while they were completing it. The task was not time restricted and the average time to do it was between 15 and 20 minutes depending on the complexity of their language history (in other words, depending on how many languages they knew).

### **5.6.2 Self-Paced Reading (SPR)**

The experimental material is taken from Gerth, Otto, and Felser (2017) and consisted of 24 sentence quadruplets (3a-3d) (see Appendix). All experimental sentences were grammatical sentences starting with an object. In each set, two sentences were temporarily ambiguous for agreement and case (3a, 3c) while the other two (3b, 3d) served as unambiguous controls.

#### **(3) a. Ambiguous, agreement**

*Die Prinzessin aus Spanien haben die Reiter ganz*  
the princess[NOM/ACC, SG] from Spain have[PL] the horsemen quite  
*spontan fotografiert.*  
spontaneously photographed  
'The horsemen have photographed the princess from Spain quite spontaneously'.

#### **b. Unambiguous, agreement**

*Den Prinzen aus Spanien haben die Reiter ganz*  
the prince[ACC, SG] from Spain have[PL] the horsemen quite  
*spontan fotografiert.*  
spontaneously photographed  
'The horsemen have photographed the prince from Spain quite spontaneously'.

#### **c. Ambiguous, case**

*Die Prinzessin hat plötzlich der Reiter ganz*

the princess[NOM/ACC] has suddenly the horseman[NOM] quite  
*spontan fotografiert.*  
spontaneously photographed  
'The horseman has suddenly photographed the princess quite  
spontaneously'.

#### **d. Unambiguous, case**

*Den Prinzen hat plötzlich der Reiter ganz*  
the prince[ACC] has suddenly the horseman[NOM] quite  
*spontan fotografiert.*  
spontaneously photographed  
'The horseman has suddenly photographed the prince quite  
spontaneously'

All the ambiguous sentences, for agreement and case, started with a feminine singular Determiner Phrase (DP), which in German is ambiguously marked for case (nominative/accusative) and thus could potentially function either as the subject or the direct object. The unambiguous control sentences (3b, 3d) all begin with a masculine singular DP, which in German is unambiguously marked for accusative case. The ambiguous sentences were disambiguated either by number marking on the auxiliary as in (3a) or by nominative case marking on the second DP as in (3c).

All the experimental items were 9 words long. For both, agreement and case, the number of words intervening between the initial DP and the disambiguating region was kept constant. Sentence (3a) is disambiguated by the second DP (i.e. *der Reiter*) which is marked unambiguously as a nominative case. This becomes fully clear when participants read the head noun (i.e. *Reiter*) as the determiner itself could also indicate that they are about to read a DP in a dative or genitive case. As regards the agreement conditions (3c, 3d) they always contained the plural auxiliary *haben* as the fifth word, immediately followed by a plural subject DP (e.g. *die Reiter*). The disambiguating region was followed by another adverbial phrase, with the same number of syllables, in order to control for possible spillover effects.

Each experimental sentence was followed by a yes/no comprehension question that was supposed to check whether the participants were paying attention to the task, by providing the correct interpretation of the sentence-initial DP. For example, the comprehension question for (3a, 3b) was *Haben die Reiter fotografiert?* (Did the horsemen take photographs?). All the experimental items were pseudo-ransomised and distributed in a Latin Square design. They were intermixed with 48 filler sentences. All of the filler sentences were unambiguous, starting with a subject with a singular or plural DP. The fillers were 9 to 11 words long presenting a syntactic structure very close to the one of the experimental items except for the positions of the direct object and subject.

The experiment began with practice items to make the participants familiar with the task procedure and with the buttons they needed to press: spacebar to show each subsequent word on the screen, Y to answer “Yes” to the comprehension questions, N for “No”. Participants were given instructions on how to perform the task and they were also informed that in case they needed to stop for any reason such as to ask questions, rest their eyes etc. they had to pause the experiment by pressing the letter Q. Reading times and comprehension accuracy data were recorded using the Opensesame program. Participants were asked to read at their comfortable reading speed and to answer the comprehension questions so that to distract them from the actual aim of the task. All sentences were presented word by word using a non-cumulative centred procedure for the reasons already provided in the present chapter.

### **5.6.3 Test of Explicit Metalinguistic Awareness**

The test was in familiar paper-and-pencil format. It consisted of five sheets with instructions and examples on how to complete it. Participants were under no time pressure, and all completed the tests in 30 minutes or less. The instructions were also given again verbally to make sure participants



understood what they had to do. The test contained 15 items in total. The first 12 sentences contained an instance of “unacceptable use of German” either because it was ungrammatical or unnatural. For this part, test takers were required to highlight the mistake, correct it, and provide a short explanation of why it represented a mistake. The items 13-15 contained 3 sentences and an inappropriate paraphrase of it. Participants were asked to explain why the given paraphrase did not match the sentence provided in terms of both meaning and grammar.

#### **5.6.4 Artificial Grammar Task: Llama-F**

All participants took the LLAMA\_F, grammar inferencing test, as the last task of the session. The box marked  $\sqcup$  controls the length of time available to learn the grammar of the new language. The number in the box tells the number of seconds they have to complete the first phase of the test. This is set at 300 secs, i.e. five minutes. The program is initialised by entering your name in the two boxes marked  $\cong$ . The LLAMA programs use this information to generate a code that identifies your personal data. You start the program by clicking the  $\wp$  button in the start panel. Clicking this button activates the array of buttons in the main panel, and starts the timer. Your task is to use the time available to you to learn as much as you can about a new language. You do this by clicking on the small buttons in the main panel. For each button you click, a picture and a sentence that describes it will be displayed, as in the screen-shot below. *unak-ek eked-ilad* is the sentence that describes the picture. The presentation phase of the program shows the test-taker a series of pictures depicting shapes and objects, and a short sentence in an artificial language which describes each picture. The participants were expected to work out how the descriptions relate to the pictures. From this, they should be able to intuit some of the grammatical and morphological features of the language such

as word order, gender, singular, dual and plural numbers, conjugating prepositions etc. Test-takers had five minutes to explore the data set. During this time, they were asked to keep the attention focused on the task as it was not possible to pause it. A short break between the two phases was suggested.

The LLAMA manual suggests that test-takers may take notes during this phase of the test. However, I decided to remove this option for a number of reasons explored by the authors in previous studies. Two versions of the test have been conducted by Rogers et al. (2016), one in which participants could take notes and another study in which participants could not take notes. A t-test did not show any difference ( $t(344) = 0.268$ ,  $p = 0.789$ ) between participants who were allowed to take notes ( $M = 41.42$ ,  $s.d. = 26.28$ ) and those who were not ( $M = 42.22$ ,  $s.d. = 28.35$ ). Moreover, it was noticed that those who were permitted to take notes did so and also made use of the full five minutes of learning time, whereas those who could not take notes did not use the full five minutes. Finally, it was observed that few of the note takers wrote out the sentences as a whole and drew pictures. They then tried to work out the rules in the testing phase rather than using the learning phase to do so. This was contrary to the instructions given.

The second phase of the test starts when you hear a bleep to signal that you are entering the test phase. The  button is clicked to start testing. This phase is not timed and the program displays a picture with two sentences in the artificial language. During the second phase, they were presented with a new set of pictures that incorporate new elements as well as some taken from the training phase. Each picture is accompanied by two sentences which might describe it, and test-takers were required to choose which was the correct description according to them. They should be able to do this if they have internalised the grammatical rules evidenced in the presentation phase. Five points are awarded for a correct answer and five points deducted for an incorrect choice.

One sentence is grammatically correct, while the other contains a major grammar error. Participants are required to click on the sentence that they think is correct. The program gives them feedback in the form of a ding for a correct answer, and a bleep for an incorrect answer. To see the next test item, they had to click the  button. There are twenty test items in total. The screen displays the score as they work through the test, and shows how many items are left to complete. At the end of the test, the score is displayed on the bottom panel. Scores for the LLAMA\_F range between 0 and 100.

Figure 1: Llama-F item example

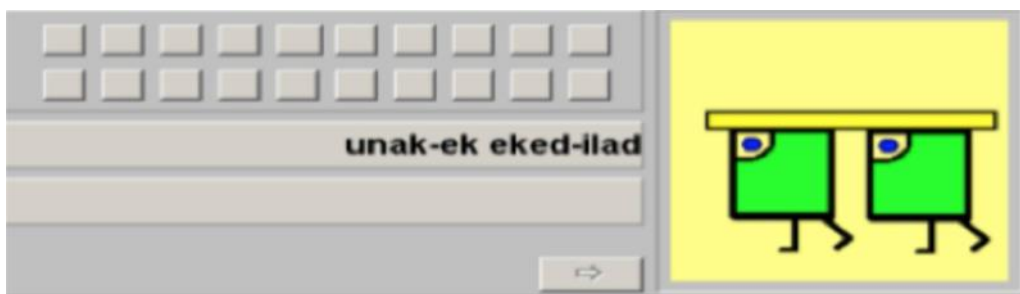


Figure 2: Llama-F Interface



## **Chapter VI: Data Coding and Analyses**

### **6.1 Coding the Data**

The answers from the Leap-Q and from the Test of explicit MLA in German L2 were coded in order to obtain numerical data from inputting into the statistical program IBM-SPSS. The coding for each of the tests is outlined in the following paragraphs.

#### **Language Experience and Proficiency Questionnaire (Leap-Q)**

The data from the questionnaire were exported into an Excel spreadsheet first, following the supplementary information released by the authors of the questionnaire (“exporting the data from the electronic version from Word 2013 into Excel”). For the paper versions, I had to export the data first on the electronic version, before exporting them onto Excel.

The number of languages known by each participant was assessed by counting all the languages in which they claimed to have competence. Participants’ languages have been counted even if their competence was low as it has been demonstrated that even a limited contact with a language may have metalinguistic benefits that bilinguals transfer when learning additional languages (Yelland et al., 1993). Dialects have also been counted as languages being a matter of a socio-political rather than a linguistic distinction (Odlin, 1989). On the basis of the number of languages known, an additional variable was created distinguishing between participants who knew up to three languages and those who knew more than three languages to see whether there was a significant effect.

As regards the participants’ age, apart from as a continuous variable, it was also reported as a dichotomous variable to see the effects of age by partialling out from the analysis data of participants with more than 60

years. As it will be seen from the analyses section in the present chapter, age did not affect the strength of correlations under investigation.

The level of overall proficiency in German L2 was obtained by computing the mean of competencies assessed in the four main skills: reading, writing, listening and speaking on a scale from 0 to 10. The competence in reading was kept separately as it was noticed that, most of the cases, it was slightly higher compared with the other sub-skills. It was particularly relevant for the SPR task since a low competence in reading would affect the main results of the test.

Level of instruction received in German L2 was also reported as a continuous variable, i.e. on a scale from 0 to 10, based on the number of years and months spent in a formal setting where German was taught and as a dichotomous variable distinguishing between participants who received at least three years of formal instruction (at school, University etc.) and those who received less than three years of formal instruction.

Age of acquisition of German L2 was also coded as a continuous variable and as a dichotomous variable in order to distinguish between early and late bilinguals. The cut point was found in the so called “Critical Period Hypothesis” (Penfield and Roberts, 1959). This period was supposed to last from about the second year to the age of puberty. As already argued in the present thesis, there was said to be a biological link to the development of the brain’s dominance of language through lateralization, i.e. the specialising of the left side of the brain in dealing with languages (Hoffmann, 1991). As it is difficult to find a clear cut point when the critical period ends, it was conventionally set at the age of 9. However, for the main analysis, the continuous variable was preferred.

Finally, from the Leap-Q, it was also coded the a variable for the participants who had an L1 different from English (i.e. 9 out of 42) to see the effects of different L1s on the score in the artificial language task (Llama-F). As already discussed in the Llama-F rationale, the task has

been proved to be language neutral, i.e. the score was not affected by having different L1s. Therefore, all the data also from participants with a different L1 from English could be taken into account.

### **Test of Explicit Metalinguistic Awareness**

For the test of explicit metalinguistic awareness in German L2 the total number of points that could maximally be attained was 45. Specifically, there was a maximum of 3 point per sentence: 1 for identifying the mistake, 1 for correction, 1 for explanation. This allowed to create an additional ordinal variable describing the three levels of explicitness of MLA (1-3). The continuous variable with a score from 0 to 45 was used to run the main correlation analyses between explicit level of MLA on the whole and language learning performance (i.e. score in Llama-F).

The ordinal variable with the three levels of explicitness of MLA was used to run the one way ANOVA. It was computed in order to assign participants to 3 different groups on the basis of the score they obtained on the test. They belong to the first group if they achieved a score up to 15 points, that is, they were only able to identify the mistake in the sentence. The second group includes participants who scored between 16 and 29, that were able to also correct the mistake in the sentence, i.e. second level of explicitness. The third group includes participants that achieved the highest score, i.e. between 30 and 45, and were able to also describe the mistake, providing a grammatical explanation.

### **Self-Paced Reading**

In selecting which SPR data to analyse and report, the important decision was whether or not to include reading time (RT) data from trials with incorrect post comprehension questions. I decided to exclude the RTs from incorrect answers for following common practice in studies using the

SPR paradigm. It has been fairly standard practice in sentence processing research to eliminate such data under the assumption that inaccurate responses to basic comprehension questions reflect a lack of attention on behalf of the participants.

The next step to prepare the RTs for statistical analyses is data trimming. Among the different trimming methods available, such as absolute cut-off, global Standard Deviation trim, per participant, per cell etc., I opted for the absolute cut-off, which involves identifying an absolute upper-and-lower limit on RTs to include in the final analysis. RTs faster than 200 ms and slower than 2000 ms were excluded. The main issue with all the trimming methods concerns the potential lack of objectivity as it is not easy to establish the criteria to use for deciding the upper and lower limit. The cut-off points have been chosen following the common practice in sentence processing research (Keating & Jegerski, 2015).

Once the RTs have been selected and trimmed, they were averaged to be submitted to statistical analysis. The in range RTs in ms from only correctly answered sentences on each word at the disambiguating region and the following word (to account for possible spillover effect) were examined. Minimal pairs of sentences were compared because case and agreement conditions differed in their syntactic structure. Accordingly, ambiguous and unambiguous sentences were compared separately in the agreement and case condition. Aggregate means were computed for the critical stimulus region, once for each participant and for each stimulus condition.

On the basis of the aggregate means, an additional ordinal variable was created as a measure of perception of implicit MLA based on the slower RTs expected in the critical area of the ambiguous conditions. The variable presents three levels, i.e. from 0 to 2, indicating respectively that the participants were not sensitive to any of the two ambiguities presented in the experiment, that participants only perceived one of the two ambiguities (either case or agreement), that they were able to perceive



both types of ambiguity. Therefore, the variable allowed to divide the participants into three groups according to their level of implicit MLA for ANOVAs.

## **Llama-F**

Data from Llama-F are automatically saved to the LlamaDat.txt file. It is a simple text file that records the scores of any test user. As a simple text file, it can be read using any word-processor. Opening the file in Notepad, all information about the test takers and score achieved can be found: i.e. Name and Surname, date when the test was taken, score reached in percentage. There is a total of 20 sentences where five points are awarded for a correct answer and five points deducted for an incorrect choice. Scores for the LLAMA\_F range between 0 and 100.

According to the authors, scores should be interpreted as follows:

- 0-15 a very poor score, probably due to guessing
- 20-45 an average score; most people score within this range
- 50-65 a good score
- 75-100 an outstandingly good score. Few people manage to score in this range.

## **6.2 Results**

The main focus of this thesis is to investigate the relationship between bilinguals' language learning experience, their highly developed explicit and implicit Metalinguistic Awareness in a second language, and their ability to learn a third (or additional) language. The ability to think about

the language as an abstract system, made of different levels interacting among each other, and to focus on the grammatical form, to analyse and manipulate it, independently of the specific language involved is hypothesised to be the most important predictor of success when learning additional languages.

Bilinguals are also expected to enhance their explicit level of MLA in proportion to the amount of formal instruction they received. The number of languages mastered is another factor supposed to enhance MLA on the whole, which in turn assists the process of language learning.

Accordingly, bilinguals' performance on the test of explicit MLA should relate with mastering more than three languages and a higher level of formal instruction received. On the other hand, this is not necessarily the case for implicit MLA, as it is more related to language proficiency on the whole and it is more affected by the time spent in an informal bilingual environment. I would therefore anticipate finding independent statistical relationship between implicit MLA and performance in additional languages, and explicit MLA and performance in additional languages.

Participants' age is another potential confounding variable taken into account. Therefore, the effect of age was also checked through partial correlation analysis. Age of acquisition of the L2, i.e. the effect of early and late bilingualism, was also investigated through Pearson Correlation analysis considered the importance given to the already mentioned "Critical Period Hypothesis" in language learning.

### **6.2.1 Standard Multiple Regression (Explicit MLA, level of instruction, and overall proficiency in German L2)**

RQs:

- Do explicit metalinguistic awareness test score, overall proficiency in German L2, and level of instruction received in German significantly predict bilinguals' performance in a Third Language, as measured by an artificial language task (i.e. Llama-F)? Which is the factor that best predicted language learning attainment?

The study included 42 adult bilinguals with German as second language, either acquired in a naturalistic setting or learned through formal instruction at school and/or University. A multiple regression analysis was performed with three IVs entered simultaneously in the regression equations: level of explicit Metalinguistic Awareness, level of instruction received in German L2, and general proficiency in German L2. The DV was the level of achievement in a third language, as measured by an artificial language task: Llama-F. The analysis was conducted to answer to the following RQs: do explicit metalinguistic awareness test score, overall proficiency in German L2, and amount of instruction received in German significantly predict bilingual performance in a Third language as measured by an artificial language task (i.e. Llama-F)? Which are the factors that best predicted performance in the artificial language task?

To answer these research questions, a Multiple regression analysis was run. It is a widely used technique in applied linguistics research that focuses on the relationship between variables, specifically, to predict scores on a dependent variable based on a score of one or more independent variables. Although it is based on correlation, it allows a more sophisticated exploration of the interrelationship among a set of different variables. This makes it ideal for the investigation of more complex real-life, rather than laboratory based, research questions (Pallant, 2011). It provides information on how well a set of variables is able to predict a

particular outcome. Specifically, it provides information about the model as a whole as well as the relative contribution of each of the variables that make up the model.

In standard multiple regression, all the independent variable are entered into the equation simultaneously. Each independent variable is evaluated in terms of its predictive power, over and above that offered by all the independent variables. Another advantage of using this approach is that it also tells you how much unique variance in the dependent variable each of the independent variables explained.

IBM-SPSS uses the “least squares method” to calculate the “coefficient of determination” represented by symbol  $R^2$ .  $R$  is “the coefficient of correlation which has a possible range from 0 to 1” (Carver & Nash, 2006: 17). When working with multiple regression analysis, the adjusted  $R^2$  is used (Carver & Nash, 2006). In regression analysis  $f^2$  is used to indicate effect size. Cohen (1988) provides the following guidelines to interpret the value of  $f^2$ : = 0.02 as a small effect; = 0.15 as a medium effect; = 0.35 a s a large effect.

A number of assumptions must be met in order to perform multiple regression analysis. First, it is preferable that the independent variables show at least some relationship with the dependent variable (above 0.3 is preferable), and the correlation between each of the independent variables is not too high (less than 0.7 preferably) (Pallant, 2007). Second, for the least square method to yield reliable estimates, normality and homoscedasticity of the residuals needs to be checked (Carver & Nash, 2006).

All the aforementioned assumptions required for linear regression analysis was checked before proceeding to examination of the results. First of all, the major assumption addressed concerns sample size. There are a number of guidelines about the minimum sample required for regression. Stevens (1996: 72) recommends that “for social sciences research, about

15 participants per predictor are needed for a reliable equation". Therefore, 42 participants per 3 predictors can be considered as a reliable sample. Second, inspection of the results of the descriptive statistics, the scatter plots and the histograms reveal that each variable was normally distributed.

Following Tabachnick and Fidell (2007), the Z score for each variable was computed by dividing the Skewness values by their corresponding Standard Errors (Zs). As these values are  $< \pm 1.96$  (which has a two-tailed probability of .05), it can be concluded that the data are likely drawn from a normally distributed population.

Moreover, the risk of multicollinearity and singularity was also checked as tolerance and VIF (Variance Inflation Factor) values were not, respectively, less than .10 and above 10. Finally, the presence of potential outliers has also been checked by inspecting the Mahalanobis distances produced by the multiple regression program. To identify which cases are outliers, the critical chi-square value was determined using the number of independent variables as a degree of freedom, following Tabanach & Fidell's guidelines (2007). Having three IVs, the critical value that should not be exceeded is 16.27. From an inspection to the Residual Statistics table, it can be seen that the maximum value obtained for the Mahalanobis is 9.69, which does not exceed the critical value of reference (i.e.  $< 16.27$ ). Given these findings, it was safe to conclude that the assumptions required for the linear regression analysis were not seriously violated. Thus, examination of the results of the multiple regression analysis was justified.

The model summary box (table 1.) reveals an R square value of .364 (adjusted R square .314) indicating that the model explains 36.4% of the variance in the dependent variable. The statistical significance of these results are confirmed by the ANOVA table which tests the null hypothesis that multiple R in the population equals 0. The current model with the included factors reaches statistical significance .001.

Of the three factors included in the model, only two contributed to significant unique variance, i.e. level of explicit metalinguistic awareness (beta .659, sig .000) and overall proficiency in German L2 (beta -.418, sig .006).

The results of the analysis presented above allow to answer the two questions posed at the beginning of this section. The model, which includes level of explicit metalinguistic awareness, overall proficiency, and amount of formal instruction received in German L2, explains 36.4% of the variance in performance in TLA, i.e. score in artificial language task. Of these three variables, the level of explicit MLA makes the largest unique contribution (beta=.659). Overall proficiency in German has a statistically significant negative contribution (beta=-.418), indicating that those bilinguals with higher overall proficiency in German L2 did not perform better in the artificial language task. Amount of instruction received in German L2 did not contribute to the multiple regression model as the beta value was not statistically significant.

Table 1.

<i>Model Summary<sup>b</sup></i>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.604 <sup>a</sup>	.365	.297	25.3842

a. Predictors: (Constant), Instr ≥ 3Y, MLA TOT, Overall Prof, Level of Instruction in G

b. Dependent Variable: Llama-F

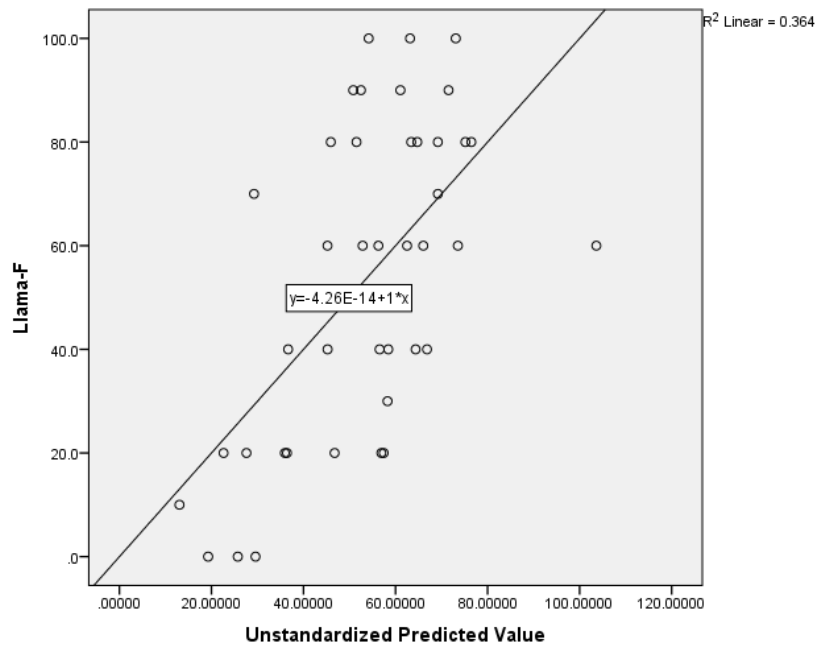
Table 2.

*Coefficients<sup>a</sup>*

Model		Unstandardized Coefficients		Standardized	t
		B	Std. Error	Coefficients	
1	(Constant)	60.937	20.383		2.990
	Level of Instruction in G	2.443	1.791	.223	1.364
	Overall Prof	-8.097	2.862	-.415	-2.830
	MLA TOT	1.676	.376	.660	4.461
	Instr ≥ 3Y	-2.713	9.685	-.045	-.280

a. Dependent Variable: Llama-F

Scatter Plot Graph from Multiregression Analysis



### **6.2.2 Partial Correlation controlling for the effect of age, amount of formal instruction**

Hypothesis: Participant's age and the amount of formal instruction received in German L2 are confounding variables affecting the strength of relationship between explicit MLA and language learning attainment. Particularly, a better performance in the artificial language task is expected by younger participants with larger amounts of formal instruction in the L2 received.

A first partial correlation was used to explore the relationship between level of explicit metalinguistic awareness and performance in TLA as measured by the artificial language task (Llama-F), while controlling for the effect of age. This technique allows to control for a variable that is suspected to influence the relationship between the two variables of interest. By statistically removing the influence of this confounding variable (i.e. participants' age), a more accurate indication of the relationship between explicit MLA and score in Llama-F can be obtained.

Preliminary analysis was performed to ensure no violation of the assumption of normality, linearity, and homoscedasticity. There was a strong, positive partial correlation between explicit metalinguistic awareness and performance in the artificial language task ( $r=.519$ ,  $n=39$ ,  $p<.001$ ) with higher level of explicit MLA being associated with better performance in TLA. An inspection of the zero order correlation ( $r=.448$ ) suggested that controlling for age had little effect on the strength of relationship between these two variables.

A second partial correlation analysis was performed in order to control for the effects of amount of instruction received in German L2 (i.e. more or less than 3 years of formal instruction). The strong positive partial correlation was also confirmed when instruction was considered ( $r=.468$ ,  $df=39$ ,  $p<.002$ ). However, comparing the value with the zero order correlation ( $r=.448$ ) it cannot be claimed that years of formal instruction



received significantly affected the strength of relationship between the level of explicit MLA in L2 and score in the Llama-F test.

### **6.2.3 Spearman's Rank Order Correlation between implicit and explicit MLA**

The relationship between the two main independent variables, i.e. implicit MLA as measured by a Self-Paced Reading task with three levels (i.e. 0-2) on one hand, and the level of explicit MLA was investigated using a Spearman's Rank Order correlation. The non-parametric alternative to the Pearson's model was chosen as implicit metalinguistic awareness is represented by an ordinal variable. Spearman's correlation coefficient, ( $\rho$ , also signified by  $r_s$ ) measures the strength and direction of association between two ranked variables. It determines the strength and direction of the monotonic relationship between the two variables rather than the strength and direction of the linear relationship between the two variables (which is what Pearson's correlation determines). Monotonicity is "less restrictive" than that of a linear relationship. The Spearman correlation coefficient,  $r_s$ , can take values from +1 to -1. A  $r_s$  of +1 indicates a perfect association of ranks, a  $r_s$  of zero indicates no association between ranks and a  $r_s$  of -1 indicates a perfect negative association of ranks. The closer  $r_s$  is to zero, the weaker the association between the ranks. There was only a small non-significant relationship between the two variables [ $r_s = .083$  sig.  $.603$ ]. Therefore, it can be claimed that the two types of metalinguistic awareness, implicit and explicit, are not correlated.

### **6.2.4 Spearman's Rank Order Correlation: Implicit MLA and Llama-F (performance in TLA)**

A second Spearman's Rank Order Correlation analysis was performed to assess the relationship between level of implicit MLA as measured by a SPR task and performance in a Third Language, as measured by an artificial language task (Llama-F). Again, the non-parametric alternative to

the Pearson correlation was chosen as implicit MLA is represented by an ordinal variable with three levels. The results indicate a small non-significant relationship between the two variables [ $r_s = .209$ , sig .184] suggesting that the level of implicit MLA developed in a second language cannot be considered as a strong predictor for a better performance in TLA.

### **6.2.5 Two Way-Between Groups ANOVA. IVs: Knowledge of 3 or more languages, Having received 3 or more years of formal instruction in German L2**

Hypothesis: the groups of participants who master three or more languages and were exposed to three or more years of formal instruction in German L2 are expected to outperform participants who only know two languages and received little amount of formal training in the L2.

A Two-Way between groups Analysis of Variance (ANOVA) was conducted to explore the impact of knowing more than 3 languages and having received at least 3 years of formal instruction in German L2 on language learning attainment, as measured by score in the artificial language task (Llama-F). This statistical technique was chosen as it allows to look at the individual and joint effect of the two IVs (i.e. number of languages and years of formal instruction in L2) on the DV (performance in the artificial grammar task). Therefore, it has the advantage of testing the main effect for each independent variable and also explore the possibility of an interaction effect. Participants were divided into two groups according to having received or not three or more years of formal instruction in German L2, and according to mastering or not three or more languages.

First, the interaction effect between the two independent variables was checked (more than 3L\* $\geq$  3Y: sig.=.361). The non-significant difference in the effect suggests that we can safely interpret the main effects. There

was a significant main effect for the more than 3 languages variable (sig= .059) but no significant main effect for having received at least 3 years of formal instruction in German L2 (Instr≥3Y: sig=.361). The effect size for the more than 3 L variable can be classified as medium (partial eta squared: .091) according to Cohen's criterion (1988).

Table 3

*Descriptive Statistics*  
Dependent Variable: Llama-F

Instr ≥ 3Y	More than 3 Lang	Mean	Std. Deviation	N
< 3 years of instruction in German	<3 Lang	39,00	31,429	10
	3 or more Lang	65,45	26,595	11
	Total	52,86	31,328	21
3 or more years of Instruction in German	<3 Lang	48,89	30,596	9
	3 or more Lang	58,33	30,101	12
	Total	54,29	29,928	21
Total	<3 Lang	43,68	30,589	19
	3 or more Lang	61,74	28,067	23
	Total	53,57	30,269	42

**F(3,38) = 1.57 p = .21, eta squared = .09**

### 6.2.6 Two Way-Between Groups ANOVA: IVs German L2, Early/Late bilinguals

The tested Hypothesis: the groups of participants with German as a second language rather than as a third (or additional) language, who learned the L2 before the critical age, conventionally 9 years old, are supposed to perform better in the artificial language task, assessing their language learning ability.

A two-way between groups Analysis of Variance was conducted to explore the impact of having German as an additional language instead of a second language and having learned German in the early childhood or later in life (i.e. early/late bilingualism) on the score in the Llama-F task. All the assumptions about the data before running ANOVA were checked: i.e. independence of cases; normality (the distributions of the residuals are normal); and equality or homogeneity of variance (homoscedasticity). The first assumption refers to independency of the data from one another. That is, each observation must not be influenced by any other observation or measurement. The second assumption for parametric techniques is that the population from which the samples are taken are normally distributed. Nonetheless, in social science research, scores on the dependent variable are not normally distributed. Pallant (2011) argues that most of the techniques are reasonably robust or tolerant of violation of this assumption with a considerable sample size (i.e. >30).

None of the aforementioned independent variables had a statistically significant main effect on the performance in the Llama-F. (German as L2: Sig= .362, early/late Bilingualism: Sig= .758). Accordingly, it can be concluded that the order and age of acquisition of German L2 (or Ln) do not affect the results in the Llama-F scores.

### **6.2.7 Pearson Correlation: age of acquisition of German L2 and score in Llama-F**

Tested Hypothesis: Participants who had learned German L2 before the age of 9 are supposed to perform better in the artificial language task, Llama-F, according to the already discussed “Critical Age Hypothesis”.

The effect of early and late bilingualism was already checked through a Two-Way ANOVA, assigning the participants to two groups: i.e. those who

had acquired German L2 before the supposed critical age of 9 and those who had acquired it later in life. The effect of age of acquisition on the performance in additional languages was also investigated through Pearson Correlation analysis. Indeed, considering the importance given to the already mentioned “Critical Period Hypothesis” in language learning, I also opted for a statistical technique which allows investigating the effect of age of acquisition as a continuous rather than a dichotomous variable. The negative, non-significant value of the Pearson Correlation coefficient, i.e.  $r = -.035$  Sig.  $.825$ , confirms the results already obtained from the ANOVA, that is early bilingualism cannot be considered as a predictor of additional language learning attainment.

Table 4

		Age of Acq	
		G	Llama-F
Age of Acq G	Pearson Correlation	1	-,035
	Sig. (2-tailed)		,825
	N	42	42
Llama-F	Pearson Correlation	-,035	1
	Sig. (2-tailed)	,825	
	N	42	42

### 6.2.8 Pearson product-moment correlation coefficient (Explicit MLA-TLA)

The tested hypothesis: the higher level of explicit MLA, as measured by a MLA test in German L2 correlates with a performance in TLA, as measured by the task in artificial language Llama-F.

The predictive effect of explicit metalinguistic awareness on performance in a third or additional language was calculated using a Pearson bivariate correlation based on bilinguals' scores in both tests. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The results indicate a strong positive correlation between explicit MLA and Llama-F test:  $r = .448$ ,  $\text{Sig.} = .003$  with high levels of explicit MLA associated with high level of performance in language learning attainment, as measured by the Llama-F test.

Table 5

<i>Correlations</i>			
		Llama-F	MLA TOT
Llama-F	Pearson Correlation	1	,448**
	Sig. (2-tailed)		,003
	N	42	42
MLA TOT	Pearson Correlation	,448**	1
	Sig. (2-tailed)	,003	
	N	42	42

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

### 6.2.9 One-Way Between Groups ANOVA with post-hoc tests: 3 levels of Explicit MLA

Tested Hypothesis: among the three groups of participants divided on the basis of the level of explicitness of MLA in German L2 (i.e. MLA1, MLA2, and MLA3) respectively on the basis of their ability to identify, correct, and explain the mistake, participants who were also able to provide an explanation for the identified and corrected mistake are expected to perform better in the artificial language task.

A one-way between groups Analysis of Variance (ANOVA) with post-hoc tests was conducted to explore the impact of different levels of explicit MLA, as measured by the explicit MLA test in German L2, on the

performance in the Llama-F test of grammatical inference. Participants' scores in the explicit MLA test were grouped according to their ability to underline, correct, and explain the mistake (i.e. group 1: score 0-15; group 2: score 16-29; group 3: score 30-45). There was a statistically significant difference at the  $p < .05$  level in Llama-F scores for the first and third group [ $F(2,39) = 4.7, p = .01$ ], suggesting that participants with higher level of explicit MLA in a L2 (i.e. the ones who were also able to provide a grammatical explanation for the detected mistake) performed significantly better in an additional language. The effect size, calculated using eta squared (sum of squares between groups divided by total sum of squares), was .19 which in Cohen's terms (1988) can be classified as a large effect (i.e.  $> .14$ ). Post-hoc comparison using the Tukey HSD test indicated that the mean difference for group 1 and 3 is 29.54 (Sig: .01).

Table 6

*Descriptives*  
Llama-F

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
MLA1	11	36.364	37.7552	11.3836	10.999	61.728
MLA2	9	44.444	21.8581	7.2860	27.643	61.246
MLA3	22	65.909	24.0355	5.1244	55.252	76.566
Total	42	53.571	30.2688	4.6706	44.139	63.004

## Post hoc tests

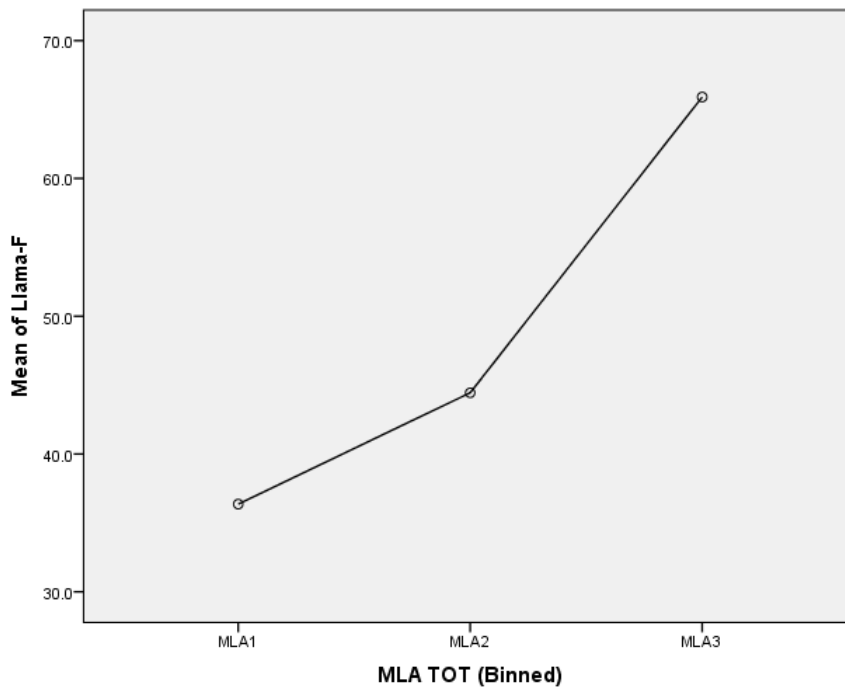
Dependent Variable: Llama-F

Tukey HSD

(I) MLA TOT (Binned)	(J) MLA TOT (Binned)	Mean Difference (I-J)	Std. Error	Sig.
MLA1	MLA2	-8.0808	12.5092	.796
	MLA3	-29.5455*	10.2774	.018
MLA2	MLA1	8.0808	12.5092	.796
	MLA3	-21.4646	11.0124	.139
MLA3	MLA1	29.5455*	10.2774	.018
	MLA2	21.4646	11.0124	.139

\*. The mean difference is significant at the 0.05 level.

## One-Way ANOVA with 3 levels of MLA





### 6.2.10 Pearson product-moment correlation coefficient (Explicit MLA-Overall proficiency in German L2)

In addition, another Pearson bivariate correlation was performed to investigate the relationship between explicit MLA, as measured by a MLA test and overall proficiency in German L2, as a result of a self-assessment through a Leap-Q. A positive significant correlation between the variables ( $r = .437$ ,  $\text{Sig.} = .004$ ) indicates that a higher overall proficiency in German as an L2 correlates with a better performance in the test of explicit MLA.

Table 7

<i>Correlations</i>		MLA TOT	Overall Prof
MLA TOT	Pearson Correlation	1	,437**
	Sig. (2-tailed)		,004
	N	42	42
Overall Prof	Pearson Correlation	,437**	1
	Sig. (2-tailed)	,004	
	N	42	42

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

## Chapter VII: Discussion

### 7.1 Introduction

The main hypothesis of the study, that the MLA developed in a second language is positively related to participants' score in the artificial language task of grammatical inference, as a measure of additional language learning attainment, is confirmed by empirical evidence when MLA is considered as a non-unitary skill. That is, when the effects of explicit and implicit MLA are assessed separately, the positive relationship only refers to the explicit level of MLA. Indeed, the hypothesis that implicit MLA in an L2 is not necessarily a predictor of subsequent language acquisition is also confirmed by the study. The second hypothesis, that three or more languages mastered by the speaker represent a boost for bilingual language learners can be confirmed by the findings too. The third hypothesis that bilinguals' explicit grammatical knowledge of the L2 relates to their performance in additional languages over and above their amount of formal instruction received in the L2, as well as their level of general proficiency, is supported by the results. The fourth hypothesis that explicit MLA is developed as a consequence of longer times of exposure to the language in a formal setting cannot be confirmed. The fifth hypothesis claiming that, when explicit MLA is divided into three levels, the highest level of explicitness is the better predictor to succeed when dealing with additional language learning is also supported by empirical evidence.

In addition, the results do not distinguish between younger and older participants as the participants' age did not prove to be a confounding variable. The variable "amount of formal instruction received in the L2" is considered as a continuous rather than a dichotomous variable in the main analysis. Recent research in the area of bilingualism (e.g. Bonfieni, 2018) has highlighted the theoretical and empirical limitations of considering the factors affecting bilingualism as strict dichotomies. Indeed, the complexity and broad dimension of the phenomenon under investigation suggests to

adopt a different perspective. Examining the different aspects of bilingualism as a continuum allows to better understand the impact that each factor has on important cognitive and linguistic abilities, including the acquisition of additional languages. Moreover, preliminary analyses demonstrate that order of acquisition of German, as a second or additional language, having an L1 different from English cannot be considered as confounding variables. Therefore, the data from participants with the aforementioned features are included in the main analysis. Finally, the current study also controlled the effects of the following variables and relationships:

- The two main independent variables, implicit and explicit level of MLA, are not correlated as a high level of explicit MLA does not relate to a high level of implicit MLA.
- Having acquired German L2 at a younger age does not significantly affect the performance in the artificial language task.
- Proficiency in German L2 correlates with a higher level of explicit MLA in the language.
- Proficiency in German L2 does not predict a higher score in the artificial language task.

The findings suggest that participants' language learning experience in multiple languages and the grammatical knowledge also developed in a second language assist the learning process of additional languages over and above the level of competence attained in the L2 and the age of acquisition of the L2. Surprisingly, the predominant role of explicit MLA in L2, in the acquisition of additional languages, was confirmed independently of the amount of formal instruction received in the L2. In other words, the more developed explicit MLA skills did not prove to be dependent upon the amount of exposure to the L2 in a formal setting. This independence between these two IVs suggests an alternative route of

interpretation, that is the development of explicit MLA may be related to the method of acquisition of the L2.

On the basis of these findings, in the present chapter, I will propose that in order to entirely exploit the linguistic benefits of knowing more than one language in third or additional language acquisition, it is fundamental to develop explicit MLA also in the second language. Indeed, it is not the specific knowledge of the previous languages involved but it is rather the ability to focus on the language as an abstract system and to switch between grammatical form and semantic content which results in a better language attainment.

## **7.2 Explicit MLA in L2 and Language Learning Attainment**

The empirical evidence from the results of hypothesis 1, that a higher level of explicit MLA also developed in German as an L2 is related to the performance in the artificial language task of grammatical inference, supports the view that the bilinguals' higher degree of MLA also developed in their L2 assists them in the process of learning additional languages. Indeed, the scores from the Metalinguistic Knowledge test in German assessing participants' explicit MLA strongly correlates with their scores in the Llama-F, as a measure of additional language learning ability.

The major role played by explicit MLA was also confirmed when other factors were inserted into the analysis: i.e. amount of instruction and overall proficiency in German L2. The results from the multiple regression suggest that explicit MLA is the strongest predictor of language learning attainment, over and above general proficiency reached in the L2 as well as the amount of instruction received in the L2.

Additionally, when the variable was split into three levels of explicitness on the basis of the results obtained in the metalinguistic knowledge test, that is ability to identify, correct, and explain the mistake, the results show that

the group that was also able to provide an explanation for the mistake significantly outperformed the group that was only able to identify the mistake in the sentence. This means that a certain level of explicitness of the grammatical knowledge of a second language must be reached in order to record a positive effect on third or additional language learning performance.

It is important to highlight that the input from the Llama-F, test of grammatical inference, is totally unrelated to the linguistic structure of German or any other potential language known by the test takers. This allows to infer that it is not the specific grammatical knowledge of a particular language which boosts the process of a third or additional language acquisition. Instead, it is the abstract knowledge of the language as a system which assists participants to think about the language critically, as an abstract object, and to resort to this awareness and ability when dealing with additional language learning.

These findings support the thesis claimed by a number of scholars in the field that MLA is considered as one of the most important factors assisting and enhancing the process of acquisition of additional languages (e.g. Cenoz & Genesee, 1998; Jessner, 1999; Thomas, 1989). Thomas' study, for instance, put the focus on the role of MLA developed by bilingual participants in both their first and second language when learning French as a second or third language. Bilinguals were divided according to the amount of formal instruction received in Spanish L2. Those who also received instruction in the second language outperformed bilinguals who only received instruction in their first language. Performance in a third language, then, is facilitated by MLA defined as "the students' conscious knowledge of the rules and forms of language". However, the study only marginally looks at the effects of instruction and MLA in a second language as the main aim is to compare monolinguals and bilinguals learning, respectively, a second and a third language.

As already argued in the literary review, in Bialystok's (2001) own view, Metalinguistic Knowledge must be both explicit and abstract in that it is stated at a higher level of generality compared to the specific knowledge of any particular language. In addition, metalinguistic ability must be continuous with linguistic ability in the sense that it cannot be isolated and only operate on the basis of independent principles. Finally, she insists on the role of attention that should be "actively focused on the domain of knowledge that describes the explicit properties of language (Bialystok, 2001: 127)". That is, MLA must be incorporated within a theory of attention that explains how certain features of a mental representation come into active processing and how attention is redistributed to some but not all aspects of the mental representation.

With these premises, it is easier to understand the importance of the role played by explicit MLA developed in previous languages in explaining the acquisition of additional languages. According to this view, it is the knowledge of the linguistic principles ruling different languages, made explicit during language acquisition, that is fundamental in this development and not the knowledge of specific grammars. Hence, the explicit MLA constructed during previous language acquisition facilitates bilingual language learners as they have already developed an explicit and universal awareness of the language as they have knowledge of at least two other linguistic systems. In other words, when they come to the process of a third or additional language acquisition, they do not need to relearn the fundamental principles of language structures. In fact, they make use of these explicit and abstract fundamental rules to figure out how the new language works by applying those principles to additional languages.

Thus, the implication of this condition of MLA enhancing the process of additional language learning in bilinguals is that the content of metalinguistic knowledge must be broader than any that applies to the knowledge of a specific linguistic structure. In this perspective, MLA refers

to the “explicit representation of abstract aspects of linguistic structure that become accessible through the knowledge of a particular language (Bialystok, 2001: 124).” Specifically, in the current study, the aforementioned knowledge is reinforced through the knowledge of at least two other languages as it deals with bilinguals’ additional language acquisition and has proved to be the most important predictor of language attainment.

Moreover, the findings suggest that the more this component of MLA becomes explicit, that is the more they are able to verbalise and provide a grammatical explanation for the mistakes, the better they perform in additional languages. This means that even though the study assesses participants’ explicit MLA in a particular language (German), it is not their knowledge of German which assists them when dealing with another language. Instead, it is their ability to use the knowledge about the language as distinct from the ability to use the language itself.

This explains another interesting aspect drawn from the results: in the multiple regression analysis, MLA has a much greater significant regression weight compared with general overall proficiency in German. Accordingly, it can be confirmed that it is not the knowledge of the language, i.e. the level of overall proficiency in an L2, to be fundamental in this development but it is the knowledge about the language, i.e. the explicit representation of the grammatical rules beyond it.

These findings are in agreement with Cummin’s (1981) Interdependence Hypothesis claiming that if instruction in one language is effective in promoting proficiency in this language, the transfer of this proficiency in another language will occur, provided that there are enough exposure and motivation. In particular, this hypothesis, also known as “Iceberg Hypothesis”, reveals the relationship of the first language to the learning of another language. What appears to be two very different phenomena on the surface is actually interdependent psychologically. The notion of transfer of the language skills from the first to the second language if there

is sufficient exposure to the L2 and motivation to learn the language can be applied by extension to TLA. That is to say, the language skills developed in an L2, in a broader and more abstract knowledge, will be transferred to the L3. In line with this hypothesis, the study confirms that the level of attainment reached in the third language is affected by participants' ability to manipulate, analyse, and think about the L2 as an abstract object. The pedagogical implication drawn is that grammatical proficiency in both, L1 and L2, should be focused since bilingual programs that promote first and second grammatical proficiency have an overall positive effect on the learning of additional languages.

The results are also in line with Sanz (2000), that investigates the relationship between biliteracy in the minority and majority language, i.e. Catalan and Spanish, and the acquisition of English as a foreign language. Despite not having specifically operationalised the effect of cognitive variables like Working Memory and Metalinguistic Awareness, the study suggests interesting hypothesis on the basis of previous studies' results which explain the advantage of bilinguals over monolinguals in TLA.

Referring to the Weak Interface Position in L2 acquisition theory (R. Ellis, 1994), Sanz points out that if on one hand it is not possible for explicit knowledge to be transformed into implicit knowledge of L2, it can still help the acquisition process by acting as an advanced organiser, focusing learners' attention on the relevant features of the language. Indeed, she states that bilingualism may naturally show the behaviour that different researchers working within the focus on form tradition (i.e. Doughty & Williams, 1998) are trying to induce in classroom language learners.

In details, following the Weak Interface Position in applied linguistics studies (N. Ellis, 2007), explicit MLA has been considered to be responsible for bilinguals' better performance in additional languages by playing a number of different roles. First, in the perception of and selective attending to L2 form by facilitating the processes of 'noticing' (i.e. paying attention to specific linguistic features of the input). Second, by 'noticing



the gap' (i.e. comparing the noticed features with those the learner typically produces in output). Third, in output, with explicit knowledge coaching practice, particularly in initial stages, with this controlled use of declarative knowledge guiding the proceduralisation and eventual automatisisation of language processing, as it does in the acquisition of other cognitive skills.

### **7.3 Different Levels of Metalinguistic Awareness in L2 and Language Learning Attainment**

The findings allow to confirm the fifth hypothesis of the study, that a higher level of "explicitness" of MLA achieved in L2 results in a better performance in the artificial grammar task, assessing language learning attainment. From a careful review of the awareness literature, it can be argued that considering the role of each level of awareness is extremely important as it leads to different levels of linguistic processing too. Regarding grammatical information, in Leow's study (2007) three levels of awareness have been distinguished: noticing, reporting, and understanding. This appears to be more in line with the already discussed Schmidt's assumptions of noticing and understanding. However, there are studies (e.g. Sachs and Suh, 2007) only reporting two levels of awareness: cognitive change on one hand, and meta-awareness and morphological rule formation on the other. The first considers awareness at the level of noticing whereas the second focuses on awareness in terms of understanding. In the distinction of the three levels of awareness, the current research focuses on both aspects: noticing and understanding. Specifically, the three levels of MLA under investigation have been distinguished on the ability to identify, correct, and verbalise the mistake. The findings suggest that there is a sort of threshold of MLA which assists learners in additional languages. That is in order to record a significant difference in TLA, learners must be able to explain the mistakes in the L2. In other words, they must develop such a level of MLA that not only allows

them to perceive the grammatical anomaly (i.e. level of noticing) but also to provide an explanation for it (i.e. level of reporting and understanding).

#### **7.4 Previous Language Experience and Third Language Acquisition**

The empirical evidence from results of hypothesis 2, that the more languages bilinguals know, the better they perform in additional language learning, reinforces the already discussed role of MLA. In addition, it allows the confirmation of the hypothesis that the number of languages mastered by the learners affects their outcome in a third or additional learning acquisition. Specifically, the study looked at the effects of knowing three or more languages, with different levels of proficiency, on language learning attainment. The group of participants with competence in multiple languages outperformed the group that was only competent in two languages in the artificial language task of grammatical inference.

These findings can be explained following two different routes of interpretation: that is in terms of a broader linguistic knowledge of the language, in line with the already discussed role of MLA, and in terms of more developed language learning strategies. Indeed, bilinguals are able to use and transfer the skills developed through their experience as language learners, when they are tested at the initial stage of learning additional languages, due to the highly specialised language learning strategies. However, the type of transfer I am referring to does not apply to lexical items or grammatical structures from one language to the other as suggested by the Typological Proximity Model (Rothman, 2011). This would not be possible since, in the current study, the performance in the additional language refers to an artificial grammar which is not typologically related to any of the languages already known by the test takers. Accordingly, the transfer refers to the practice of internalising grammatical patterns and exploiting those strategies when dealing with additional languages.

This is confirmed by the fact that, in the artificial language task, participants are required to make grammatical inferences on the basis of a short passive training where they are supposed to figure out how the language works, without receiving explicit instructions about the grammatical rules beyond and without mentioning any linguistic terminology. Therefore, what the test assesses in the second phase is precisely their ability to exploit their language learning strategies, grammatical inference, and their ability to generalise principles on the basis of observation of the language by decoding and interpreting it. In other words, when learning another language, participants use their capacity to learn grammar through previous language learning rather than using their knowledge of individual grammatical structures.

Besides, as participants were not allowed to take notes during the training phase, the test requires additional effort involving the working memory as they had to remember the relevant patterns involved in the training to understand the mechanism beyond the language they were learning.

As it has already discussed, the Llama-F task, used as a measure of language learning attainment, has been proved to be language neutral, in the sense that it is not typologically related to any specific natural language that participants may know. This provides additional evidence that the higher score could not be due to the transfer of patterns and structures from specific languages already known by the participants.

Again, the empirical evidence that the more languages bilinguals have gained literacy and study experience in, the better they are at learning additional languages with an implicit focus on grammatical form confirms the claim supported by a number of scholars in the field. As Cenoz (2013) points out, MLA is one of the key factors associated with bilinguals' better performance in TLA together with learning strategies and a broader linguistic repertoire. These three elements affect each other and are closely related to the number of languages known by bilingual learners. First, the higher level of MLA can be considered as both a cause and

effect of bilinguals' success in additional language learning. On one hand, on the basis of their previous experience of the task of learning a language and their knowledge of two linguistic systems they enhance their level of MLA. On the other, it is precisely the more developed MLA skills and the idea that they manage to think about the language in an abstract way and regard it as an object to assist them in the process of learning additional languages.

Second, the claimed bilingual advantage in TLA is related to bilinguals' experience as language learners itself as they develop a wider range of learning strategies. Specifically, it has been argued that "they look for more sources of input, make an early effort to use the new language, and show self-direction and a positive attitude towards the task (Bowden, Sanz & Stafford, 2005)." This argument, mostly developed on the basis of research using artificial language tasks, has also been confirmed by other studies dealing with natural languages.

Kemp (2007), for instance, demonstrated that bilinguals appear to become better at learning additional languages the more languages they know, and in particular, to be faster at learning grammar. Her study investigates the use of grammar learning strategies in 144 participants who knew between 2 and 12 languages. She confirmed the hypothesis that the more languages learners knew, the greater the number of grammar learning strategies they used, and the more frequently they resorted to them. In addition, the group of participants with more than two languages used more of the 40 strategies than participants with knowledge of only two languages and also reported to resort to them "always" on the Likert scale. Interestingly, the author concluded that there may be a threshold effect for the use of grammar learning strategies so that an increase in the number and frequency of strategies used occurs to a greater extent during the acquisition of the third language, increasing more gradually in additional languages, than occurs in L2 learning.

Third, the broader linguistic repertoire that bilinguals have at their disposal has also been associated with a better performance in a third or additional language. The majority of the studies have explained it in terms of language distance, that is, closely related languages would be more useful for bilinguals learning a third (e.g. De Angelis, 2007; Ringbom, 2007; Rothman, 2011). However, as already mentioned, this is not the case for the present research as the task used to assess performance in additional languages has been proved to be language neutral and have no typological relationship with the languages known by the participants. This suggests that the broader linguistic repertoire on behalf of bilinguals supports them in TLA independently of nature and specific linguistic features of the languages involved.

The empirical evidence provided in the present thesis that developing previous experience in multiple languages enhances language learning attainment can be better understood in light of the theory of Dynamic Systems (Herdina & Jessner, 2002). In the Dynamic Model of Multilingualism (DMM), MLA is considered as a key component in the process of language learning from a cognitive point of view. The model presents bilingualism as a dynamic process of language development, where previous language systems affect the development of further ones, making it clear the connection between SLA and bilingualism, characterising the process of third or additional language acquisition.

According to this view, in TLA, the role of MLA becomes even more predominant than in SLA as the number of previous languages known by the learners increases. Therefore, with an increased learning experience, a speeding up of the language learning process is expected too, in that the nature of the metalinguistic skills found in third language learners differs from that found in second language learners both qualitatively and quantitatively. This focus on MLA taken by the model is fundamental to interpret these findings as it sheds the light on the relationship between an increased number of languages and MLA on one hand, and better

performance in additional languages on the other. By concentrating on the cognitive aspects of language learning, the DMM considers MLA "crucial in the search for an explanation of the catalytic effects that can take place in third language learning (Jessner, 1999: 203)." Therefore, taking all this into account, what makes the two processes of SLA and TLA so different is the level of MLA which is gained from contact with several languages.

### **7.5 Proficiency in L2 and Performance in a Third (or additional) Language**

In the multi-regression analysis, proficiency in German L2 was included as one of the three predictors of attainment in the artificial language task. The findings allow discarding part of the third hypothesis that, together with explicit MLA and level of instruction received in the L2, a higher proficiency in the L2 is responsible for a better performance in a third or additional language. Interestingly, the results indicate a negative relationship between the level of proficiency in German as an L2, as measured by a self-assessment through the language background questionnaire and language learning attainment, assessed by the artificial language task Llama-F.

Considering the language neutrality of the linguistic input used in the artificial language task, that is participants could not have been resorted to language similarity to succeed in the task, this is a very interesting finding which is worth investigating more in details in future research. The degree of proficiency to reach in a second language in order to have significant benefits in third language acquisition has been a matter of large debate in the area of applied linguistics. On the basis of some influential studies in the literature, such as Cummins' Threshold Hypothesis, it was expected that balanced bilinguals (i.e. those with a high level of proficiency in both L1 and L2) would have advantages over unbalanced bilinguals. However, this hypothesis has not been confirmed in all studies.

Sagasta (2003) found that more balanced bilinguals had developed more advanced writing skills in English as a third language compared to less balanced bilinguals. On the other hand, Gallardo (2007) did not find any difference in terms of degree of proficiency in the L2 in the acquisition of phonetic competence in English as a third language, although this may be related to the similarity of the other two languages involved. Sanz (2007) reported different effects for balanced bilinguals according to the type of test used to assess participants in TLA. Specifically, balanced bilinguals performed better in measures of grammatical proficiency but not in lexical proficiency.

On the whole, it can be argued that advanced bilingualism is not necessary for learners' metalinguistic skills to develop. It has been demonstrated that even a limited contact with a second language can have beneficial effects, which has been observed to carry on into the acquisition of literacy (Yelland et al., 1993). In particular, again, MLA has been considered as a cause and effect of literacy learning. Indeed, literacy encourages MLA on account of language being turned into a visual medium. In other words, it is fundamental as it permits learners to "see" the language. It provides the means of analysing languages in that it turns the language into an object. Consequently, they argue that even a limited amount of L2 knowledge help develop the representation of language that is essential for any extensive explicit analysis of Metalinguistic form.

Another issue about the level of proficiency in the L2 concerns the stage of TLA at which bilinguals can benefit more from their prior linguistic knowledge. Again, no common agreement among scholars in the field is found as each study considered some specific elements of language proficiency and attainment. All in all, it can be argued that studies that focused on overall proficiency reported more benefits compared to those assessing specific aspects of language proficiency.

An important point provided by Cenoz (2013) for the debated relationship between the level of proficiency in L2 and additional language attainment

deals with the complexity of the phenomenon under investigation. Indeed, TLA is such a broad phenomenon influenced by many other factors that the effects of bilingualism (i.e. balanced/unbalanced) may be hidden by other potential confounding variables difficult to test at the same time such as intelligence, socio-economic status, motivation, and exposure. Therefore, there is a need for more controlled, longitudinal studies to control for the wide range of variables affecting the complex area of TLA.

An additional interpretation of the findings can be found if one considers the non-unitary nature of MLA. As already discussed in the present thesis, MLA is not a homogenous construct. Bialystok (1993, 2001), in particular, identified two different components of MLA, i.e. representation and control of attention, which have been proved to be affected by different aspects of bilingualism. She argues that on control of attention tasks bilinguals are expected to outperform monolinguals independently of their degree of bilingualism (i.e. their specific skills in L1 and L2). On the other hand, an analysis of representation tasks, such as a syntax correction task, the level of bilingualism of participants played a major role. Taking into account the implication of distinguishing between these two components of MLA, and that the main aim of the present study is to assess the benefits of bilingualism on the acquisition of additional languages as mediated through the level of MLA developed by bilingual learners, it is important to highlight the fact that explicit MLA is assessed by an analysis of representation task.

Therefore, the findings from this study seem not to be in line with Bialystok's theory as participants with a higher level of proficiency in German L2, in fact, had a detrimental performance in TLA. A number of explanations for these results can be accounted. First, due to the language neutrality of the Llama-F, participants could not have relied on the language similarity between their L2 German and the artificial language used to assess their language learning attainment. Second, one may argue that participants underestimated their level of language



proficiency in German, as it was measured through a self-assessment questionnaire (Leap-Q). However, if it had been the case, they would not have been able to succeed in the two tasks assessing their implicit and explicit MLA in German. Indeed, both the metalinguistic knowledge task and the Self-Paced Reading, beyond the specific features under investigation, require at least an intermediate level of the language to be performed.

In addition, the validity and reliability of the Leap-Q as a self-assessment measure of proficiency has been proved by a study (i.e. Marian et al. 2007) comparing results from self-reports and standardised language tests. In particular, the study revealed both the internal and criterion-based validity of the questionnaire suggesting that the self-reports from the Leap-Q are reliable, valid and efficient tools for assessing the language profile of bilinguals in research settings.

Thus, the unexpected significant negative correlation between general proficiency in L2 and performance in additional languages needs to be found in other cognitive factors distinguishing between the level of bilingualism on one hand and level of linguistic knowledge on the other. According to Bialystok and Barac (2012), cognitive development proceeds with a structured representation of knowledge and gains greater control over attentional procedures.

In particular, they argue that representational structures are more sensitive to increasing knowledge of the language. In this sense, knowing two languages enhances the knowledge of abstract linguistic structures and bilingualism improves metalinguistic performance. More specifically, they claim that “it is the absolute level of linguistic knowledge and not the degree of bilingualism that is most important in this development”.

On the other hand, control of attention is sensitive to accumulated experience in a bilingual environment. However, executive control tasks rely on domain-general systems. It takes time for these systems to reach

levels that are able to affect non-linguistic domains. “The length of time spent in a bilingual environment determines the extent to which executive control is affected”. That is to say, in this specific domain, the level of bilingualism or general proficiency in both languages plays the most important role.

Following Bialystok and Barac’s theory, the unexpected findings from the present research can be interpreted in a different perspective. Indeed, it is important to highlight that the artificial language task, as a measure of additional language learning, makes more demands on the representational analysis of linguistic knowledge rather than control of processing. Accordingly, it is understandable that a higher level of MLA developed also in an L2 was a strong predictor for the task whereas having a higher overall proficiency in the L2, in fact, did not appear to be a positive predictor of success in additional language learning.

In a previous study, Bialystok (1988) had already proposed the claim that the relationship between bilingualism and linguistic awareness must be stated in terms of the degree and type of bilingualism as well as the degree and type of linguistic awareness. This claim is crucial to understand the main purpose of the present research. Indeed, as it has been argued, the type of methodology chosen aims at focusing on the distinction between the effects of bilingualism on one hand, and metalinguistic awareness on the other on TLA.

## **7.6 Amount of Formal Instruction Received in L2 and Language Learning Attainment**

The results from hypotheses three and four indicate that the amount of formal instruction that participants received in L2 is not a predictor of better performance in additional languages. In particular, the higher level of explicit MLA does not correlate with longer times of exposure to the L2 in a formal environment. Interestingly, the results from the multi-regression

analysis suggest that explicit MLA, with its strong significant regression weight, relates to bilingual performance in the artificial language task over and above the already discussed participants' overall proficiency and amount of formal instruction received in the L2.

There are a number of factors that could account for these findings. First, the amount of formal instruction analysed as a continuous and dichotomous variable, respectively through the multi-regression and ANOVA, does not seem to predict a better performance in additional languages as expected. Since the level of explicit MLA is the strongest predictor of success in additional languages, one would expect a positive correlation between the two independent variables too, i.e. explicit MLA and amount of formal instruction received in the L2. However, as this is not the case in the present study, an alternative route of interpretation can be propounded. It could be that the higher level of linguistic knowledge in the L2, responsible for bilinguals' better performance in additional languages, is related to the method of instruction received rather than the amount of exposure to the language in a formal setting.

As the method of instruction received was not controlled in the present study, it would be worth investigating the effects of this variable, in more details, in future studies. Indeed, as already mentioned in the literature review of the present thesis, different methods of instruction lead to different types of knowledge. Specifically, focus on form and focus on meaning programs are supposed to give rise to different types of metalinguistic knowledge, explicit and implicit, in language learners that may account for the aforementioned findings.

Even though participants who declared to have received considerable amount formal instruction (i.e. more than three years) in German L2, their different teaching methods they were exposed to could explain their different performance. A rule-governed way of teaching languages developed teaching programmes based on grammar and form, motivated by the idea that before using a language it is necessary to be aware of its

rules. On the other hand, the so-called "communicative" or natural approach is grounded on the assumption that adult language learning is implicit, likewise L1 acquisition. Since this approach maintains that language skills and having knowledge about language are different matters, it refuses any explicit grammar-based instruction.

Accordingly, this could explain the positive, strong, significant relationship between participants' level of explicit MLA on one hand, and their performance in additional language learning in an experimental setting. In other words, it could be the case that the highly developed explicit MLA, that has been proved to be the strongest predictor of success in additional language learning, is the result of a focus on form instruction. This interpretation is closely related to another factor under investigation that I am going to discuss in the next section, i.e. implicit and explicit MLA.

### **7.7 Implicit MLA and Language Learning Attainment**

Results from Hypothesis 1, that MLA developed in an L2 is the most important factor which assists bilinguals in the process of acquiring additional language cannot be totally confirmed when the effects of implicit and explicit MLA are separated. As already argued, MLA is a non-unitary skill, made of different components which is important to assess separately in experimental settings. First, results show no correlation between the two independent variables, implicit and explicit MLA. Second, no significant effects of implicit MLA on language learning attainment on behalf of bilingual participants are recorded.

Previous research in the area of cognitive linguistics has claimed that it is fundamental to distinguish between implicit and explicit learning as they lead to two different types of knowledge. To recall the most important criterion to distinguish the two components of metalinguistic awareness under investigation, it can be argued that attention plays a major role. In implicit learning, leading to implicit knowledge and MLA, learners remain

unaware of the process that has taken place, although it is evident in the behavioural response that they make. It proceeds without making demands on the central attentional resources. For instance, in the SPR task assessing implicit MLA, participants were tested on their ability to perceive the temporal semantic and syntactic ambiguity without being asked to explicitly verbalise what they were observing and account for their linguistic choices. That is to say, without being aware of the linguistic analytic process that was taking place beyond their tacit perception, recorded through their Reading Times.

On the other hand, in explicit learning leading to explicit MLA, learners are aware that they have learned something and can verbalise what they have learned. It typically involves memorising a series of successive facts and this makes heavy demands on working memory. It takes place consciously and results in knowledge that is symbolic in nature (i.e. it represented in explicit form).

Accordingly, it can be argued that the non-unitary nature of MLA accounts for bilinguals' different performance in additional languages as it is the explicit component that plays the fundamental role. Nonetheless, in an experimental setting, it is not easy to draw the line between the two aspects of MLA as there is not a clear cut point between what is explicit and what is implicit. Rather than in terms of a strict dichotomy, MLA can be conceived on a sort of continuum which goes from an extreme point of implicitness to an extreme point of explicitness with different levels in between. Put in these terms, the degree of implicitness and explicitness of the component can be assessed on the basis of conventional points indicating, for example, learners' ability to detect, identify, correct, and explain the grammatical mistake.

As argued in the literature review chapters, considerable debate has taken place regarding the nature of the features that learners are able to internalise from their input and the way the process occurs. I suggest that explicit learning with a focus on form in both L1 and L2 is the element that

facilitates additional language learning on behalf of bilinguals. The explicit MLA developed as a consequence of this type of learning, indeed, focuses learners' attention on features of the input that are salient to the learning situation, which enhances third language acquisition.

Schmidt argues that “attention to input (not mere exposure to comprehensive input) is a necessary condition for explicit learning and may be both necessary and sufficient for implicit learning (1994: 198).” Nonetheless, in contrast with this claim, the study shows that in fact, learners can also be implicitly aware of the structures of the language without noticing that they are aware. In other words, by slowing down their reading times in the critical area of the sentences, participants demonstrated that they were perceiving the temporary ambiguity while processing them.

If on one hand, Schmidt holds that awareness at this level, i.e. implicit, does not give rise to learning, Reber, on the other, argues not only that it does but that it is the default mode of learning. In particular, in his theory of the primacy of the implicit, Reber maintains that implicit functions are more primitive and basic than explicit functions and that “other things being equal, implicit learning is the default mode for the acquisition of complex information (Reber, 1993: 25).” Moreover, he states that implicit functions are more primitive and take more time to evolve, therefore, less individual variation is expected when implicit measures are employed.

Again, the precise role of implicit and explicit MLA in language learning, that is to say, the extent to which they assist learners to internalise the input is difficult to assess experimentally. However, it seems that focusing on form at some levels increases the likelihood that the patterns of grammar are internalised, together with its meaning. Nick Ellis (1994) claims that implicit and explicit knowledge are dissociable but cooperative, in that explicit knowledge of form-meaning associations impacts upon implicit language learning. This interface is, in fact, dynamic. That is, it

happens transiently during conscious processing but the influence upon implicit cognition endures thereafter.

The present study demonstrates that beyond the individual performance on implicit and explicit measures of awareness, when the effects of both subcomponents are assessed in TLA, the level of explicit MLA plays the most important role. That is to say, having developed explicit MLA in both L1 and L2 has proved to assist and enhance the process of learning additional languages in an experimental setting. Therefore, it appears that it is by exploiting the explicit MLA skills that bilingual learners transfer these analytical skills to the learning of additional languages.

The findings seem to be in line with the aforementioned Schmidt's argumentation on the role of noticing. With studies focused on learners attending the communicative (grammar-free) programmes, the limits of the accuracy of their language performance started to be highlighted.

The empirical evidence, together with the critical theoretical disagreement with Krashen's hypothesis, prompted Schmidt (1990) to advance his theory. He argues that conscious cognitive effort, where noticing is involved, is the necessary condition for the conversion of input into foreign language acquisition to occur. In other words, learners in all conditions who claim to have noticed the rules should outperform those who do not, for conscious noticing is necessary for subsequent learning. Accordingly, in line with this theory, the present study also demonstrated that the more consciously participants noticed and explained the grammatical patterns of the language under investigation, the better they performed in additional languages.

### **7.8 Age of Acquisition of L2 and Language Learning Attainment**

Following previous findings on the beneficial effects of acquiring the second language at a younger age on the acquisition of additional

languages, my hypothesis was that bilinguals who acquired German L2 earlier in life would perform better in TLA. The hypothesis was tested by analysing the effects of age of acquisition of L2 as a dichotomous and a continuous variable through ANOVA and Pearson Correlation analyses. In both cases, results indicated that age of acquisition of German L2 does not significantly affect the performance in the artificial language task, as a measure of additional language learning attainment.

These findings appear to be in contrast with the studies propounded by the supporters of the so-called “Critical Period” effects. However, a number of considerations need to be drawn. First, scholars demonstrating the beneficial effects of early bilingualism focused on studies considering the level of attainment that can be reached in a second language. It is important to highlight that this does not necessarily imply the same consequences for learning additional languages. Indeed, in the present study, the effects of the age of acquisition in German L2 were tested on language performance in a third (or additional) language. Second, there is the view that late bilinguals, on their behalf, exploit different areas of the brain to process and acquire a new language. Specifically, they have been reported to make greater use of the right hemisphere when dealing with a second language, whereas the left hemisphere is active in the acquisition and processing of the first language.

The widespread belief that considers early bilingualism as the only “real” bilingualism is also supported by a number of academics (i.e. Adler, 1977). In particular, it has been propounded the idea that the late bilingual will never reach a perfect level of proficiency in both languages and that children have better language learning skills compared to adults.

However, as Hoffmann points out, there is a considerable number of aspects to take into account when addressing these topics. First of all, the idea that bilinguals achieve complete, perfect mastery of both languages is an unrealistic scenario. Indeed, even the total linguistic repertoire of fully balanced bilingual consists of items taken from both languages which



complement each other and may also overlap to different degrees. As regards the second assumption, the author maintains that there is no solid evidence to state that children are better than adults at learning languages. It has been argued that the impression that children achieve a higher fluency in a second language more easily than older people cannot be scientifically proved because of two different factors involved. On one hand, the apparent ease with which children acquire languages and the greater analytical abilities of adult learners, on the other, cannot be put on the same level. Indeed, apart from pronunciation that is supposed to be the only exception, the difference between first and additional language learning cannot be considered only either qualitative or quantitative.

## **7.9 Conclusion**

The central hypothesis of the present study, that is the explicit level of MLA developed in the L2 is the determining factor responsible for bilinguals' better performance when learning additional languages has been confirmed. Moreover, it has been demonstrated that the more explicit participants' MLA was, the higher was the score they achieved in the artificial language task. Implicit MLA did not prove to be a predictor of a better language learning attainment and was not correlated with explicit MLA. The effect of other confounding variables was also taken into account in the study. First, the widespread belief that the more languages bilinguals master, the easier they acquire additional languages was also supported by empirical evidence in the present research.

Second, in contrast with the general view shared by researchers in early and late bilingualism, a younger age of acquisition of German L2 did not prove to be an influential feature which significantly affects performance in additional languages. This suggests that late bilinguals may resort to a number of skills that they have developed through their greater language learning experience. Apart from the already mentioned different areas of

the brain involved in children and adults language learning, adult bilinguals make use of their broader analytic skills, particularly MLA, when they deal with another language.

Third, interestingly enough, amount of formal instruction received was not a significant predictor of bilinguals' success in additional languages. This leads to shed light on the role of another important factor that was not considered in the experiment, that is the different methods of language acquisition involved. It would be worth investigate the issue more in depth considering not only the role of instructed and uninstructed bilingualism in the L2 but also the method of formal instruction received in the second language. Specifically, whether it was mainly focused on grammatical form or meaning.

Fourth, the study also controlled the effects of balanced and unbalanced bilingualism demonstrating that even a limited contact with the L2 has beneficial effects on additional language learning as long as they have developed explicit MLA. In particular, even those bilinguals who declared to have a relatively low overall proficiency in German L2 recorded high scores in the artificial language task if a high level of explicit MLA was recorded.

The results are in line with the Cumulative-Enhancement Model (CEM) for Language Acquisition (Flynn et al., 2004) for a number of reasons. First, it claims that experience in any prior language can be drawn upon in subsequent acquisition. Second, learners' L1 does not seem to play a privileged role in subsequent language learning.

The findings are also in line with some aspects of another influential study by Jaensch (2009), where the beneficial effects of bilingualism in terms of degree of proficiency reached in L2 on one hand, and already mentioned threshold hypothesis in TLA were tested. The author explained the better performance of L3 learners, who have a higher proficiency in L2, by extending the Threshold Hypothesis advanced by Cummins (1976) to

adults. However, this can be only partially applied to the current study as the general proficiency level reached in the L2 did not appear to be a significant predictor. On the other hand, the results show that, when grammatical proficiency achieved in the L2 is considered, a strong significant impact on subsequent language acquisition is observed.

Another interesting assumption made by Jaensch, that provides additional support to the current findings, is that learners of an L3 who have acquired the L2 to a relatively high level have developed an increased sensibility to new features in a third or additional language. This “enhanced feature sensitivity”, claimed by the author, explains why language learners who have already acquired different non-native languages are more successful in TLA. In particular, it is their “heightened metalinguistic expertise, better lexical knowledge and more developed cognitive skills, which aid them in triggering the setting of UG patterns (Jaensch, 2009: 140).”

Flynn and colleagues' findings have also implications for the representation of knowledge in the mind. In particular, they support the view that domain-specific structure for learning may exist, and that ‘movement along a domain-relevant learning path’ characterises L1, L2, and L3 acquisition. The basic premise of the Cumulative-Enhancement Model for language acquisition is that developmental patterns in language learning are not redundant. Finally, by claiming that language acquisition is cumulative, they mean that the prior language enhances subsequent language acquisition.

On the privileged role of the L2 in subsequent language learning, it is worth mentioning another important model for language acquisition, in line with the current study: the L2 Status Factor Model, developed by Bardel and Falk (2007). Hammarberg (2001) defines the L2 status factor as “a desire to suppress L1 as being ‘non-foreign’ and to rely rather on an orientation towards a prior L2 as a strategy to approach the L3” (Hammarberg, 2001: 36-37). This phenomenon was observed early on by Meisel (1983), who labeled it “foreign language effect”.

Bardel and Falk (2007) suggested that L2 status was a factor also in the learning of L3 syntax, as they found that L2 was preferred as a transfer source in L3 syntax in the initial state of a group of L3 learners. Subsequently, in another study (Falk and Bardel, 2011) they tested the L2 status factor hypothesis in a larger number of intermediate L3 learners and found the same tendency.

Precisely, the model accounts for the privileged role of the L2 in subsequent language learning in terms of cognitive similarities between L2 and L3 learning in that, from a cognitive point of view, they are both perceived as “foreign languages”. Thus, the findings from the present research also confirms some of the fundamental assumptions made by the CEM on one hand, and the L2 status factor model on the other. That is, the accumulative principle of language acquisition of the first model and the predominant role of the L2 in additional language learning conveyed by the second.

## Conclusions

In this thesis I set out to investigate the hypothesis that a higher level of implicit and explicit MLA, developed in a second language, is related to bilinguals' attainment in learning an additional language in a formal setting, over and above other mediating factors, including their level of bilingualism and age of acquisition of the second language. The hypothesis was propounded on the basis of experimental evidence suggesting that the positive effects of bilingualism in TLA are mainly related to metalinguistic awareness, more refined language learning strategies, and a broader linguistic repertoire, already including (at least) two other systems.

The findings were that, with age of acquisition and level of proficiency in German L2 held constant, participants' performance on the artificial language task was positively related with their level of explicit MLA in the L2. Instead, as far as the implicit level of MLA is concerned, no significant correlation was found with additional language learning attainment.

Moreover, from the evidence provided, it would seem that the number of languages known by the participant also represents a determining factor to succeed in TLA. This finding also accounts for the aforementioned results indicating that explicit MLA is the most important factor that boosts performance in subsequent languages for two considerable reasons. First, it proves that MLA develops in proportion with the number of languages mastered by the speakers. Most importantly, it confirms a crucial aspect of the study, addressed in the hypothesis. That is to say, it is neither the level of bilingualism nor the linguistic knowledge of the specific languages mastered by bilingual speakers to play the most important role in TLA. It is rather the level of the MLA, seen as the analytic ability to think about the language as an abstract object, made of different sub-levels, which can be manipulated and analysed.

Indeed, the fact that when the major independent variable, i.e. MLA in L2, was separated experimentally in implicit and explicit MLA, only explicit

MLA significantly affected performance in L3 on behalf of bilinguals, indicates that objectification of languages is a necessary prerequisite. Specifically, it is required for learners to focus on grammatical form, and for analysis, i.e. the ability to break down languages into its constituent parts. Once learners have begun to develop MLA, it is then transferable in their other languages. Therefore, studying multiple languages in a formal setting seems necessary to develop MLA so that learners are able to focus on form in their other languages. This seems to be due to the more experience gained as learners of multiple languages that allow them to develop an increased amount of grammatical structures, a richer lexicon, semantic scope, a wider range of contexts of use etc., which, importantly, does not refer to a single, specific language but rather to the linguistic system as a whole, in a broader sense. In addition, it has been argued that the experience itself improves performance because the more individuals have expanded cognitive efforts on learning languages and developing MLA, the better they are able to cope with further demands.

### **Implications**

The findings of the present Ph.D. study, regarding the relationship between previous formal language experience, implicit and explicit MLA and performance in subsequent language learning, have implications from a theoretical point of view and for teaching methodologies.

As regards the theoretical implications, the results of this thesis suggest that the higher level of MLA developed in an L2 is not necessarily the result of more years of formal instruction received, despite the highly significant correlation between explicit knowledge of the language and performance in TLA. Indeed, differently from what one may expect, the correlation may be due to the method of instruction instead. Accordingly, in future research, the method of instruction must be a fundamental variable to take into account, to probe the aforementioned theory. Specifically, it seems that a type of learning with a focus on form improves

the development of MLA as an abstract analytical competence which, in turn, assists in learning subsequent languages.

Moreover, the fact that MLA represents the strongest predictor for language learning attainment, over and above age of acquisition of the L2 and level of proficiency of L2 further confirms that it is not the linguistic knowledge developed in a specific language but, again, it is the MLA developed as abstract thinking about language itself. Therefore, in terms of research theory, it seems necessary to consider more carefully the variable “overall proficiency” since, as Bialystok and Barac (2012) maintain, “it is the absolute level of linguistic knowledge and not the relative degree of bilingualism that is most important for the development of metalinguistic performance”.

Additionally, proficiency is made of different sub-components which play a considerable role on their own in terms of linguistic transfer. Among these latter, on one hand, it worth mentioning the pragmatic perception of language ambiguities and anomalies, indicative of implicit MLA, which is more the result of language practice and exposure to different contexts of the language. On the other, a higher overall proficiency may be indicative of linguistic knowledge, namely explicit MLA, as probed in the present study. Accordingly, it seems extremely important to separate experimentally the two subcomponents of MLA, implicit and explicit, since they have been seen to develop through different types of learning and, most importantly, to have a different impact on additional language learning.

Another major implication drawn from the current study, linked to the already discussed ones, is the importance of taking into account different levels of explicitness, that is to say, different levels of objectivation of the language. This is in line with Bialystok’s theory according to which skilled performance requires both a specialised knowledge and a set of procedures to be able to use that knowledge, i.e. analysis of representations and control of attention processes. She argues that “as

knowledge becomes more organised and structured, it becomes more explicit and can be articulated and manipulated (Bialystok, 2011: 50)". Through the continuous rebuilding of the process of analysis, knowledge is built up by the addition of new information and by the restructuring of previous information so that to make it more accessible and suitable as an object of thought. Moreover, she argues that different degrees of explicitness are required to support different activities. That is to say, thinking about the analysis of knowledge as a continuum from implicit to explicit, it can be argued that implicit MLA is a starting point whereas explicit MLA, at different degrees, is required for more complicated tasks, involving a higher cognitive effort. Thus, as demonstrated in the present thesis, different degrees of explicitness of MLA lead to a different performance in TLA. Accordingly, a methodological approach which allows to separate experimentally and correlate different levels of MLA with performance in a foreign language is required.

On the other hand, as regards the pedagogical implications of the research, considerable discussion has taken place on the basis of the different outcomes of different types of learning. Specifically, on the basis of the results provided in the present thesis, it seems necessary to develop didactic methodologies which draw learners' attention on form too, in order to develop explicit MLA.

However, as Sorace (1985) points out, if one believes that formal knowledge of a foreign language does have a positive function on MLA, the question is open as to how to exploit this potential in a lively, communicative-oriented learning situation. This requires a better comprehension of the psycholinguistic processes underlying the complex relationship between knowledge and use in language learning.

Moreover, once acknowledged that languages are interdependent in the mind of the learner and previous that and subsequent learning of languages affects each language they know, it seems advisable for



educators to develop language materials drawn upon learners' knowledge of other languages to explain and exemplify the target language.

In particular, it has been argued that studies on SLA have mainly focused on the differences between the languages. In the language learning classroom, the willingness to activate prior language knowledge has been generally ignored, although it is part of the actual process of language learning. As Jessner (1999) maintains, among teachers, it has been the exception rather than the rule to underline common features between L1, L2, and L3.

Indeed, in line with the models discussed in the present thesis, particularly the CEM and the TPM, it can be claimed that increased transfer strategies built on a language system already established seems to be facilitative. In other words, the role of previous languages must be exploited in terms of both similarities and differences. The traditional contrastive method should be complemented by a psycholinguistic approach to the interlinguistic strategies used in language learning.

In the specific case of TLA, particularly if the languages involved are typologically related, it is important to create the conditions to exploit students' prior experience as language learners, focusing not only on the commonalities among languages. Indeed, what is fundamental in this context is to recall the learning strategies and processes used with previous languages and apply them to TLA. That is to say, students must be stimulated and assisted in the process of conscious reflection and manipulation of the metalinguistic awareness developed for this latter to play a significant role in subsequent language learning.

Therefore, an alternative methodological approach, that looks at the whole linguistic repertoire of students as well as at the interactions and similarities among languages is advisable. Indeed, school curricula and teaching practices could benefit from relating the different languages so that learners can develop MLA based on knowledge and use of all the

languages involved. In this way, what is learned in one language can be reinforced in other languages. Another crucial aspect to highlight is that this approach put the learners and their whole linguistic background at the centre rather than the target languages.

### **Limitations and Further Research**

Due to the complexity of factors affecting the phenomenon under investigation, it was necessary to make choices to simplify the intricate relationship among variables, in order to make the data suitable for statistical analysis.

A second aspect concerns the considerable number of variables affecting the area of research of TLA. Indeed, among all the numerous and complex variables that could not be included in the study, it would be worth examining the order of acquisition, typological proximity, the context of use, and attrition. Additionally, on one hand, the study confirms the significant correlation between explicit MLA and performance in subsequent languages. However, it still remains to be further clarified which is the main factor boosting explicit MLA on the other hand. Indeed, the current findings suggest that it is neither due to the number of years of formal instruction received in language nor to the amount of overall proficiency reached in the L2.

Thus, for all the reasons discussed in the present thesis, further research focusing in more detail on the method of acquisition of the language involved is supposed to account for the different levels of MLA which, in turn, explain the different performance in TLA. In particular, a research design addressing all the aforementioned variable is required and a higher number of participants is needed to avoid the risk that the experiment does not reflect real-life phenomena. Indeed, in order to fully confirm or discard all the hypotheses under investigation, larger and more heterogeneous groups of participants are needed. In particular, it would be

worth dividing the group on the basis of the method of instruction received in L2 (i.e. focus on form or meaning).

Finally, to confirm the already discussed reliability of the artificial language task (Llama\_F) as a measure to assess participants' ability to learn subsequent languages, it would be worth using a natural language as an L3, controlling for level of proficiency, amount and type of exposure to the language.

To conclude, it can be argued that TLA is such a broad phenomenon influenced by all the reviewed and discussed factors, both individual and external, that the effects of bilingualism on subsequent language learning may be hidden by other potential confounding variables. These latter, such as intelligence, socio-economic status, motivation, formal exposure to the language etc. may be difficult to test at the same time, in the same experiment. Therefore, there is a need for additional studies, each focused on specific aspects, to control for the wide range of variables affecting the complex area of TLA and bilingualism.

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## **Appendices: The tests**

1. Consent Form
2. Leap-Q The Language Experience and Proficiency Questionnaire
3. Test of Explicit Metalinguistic Awareness
4. Self-Paced Reading: Experimental Items
5. Llama\_F: example of a test sentence
6. Tables of frequency data for participants' attributes and performance on all tasks



## Consent for Participation in Experiments, Data Use, and Data Storage

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<b>Study title:</b>	The Bilingual effects in Third Language Acquisition
<b>Principal Investigator:</b>	Francesca D'Angelo
<b>Researcher collecting current data:</b>	Francesca D'Angelo

**What is this document?** This document explains what kind of study we're doing, what your rights are, and what will be done with your data. If there are any special benefits or risks, they will be explained here. By filling in, signing and dating this document, you will be agreeing to participate and to let us use your data in specific ways. Please read the information below, then turn to the next page, tick all boxes that apply, and, if you are happy to proceed, sign and date where indicated at the end of the form.

**Nature of the study.** You are about to participate in a study which involves reading sentences carefully and answering questions about them. The session will take place here and you will read from the screen in front of you. Your session should last for up to 1 hour. You will be given full instructions shortly and will be able to ask any questions you may have.

**Risks and benefits.** There are no known risks to participation in this study. The only benefits to you personally are those you draw from making a contribution to our knowledge about language and its use.

**Confidentiality.** The data we collect will not be associated with your name or with any other personal details that might identify you.

**Voluntary participation and right to withdraw.** Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you withdraw from the study during or after data gathering, we will delete your data and there is no penalty or loss of benefits to which you are otherwise entitled.

**Contact information.** This research is being conducted by the above-listed researchers at the University of Edinburgh. The researchers can be contacted at 07729221793\_\_ or \_\_\_\_\_s1688875@ed.ac.uk for questions or to report a research-related problem. Contact the Linguistics & English Language Ethics committee at 0131 651 5510 or lel.ethics@ed.ac.uk if you have concerns regarding your rights as a participant in the research.

If you have any questions about what you've just read, please feel free to ask them now.

Thank you for your help! Now please complete the consent form on the next page.





Consent for Participation, Use of Data, and Data Storage

**Study title:** The Bilingual effect in TLA  
**Principal Investigator** Francesca D’Angelo  
**Researcher collecting current data:** Francesca D’Angelo

**PLEASE MARK EITHER ‘YES’ OR ‘NO’ FOR EVERY STATEMENT BELOW:**

<b><u>Consent for participation:</u></b>	<b>Ye s</b>	<b>N o</b>
I consent to having my responses recorded for the specific research project identified above. I have been given the opportunity to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>
I understand that I have the right to terminate this session at any point. My data will be deleted at that time.	<input type="checkbox"/>	<input type="checkbox"/>
<b><u>Researcher use of data:</u></b>	<b>Ye s</b>	<b>N o</b>
I agree that the data I produce may be <b>kept permanently in Edinburgh University archives</b> and used <b>for the specific research project</b> which made them.	<input type="checkbox"/>	<input type="checkbox"/>
I agree that the data I produce <b>may be used by the above-named researchers, as well as by other qualified researchers, for teaching or research purposes, and in professional presentations and publications.</b>	<input type="checkbox"/>	<input type="checkbox"/>

Name:  
Email: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
/d \_\_\_\_\_ /m \_\_\_\_\_  
/y \_\_\_\_\_

## Northwestern Bilingualism & Psycholinguistics Research Laboratory

Marian, Blumenfeld, & Kaushanskaya (2007). The Language Experience and Proficiency Questionnaire (LEAP-Q): Assessing language profiles in bilinguals and multilinguals. *Journal of Speech Language and Hearing Research*, 50 (4), 940-967.

### Language Experience and Proficiency Questionnaire (LEAP-Q)

Last Name		First Name		Today's Date	
Age		Date of Birth		Male <input type="checkbox"/>	Female <input type="checkbox"/>

**(1)** Please list all the languages you know **in order of dominance**:

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
----------	----------	----------	----------	----------

**(2)** Please list all the languages you know **in order of acquisition** (your native language first):

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
----------	----------	----------	----------	----------

**(3)** Please list what percentage of the time you are *currently* and *on average* exposed to each language.

*(Your percentages should add up to 100%):*

<b>List language here:</b>					
<b>List percentage here:</b>					

**(4)** When choosing to read a text available in all your languages, in what percentage of cases would you choose to read it in each of your languages? Assume that the original was written in another language, which is unknown to you.

*(Your percentages should add up to 100%):*

<b>List language here</b>					
<b>List percentage here:</b>					

**(5)** When choosing a language to speak with a person who is equally fluent in all your languages, what percentage of time would you choose to speak each language? Please report percent of total time.

*(Your percentages should add up to 100%):*

<b>List language here</b>					
<b>List percentage here:</b>					

**(6)** Please name the cultures with which you identify. On a scale from zero to ten, please rate the extent to which you identify with each culture. (Examples of possible cultures include US-American, Chinese, Jewish-Orthodox, etc):

<b>List cultures here</b>					
	(click here for s	(click here for s	(click here for s	(click here for s	(click here for s

**(7)** How many years of formal education do you have?  
 \_\_\_\_\_

Please check your highest education level (or the approximate US equivalent to a degree obtained in another country):

- Less than High School       Some College       Masters
- High School       College       Ph.D./M.D./J.D.
- Professional Training       Some Graduate School       Other:

**(8)** Date of immigration to the USA, if applicable  
 \_\_\_\_\_

If you have ever immigrated to another country, please provide name of country and date of immigration here.

\_\_\_\_\_

\_\_\_\_\_

**(9)** Have you ever had a vision problem , hearing impairment , language disability , or learning disability  ? (Check all applicable). If yes, please explain (including any corrections):

\_\_\_\_\_

\_\_\_\_\_

**Language:**

This is my (please select from pull-down menu) language.

All questions below refer to your knowledge of .

(1) Age when you...:

<i>began acquiring</i> :	<i>became fluent</i> in :	<i>began reading</i> in :	<i>became fluent reading</i> in :

(2) Please list the number of years and months you spent in each language environment:

	Years	Months
A country where is spoken		
A family where is spoken		
A school and/or working environment where is spoken		

**(3)** On a scale from zero to ten, please select your *level of **proficiency*** in speaking, understanding, and reading from the scroll-down menus:

Speaking	(click here for scroll-down menu)	Understanding spoken language	(click here for scroll-down menu)	Reading	(click here for scroll-down menu)
----------	-----------------------------------	-------------------------------	-----------------------------------	---------	-----------------------------------

**(4)** On a scale from zero to ten, please select how much the following factors contributed to you

learning :

Interacting with friends	(click here for pull-down menu)	Language instruction	tape	(click here for pull-down menu)
Interacting with family	(click here for pull-down menu)	Watching TV		(click here for pull-down menu)
Reading	(click here for pull-down menu)	Listening to the radio		(click here for pull-down menu)

**(5)** Please rate to what extent you are currently exposed to in the following contexts:

Interacting with friends	(click here for pull-down menu)	Listening to radio/music	(click here for pull-down menu)
Interacting with family	(click here for pull-down menu)	Reading	(click here for pull-down menu)
Watching TV	(click here for pull-down menu)	Language-lab/self-instruction	(click here for pull-down menu)

**(6)** In your perception, how much of a foreign accent do you have in ?

(click here for pull-down scale)

(7) Please rate how frequently others identify you as a non-native speaker based on your accent in :

(click here for pull-down scale)

**Language:**

This is my (please select from pull-down menu) language.

All questions below refer to your knowledge of .

(1) Age when you...:

<i>began acquiring</i> :	<i>became fluent</i> in :	<i>began reading</i> in :	<i>became fluent reading</i> in :



(2) Please list the number of years and months you spent in each language environment:

	Years	Months
A country where _____ is spoken		
A family where _____ is spoken		
A school and/or working environment where _____ is spoken		

(3) On a scale from zero to ten please select your *level of proficiency* in speaking, understanding, and reading \_\_\_\_\_ from the scroll-down menus:

Speaking	(click here for scroll-down menu)	Understanding _____ spoken language	(click here for scroll-down menu)	Reading	(click here for scroll-down menu)
----------	-----------------------------------	-------------------------------------	-----------------------------------	---------	-----------------------------------

(4) On a scale from zero to ten, please select how much the following factors contributed to you

learning \_\_\_\_\_ :

Interacting with friends	(click here for pull-down menu)	Language instruction	tape	(click here for pull-down menu)
Interacting with family	(click here for pull-down menu)	Watching TV		(click here for pull-down menu)
Reading	(click here for pull-down menu)	Listening to the radio		(click here for pull-down menu)

(5) Please rate to what extent you are currently exposed to \_\_\_\_\_ in the following contexts:

Interacting _____ with	(click here for pull-down menu)	Listening _____ to	(click here for pull-down menu)
------------------------	---------------------------------	--------------------	---------------------------------

friends		radio/music	
Interacting with family	(click here for pull-down s	Reading	(click here for pull
Watching TV	(click here for pull-down s	Language-lab/self-instruction	(click here for pull

**(6)** In your perception, how much of a foreign accent do you have in ?

(click here for pull-down scale)

**(7)** Please rate how frequently others identify you as a non-native speaker based on your accent in :

(click here for pull-down scale)

## **Test of Explicit MLA: Roehr (2008b)**

**Name:**

**Did you also receive instruction in German? Yes/No**

### **Test of Metalinguistic Knowledge**

Each of the following sentences contains an instance of unacceptable use of German. For tasks 1-12, please correct the highlighted mistake and then explain why the underlined part represents a mistake. For tasks 13-15, please explain why the given paraphrase is inappropriate.

You can give your explanation in English or German. The instances of unacceptable use of German are not necessarily typical grammar mistakes. It may be helpful to imagine that a fellow student has made these errors and that you are trying to explain to them why they cannot use an expression or structure in the way suggested.

Examples:

a) Bist du endlich fertig? Wenn du dich nicht beeilst, verpassen wir noch den Flug. Ich gehe jedenfalls schon mal unten und lade die Koffer ins Auto.

Correction: nach unten or runter Explanation: The verb ("gehen") indicates directional movement and therefore needs to be complemented by an adverb of direction.

b) Die Zeitung liegt immer noch unter das Bett. Kannst du sie bitte wegwerfen? Correction: dem. Explanation: "unter" is one of the "Wechselpräpositionen" which can be combined with either the dative or the accusative case. If it is used with a verb expressing location, it needs to be followed by the dative case (here: masculine, singular, neuter).

c) Der Chef zum Angestellten: "Diese Arbeit ist bis morgen zu erledigen." Why is the following not an acceptable paraphrase of the sentence above? Der Chef zum Angestellten: "Diese Arbeit können Sie bis morgen erledigen." Please also describe what forms or structures are used to

express the meaning of the first sentence. Explanation: The first sentence expresses obligation, while the paraphrase expresses possibility. "ist zu" + infinitive is used instead of the modal verb "müssen" as an alternative way of expressing obligation.

1. Wir möchten alle Passagiere bitten, die Sicherheitsgurte zu anlegen.

Correction:

Explanation:

2. Wohin soll der neue Schrank? Soll ich ihn hier in der Ecke stellen?

Correction:

Explanation:

3. Hast du gestern den interessanter Dokumentarfilm gesehen?

Correction:

Explanation:

4. Er öffnete die Tür und trat zu uns hinein.

Correction:

Explanation:

5. Wir haben seit fünf Jahren in Berlin gewohnt.

Correction:

Explanation:

6. Da er hat die Hälfte aller Seminare versäumt, wird Andreas die Prüfung wahrscheinlich nicht bestehen.

Correction:

Explanation:

7. Es tut mir Leid, dass ich gestern Abend nicht zu deiner Geburtstagsfeier kommen konnte, aber ich musste bis 20 Uhr im Büro bleiben. Wenn mein Kollege nicht krank gewesen ist, hätte ich keine Überstunden machen müssen, aber so blieb mir nichts anderes übrig.

Correction:

Explanation:

8. Und hier auf der linken Seite sehen Sie das Geburtshaus die berühmten Schriftstellerin Annette von Droste-Hülshoff.

Correction:

Explanation:

9. Das Jahr in Heidelberg hat mir gut gefallen. Die Stadt ist sehr schön, die Universität hat einen guten Ruf und während des Studiums dort habe ich viele neue Freunde gemacht.

Correction:

Explanation:

10. Die Preisverleihung findet am achtzehnte November statt.

Correction:

Explanation:

11. Das Wochenende im Schwarzwald war ziemlich langweilig. Wenn es nicht die ganze Zeit geregnet hätte, könnten wir wenigstens spazieren gehen. Aber wegen des schlechten Wetters saßen wir nur im Hotelzimmer.

Correction:

Explanation:

12. Ich habe leider nicht Geschwister.

Correction:

Explanation:

13. Die Mutter zum Kind: "Zuerst werden die Zähne geputzt, dann wird sich gewaschen und dann geht's ab ins Bett."

Why is the following not an acceptable paraphrase of the sentence above?

Die Mutter zum Kind: "Zuerst putze ich dir die Zähne, dann wasche ich dich und dann geht's ab ins Bett." Please also describe what forms or structures are used to express the meaning of the first sentence.

14. Tagelang beherrschten diese Bilder die Medien in Deutschland: In schlammigen Fluten versunkene Ortschaften, aufgerissene Hauswände, weinende Menschen vor den Trümmern ihrer Existenz.

Why is the following not an acceptable paraphrase of the passage above?

Tagelang beherrschten diese Bilder die Medien in Deutschland: Ortschaften drohen in schlammigen Fluten zu versinken, Hauswände könnten aufreißen, Menschen würden weinend vor den Trümmern ihrer Existenz stehen. Please also describe what forms or structures are used to express the meaning of the first sentence.

15. Dieses Auto lässt sich nicht mehr reparieren.

Why is the following not an acceptable paraphrase of the sentence above?

Dieses Auto braucht man nicht zu reparieren. Please also describe what forms or structures are used to express the meaning of the first sentence.

## Experimental Items for Self-Paced Reading Task taken from Gerth (2012)

Each Block contains 8 experimental sentences in 4 conditions and 12 filler sentences. All of the experimental sentence are object-first and all of the filler sentences are subject-first.

For the self-paced reading setup: All of the sentences are followed by a yes/no comprehension question asking for different parts of the sentence.

There are 4 different version of comprehension questions for the experimental sentences:

1. Hat NP2 etwas gemacht?
2. Hat NP1 etwas gemacht?
3. Wurde mit NP1 etwas gemacht?
4. Wurde mit NP2 etwas gemacht?

### Experimental Items

#### Block 1 - Prinz/essin, ReiterIn, SchwimmerIn, Großmutter/Großvater

- (1) *Kamera*  
Die Prinzessin aus Spanien haben die Reiter ganz spontan fotografiert.  
Haben die Reiter fotografiert?/yes  
Die Prinzessin hat plötzlich der Reiter ganz spontan fotografiert.  
Hat der Reiter fotografiert?/yes  
Den Prinzen aus Spanien haben die Reiter ganz spontan fotografiert.  
Haben die Reiter fotografiert?/yes  
Den Prinzen hat plötzlich der Reiter ganz spontan fotografiert.  
Hat der Reiter fotografiert?/yes



(2) *Taschenlampe*

Die Reiterin aus Finnland haben die Schwimmer richtig blendend beleuchtet.

Wurden die Schwimmer beleuchtet?/no

Die Reiterin hat letztens der Schwimmer richtig blendend beleuchtet.

Wurde der Schwimmer beleuchtet?/no

Den Reiter aus Finnland haben die Schwimmer richtig blendend beleuchtet.

Wurden die Schwimmer beleuchtet?/no

Den Reiter hat letztens der Schwimmer richtig blendend beleuchtet.

Wurde der Schwimmer beleuchtet?/no

(3) *Bürste*

Die Schwimmerin aus Island haben die Großväter einfach liebevoll gebürstet.

Wurde die Schwimmerin gebürstet?/yes

Die Schwimmerin hat gerade der Großvater einfach liebevoll gebürstet.

Wurde die Schwimmerin gebürstet?/yes

Den Schwimmer aus Island haben die Großväter einfach liebevoll gebürstet.

Wurde der Schwimmer gebürstet?/yes

Den Schwimmer hat gerade der Großvater einfach liebevoll gebürstet.

Wurde der Schwimmer gebürstet?/yes

(4) *Megafon*

Die Großmutter aus Berlin haben die Prinzen enorm schallend gerufen.

Hat die Großmutter gerufen?/no

Die Großmutter hat heute der Prinz enorm schallend gerufen.

Hat die Großmutter gerufen?/no

Den Großvater aus Berlin haben die Prinzen enorm schallend gerufen.

Hat der Großvater gerufen?/no

Den Großvater hat heute der Prinz enorm schallend gerufen.

Hat der Großvater gerufen?/no

(5) *Föhn*

Die Prinzessin aus Spanien haben die Schwimmer total aufmerksam geföhnt.

Wurde die Prinzessin geföhnt?/yes

Die Prinzessin hat einst der Schwimmer total aufmerksam

geföhnt.

Wurde die Prinzessin geföhnt?/yes

Den Prinzen aus Spanien haben die Schwimmer total aufmerksam geföhnt.

Wurde der Prinz geföhnt?/yes

Den Prinzen hat der einst Schwimmer total aufmerksam geföhnt.

Wurde die Prinz geföhnt?/yes

(6) *Handschellen*

Die Reiterin aus Finnland haben die Großväter ziemlich schnell festgenommen.

Hat die Reiterin jemanden festgenommen?/no

Die Reiterin hat gestern der Großvater ziemlich schnell festgenommen.

Hat die Reiterin jemanden festgenommen?/no

Den Reiter aus Finnland haben die Großväter ziemlich schnell festgenommen.

Hat der Reiter jemanden festgenommen?/no

Den Reiter hat gestern der Großvater ziemlich schnell festgenommen.

Hat der Reiter jemanden festgenommen?/no

(7) *Blumen*

Die Schwimmerin aus Island haben die Prinzen sehr großzügig beschenkt.

Haben die Prinzen jemanden beschenkt?/yes

Die Schwimmerin hat gerade der Prinz sehr großzügig beschen

Hat der Prinz jemanden beschenkt?/yes

Den Schwimmer aus Island haben die Prinzen sehr großzügig beschenkt.

Haben die Prinzen jemanden beschenkt?/yes

Den Schwimmer hat gerade der Prinz sehr großzügig beschenkt.

Hat der Prinz jemanden beschenkt?/yes

(8) *Ball*

Die Großmutter aus Berlin haben die Reiter einfach furchtlos beworfen.

Wurden die Reiter beworfen?/no

Die Großmutter hat vorhin der Reiter einfach furchtlos beworfen.

Wurde der Reiter beworfen?/no

Den Großvater aus Berlin haben die Reiter einfach furchtlos beworfen.

Wurden die Reiter beworfen?/no

Den Großvater hat vorhin der Reiter einfach furchtlos beworfen.

Wurde der Reiter beworfen?/no

## **Block 2 - Pirat/Piratenbraut, PolizistIn, Ärztin/Arzt, FußballerIn**

(9) *no instrument*

Die Piratenbraut aus der Karibik haben die Polizisten total rücksichtslos geschubst.

Hat die Piratenbraut jemanden geschubst?/no

Die Piratenbraut hat damals der Polizist total rücksichtslos geschubst.

Hat die Piratenbraut jemanden geschubst?/no

Den Piraten aus der Karibik haben die Polizisten total rücksichtslos geschubst.

Hat der Pirat jemanden geschubst?/no

Den Piraten hat damals der Polizist total rücksichtslos geschubst.

Hat der Pirat jemanden geschubst?/no

- (10) *Wagen*  
Die Polizistin aus Hamburg haben die Ärzte ziemlich  
schwungvoll geschoben.

Wurde die Polizistin geschoben?/yes

Die Polizistin hat einmal der Arzt ziemlich schwungvoll  
geschoben.

Wurde die Polizistin geschoben?/yes

Den Polizisten aus Hamburg haben die  
geschoben. Ärzte ziemlich schwungvoll

Wurde der Polizist geschoben?/yes

Den Polizisten hat einmal der Arzt ziemlich schwungvoll  
geschoben.

Wurde der Polizist geschoben?/yes

- (11) *Handtuch*  
Die Ärztin aus Hannover haben die Fußballer sehr  
gründlich abgetrocknet.

Wurden die Fußballer abgetrocknet?/no

Die Ärztin hat wieder der Fußballer sehr gründlich  
abgetrocknet.

Wurde der Fußballer abgetrocknet?/no

Den Arzt aus Hannover haben die Fußballer sehr gründlich  
abgetrocknet

Wurden die Fußballer abgetrocknet?/no

Den Arzt hat wieder der Fußballer sehr gründlich abgetrocknet.

Wurde der Fußballer abgetrocknet?/no

(12) *Arztkoffer, Stethoskop*

Die Fußballerin aus England haben die Piraten richtig mitfühlend ver- arztet.

Haben die Piraten jemanden verarztet?/yes

Die Fußballerin hat einmal der Pirat richtig mitfühlend verarztet.

Hat der Pirat jemanden verarztet?/yes

Den Fußballer aus England haben die Piraten richtig mitfühlend ver- arztet

Haben die Piraten jemanden verarztet?/yes

Den Fußballer hat einmal der Pirat richtig mitfühlend verarztet.

Hat der Pirat jemanden verarztet?/yes

(13) *Kamera*

Die Piratenbraut aus der Karibik haben die Ärzte recht spontan fo- tographiert.

Wurden die Ärzte fotografiert?/no

Die Piratenbraut hat letztens der Arzt recht spontan fotografiert.

Wurde der Arzt fotografiert?/no

Den Piraten aus der Karibik haben die Ärzte recht spontan fotografiert.

Wurden die Ärzte fotografiert?/no

Den Piraten hat letztens der Arzt recht spontan fotografiert.

Wurde der Arzt fotografiert?/no

(14) *Taschenlampe*

Die Polizistin aus Hamburg haben die Fußballer einfach blendend beleuchtet.

Haben die Fußballer jemanden beleuchtet?/yes

Die Polizistin hat gerade der Fußballer einfach blendend beleuchtet.

Hat der Fußballer jemanden beleuchtet?/yes

Den Polizisten aus Hamburg haben die Fußballer einfach blendend beleuchtet.

Haben die Fußballer jemanden beleuchtet?/yes

Den Polizisten hat gerade der Fußballer einfach blendend beleuchtet.

Hat der Fußballer jemanden beleuchtet?/yes

(15) *Bürste*

Die Ärztin aus Hannover haben die Piraten ziemlich liebevoll gebürstet.

Hat die Ärztin jemanden gebürstet?/no

Die Ärztin hat heute der Pirat ziemlich liebevoll gebürstet.

Hat die Ärztin jemanden gebürstet?/no

Den Arzt aus Hannover haben die Piraten ziemlich liebevoll gebürstet.

Hat der Arzt jemanden gebürstet?/no

Den Arzt hat heute der Pirat ziemlich liebevoll gebürstet.

Hat der Arzt jemanden gebürstet?/no

(16) *Megafon*

Die Fußballerin aus England haben die  
Polizisten laut schallend gerufen.

Wurde die Fußballerin gerufen?/yes

Die Fußballerin hat einst der Polizist laut schallend  
gerufen.

Wurde die Fußballerin gerufen?/yes

Den Fußballer aus England haben die  
Polizisten laut schallend gerufen.

Wurde der Fußballer gerufen?/yes

Den Fußballer hat einst der Polizist laut schallend  
gerufen.

Wurde der Fußballer gerufen?/yes

### **Block 3 - IndianerIn, Köchin/Koch, Braut/Bräutigam, Feuerwehrfrau/mann**

(17) *Föhn*

Die Indianerin aus Nordamerika haben die  
Köche ganz aufmerksam geföhnt.

Haben die Köche jemanden geföhnt?/yes

Die Indianerin hat gestern der Koch ganz aufmerksam  
geföhnt.

Hat der Koch jemanden geföhnt?/yes

Den Indianer aus Nordamerika haben die Köche ganz  
aufmerksam geföhnt.

Haben die Köche jemanden geföhnt?/yes

Den Indianer hat gestern der Koch ganz aufmerksam  
geföhnt.

Hat der Koch jemanden geföhnt?/yes



(18) *Handschellen*

Die Köchin aus München haben die Bräutigame ziemlich schnell festgenommen.

Wurden die Bräutigame festgenommen?/no

Die Köchin hat gerade der Bräutigam ziemlich schnell festgenommen.

Wurde der Bräutigam festgenommen?/no

Den Koch aus München haben die Bräutigame ziemlich schnell festgenommen.

Wurden die Bräutigame festgenommen?/no

Den Koch hat gerade der Bräutigam ziemlich schnell festgenommen.

Wurde der Bräutigam festgenommen?/no

(19) *Blumen*

Die Braut aus Russland haben die Feuerwehrmänner sehr großzügig beschenkt.

Wurde die Braut beschenkt?/yes

Die Braut hat vorhin der Feuerwehrmann sehr großzügig beschenkt.

Wurde die Braut beschenkt?/yes

Den Bräutigam aus Russland haben die Feuerwehrmänner sehr großzügig beschenkt.

Wurde der Bräutigam beschenkt?/yes

Den Bräutigam hat vorhin der Feuerwehrmann sehr großzügig beschenkt.

Wurde der Bräutigam beschenkt?/yes

(20) *Ball*

Die Feuerwehrfrau aus Dortmund haben die Indianer ziemlich furchtlos beworfen.

Hat die Feuerwehrfrau jemanden beworfen?/no

Die Feuerwehrfrau hat damals der Indianer ziemlich furchtlos beworfen.

Hat die Feuerwehrfrau jemanden beworfen?/no

Den Feuerwehrmann aus Dortmund haben die Indianer ziemlich furchtlos beworfen.

Hat der Feuerwehrmann jemanden beworfen?/no

Den Feuerwehrmann hat damals der Indianer ziemlich furchtlos beworfen.

Hat der Feuerwehrmann jemanden beworfen?/no

(21) *no instrument*

Die Indianerin aus Nordamerika haben die Bräutigame enorm rücksichtslos geschubst.

Wurde die Indianerin geschubst?/yes

Die Indianerin hat einmal der Bräutigam enorm rücksichtslos geschubst.

Wurde die Indianerin geschubst?/yes

Den Indianer aus Nordamerika haben die Bräutigame enorm rücksichtslos geschubst.

Wurde der Indianer geschubst?/yes

Den Indianer hat einmal der Bräutigam enorm rücksichtslos geschubst.

Wurde der Indianer geschubst?/yes

(22) *Wagen*

Die Köchin aus München haben die Feuerwehrmänner richtig schwungvoll geschoben.

Hat die Köchin jemanden geschoben?/no

Die Köchin hat wieder der Feuerwehrmann richtig  
schwungvoll geschoben.

Hat die Köchin jemanden geschoben?/no

Den Koch aus München haben die Feuerwehrmänner  
richtig schwungvoll geschoben.

Hat der Koch jemanden geschoben?/no

Den Koch hat wieder der Feuerwehrmann richtig  
schwungvoll geschoben.

Hat der Koch jemanden geschoben?/no

(23) *Handtuch*

Die Braut aus Russland haben die Indianer  
sehr gründlich abgetrocknet.

Haben die Indianer jemanden abgetrocknet?/yes

Die Braut hat einmal der Indianer sehr gründlich  
abgetrocknet.

Hat der Indianer jemanden abgetrocknet?/yes

Den Bräutigam aus Russland haben die Indianer  
sehr gründlich abgetrocknet.

Haben die Indianer jemanden abgetrocknet?/yes

Den Bräutigam hat einmal der Indianer sehr gründlich  
abgetrocknet

Hat der Indianer jemanden abgetrocknet?/yes

(24) *Arztkoffer, Stethoskop*

Die Feuerwehrfrau aus Dortmund haben die Köche sehr mitfühlend verarztet.

Wurden die Köche verarztet?/no

Die Feuerwehrfrau hat plötzlich der Koch sehr mitfühlend verarztet.

Wurde der Koch verarztet?/no

Den Feuerwehrmann aus Dortmund haben die Köche sehr mitfühlend verarztet.

Wurden die Köche verarztet?/no

Den Feuerwehrmann hat plötzlich der Koch sehr mitfühlend verarztet.

Wurde der Koch verarztet?/no

## Fillers

There are 48 fillers (16 per block), 24 starting with a female noun phrase (12 singular, 12 plural). 12 start with a temporal adverb to introduce variance, 12 fillers have a lengthened first NP, 12 fillers have a lengthened second NP, some fillers include a dative object, some fillers contain prepositional phrases.

### Block 1 - Prinz/essin, ReiterIn, SchwimmerIn,

#### Großmutter/Großvater female/singular

(1) Die Prinzessin hat spontan dem Großvater aus Bremen einen Teddy gegeben.

#### Haben mehrere Prinzessinnen

etwas gegeben?/no

(2) Die Reiterin aus Sibirien hat den Prinzen auf dem Wagen schwungvoll gezogen.

#### Wurde der Prinz

gezogen?/yes

(3) Die Schwimmerin hat gerade mit den Reitern laut Fußball gespielt.

(4) Gestern hat die Großmutter das Handtuch vom Schwimmer angenommen.

#### femal

#### e/plur

#### al

(5) Die Prinzessinnen haben dem Reiter plötzlich einfach den Hut gestohlen.

#### Wurden mehrere Reiter

bestohlen?/no

(6) Die Reiterinnen haben das Schild des Indianers besonders hoch gehalten.

#### Haben mehrere Reiterinnen etwas

gehalten?/yes

(7) Vorhin haben die Schwimmerinnen entspannt neben dem Boot gesessen.

(8) Die Großmütter aus Hamburg haben neben den Prinzen aus Indien gelegen.

male/singular

(9) Der Prinz aus England hat wieder den Kuchen der Großmutter gegessen.

Kam der Prinz aus Frankreich?/no

(10) Plötzlich hat der Reiter die Prinzessin aus Frankreich geküsst.

Wurde eine Prinzessin geküsst?/yes

(11) Der Schwimmer hat dem Reiter ganz freundlich den Hut aufgesetzt.

(12) Der Großvater hat heute die Schwimmerin ohne Absicht umgeworfen.

male/plural

al

(13) Heute haben die Prinzen auf der Blumenwiese ganz verträumt getanzt.

Haben die Prinzen gelesen?/no

(14) Die Reiter haben die Tasche des Schwimmers aus Berlin hilfsbereit getragen.

Wurde dem Schwimmer etwas getragen?/yes

(15) Die Schwimmer aus Polen haben vorhin der Großmutter liebevoll gewunken.

(16) Die Großväter haben dem Reiter freundschaftlich die Hand gegeben.

Block 2 - Pirat/Piratenbraut, PolizistIn, Ärztin/Arzt,

FußballerIn female/singular

(17) Die Piratenbraut aus Stuttgart hat die Blumen der Fußballerin gegessen.

Hat die Piratenbraut Blumen gegessen?/yes

(18) Die Polizistin hat den Ball schnell vor dem Piraten aus der Karibik versteckt.

Hat der Pirat etwas versteckt?/no

(19) Die Ärztin hat gestern die Katze der Polizistin liebevoll gestreichelt.

(20) Letztens hat die Fußballerin schnell aus dem Becher des Piraten getrunken.

female/plural

(21) Die Piratenbräute aus Indonesien haben mit dem Arzt den Boden gefegt.

Haben mehrere Ärzte gefegt?/no

(22) Die Polizistinnen haben vorhin mit dem Fußballer aus England ein Loch gegraben.

Kam der Fußballer aus Hannover?/no

(23) Einmal haben die Ärztinnen für die Prinzessin netterweise Blumen gepflückt.

(24) Die Fußballerinnen haben letztens dem Piraten schnell den Koffer gegeben.

male/singular

(25) Der Pirat hat einmal die Polizistin schwungvoll auf dem Wagen gezogen.

(26) Gestern hat der Polizist der Ärztin hilfsbereit den Teddy gegeben.

(27) Der Arzt aus Bochum hat mit dem Fußballer aus Ungarn gespielt.

Hat ein Arzt gespielt?/yes

(28) Der Fußballer hat gestern den Hut der Piraten dankbar angenommen.

Hat der Fußballer etwas

angenommen?/yes male/plural

(29) Vorhin haben die Piraten einfach das Handtuch des Polizisten gestohlen.

(30) Die Polizisten haben gerade das Schild des Piraten besonders hoch gehalten.

(31) Die Ärzte haben letztens friedlich neben den Fußballern aus Irland gesessen.

Haben mehrere Ärzte gesessen?/yes

(32) Die Fußballer aus Paris haben das Baby ganz vorsichtig auf den Boden gelegt.

Haben die Fußballer das Baby fallengelassen?/no

**Block 3 - IndianerIn, Köchin/Koch, Braut/Bräutigam,  
Feuerwehrfrau/mann female/singular**

(33) Die Indianerin aus Bremen hat gestern einfach den Kuchen der Braut gegessen.

(34) Die Köchin hat heute den Feuerwehrmann aus Bonn leidenschaftlich geküsst.

(35) Die Braut hat plötzlich den Helm des Feuerwehrmannes aufgesetzt.

Hat die Braut etwas aufgesetzt?/yes

(36) Gerade hat die Feuerwehrfrau aus Versehen den Koch einfach umgeworfen.

Wurde der Koch geküsst?/no

female/plural

(37) Die Indianerinnen haben ruhig neben den Köchen aus Spanien gelegen.

(38) Die Köchinnen haben hilfsbereit die Tasche des Bräutigams getragen.

(39) Einmal haben die Bräute den Indianern freundlich die Hand gegeben.

Haben die Bräute gegessen?/no

(40) Die Feuerwehrfrauen aus Bonn haben liebevoll dem Indianer gewunken.

Haben mehrere Feuerwehrfrauen

gewunken?/yes male/singular

(41) Der Indianer hat aufmerksam die Blumen des Feuerwehrmannes gegessen.

(42) Plötzlich hat der Koch einfach den Fotoapparat vor dem Bräutigam ver- steckt.

(43) Der Bräutigam aus Mannheim hat die Katze der Indianerin gestreichelt.

Hat der Bräutigam etwas getragen?/no



(44) Der Feuerwehrmann hat gerade mit der Köchin aus Hannover etwas getrunken.

Kam die Köchin aus

Hannover?/yes

male/plural

(45) Letztens haben die Indianer mit dem Bräutigam gemeinsam den Boden gefegt.

(46) Die Köche aus Leipzig haben letztens die Mütze der Feuerwehrfrau getra- gen.

(47) Die Bräutigame haben mit den Indianern aus Kanada vorhin ein Loch gegraben.

Haben Köche ein Loch gegraben?/no

(48) Die Feuerwehrmänner haben Blumen für die Köchinnen gepflückt.

Wurden Blumen gepflückt?/yes

Experimental item (example) from Llama\_F, artificial test of grammatical inference (Meara, 2005)



**Tables of frequency data for participants' attributes and performance on all tasks**

*≥ 60, < 60 years old*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<60	31	73,8	73,8	73,8
	>60	11	26,2	26,2	100,0
	Total	42	100,0	100,0	

*Gender*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	18	42,9	42,9	42,9
	1	24	57,1	57,1	100,0
	Total	42	100,0	100,0	

*English L1*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	L1 not Eng	9	21,4	21,4	21,4
	L1 Eng	33	78,6	78,6	100,0
	Total	42	100,0	100,0	

*More than 3 Languages*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<3 Lang	19	45,2	45,2	45,2
	3 or more Lang	23	54,8	54,8	100,0
	Total	42	100,0	100,0	

*German L2*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	L2 different from German	10	23,8	23,8	23,8
	L2 German	32	76,2	76,2	100,0
	Total	42	100,0	100,0	

*Early / Late Bilinguals*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	late bilinguals	30	71,4	71,4	71,4
	early bilinguals	12	28,6	28,6	100,0
	Total	42	100,0	100,0	

*Instruction received in German L2*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 3 years of instruction in German	21	50,0	50,0	50,0
	3 or more years of Instruction in German	21	50,0	50,0	100,0
	Total	42	100,0	100,0	

*Descriptive Statistics for continuous variables*

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	N	Minimum	Maximum	Mean	Std. Deviation
MLA TOT	42	2	44	26,52	11,923
Llama-F	42	0	100	53,57	30,269
Age	42	18	76	41,88	18,289
Overall Prof	42	3,66	10,00	7,5045	1,55214
Level of Instruction in G	42	0	9	4,21	2,763
Age of Acq G	42	0	26	11,83	6,998
Implicit MLA	42	0	2	1,05	,661
Valid N (listwise)	42				

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